

8590 Series Analyzers Calibration Guide

**8590 E-Series Spectrum Analyzers,
8591C Cable TV Analyzer, and
8594Q QAM Analyzer**



Agilent Technologies

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Cleaning

The instrument front and rear panels should be cleaned using a soft cloth with water or a mild soap and water mixture.

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1 **Calibrating**

This chapter identifies the performance test procedures which test the electrical performance of the analyzer. Allow the analyzer to warm up in accordance with the temperature stability specifications before performing the tests in this chapter.

None of the test procedures involve removing the cover of the analyzer.

Calibrating

Calibration

Calibration verifies that the analyzer performance is within all specifications. It is time consuming and requires extensive test equipment. Calibration consists of *all* the performance tests. For a complete listing of the performance tests, see the performance verification tests table for your specific analyzer.

Operation Verification

Operation verification only tests the most critical specifications. These tests are recommended for incoming inspection, troubleshooting, or after repair. Operation verification requires less time and equipment than the calibration. See the performance verification tests table for your analyzer.

Calibration Cycle

The performance tests in [Chapter 2](#), "[Performance Verification Tests](#)" should be used to check the analyzer against its specifications once every year. Specifications are listed in this calibration guide.

The 300 MHz frequency of the CAL OUT signal must be checked at the same time and adjusted if necessary. Refer to the "10 MHz Frequency Reference Adjustment" procedure in the assembly-level repair service guide.

When A 3335A Source Is Not Available

The 3335A Synthesizer Level Generator signal source has become obsolete because parts used in the manufacture of this instrument are no longer available from suppliers. To meet the need of our customers, this calibration guide has been revised to add new performance verification tests that do not use the 3335A Synthesizer Level Generator. This revision includes the addition of signal sources required to replace the 3335A, changes to the test equipment setup illustrations, and changes in the steps required to execute the procedures.

Since all of our customers will not need to replace their 3335A Synthesizer Level Generators immediately, the original performance tests which use the 3335A signal generator have been retained. The revisions have been incorporated in this calibration guide as [Chapter 2a](#), "[Performance Verification Tests: If 3335A Source Not Available](#)" and [Chapter 3a](#), "[Performance Test Records: If 3335A Source Not Available](#)."

Performance Verification Test Tables

The tables on the following pages list the performance tests in Chapter 2 and Chapter 2a. Select the analyzer option being calibrated and perform the tests marked in the option column.

A dot indicates that the test is required for calibration. A diamond indicates that the test is required for operation verification. Note that some of the tests are used for both calibration and operation verification.

Table 1-1 8591C Performance Verification Tests

Performance Test Name		Calibration for Instrument Option:					
		Std ^a	701	704	011	130	107
1.	10 MHz Reference Output Accuracy			•			
2.	10 MHz Precision Frequency Reference Output Accuracy	•	•		•	•	•
4.	Frequency Readout and Marker Count Accuracy	◇	◇	◇	◇	◇	◇
6.	Noise Sidebands	◇	◇	◇	◇	◇	◇
7.	System Related Sidebands	•	•	•	•	•	•
8.	Frequency Span Readout Accuracy ^b	◇	◇	◇	◇	◇	◇
8a.	Frequency Span Readout Accuracy ^c	◇	◇	◇	◇	◇	◇
10.	Residual FM	•	•	•	•	•	•
12.	Sweep Time Accuracy	•	•	•	•	•	•
13.	Scale Fidelity ^b	◇	◇	◇	◇	◇	◇
13a.	Scale Fidelity ^c	◇	◇	◇	◇	◇	◇
14.	Reference Level Accuracy ^b	◇	◇	◇	◇	◇	◇
14a.	Reference Level Accuracy ^c	◇	◇	◇	◇	◇	◇
16.	Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties	◇	◇	◇	◇	◇	◇
17.	Resolution Bandwidth Accuracy ^b	•	•	•	•	•	•
17a.	Resolution Bandwidth Accuracy ^c	•	•	•	•	•	•
18.	Calibrator Amplitude Accuracy	◇	◇	◇	◇	◇	◇
19.	Frequency Response ^b	◇	◇	◇	◇	◇	◇
19a.	Frequency Response ^c	◇	◇	◇	◇	◇	◇
24.	Other Input Related Spurious Responses	•	•	•	•	•	•
29.	Spurious Response ^{b, d}	◇	◇	◇	◇	◇	◇
29a.	Spurious Response ^{c, d}	◇	◇	◇	◇	◇	◇
34.	Gain Compression ^b	•	•	•	•	•	•

Table 1-1 8591C Performance Verification Tests (Continued)

Performance Test Name	Calibration for Instrument Option:					
	Std ^a	701	704	011	130	107
34a. Gain Compression ^c	•	•	•	•	•	•
39. Displayed Average Noise Level	◇	◇	◇	◇		◇
44. Displayed Average Noise Level for Option 130					◇	
49. Residual Responses	•	•	•	•		•
54. Residual Responses for Option 130					•	
57. Fast Time Domain Sweeps ^b	•		•			
57a. Fast Time Domain Sweeps ^c	•		•			
59. Absolute Amplitude, Vernier, and Power Sweep Accuracy				•		
62. Tracking Generator Level Flatness				•		
64. Harmonic Spurious Outputs				•		
66. Non-Harmonic Spurious Outputs				•		
68. Tracking Generator Feedthrough				•		
73. Gate Delay Accuracy and Gate Length Accuracy	•	•	•			•
74. Gate Card Insertion Loss ^b	•	•	•			•
74a. Gate Card Insertion Loss ^c	•	•	•			•
75. TV Receiver, Video Tester						•

- a. Use this column for all other options *not* listed in this table.
- b. If a 3335A source is not available, use the alternative performance test with the same number found in [Chapter 2a, “Performance Verification Tests: If 3335A Source Not Available.”](#)
- c. If a 3335A source is not available, substitute this performance test for the one with the same number found in [Chapter 2, “Performance Verification Tests.”](#)
- d. “Part 2: Third Order Intermodulation Distortion, 50 MHz” is not required for operation verification.

Table 1-2 8591E Performance Verification Tests

Performance Test Name		Calibration for Instrument Option:									
		Std ^a	001	004	010	011	101	103	105	130	107
1.	10 MHz Reference Output Accuracy	•	•		•	•	•	•	•	•	•
2.	10 MHz Precision Frequency Reference Output Accuracy			•							
4.	Frequency Readout and Marker Count Accuracy	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
6.	Noise Sidebands	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
7.	System Related Sidebands	•	•	•	•	•	•	•	•	•	•
8.	Frequency Span Readout Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
8a.	Frequency Span Readout Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
10.	Residual FM	•	•	•	•	•	•	•	•	•	•
12.	Sweep Time Accuracy	•	•	•	•	•	•	•	•	•	•
13.	Scale Fidelity ^b	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
13a.	Scale Fidelity ^c	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
14.	Reference Level Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
14a.	Reference Level Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
16.	Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
17.	Resolution Bandwidth Accuracy ^b	•	•	•	•	•	•	•	•	•	•
17a.	Resolution Bandwidth Accuracy ^c	•	•	•	•	•	•	•	•	•	•
18.	Calibrator Amplitude Accuracy	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
19.	Frequency Response ^b	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
19a.	Frequency Response ^c	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
24.	Other Input Related Spurious Responses	•	•	•	•	•	•	•	•	•	•
29.	Spurious Response ^{b, d}	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
29a.	Spurious Response ^{c, d}	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
34.	Gain Compression ^b	•	•	•	•	•	•	•	•	•	•
34a.	Gain Compression ^c	•	•	•	•	•	•	•	•	•	•
39.	Displayed Average Noise Level	◇	◇	◇	◇	◇	◇	◇	◇		◇
44.	Displayed Average Noise Level for Option 130									◇	
49.	Residual Responses	•	•	•	•	•	•	•	•		
54.	Residual Responses for Option 130									•	
57.	Fast Time Domain Sweeps ^b						•				
57a.	Fast Time Domain Sweeps ^c						•				
59.	Absolute Amplitude, Vernier, and Power Sweep Accuracy				•	•					
62.	Tracking Generator Level Flatness				•	•					

Table 1-2 8591E Performance Verification Tests (Continued)

Performance Test Name		Calibration for Instrument Option:									
		Std ^a	001	004	010	011	101	103	105	130	107
64.	Harmonic Spurious Outputs				•	•					
66.	Non-Harmonic Spurious Outputs				•	•					
68.	Tracking Generator Feedthrough				•	•					
72.	CISPR Pulse Response ^b							•			
72a.	CISPR Pulse Response ^c							•			
73.	Gate Delay Accuracy and Gate Length Accuracy								•		
74.	Gate Card Insertion Loss ^b								•		
74a.	Gate Card Insertion Loss ^c								•		
75.	TV Receiver, Video Tester										◇

- Use this column for all other options *not* listed in this table.
- If a 3335A source is not available, use the alternative performance test with the same number found in [Chapter 2a, “Performance Verification Tests: If 3335A Source Not Available.”](#)
- If a 3335A source is not available, substitute this performance test for the one with the same number found in [Chapter 2, “Performance Verification Tests.”](#)
- “Part 2: Third Order Intermodulation Distortion, 50 MHz” is not required for operation verification.

Table 1-3 8593E Performance Verification Tests

Performance Verification Test Name		Calibration for Instrument Option:									
		Std ^a	004	010	026	027	101	103	105	130	107
1.	10 MHz Reference Output Accuracy	•		•	•	•	•	•	•	•	•
2.	10 MHz Precision Frequency Reference Output Accuracy		•								
3.	Comb Generator Frequency Accuracy	•	•	•	•	•	•	•	•	•	•
5.	Frequency Readout and Marker Count Accuracy	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
6.	Noise Sidebands	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
7.	System Related Sidebands	•	•	•	•	•	•	•	•	•	•
9.	Frequency Span Readout Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
9a.	Frequency Span Readout Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
11.	Residual FM	•	•	•	•	•	•	•	•	•	•
12.	Sweep Time Accuracy	•	•	•	•	•	•	•	•	•	•
13.	Scale Fidelity ^b	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
13a.	Scale Fidelity ^c	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
15.	Reference Level Accuracy	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
15a.	Reference Level Accuracy	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
16.	Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
17.	Resolution Bandwidth Accuracy ^b	•	•	•	•	•	•	•	•	•	•
17a.	Resolution Bandwidth Accuracy ^c	•	•	•	•	•	•	•	•	•	•
18.	Calibrator Amplitude Accuracy	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
20.	Frequency Response ^b	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
20a.	Frequency Response ^c	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
25.	Other Input Related Spurious Responses	•	•	•	•	•	•	•	•	•	•
30.	Spurious Response ^d	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
35.	Gain Compression	•	•	•	•	•	•	•	•	•	•
40.	Displayed Average Noise Level	◇	◇	◇	◇	◇	◇	◇	◇		◇
45.	Displayed Average Noise Level for Option 130									◇	
50.	Residual Responses	•	•	•	•	•	•	•	•		
56.	Residual Responses for Option 130									•	
58.	Fast Time Domain Sweeps ^b						•				
58a.	Fast Time Domain Sweeps ^c						•				
60.	Absolute Amplitude Accuracy			•							
61.	Power Sweep Range			•							
63.	Tracking Generator Level Flatness			•							
65.	Harmonic Spurious Outputs			•							
67.	Non-Harmonic Spurious Outputs			•							
70.	Tracking Generator Feedthrough			•							

Table 1-3 8593E Performance Verification Tests (Continued)

Performance Verification Test Name		Calibration for Instrument Option:									
		Std ^a	004	010	026	027	101	103	105	130	107
71.	Tracking Generator LO Feedthrough Amplitude			•							
72.	CISPR Pulse Response ^b							•			
72a.	CISPR Pulse Response ^c							•			
73.	Gate Delay Accuracy and Gate Length Accuracy								•		
74.	Gate Card Insertion Loss ^b								•		
74a.	Gate Card Insertion Loss ^c								•		
75.	TV Receiver, Video Tester										◇

- a. Use this column for all other options *not* listed in this table.
- b. If a 3335A source is not available, use the alternative performance test with the same number found in [Chapter 2a, “Performance Verification Tests: If 3335A Source Not Available.”](#)
- c. If a 3335A source is not available, substitute this performance test for the one with the same number found in [Chapter 2, “Performance Verification Tests.”](#)
- d. “Third Order Intermodulation Distortion” is not required for operation verification.

Table 1-4 8594E Performance Verification Tests

Performance Verification Test Name		Calibration for Instrument Option:							
		Std ^a	004	010	101	103	105	130	107
1.	10 MHz Reference Output Accuracy	•		•	•	•	•	•	•
2.	10 MHz Precision Frequency Reference Output Accuracy		•						
4.	Frequency Readout and Marker Count Accuracy	◇	◇	◇	◇	◇	◇	◇	◇
6.	Noise Sidebands	◇	◇	◇	◇	◇	◇	◇	◇
7.	System Related Sidebands	•	•	•	•	•	•	•	•
9.	Frequency Span Readout Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇
9a.	Frequency Span Readout Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇
11.	Residual FM	•	•	•	•	•	•	•	•
12.	Sweep Time Accuracy	•	•	•	•	•	•	•	•
13.	Scale Fidelity ^b	◇	◇	◇	◇	◇	◇	◇	◇
13a.	Scale Fidelity ^c	◇	◇	◇	◇	◇	◇	◇	◇
15.	Reference Level Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇
15a.	Reference Level Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇
16.	Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties	◇	◇	◇	◇	◇	◇	◇	◇
17.	Resolution Bandwidth Accuracy ^b	•	•	•	•	•	•	•	•
17a.	Resolution Bandwidth Accuracy ^c	•	•	•	•	•	•	•	•
18.	Calibrator Amplitude Accuracy	◇	◇	◇	◇	◇	◇	◇	◇
21.	Frequency Response ^b	◇	◇	◇	◇	◇	◇	◇	◇
21a.	Frequency Response ^c	◇	◇	◇	◇	◇	◇	◇	◇
26.	Other Input Related Spurious Responses	•	•	•	•	•	•	•	•
31.	Spurious Response ^d	◇	◇	◇	◇	◇	◇	◇	◇
36.	Gain Compression	•	•	•	•	•	•	•	•
41.	Displayed Average Noise Level	◇	◇	◇	◇	◇			◇
46.	Displayed Average Noise Level for Option 130						◇		
51.	Residual Responses	•	•	•	•	•			
55.	Residual Responses for Option 130							•	
58.	Fast Time Domain Sweeps ^b				•				
58a.	Fast Time Domain Sweeps ^c				•				
60.	Absolute Amplitude Accuracy			•					
61.	Power Sweep Range			•					
63.	Tracking Generator Level Flatness			•					
65.	Harmonic Spurious Outputs			•					
67.	Non-Harmonic Spurious Outputs			•					
69.	Tracking Generator Feedthrough			•					

Table 1-4 8594E Performance Verification Tests (Continued)

Performance Verification Test Name		Calibration for Instrument Option:							
		Std ^a	004	010	101	103	105	130	107
71.	Tracking Generator LO Feedthrough Amplitude			•					
72.	CISPR Pulse Response ^b					•			
72.	CISPR Pulse Response ^c					•			
73.	Gate Delay Accuracy and Gate Length Accuracy						•		
74.	Gate Card Insertion Loss ^b						•		
74a.	Gate Card Insertion Loss ^c						•		
75.	TV Receiver, Video Tester								◇

- Use this column for all other options *not* listed in this table.
- If a 3335A source is not available, use the alternative performance test with the same number found in [Chapter 2a, “Performance Verification Tests: If 3335A Source Not Available.”](#)
- If a 3335A source is not available, substitute this performance test for the one with the same number found in [Chapter 2, “Performance Verification Tests.”](#)
- “Third Order Intermodulation Distortion” is not required for operation verification.

Table 1-5 8594Q Performance Verification Tests

Performance Verification Test Name		Calibration for Instrument Option:		
		190	195	704
1.	10 MHz Reference Output Accuracy			•
2.	10 MHz Precision Frequency Reference Output Accuracy	•	•	
4.	Frequency Readout and Marker Count Accuracy	◇	◇	◇
6.	Noise Sidebands	◇	◇	◇
7.	System Related Sidebands	•	•	
9.	Frequency Span Readout Accuracy ^a	◇	◇	
9a.	Frequency Span Readout Accuracy ^b	◇	◇	
11.	Residual FM	•	•	•
12.	Sweep Time Accuracy	•	•	•
13.	Scale Fidelity ^a	◇	◇	◇
13a.	Scale Fidelity ^b	◇	◇	◇
15.	Reference Level Accuracy ^a	◇	◇	◇
15a.	Reference Level Accuracy ^b	◇	◇	◇
16.	Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties	◇	◇	◇
17.	Resolution Bandwidth Accuracy ^a	•	•	•
17a.	Resolution Bandwidth Accuracy ^b	•	•	•
18.	Calibrator Amplitude Accuracy	◇	◇	◇
21.	Frequency Response ^a	◇	◇	◇
21a.	Frequency Response ^b	◇	◇	◇
26.	Other Input Related Spurious Responses	•	•	•
31.	Spurious Response ^c	◇	◇	◇
36.	Gain Compression	•	•	•
41.	Displayed Average Noise Level	◇	◇	◇
51.	Residual Responses	•	•	•

a. If a 3335A source is not available, use the alternative performance test with the same number found in [Chapter 2a, “Performance Verification Tests: If 3335A Source Not Available.”](#)

b. If a 3335A source is not available, substitute this performance test for the one with the same number found in [Chapter 2, “Performance Verification Tests.”](#)

c. “Third Order Intermodulation Distortion” is not required for operation verification.

Table 1-6 8595E Performance Verification Tests

Performance Verification Test Name		Calibration for Instrument Option:							
		Std ^a	004	010	101	103	105	130	107
1.	10 MHz Reference Output Accuracy	•		•	•	•	•	•	•
2.	10 MHz Precision Frequency Reference Output Accuracy		•						
5.	Frequency Readout and Marker Count Accuracy	◇	◇	◇	◇	◇	◇	◇	◇
6.	Noise Sidebands	◇	◇	◇	◇	◇	◇	◇	◇
7.	System Related Sidebands	•	•	•	•	•	•	•	•
9.	Frequency Span Readout Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇
9a.	Frequency Span Readout Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇
11.	Residual FM	•	•	•	•	•	•	•	•
12.	Sweep Time Accuracy	•	•	•	•	•	•	•	•
13.	Scale Fidelity ^b	◇	◇	◇	◇	◇	◇	◇	◇
13a.	Scale Fidelity ^c	◇	◇	◇	◇	◇	◇	◇	◇
15.	Reference Level Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇
15a.	Reference Level Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇
16.	Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties	◇	◇	◇	◇	◇	◇	◇	◇
17.	Resolution Bandwidth Accuracy ^b	•	•	•	•	•	•	•	•
17a.	Resolution Bandwidth Accuracy ^c	•	•	•	•	•	•	•	•
18.	Calibrator Amplitude Accuracy	◇	◇	◇	◇	◇	◇	◇	◇
22.	Frequency Response ^b	◇	◇	◇	◇	◇	◇	◇	◇
22a.	Frequency Response ^c	◇	◇	◇	◇	◇	◇	◇	◇
27.	Other Input Related Spurious Responses	•	•	•	•	•	•	•	•
32.	Spurious Response ^d	◇	◇	◇	◇	◇	◇	◇	◇
37.	Gain Compression	•	•	•	•	•	•	•	•
42.	Displayed Average Noise Level	◇	◇	◇	◇	◇			◇
47.	Displayed Average Noise Level for Option 130						◇		
52.	Residual Responses	•	•	•	•	•			
56.	Residual Responses for Option 130							•	
58.	Fast Time Domain Sweeps ^b				•				
58a.	Fast Time Domain Sweeps ^c				•				
60.	Absolute Amplitude Accuracy			•					
61.	Power Sweep Range			•					
63.	Tracking Generator Level Flatness			•					
65.	Harmonic Spurious Outputs			•					
67.	Non-Harmonic Spurious Outputs			•					
70.	Tracking Generator Feedthrough			•					

Table 1-6 8595E Performance Verification Tests (Continued)

Performance Verification Test Name		Calibration for Instrument Option:						
		Std ^a	004	010	101	103	105	130
71.	Tracking Generator LO Feedthrough Amplitude			•				
72.	CISPR Pulse Response ^b					•		
72.	CISPR Pulse Response ^c					•		
73.	Gate Delay Accuracy and Gate Length Accuracy						•	
74.	Gate Card Insertion Loss ^b						•	
74.	Gate Card Insertion Loss ^c						•	
75.	TV Receiver, Video Tester							◇

- Use this column for all other options *not* listed in this table.
- If a 3335A source is not available, use the alternative performance test with the same number found in [Chapter 2a, “Performance Verification Tests: If 3335A Source Not Available.”](#)
- If a 3335A source is not available, substitute this performance test for the one with the same number found in [Chapter 2, “Performance Verification Tests.”](#)
- “Third Order Intermodulation Distortion” is not required for operation verification.

Table 1-7 8596E Performance Verification Tests

Performance Verification Test Name		Calibration for Instrument Option:							
		Std ^a	004	010	101	103	105	130	107
1.	10 MHz Reference Output Accuracy	•		•	•	•	•	•	•
2.	10 MHz Precision Frequency Reference Output Accuracy		•						
3.	Comb Generator Frequency Accuracy	◇	◇	◇	◇	◇	◇	◇	◇
5.	Frequency Readout and Marker Count Accuracy	◇	◇	◇	◇	◇	◇	◇	◇
6.	Noise Sidebands	◇	◇	◇	◇	◇	◇	◇	◇
7.	System Related Sidebands	•	•	•	•	•	•	•	•
9.	Frequency Span Readout Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇
9a.	Frequency Span Readout Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇
11.	Residual FM	•	•	•	•	•	•	•	•
12.	Sweep Time Accuracy	•	•	•	•	•	•	•	•
13.	Scale Fidelity ^b	◇	◇	◇	◇	◇	◇	◇	◇
13a.	Scale Fidelity ^c	◇	◇	◇	◇	◇	◇	◇	◇
15.	Reference Level Accuracy ^b	◇	◇	◇	◇	◇	◇	◇	◇
15a.	Reference Level Accuracy ^c	◇	◇	◇	◇	◇	◇	◇	◇
16.	Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties	◇	◇	◇	◇	◇	◇	◇	◇
17.	Resolution Bandwidth Accuracy ^b	•	•	•	•	•	•	•	•
17a.	Resolution Bandwidth Accuracy ^c	•	•	•	•	•	•	•	•
18.	Calibrator Amplitude Accuracy	◇	◇	◇	◇	◇	◇	◇	◇
22.	Frequency Response ^b	◇	◇	◇	◇	◇	◇	◇	◇
22a.	Frequency Response ^c	◇	◇	◇	◇	◇	◇	◇	◇
27.	Other Input Related Spurious Responses	•	•	•	•	•	•	•	•
32.	Spurious Response ^d	◇	◇	◇	◇	◇	◇	◇	◇
37.	Gain Compression	•	•	•	•	•	•	•	•
42.	Displayed Average Noise Level	◇	◇	◇	◇	◇			◇
47.	Displayed Average Noise Level for Option 130						◇		
52.	Residual Responses	•	•	•	•	•			
56.	Residual Responses for Option 130							•	
58.	Fast Time Domain Sweeps ^b				•				
58a.	Fast Time Domain Sweeps ^c				•				
60.	Absolute Amplitude Accuracy			•					
61.	Power Sweep Range			•					
63.	Tracking Generator Level Flatness			•					
65.	Harmonic Spurious Outputs			•					
67.	Non-Harmonic Spurious Outputs			•					
70.	Tracking Generator Feedthrough			•					

Table 1-7 8596E Performance Verification Tests (Continued)

Performance Verification Test Name		Calibration for Instrument Option:						
		Std ^a	004	010	101	103	105	130
71.	Tracking Generator LO Feedthrough Amplitude			•				
72.	CISPR Pulse Response ^b					•		
72a.	CISPR Pulse Response ^c					•		
73.	Gate Delay Accuracy and Gate Length Accuracy						•	
74.	Gate Card Insertion Loss ^b						•	
74a.	Gate Card Insertion Loss ^c						•	
75.	TV Receiver, Video Tester							◇

- Use this column for all other options *not* listed in this table.
- If a 3335A source is not available, use the alternative performance test with the same number found in [Chapter 2a, “Performance Verification Tests: If 3335A Source Not Available.”](#)
- If a 3335A source is not available, substitute this performance test for the one with the same number found in [Chapter 2, “Performance Verification Tests.”](#)
- “Third Order Intermodulation Distortion” is not required for operation verification.

Safety

Familiarize yourself with the safety symbols marked on the analyzer, and read the general safety instructions and the symbol definitions given in [Chapter 12](#) , “[Safety and Regulatory Information](#),” *before* you begin verifying performance of the spectrum analyzer.

Before You Start

There are four things you should do before starting a performance verification test:

- Switch the analyzer on and let it warm up in accordance with the temperature stability specification.
 - Read “Making a Measurement” in your analyzer user's guide.
 - After the analyzer has warmed up as specified, perform the self-calibration procedure documented in “Improving Accuracy With Self-Calibration Routines” in the *8590 E-Series and L-Series Spectrum Analyzer User's Guide*, *8591C Cable TV Analyzer, Spectrum Analyzer Reference User's Guide*, or *8594Q QAM Analyzer Spectrum Analyzer Reference User's Guide*. The performance of the analyzer is only specified after the analyzer calibration routines have been run and if the analyzer is autocoupled.
 - Read the rest of this section before you start any of the tests, and make a copy of the Performance Verification Test Record described below in “Recording the test results.”
-

Test Equipment You Will Need

[Table 1-8](#) through [Table 1-11](#) list the recommended test equipment for the performance tests. The tables also list recommended equipment for the analyzer adjustment procedures which are located in the *8590 Series Analyzers Assembly-Level Repair Service Guide*. Any equipment that meets the critical specifications given in the table can be substituted for the recommended model.

If a 3335A Synthesizer/Level Generator is not available, see [Table 1-8](#) through [Table 1-10](#) for alternative recommended test equipment, accessories, and adapters.

Recording the Test Results

Performance verification test records, for each spectrum analyzer, are provided in [Chapter 3](#) , "Performance Test Records" and [Chapter 3a](#), "Performance Test Records: If 3335A Source Not Available" following the tests.

Each test result is identified as a *TR Entry* in the performance test and on the performance verification test record. We recommend that you make a copy of the performance verification test record, record the test results on the copy, and keep the copy for your calibration test record. This record could prove valuable in tracking gradual changes in test results over long periods of time.

Frequency and Amplitude Self-Calibration

Perform the frequency and amplitude self-calibration routines at least once per day, or if the analyzer fails a verification test. To perform self-calibration, press **CAL** then **CAL FREQ & AMPTD**. The instrument must be up to operating temperature in order for this test to be valid. Press **CAL STORE** when the test is complete. If the analyzer continuously fails one or more specifications, complete any remaining tests and record all test results on a copy of the test record. Then refer to Chapter 1 for instructions on how to solve the problem.

Periodically Verifying Operation

The analyzer requires periodic verification of operation. Under most conditions of use, you should test the analyzer at least once a year with either operation verification or the complete set of performance verification tests.

Table 1-8 Recommended Test Equipment

Equipment	Critical Specifications for Equipment Substitution	Recommended Model	Use ^a
Digital Voltmeter	Input Resistance: $\geq 10 \text{ M}\Omega$ Accuracy: $\pm 10 \text{ mV}$ on 100 V range	3456A	P,A,T
DVM Test Leads	For use with 3456A	34118B	A,T
Frequency Counter ^b	Frequency: 10 MHz Resolution: $\pm 0.002 \text{ Hz}$ External Timebase	5334A/B	P,A,T
Frequency Standard	Frequency: 10 MHz Timebase Accuracy (Aging): $< 1 \times 10^{-9}/\text{day}$	5061B	P,A
Measuring Receiver	Compatible with Power Sensors dB Relative Mode Resolution: 0.01 dB Reference Accuracy: $\pm 1.2\%$	8902A	P,A,T
Microwave Frequency Counter	Frequency Range: 9 MHz to 7 GHz Timebase Accuracy (Aging): $< 5 \times 10^{-10}/\text{day}$	5343A	P,A,T
Oscilloscope	Bandwidth: dc to 100 MHz Vertical Scale Factor of 0.5 V to 5 V/Div	54501A	T
Power Meter	Power Range: Calibrated in dBm and dB relative to reference power -70 dBm to $+44 \text{ dBm}$, sensor dependent	436A	P,A,T
Power Sensor	Frequency Range: 100 kHz to 1800 MHz Maximum SWR: 1.60 (100 kHz to 300 kHz) 1.20 (300 kHz to 1 MHz) 1.1 (1 MHz to 2.0 GHz) 1.30 (2.0 to 2.9 GHz)	8482A	P,A,T
Power Sensor ^c	Frequency Range: 1 MHz to 2 GHz Maximum SWR: 1.18 (600 kHz to 2.0 GHz) 75 Ω	8483A	P,A,T
Power Sensor, Low Power	Frequency Range: 300 MHz Amplitude Range: -20 dBm to -70 dBm Maximum SWR: 1.1 (300 MHz)	8484A	P,A,T
Power Sensor ^d	Frequency Range: 50 MHz to 26.5 GHz Maximum SWR: 1.10 (300 MHz) 1.15 (50 MHz to 100 MHz) 1.10 (100 MHz to 2.0 GHz) 1.15 (2.0 GHz to 12.4 GHz) 1.20 (12.4 GHz to 18.0 GHz) 1.25 (18.0 GHz to 26.5 GHz)	8485A	P,A,T

Table 1-8 Recommended Test Equipment (Continued)

Equipment	Critical Specifications for Equipment Substitution	Recommended Model	Use ^a
Pulse Generator ^e	Period Range: 1 ms to 980 ms $\pm 2\%$, single pulse mode Level -2 V to $+2$ V Transition Time: 6 ns $\pm 10\%$, ± 1 ns Pulse Width: 150 ns to 3 μ s $\pm 1\%$ ± 1 ns	8161A	P,T
Pulse Generator	Frequency: 100 Hz Duty Cycle: 50% Output: TTL	8116A	P,T
Quasi-Peak Detector Driver	Down-Loadable Program (DLP)	11946-10001	P,A,T
Signal Generator	Frequency Range: 1 MHz to 1000 MHz Amplitude Range: -35 to $+16$ dBm SSB Noise: < -120 dBc/Hz at 20 kHz offset	8640B Option 002 or 8642A	P,A,T
Spectrum Analyzer, Microwave	Frequency Range: 100 kHz to 7 GHz Relative Amplitude Accuracy: 100 kHz to 1.8 GHz: $< \pm 1.8$ dB Frequency Accuracy: $< \pm 10$ kHz @ 7 GHz	8566A/B	P,A,T
Synthesized Sweeper ^f	Frequency Range: 10 MHz to 22 GHz Frequency Accuracy (CW): $\pm 0.02\%$ Leveling Modes: Internal and External Modulation Modes: AM Power Level Range: -35 to $+16$ dBm	8340A/B or 83630A	P,A,T
Synthesizer/Function Generator	Frequency Range: 0.1 Hz to 500 Hz Frequency Accuracy: $\pm 0.02\%$ Waveform: Triangle	3325B	P,T
Synthesizer/Level Generator ^g	Frequency Range: 1 kHz to 80 MHz Amplitude Range: $+12$ to -85 dBm Flatness: ± 0.15 dB Attenuator Accuracy: ± 0.09 dB	3335A	P,A,T
Universal Counter ^h	Time Interval Range: 25 ms to 100 ms Single Operation Range: $+2.5$ Vdc to -2.5 Vdc	5316B	P,T

Table 1-8 Recommended Test Equipment (Continued)

Equipment	Critical Specifications for Equipment Substitution	Recommended Model	Use ^a
Base Band Signal Source ⁱ	Capable of providing the following VIT signals: FCC composite NTC7 composite or CCIR 17 and CCIR 330	Magni Signal Creator	P,T
Video Modulator	Differential Gain: <2% Differential Phase: <0.5°	8780A, Scientific Atlanta 6350 or 6351 with Option FAOC	P,T
When a 3335A source is not available:			
Synthesized Signal Generator	Frequency Range: 100 kHz to 2560 MHz	8663A	P

- a. P = Performance Test, A = Adjustment, T = Troubleshooting
- b. Precision Frequency Reference only
- c. 8591E and 8591C only
- d. Not for 8591E or 8591C
- e. For Option 103 or 8591C
- f. For 8591E, 8591C, 8593E Option 026 or Option 027, 8594E, 8594Q, 8595E, and 8596E
- g. If a 3335A source is not available, substitute an 8663A signal generator.
- h. For Option 105 and 8591C
- i. For Option 107

Table 1-9 Recommended Accessories

Equipment	Critical Specifications for Accessory Substitution	Recommended Model	Use ^a
Active Probe ^b	5 Hz to 500 MHz	41800A	T
Active Probe	300 kHz to 3 GHz	85024A	T
Attenuator, 3 dB ^c	Type N (m to f) Attenuation: 3 dB Frequency: dc to 12.4 GHz	8491A Option 003	P
Attenuator, 10 dB	Type N (m to f) Frequency: 300 MHz	8491A Option 010	P,A,T
Attenuator, 20 dB ^d	Type N (m to f) Attenuation: 20 dB Frequency: dc to 12.4 GHz	8491A Option 020	A
Attenuator, 1 dB Step	Attenuation Range: 0 to 12 dB Frequency Range: 50 MHz Connectors: BNC female	355C	P,A
Attenuator, 10 dB Step	Attenuation Range: 0 to 30 dB Frequency Range: 50 MHz Connectors: BNC female	355D	P,A
Coupler, 9 dB ^e	Coupling: Nominal 9 dB Insertion Loss: 2 dB	0955-0704	P,T
Digital Current Tracer	Sensitivity: 1 mA to 500 mA Frequency Response: Pulse trains to 10 MHz Minimum Pulse Width: 50 ns Pulse Rise Time: <200 ns	547A	T
Directional Bridge	Frequency Range: 0.1 to 110 MHz Directivity: >40 dB Maximum VSWR: 1.1:1 Transmission Arm Loss: 6 dB (nominal) Coupling Arm Loss: 6 dB (nominal)	8721A	P,T
Logic Pulser	TTL voltage and current drive levels	546A	T
Logic Clip	TTL voltage and current drive levels	548A	T
Directional Coupler	Frequency Range: 1.7 GHz to 8 GHz Coupling: 16 dB (nominal) Max. Coupling Deviation: ± 1 dB Directivity: 14 dB minimum Flatness: 0.75 dB maximum VSWR: <1.45 Insertion Loss: <1.3 dB	0955-0125	P,T
Low Pass Filter,	Cutoff Frequency: 4.4 GHz Rejection at 5.5 GHz: >40 dB	11689A	P,A

Table 1-9 Recommended Accessories (Continued)

Equipment	Critical Specifications for Accessory Substitution	Recommended Model	Use ^a
Low Pass Filter, 50 MHz	Cutoff Frequency: 50 MHz Rejection at 80 MHz: >50 dB	0955-0306	P,T
Low Pass Filter, 300 MHz	Cutoff Frequency: 300 MHz Bandpass Insertion Loss: <0.9 dB at 300 MHz Stopband Insertion Loss: >40 dB at 435 MHz	0955-0455	P,A,T
Modulator Teletech SC35B	Frequency 50 MHz ON/OFF RATIO >70 dB Switching Speed 2 ns Insertion Loss: 5 dB	0955-0533	P,T
Power Splitter ^f	Frequency Range: 50 kHz to 1.8 GHz Insertion Loss: 6 dB (nominal) Output Tracking: <0.25 dB Equivalent Output SWR: <1.22:1	11667A	P,A
Power Splitter ^g	Frequency Range: 50 kHz to 22 GHz Insertion Loss: 6 dB (nominal) Output Tracking: <0.25 dB Equivalent Output SWR: <1.22:1	11667B	P,A
Termination, 50 Ω	Impedance: 50 Ω (nominal) (2 required for Option 010)	908A	P,T
Termination ^h		909D	
Termination, 75 Ω ⁱ	Impedance: 75 Ω (nominal) (2 required for option 011)	909E Option 201	P,T
When a 3335A source is not available:			
Attenuator/Switch Driver	Compatible with 8494G and 8496G programmable step attenuators	11713A	P, A
Attenuator Interconnect Kit	Mechanically and electrically connects 8494A/G and 8496A/G	11716 Series	P, A

a. P = Performance Test, A = Adjustment, T = Troubleshooting

b. 8591E only

c. Option 103 and 8591C only

d. 8593E, 8594E, 8594Q, 8595E, and 8596E

e. Option 107 only

f. 8591C, 8591E, and 8593E

g. 8593E, 8594E, 8594Q, 8595E, and 8596E

h. 8595E and 8596E only

i. 8591E and 8591C only

Table 1-10 Recommended Adapters

Equipment	Critical Specifications for Accessory Substitution	Recommended Model	Use ^a
Adapter	APC 3.5 (f) to APC 3.5 (f)	5061-5311	P,A,T
Adapter ^b	BNC (f) to dual banana plug	1251-1277	P,A,T
Adapter ^c	SMA (f) to SMA (f)	1250-1158	P,A,T
Adapter	BNC (m) to BNC (m)	1250-0216	P,A,T
Adapter	SMA (m) to SMA (m)	1250-1159	P, A, T
Adapter	BNC (m) to BNC (m), 75 Ω	1250-1288	P,A,T
Adapter	BNC (f) to SMB (m)	1250-1237	A,T
Adapter	BNC tee (m) (f) (f)	1250-0781	T
Adapter ^d	MNC (m) to SMA (f)	1250-1700	P,A,T
Adapter	Type N (f) to APC 3.5 (f)	1250-1745	P,A,T
Adapter	Type N (f) to APC 3.5 (m)	1250-1750	P,A,T
Adapter ^e	Type N (f) to SMA (f)	1250-1772	P,A,T
Adapter	Type N (m) to APC 3.5 (m)	1250-1743	P,A,T
Adapter	Type N (m) to APC 3.5 (f)	1250-1744	P,A,T
Adapter ^f	Type N (f) to BNC (f)	1250-1474	P,A,T
Adapter	Type N (f) to BNC (m)	1250-1477	P,A,T
Adapter	Type N (f) to BNC (m), 75 Ω	1250-1534	P,A,T
Adapter	Type N (m) to BNC (f) (4 required)	1250-1476	P,A,T
Adapter	Type N (m) to BNC (m) (2 required)	1250-1473	P,A,T
Adapter	Type N (f) to N (f)	1250-1472	P,A,T
Adapter	Type N (m) to N (m)	1250-1475	P,A,T
Adapter	Type N (f) to N (f), 75 Ω	1250-1529	P,A,T
Adapter ^g	Type N (f), 75 Ω to Type N (m), 50 Ω	1250-0597	P,A,T
Adapter	SMB (f) to SMB (f)	1250-0692	A,T
Adapter	SMC (m) to SMC (m)	1250-0827	A,T
Adapter	SMB (m) to SMB (m)	1250-0813	A,T

Table 1-10 Recommended Adapters (Continued)

Equipment	Critical Specifications for Accessory Substitution	Recommended Model	Use^a
Adapter, Minimum Loss	50 to 75 Ω , matching Frequency Range: dc to 2 GHz Insertion Loss: 5.7 dB	11852B	P,A,T
Adapter ^h	Type N tee (m) (f) (f)	1250-0559	P,T
When a 3335A source is not available:			
Adapter	BNC (f) to SMA (m)	1250-1200	P, A, T
Adapter	BNC tee (f, m, f)	1250-0781	P, A, T

a. P = Performance Test, A = Adjustment, T = Troubleshooting

b. 8591C and 8591E only

c. 8594E, 8594Q, 8595E, and 8596E only

d. 8593E only

e. 8593E, 8594E, 8594Q, 8595E, and 8596E only

f. 8591C, 8591E, 8594E, 8594Q 8595E, and 8596E only

g. 8591E Option 001 and Option 011 only

h. 8593E, 8594E, 8595E, and 8596E with Option 010 only

Table 1-11 Recommended Cables

Equipment	Critical Specifications for Cable Substitution	Recommended Model	Use ^a
Cable ^b	Cal Comb SMA (m) to (m)	08592-60061	P,A,T
Cable	SMA (m) to (m), 61 cm (18 in)	8120-1578	P,A,T
Cable Assembly ^c	Length: approximately 15 cm (6 in) Connectors: BNC (f) to Alligator Clips	8120-1292	A
Cable Assembly	Length: ≥91 cm (36 in) Connectors: Banana Plug to Alligator Clips	11102A	A
Cable ^d	Frequency Range: 10 MHz to 26.5 GHz Maximum SWR: <1.4 at 26.5 GHz Length: ≥91 cm (36 in) Connectors: APC 3.5 (m) both ends Maximum Insertion Loss 2 dB (2 required)	8120-4921	P,A
Cable	Frequency Range: 50 MHz to 7 GHz Length: ≥91 cm (36 in) Connectors: SMA (m) both ends	5061-5458	P,A,T
Cable	Type N, 183 cm (72 in)	11500A	P,A,T
Cable	Type N, 62 cm (24 in)	11500B/C	P,A,T
Cable	Type N, 152 cm (60 in)	11500D	P,A,T
Cable	Frequency Range: dc to 310 MHz Length: 20 cm (9 in) Connectors: BNC (m) both ends	10502A	P,A,T
Cable ^e	BNC, 75 Ω, 30 cm (12 in)	5062-6452	P,A,T
Cable	BNC, 75 Ω, 120 cm (48 in)	15525-80010	P,A,T
Cable, Test	Length: ≥91 cm (36 in) Connectors: SMB (f) to BNC (m) (2 required)	85680-60093	A,T

- a. P = Performance Test, A = Adjustment, T = Troubleshooting
- b. For 8593E only
- c. Not for 8591E
- d. For 8593E Option 026 or Option 027, 8594E, 8594Q, 8595E, 8596E only
- e. For 8591E Option 001 and Option 011 only

2

Performance Verification Tests

These tests verify the electrical performance of the spectrum analyzer. Allow the spectrum analyzer to warm up in accordance with the temperature stability specifications before performing the tests.

If a 3335A source is not available, use the alternative performance test with the same number found in Chapter 2a.

Calibrated Attenuator Settings, 8494G and 8496G

Refer to [Table 2-1](#) for each test in [Chapter 2](#) which requires the use of a calibrated attenuator.

Table 2-1 **11713A Settings for 8494G and 8496G**

1 dB Step Atten (dB)	Attenuator X				10 dB Step Atten (dB)	Attenuator Y			
	1	2	3	4		5	6	7	8
0	0	0	0	0	0	0	0	0	0
1	1	0	0	0	10	1	0	0	0
2	0	1	0	0	20	0	1	0	0
3	1	1	0	0	30	1	1	0	0
4	0	0	1	0	40	0	0	1	0
5	1	0	1	0	50	1	0	1	0
6	0	1	1	0	60	0	1	1	0
7	1	1	1	0	70	1	1	1	0
8	0	0	1	1	80	0	0	1	1
9	1	0	1	1	90	1	0	1	1
10	0	1	1	1	100	0	1	1	1
11	1	1	1	1	110	1	1	1	1

1. 10 MHz Ref. Output Accuracy, 8590 E-Series, 8591C Option 704, and 8594Q Option 704

If your instrument is equipped with a Precision Frequency Reference, perform “10 MHz Precision Frequency Reference Output Accuracy,” instead.

The settability is measured by changing the setting of the digital-to-analog converter (DAC) which controls the frequency of the timebase. The frequency difference per DAC step is calculated and compared to the specification.

The related adjustment for this performance verification test is the “10 MHz Frequency Reference Adjustment.”

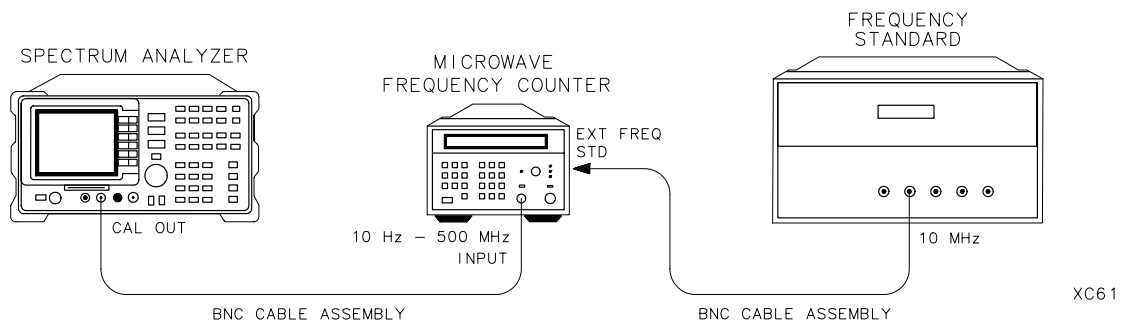
Equipment Required

Microwave frequency counter

Frequency standard

Cable, BNC, 122 cm (48 in) (2 required)

Figure 2-1 10 MHz Reference Test Setup



Procedure

The test results will be invalid if REF UNLK is displayed at any time during this test. REF UNLK will be displayed if the internal reference oscillator is unlocked from the 10 MHz reference. A REF UNLK might occur if there is a hardware failure or if the jumper between 10 MHz REF OUTPUT and EXT REF IN on the rear panel is removed.

1. Connect the equipment as shown in [Figure 2-1](#).

2. Set the frequency counter controls as follows:

SAMPLE RATE Midrange

50 Ω /1 Ω SWITCH 50 Ω

10 Hz-500 MHz/500 MHz-26.5 GHz

SWITCH 10 Hz-500 MHz

FREQUENCY STANDARD (Rear panel) ... EXTERNAL

3. Wait for the frequency counter reading to stabilize. Record the frequency counter reading in the 10 MHz Reference Accuracy Worksheet as Counter Reading 1.

4. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, -37, Hz

CAL, More 1 of 4, More 2 of 4, VERIFY TIMEBASE

5. Record the number in the active function block of the spectrum analyzer in [Table 2-2](#) as the Timebase DAC Setting.

6. Add one to the Timebase DAC Setting recorded in step 5, then enter this number using the DATA keys on the spectrum analyzer. For example, if the timebase DAC setting is 105, press 1,0,6 **Hz**.

7. Wait for the frequency counter reading to stabilize. Record the frequency counter reading in [Table 2-2](#) as Counter Reading 2.

8. Subtract one from the Timebase DAC Setting recorded in step 5, then enter this number using the DATA keys on the spectrum analyzer. For example, if the timebase DAC setting is 105, press 1, 0, 4, **Hz**.

9. Wait for the frequency counter reading to stabilize. Record the frequency counter reading in [Table 2-2](#) as Counter Reading 3.

10. Calculate the frequency settability by performing the following steps:

a. Calculate the frequency difference between Counter Reading 2 and Counter Reading 1.

b. Calculate the frequency difference between Counter Reading 3 and Counter Reading 1.

1. 10 MHz Ref. Output Accuracy, 8590 E-Series, 8591C Option 704, and 8594Q Option 704

- c. Divide the difference with the greatest absolute value by two and record the value as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The settability should be less than ± 150 Hz.
- d. Press **PRESET** on the spectrum analyzer. The timebase DAC will be reset automatically to the value recorded in step 5.

Performance verification test “10 MHz Reference Output Accuracy” is now complete.

Table 2-2**10 MHz Reference Accuracy Worksheet**

Description	Measurement
Counter Reading 1	_____Hz
Timebase DAC Setting	_____
Counter Reading 2	_____Hz
Counter Reading 3	_____Hz

2. 10 MHz Precision Frequency Reference Output Accuracy, 8590 E-Series Option 004, 8591C, and 8594Q

If the spectrum analyzer is *not* equipped with a Precision Frequency Reference, perform “10 MHz Reference Output Accuracy,” instead.

This test measures the warmup characteristics of the 10 MHz reference oscillator. The ability of the 10 MHz oscillator to meet its warmup characteristics gives a high level of confidence that it will also meet its yearly aging specification.

A frequency counter is connected to the 10 MHz REF OUTPUT. After the spectrum analyzer has been allowed to cool for at least 60 minutes, the spectrum analyzer is powered on. A frequency measurement is made five minutes after power is applied and the frequency is recorded. Another frequency measurement is made 25 minutes later (30 minutes after power is applied) and the frequency is recorded. A final frequency measurement is made 60 minutes after power is applied. The difference between each of the first two frequency measurements and the last frequency measurement is calculated and recorded.

The related adjustment for this procedure is “10 MHz Precision Frequency Reference Accuracy Adjustment.”

Equipment Required

Frequency counter

Frequency standard

Cable, BNC, 122 cm (48 in) (2 *required*)

Procedure

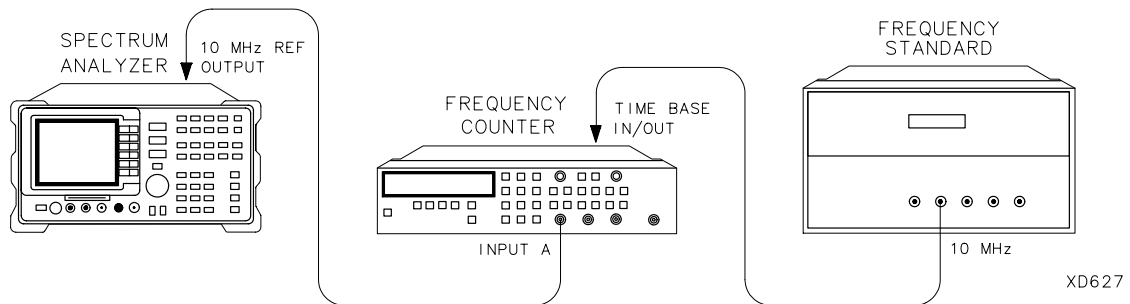
The spectrum analyzer must have been allowed to sit with the power for at least 60 minutes before performing this procedure. This adequately simulates a cold start. A cold start is defined as the spectrum analyzer being powered on after being for at least 60 minutes.

1. Allow the spectrum analyzer to sit with the power off for at least 60 minutes before proceeding. Connect the equipment as shown in [Figure 2-2](#).
2. Set the spectrum analyzer LINE switch on. Record the Power On Time below.

Power On Time _____

2. 10 MHz Precision Frequency Reference Output Accuracy, 8590 E-Series Option 004, 8591C, and 8594Q

Figure 2-2 10 MHz Precision Frequency Reference Accuracy Test Setup



3. Set the frequency counter controls as follows:

FUNCTION/DATA FREQ A
 INPUT A
 X10 ATTN OFF
 AC OFF
 50 Ω Z OFF
 AUTO TRIG ON
 100 kHz FILTER A OFF

4. On the frequency counter select a 10 second gate time by pressing **GATE TIME 10 GATE TIME**. Offset the displayed frequency by -10.0 MHz by pressing **MATH, SELECT/ENTER, CHS/EEEX, 10, CHS/EEEX, 6, SELECT/ENTER, SELECT ENTER**. The frequency counter should now display the difference between the INPUT A signal and 10.0 MHz with 0.001 Hz resolution.
5. Proceed with the next step 5 minutes after the Power On Time noted in step 2.
6. Wait at least two periods for the frequency counter to settle. Then record the frequency counter reading in [Table 2-3](#) as Counter Reading 1 with 0.001 Hz resolution.
7. Proceed with the next step 30 minutes after the Power On Time noted in step 2.
8. Record the frequency counter reading in the [Table 2-3](#) as Counter Reading 2 with 0.001 Hz resolution.
9. Proceed with the next step 60 minutes after the Power On Time noted in step 2.

10. Wait at least two periods for the frequency counter to settle. Record the frequency counter reading in Table 2-3 as Counter Reading 3 with 0.001 Hz resolution.

Table 2-3**10 MHz Reference Accuracy Worksheet**

Description	Measurement
Counter Reading 1	_____ Hz
Counter Reading 2	_____ Hz
Counter Reading 3	_____ Hz

11. Calculate the 5 Minute Warmup Error by subtracting Reading 3 from Reading 1 and dividing the result by 10 MHz.

$$5 \text{ Min. Warmup Error} = (\text{Reading 1} - \text{Reading 3}) / (10.0 \times 10^6)$$

12. Record the results as TR Entry 1 of the performance verification test record.

13. Calculate the 30 Minute Warmup Error by subtracting Reading 3 from Reading 2 and dividing the result by 10 MHz.

$$30 \text{ Min. Warmup Error} = (\text{Reading 2} - \text{Reading 3}) / (10.0 \times 10^6)$$

14. Record the results as TR Entry 2 of the performance verification test record.

Performance verification test “10 MHz Precision Frequency Reference Output Accuracy” is now complete.

3. Comb Generator Frequency Accuracy, 8593E and 8596E

A 100 MHz signal from a synthesized source and the output from a comb generator are applied to the input of the spectrum analyzer. The source frequency is adjusted until the two signals appear at the same frequency. The frequency setting of the source is then equal to the comb generator frequency and this frequency is compared to the specification.

The related adjustment procedure for this performance verification test is “Comb Generator Frequency Adjustment.”

Equipment Required

Synthesized sweeper

Power splitter

Cable, APC mm (m) 91 cm (36 in)

Cable, SMA 61 cm (18 in) (m) to (m)

Adapter, Type N (m) to APC 3.5 (m)

Adapter, 3.5 mm (f) to 3.5 mm (f)

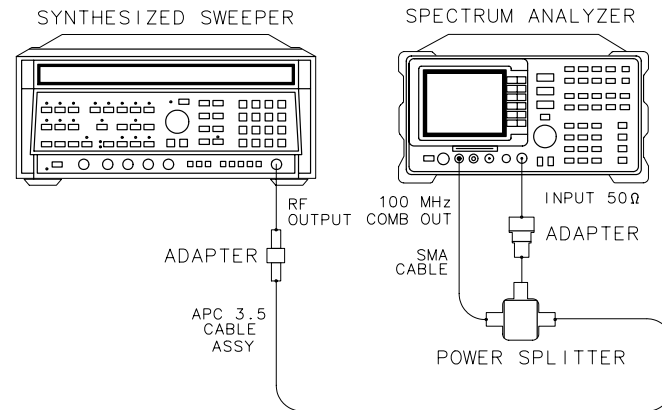
Procedure

1. Connect the equipment as shown in [Figure 2-3](#).

Option 026 only: Omit the Type N to APC adapter.

Figure 2-3

Comb Generator Frequency Accuracy Test Setup



XD62

2. Press **INSTRUMENT PRESET** on the synthesized sweeper, then set the controls as follows:

CW 100.025 MHz

POWER LEVEL 0 dBm

RF OFF

3. Press **PRESET** on the spectrum analyzer, then wait for preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 100, MHz

AUX CTRL, COMB GEN ON OFF (ON)

SPAN, 10, MHz

AMPLITUDE, REF LVL, 10, dB

BW, RES BW AUTO MAN, 10, kHz

4. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

5. Press **AMPLITUDE** and adjust the reference-level setting until the signal peak is 10 dB below the reference level.
6. Set the synthesized sweeper RF on. Adjust the synthesized sweeper power level until the two signals are the same amplitude.

3. Comb Generator Frequency Accuracy, 8593E and 8596E

7. Set **SCALE LOG LIN** (LOG) to 2 dB on the spectrum analyzer.
8. If necessary, readjust the synthesized sweeper power level until the two signals are the same amplitude.
9. Set the synthesized sweeper CW to 100 MHz. A very unstable signal will probably appear. The peak amplitude should be at least 3 dB greater in amplitude than either of the individual signals.
10. Adjust the synthesized sweeper CW setting until a single signal appears to rise and fall in amplitude at the slowest rate (1 Hz frequency resolution will be necessary). The signal peak should be displayed approximately 6 dB above the amplitude of the individual signals.
11. Record the synthesized sweeper CW frequency setting as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The frequency should be between 99.993 MHz and 100.007 MHz.

Performance verification test “Comb Generator Frequency Accuracy” is now complete.

4. Frequency Readout and Marker Count Accuracy, 8591C, 8591E, 8594E, and 8594Q

The frequency readout accuracy of the spectrum analyzer is tested with an input signal of known frequency. By using the same frequency standard for the spectrum analyzer and the synthesized sweeper, the frequency reference error is eliminated.

The related adjustment for this performance test is the “Sampler Match Adjustment.”

Equipment Required

- Synthesized sweeper
- Adapter, Type N (f) to APC 3.5 (m)
- Adapter, APC 3.5 (f) to APC 3.5 (f)
- Cable, Type N, 183 cm (72 in)
- Cable, BNC, 122 cm (48 in)

Additional Equipment for 75 Ω Input

- Adapter, minimum loss
- Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

This performance test consists of two parts:

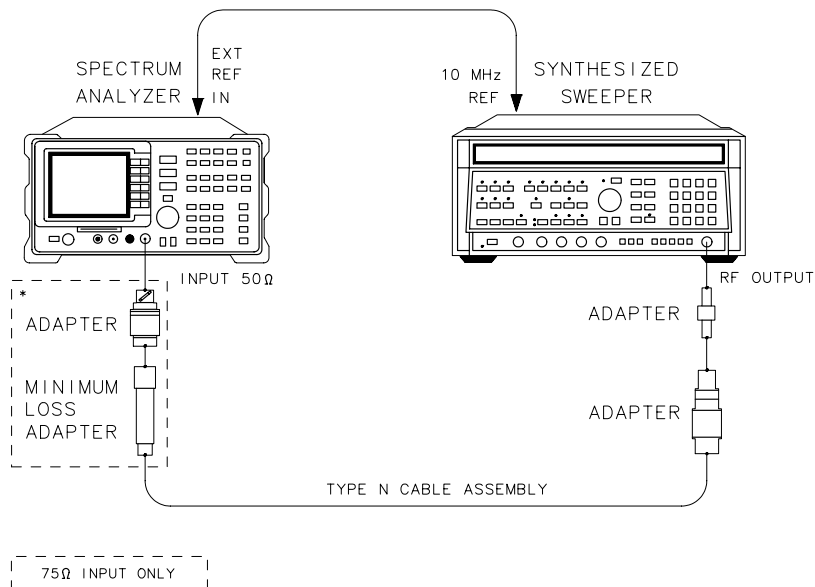
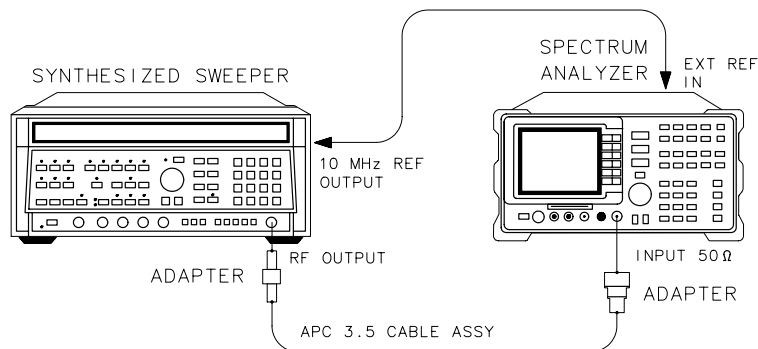
- Part 1: Frequency Readout Accuracy
- Part 2: Marker Count Accuracy

Perform “Part 1: Frequency Readout Accuracy” before “Part 2: Marker Count Accuracy.”

Part 1: Frequency Readout Accuracy

1. Connect the equipment as shown in [Figure 2-4](#) (8591E, 8591C) or as shown in [Figure 2-5](#) (8594E, 8594Q). Remember to connect the 10 MHz REF OUT of the synthesized sweeper to the EXT REF IN of the spectrum analyzer.

4. Frequency Readout and Marker Count Accuracy, 8591C, 8591E, 8594E, and 8594Q

Figure 2-4 8591E and 8591C Frequency Readout Accuracy Test Setup**Figure 2-5 8594E and 8594Q Frequency Readout Accuracy Test Setup****CAUTION**

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Perform the following steps to set up the equipment:

- a. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 1.5 GHz

POWER LEVEL -10 dBm

4. Frequency Readout and Marker Count Accuracy, 8591C, 8591E, 8594E, and 8594Q

- b. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 1.5, GHz

SPAN, 20, MHz

3. Press **PEAK SEARCH** on the spectrum analyzer to measure the frequency readout accuracy.
4. Record the MKR frequency reading in the performance verification test record. The reading should be within the limits shown in [Table 2-4](#).
5. Change to the next spectrum analyzer span setting listed in [Table 2-4](#).
6. Repeat steps 3 through 5 for each spectrum analyzer span setting listed in [Table 2-4](#).

If you are testing a spectrum analyzer equipped with Option 130 continue with step 7.

“Part 1: Frequency Readout Accuracy” is now complete for all other spectrum analyzers. Continue with “Part 2: Marker Count Accuracy.”

Table 2-4

Frequency Readout Accuracy

Spectrum Analyzer	MKR Reading		
	Min. (MHz)	TR Entry Actual	Max. (MHz)
20	1.49918	(1)_____	1.50082
10	1.49968	(2)_____	1.50032
1	1.499968	(3)_____	1.500032

Additional Frequency Readout Accuracy Steps for Option 130

7. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 300, Hz

SPAN, 20, kHz

8. Press **PEAK SEARCH** on the spectrum analyzer.
9. Record the MKR frequency reading as TR Entry 4 of the performance verification test record. The reading should be within the limits of 1.49999924 GHz and 1.50000076 GHz.

“Part 1: Frequency Readout Accuracy” is now complete for the Option 130. Continue with “Part 2: Marker Count Accuracy.”

Part 2: Marker Count Accuracy

Perform “Part 1: Frequency Readout Accuracy” before performing this procedure.

1. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer to measure the marker count accuracy by pressing the following keys:

FREQUENCY, 1.5, GHz

SPAN, 20, MHz

BW, RES BW AUTO MAN, 300, kHz

MKR FCTN, MK COUNT ON OFF (ON)

More 1 of 2

CNT RES AUTO MAN, 100, Hz

2. Press **PEAK SEARCH**, then wait for a count be taken (it may take several seconds).
3. Record the CNTR frequency reading as TR Entry 5 of the performance verification test record. The reading should be within the limits of 1.4999989 GHz and 1.5000011 GHz.
4. Change the spectrum analyzer settings by pressing the following keys:

SPAN, 1, MHz

MKR FCTN, MK COUNT ON OFF (ON)

More 1 of 2

CNT RES AUTO MAN, 10, Hz

4. Frequency Readout and Marker Count Accuracy, 8591C, 8591E, 8594E, and 8594Q

5. Press **PEAK SEARCH**, then wait for a count be taken (it may take several seconds).
6. Record the CNTR frequency reading as TR Entry 6 in the appropriate performance verification test record in Chapter 3. The reading should be within the limits of 1.49999989 GHz and 1.50000011 GHz.

If you are testing a spectrum analyzer equipped with Option 130 continue with step 7.

Performance verification test “Frequency Readout and Marker Count Accuracy” is now complete for all other spectrum analyzers.

Additional Marker Count Accuracy Steps for Option 130

7. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 300, Hz

SPAN, 20, kHz

8. Press **PEAK SEARCH** on the spectrum analyzer.
9. Record the MKR frequency reading as TR Entry 7 in the appropriate performance verification test record in Chapter 3. The reading should be within the limits of 1.49999989 GHz and 1.50000011 GHz.
10. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 30, Hz

SPAN, 2, kHz

11. Press **PEAK SEARCH, MKR FCTN, Mk Track On Off (ON)**, then wait until the count is completed (it may take several seconds).
12. Record the MKR reading as TR Entry 8 in the appropriate performance verification test record in Chapter 3. The reading should be within the limits of 1.49999989 and 1.50000011.

Performance verification test “Frequency Readout and Marker Count Accuracy” is now complete for spectrum analyzers equipped with Option 130.

5. Frequency Readout and Marker Count Accuracy, 8593E, 8595E, and 8596E

The frequency readout accuracy of the spectrum analyzer is tested with an input signal of known frequency. By using the same frequency standard for the spectrum analyzer and the synthesized sweeper, the frequency reference error is eliminated.

The related adjustments for this performance verification test are “Sampler Match Adjustment” and “Frequency Reference Adjustment.”

Equipment Required

- Synthesized sweeper
- Adapter, Type N (f) to APC 3.5 (m)
- Adapter, APC 3.5 (f) to APC 3.5 (f)
- Cable, APC 3.5, 91 cm (36 in)
- Cable, BNC, 122 cm (48 in)

Additional Equipment for Option 026

- Adapter, 3.5 mm (f) to 3.5 mm (f)

Procedure

This performance verification test consists of two parts:

- Part 1: Frequency Readout Accuracy

- Part 2: Marker Count Accuracy

Perform “Part 1: Frequency Readout Accuracy” before “Part 2: Marker Count Accuracy.”

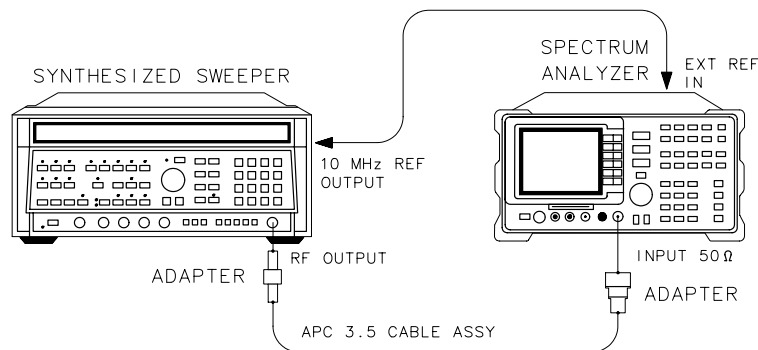
Part 1: Frequency Readout Accuracy

1. Connect the equipment as shown in [Figure 2-6](#). Remember to connect the 10 MHz REF OUT of the synthesized sweeper to the EXT REF IN of the spectrum analyzer.

Option 026 only: Use the 3.5 mm adapter to connect the cable to the spectrum analyzer input.

Figure 2-6

Frequency Readout Accuracy Test Setup



XD63

2. Perform the following steps to set up the equipment:
 - a. Press **INSTRUMENT PRESET** on the synthesized sweeper, then set the controls as follows:

CW 1.5 GHz

POWER LEVEL -10 dBm
 - b. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 1.5, GHz

SPAN, 20, MHz
3. Press **PEAK SEARCH** on the spectrum analyzer to measure the frequency readout accuracy.
4. Record the MKR frequency reading in the performance verification test record as indicated in [Table 2-5](#). The reading should be within the limits shown.
5. Change to the next spectrum analyzer span setting listed in [Table 2-5](#).
6. Repeat steps 3 through 5 for each spectrum analyzer frequency and span setting listed in [Table 2-5](#).

5. Frequency Readout and Marker Count Accuracy, 8593E, 8595E, and 8596E

If you are testing a spectrum analyzer equipped with Option 130 continue with step 7.

Part 1 of performance verification test “Frequency Readout and Marker Count Accuracy” is now complete for all other spectrum analyzers.

Additional Frequency Readout Accuracy Steps for Option 130

7. Set the synthesized sweeper CW to 1.5 GHz.
8. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 1.5, GHz

BW, 300, Hz

SPAN, 20, kHz

9. Press **PEAK SEARCH** on the spectrum analyzer.
10. Record the MKR frequency reading as TR Entry 16 of the performance verification test record. The reading should be within the limits of 1.49999924 GHz and 1.50000076 GHz.

Part 1 of performance verification test “Frequency Readout and Marker Count Accuracy” is now complete for spectrum analyzers equipped with Option 130. Proceed with “Part 2: Marker Count Accuracy.”

Part 2: Marker Count Accuracy

Perform “Part 1: Frequency Readout Accuracy” before performing this procedure.

1. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish.
2. Set the spectrum analyzer to measure the marker count accuracy by pressing the following keys:

FREQUENCY, 1.5, GHz

SPAN, 20, MHz

BW, RES BW AUTO MAN, 300, kHz

MKR FCTN, MK COUNT ON OFF (ON)

More 1 of 2

CNT RES AUTO MAN, 100, Hz

3. Press **PEAK SEARCH**, then wait for a count be taken (it may take several seconds).

4. Record the CNTR frequency reading as TR Entry 17 of the performance verification test record. The reading should be within the limits shown in [Table 2-6](#).

5. Change the spectrum analyzer settings by pressing the following keys:

SPAN, 1, MHz

MKR FCTN, MK COUNT ON OFF (ON)

More 1 of 2

CNT RES AUTO MAN, 10, Hz

6. Press **PEAK SEARCH**, then wait for a count be taken (it may take several seconds).
7. Record the CNTR frequency reading as TR Entry 18 of the performance verification test record. The reading should be within the limits shown in [Table 2-6](#).
8. Repeat step 2 through step 7 for each spectrum analyzer setting listed in [Table 2-6](#).

If you are testing a spectrum analyzer equipped with Option 130 continue with step 9.

Part 2 of performance verification test “Frequency Readout and Marker Count Accuracy” is now complete for all other spectrum analyzers.

Additional Marker Count Accuracy Steps for Option 130

9. Set the synthesized sweeper CW to 1.5 GHz.
10. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 1.5, GHz

BW, RES BW AUTO MAN, 300, Hz

SPAN, 20, kHz

11. Press **PEAK SEARCH** on the spectrum analyzer.
12. Record the MKR frequency reading as TR Entry 27 of the performance verification test record. The reading should be within the limits of 1.49999989 GHz and 1.50000011 GHz.
13. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 30, Hz

SPAN, 2, kHz

5. Frequency Readout and Marker Count Accuracy, 8593E, 8595E, and 8596E

14. Press **PEAK SEARCH, MKR FCTN, Mk Track On Off (ON)**, then wait until the count is completed (it may take several seconds).

15. Record the MKR reading as TR Entry 28 in the appropriate performance verification test record in Chapter 3. The reading should be within the limits of 1.49999989 and 1.50000011.

Part 2 of performance verification test “Frequency Readout and Marker Count Accuracy” is now complete for spectrum analyzers equipped with Option 130.

Table 2-5 Frequency Readout Accuracy

Synthesized Sweeper CW Frequency (MHz)	Spectrum Analyzer Span (MHz)	Spectrum Analyzer Center Frequency (GHz)	Min. Frequency (GHz)	TR Entry Frequency (GHz)	Max. Frequency (GHz)
1500	20	1.5	1.49918	(1)_____	1.50082
1500	10	1.5	1.49968	(2)_____	1.50032
1500	1	1.5	1.499968	(3)_____	1.500032
4000	20	4.0	3.99918	(4)_____	4.00082
4000	10	4.0	3.99968	(5)_____	4.00032
4000	1	4.0	3.999968	(6)_____	4.000032
Stop here for 8595E.					
9000	20	9.0	8.99918	(7)_____	9.00082
9000	10	9.0	8.99968	(8)_____	9.00032
9000	1	9.0	8.999968	(9)_____	9.000032
Stop here for 8596E.					
16000	20	16.0	15.99918	(10)_____	16.00082
16000	10	16.0	15.99968	(11)_____	16.00032
16000	1	16.0	15.999968	(12)_____	16.000032
21000	20	21.0	20.99918	(13)_____	21.00082
21000	10	21.0	20.99968	(14)_____	21.00032
21000	1	21.0	20.999968	(15)_____	21.000032

Table 2-6 Marker Count Accuracy

Synthesized Sweeper CW Frequency MHz	Spectrum Analyzer Center Frequency GHz	Spectrum Analyzer Span MHz	Spectrum Analyzer Counter Resolution Hz	CNT MKR Frequency		
				Min. (GHz)	TR Entry	Max. (GHz)
1500	1.5	20	100	1.4999989	(17)_____	1.5000011
1500	1.5	1	10	1.49999989	(18)_____	1.50000011
4000	4.0	20	100	3.9999989	(19)_____	4.0000011
4000	4.0	1	10	3.99999989	(20)_____	4.00000011
If 8595E, stop here.						
9000	9.0	20	100	8.9999979	(21)_____	9.0000021
9000	9.0	1	10	8.999999979	(22)_____	9.00000021
If 8596E, stop here.						
16000	16.0	20	100	15.9999969	(23)_____	16.0000031
16000	16.0	1	10	15.99999969	(24)_____	16.00000031
21000	21.0	20	100	20.9999959	(25)_____	21.0000041
21000	21.0	1	10	20.99999959	(26)_____	21.00000041

6. Noise Sidebands, 8590 E-Series, 8591C, and 8594Q

A 500 MHz CW signal is applied to the input of the spectrum analyzer. The marker functions are used to measure the amplitude of the carrier and the noise level 10 kHz, 20 kHz, and 30 kHz above and below the carrier. The difference between these two measurements is compared to specification after the result is normalized to 1 Hz.

There are no related adjustment procedures for this performance test.

Equipment Required

Signal generator

Cable, Type N, 183 cm (72 in)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

This performance test consists of three parts:

Part 1: Noise Sideband Suppression at 10 kHz

Part 2: Noise Sideband Suppression at 20 kHz

Part 3: Noise Sideband Suppression at 30 kHz

Perform part 1 before performing part 2 or part 3 of this procedure.

A worksheet is provided at the end of this procedure for calculating the noise sideband suppression.

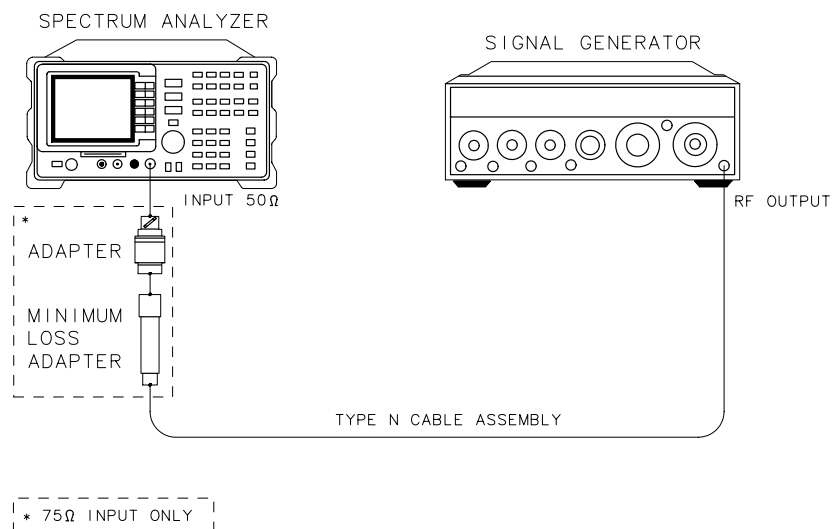
Part 1: Noise Sideband Suppression at 10 kHz

1. Set the signal generator controls as follows:

FREQUENCY 500 MHz
 OUTPUT LEVEL 0 dBm
 AM OFF
 FM OFF
 COUNTER INT
 RF ON

2. Connect the equipment as shown in [Figure 2-7](#).

Figure 2-7 Noise Sidebands Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 500, MHz

SPAN, 10, MHz

4. Press the following spectrum analyzer keys to measure the carrier amplitude.

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

BW, 1, kHz

VID BW AUTO MAN, 30, Hz

MKR FCTN, MK TRACK ON OFF (OFF)

SGL SWP

5. Wait for the completion of a sweep, then press **PEAK SEARCH**.
6. Record the MKR amplitude reading in [Table 2-7](#) as the Carrier Amplitude.
7. Press the following spectrum analyzer keys to measure the noise sideband level at +10 kHz:

MARKER Δ , 10, kHz

MKR, MARKER NORMAL

8. Record the MKR amplitude reading in [Table 2-7](#) as the Noise Sideband Level at +10 kHz.
9. Press the following spectrum analyzer keys to measure the noise sideband level at -10 kHz:

PEAK SEARCH

MARKER Δ , -10, kHz

MKR, MARKER NORMAL

10. Record the MKR amplitude reading in [Table 2-7](#) as the Noise Sideband Level at -10 kHz.
11. Record the more positive value, either Noise Sideband Level at +10 kHz or Noise Sideband Level at -10 kHz from [Table 2-7](#) as the Maximum Noise Sideband Level.
12. Calculate the Noise Sideband Suppression (NSS) by subtracting the Carrier Amplitude (Carrier AMP) from the Maximum Noise Sideband Level (NSL) at 10 kHz as follows:

$$\text{NSS} = \text{Maximum NSL} - \text{Carrier AMP}$$

13. Record the Noise Sideband Suppression at 10 kHz in the performance verification test record as TR Entry 1. The suppression should be ≤ -60 dBc.

Part 1 of performance verification test “Noise Sidebands” is now complete. Proceed with Part 2 of performance verification test “Noise Sidebands.”

Part 2: Noise Sideband Suppression at 20 kHz

1. Press the following spectrum analyzer keys to measure the noise sideband level at +20 kHz:

MKR, MARKER Δ, 20, kHz

MARKER NORMAL

2. Record the MKR amplitude reading in [Table 2-7](#) as the Noise Sideband Level at +20 kHz.
3. Press the following spectrum analyzer keys to measure the noise sideband level at –20 kHz:

PEAK SEARCH

MARKER Δ, –20, kHz

MKR, MARKER NORMAL

4. Record the MKR amplitude reading in [Table 2-7](#) as the Noise Sideband Level at –20 kHz.
5. Record the more positive value, either Noise Sideband Level at +20 kHz or Noise Sideband Level at –20 kHz from [Table 2-7](#) as the Maximum Noise Sideband Level.
6. Subtract the Carrier Amplitude (Carrier AMP) from the Maximum Noise Sideband Level (NSL) at 20 kHz using the equation below.

$$\text{NSS} = \text{Maximum NSL} - \text{Carrier AMP}$$

7. Record the Noise Sideband Suppression at 20 kHz in the performance verification test record as TR Entry 2. The suppression should be ≤ -70 dBc.

Part 2 of performance verification test “Noise Sidebands” is now complete. Proceed with Part 3 of performance verification test “Noise Sidebands.”

Part 3: Noise Sideband Suppression at 30 kHz

1. Press the following spectrum analyzer keys to measure the noise sideband level at +30 kHz:

MKR, MARKER Δ, 30, kHz

MARKER NORMAL

2. Record the MKR amplitude reading in [Table 2-7](#) as the Noise Sideband Level at +30 kHz.
3. Press the following spectrum analyzer keys to measure the noise sideband level at –30 kHz:

PEAK SEARCH

MARKER Δ, –30, kHz

MKR, MARKER NORMAL

4. Record the MKR amplitude reading in [Table 2-7](#) as the Noise Sideband Level at –30 kHz.
5. Record the more positive value, either Noise Sideband Level at +30 kHz or Noise Sideband Level at –30 kHz from [Table 2-7](#) as the Maximum Noise Sideband Level.
6. Subtract the Carrier Amplitude (Carrier AMP) from the Maximum Noise Sideband Level (NSL) at 30 kHz using the equation below.
$$\text{NSL} = \text{Maximum NSL} - \text{Carrier AMP}$$
7. Record the Noise Sideband Suppression at 30 kHz in the appropriate performance verification test record as TR Entry 3. The suppression should be ≤ -75 dBc.

NOTE

The resolution bandwidth is normalized to 1 Hz as follows:

$$1 \text{ Hz noise-power} = (\text{noise-power in dBc}) - (10 \times \log[\text{RBW}])$$

For example, –60 dBc in a 1 kHz resolution bandwidth is normalized to –90 dBc/Hz.

Performance verification test “Noise Sidebands” is now complete.

Table 2-7 Noise Sideband Worksheet

Description	Measurement
Carrier Amplitude	_____ dBm or dBmV
Noise Sideband Level at +10 kHz	_____ dBm or dBmV
Noise Sideband Level at -10 kHz	_____ dBm or dBmV
Maximum Noise Sideband Level at ± 10 kHz	_____ dBm or dBmV
Noise Sideband Level at +20 kHz	_____ dBm or dBmV
Noise Sideband Level at -20 kHz	_____ dBm or dBmV
Maximum Noise Sideband Level at ± 20 kHz	_____ dBm or dBmV
Noise Sideband Level at +30 kHz	_____ dBm or dBmV
Noise Sideband Level at -30 kHz	_____ dBm or dBmV
Maximum Noise Sideband Level at ± 30 kHz	_____ dBm or dBmV

7. System Related Sidebands, 8590 E-Series, 8591C, and 8594Q

A 500 MHz CW signal is applied to the input of the spectrum analyzer. The marker functions are used to measure the amplitude of the carrier and the amplitude of any system related sidebands 30 kHz above and below the carrier. System related sidebands are any internally generated line related, power supply related or local oscillator related sidebands.

There are no related adjustment procedures for this performance test.

Equipment Required

Signal generator

Cable, Type N, 183 cm (72 in)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

1. Set the signal generator controls as follows:

FREQUENCY 500 MHz

OUTPUT LEVEL 0 dBm

AM OFF

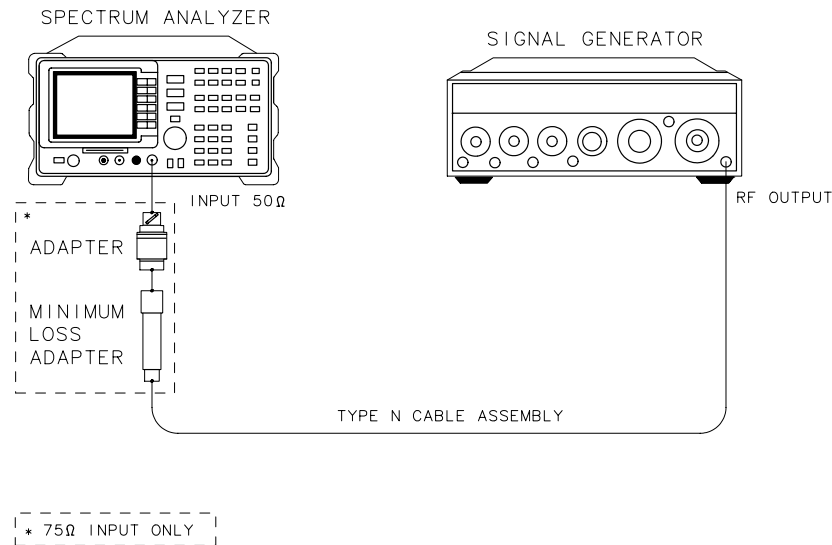
FM OFF

COUNTER INT

RF ON

2. Connect the equipment as shown in [Figure 2-8](#).

Option 026 only: Use the APC adapter to connect the cable to the spectrum analyzer input.

Figure 2-8 System Related Sidebands Test Setup**CAUTION**

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 500, MHz**
 - SPAN, 10, MHz**
4. Set the spectrum analyzer to measure the system related sideband above the signal as follows:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 200, kHz**
 - BW, 1, kHz**
 - VID BW AUTO MAN, 30, Hz**
5. Allow the spectrum analyzer to stabilize for approximately 1 minute, then press the following keys:
 - MKR FCTN, MK TRACK ON OFF (OFF)**
 - FREQUENCY, CF STEP AUTO MAN, 130, kHz**
6. Press **SGL SWP** and wait for the completion of the sweep. Then press **PEAK SEARCH, MARKER Δ** .
7. On the spectrum analyzer, press **FREQUENCY, $\uparrow$** (step-up key).

7. System Related Sidebands, 8590 E-Series, 8591C, and 8594Q

8. Measure the system related sideband above the signal by pressing **SGL SWP** on the spectrum analyzer. Wait for the completion of a new sweep, then press **PEAK SEARCH**.

9. Record the Marker-Δ Amplitude as TR Entry 1 of the performance verification test record.

The system related sideband above the signal should be < -65 dB.

10. Set the spectrum analyzer to measure the system related sideband below the signal by pressing the following spectrum analyzer keys:

↓ (step-down key)

↓ (step-down key)

11. Measure the system related sideband below the signal by pressing **SGL SWP**. Wait for the completion of a new sweep, then press **PEAK SEARCH**.

The system related sideband below the signal should be < -65 dB.

12. Record the Marker-Δ Amplitude as TR Entry 2 in the appropriate performance verification test record in Chapter 3.

Performance verification test “System Related Sidebands” is now complete.

8. Frequency Span Readout Accuracy, 8591E and 8591C

For testing each frequency span, two synthesized sources are used to provide two precisely-spaced signals. The spectrum analyzer marker functions are used to measure this frequency difference and the marker reading is compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

- Synthesized sweeper
- Synthesizer/level generator
- Signal generator
- Power splitter
- Adapter, Type N (m) to Type N (m)
- Adapter, Type N (f) to APC 3.5 (f)
- Cable, Type N, 183 cm (72 in)
- Cable, Type N, 152 cm (60 in)

Additional Equipment for 75 Ω Input

- Adapter, minimum loss
- Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

This performance test consists of two parts:

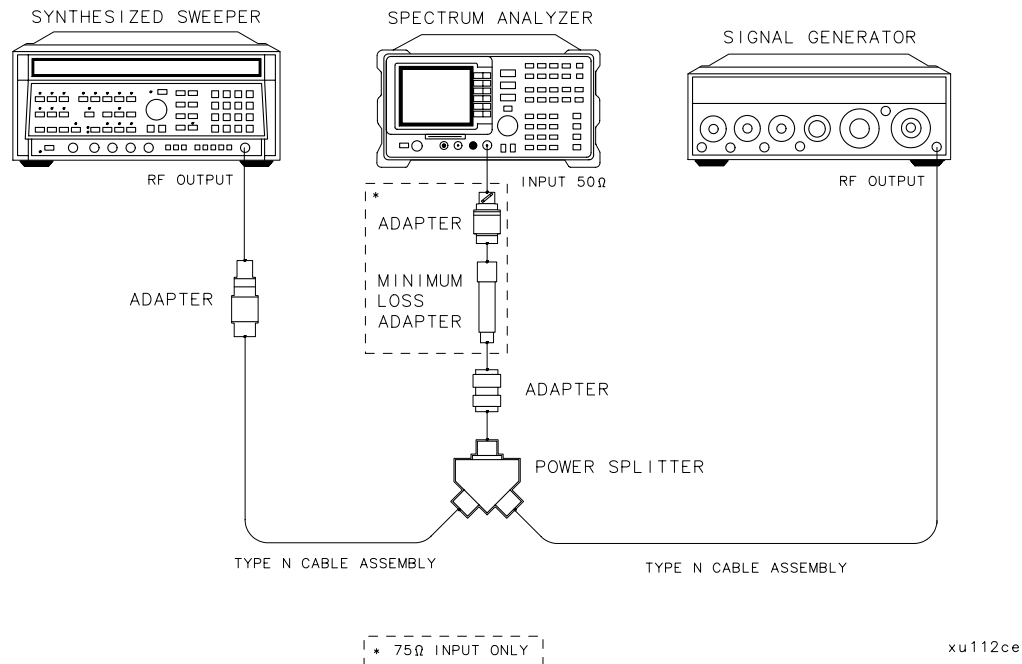
- Part 1: 1800 MHz Frequency Span Readout Accuracy
- Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform “Part 1: 1800 MHz Frequency Span Readout Accuracy” before “Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy.”

Part 1: 1800 MHz Frequency Span Readout Accuracy

1. Connect the equipment as shown in Figure 2-9. Note that the power splitter is used as a combiner.

Figure 2-9 1800 MHz Frequency Span Readout Accuracy Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish.
3. Press **INSTRUMENT PRESET** on the synthesized sweeper and set the controls as follows:
 - CW 1700 MHz
 - POWER LEVEL -5 dBm
4. On the signal generator, set the controls as follows:
 - FREQUENCY (LOCKED MODE) 200 MHz
 - CW OUTPUT 0 dBm
5. Adjust the spectrum analyzer center frequency, if necessary, to place the lower frequency on the second vertical graticule line (one division from the left-most graticule line).
6. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

8. Frequency Span Readout Accuracy, 8591E and 8591C

The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

7. Press **MARKER** Δ , then continue pressing **NEXT PK RIGHT** until the marker Δ is on the right-most signal (1700 MHz).
8. Record the MKR Δ frequency reading as TR Entry 1 of the performance verification test record.

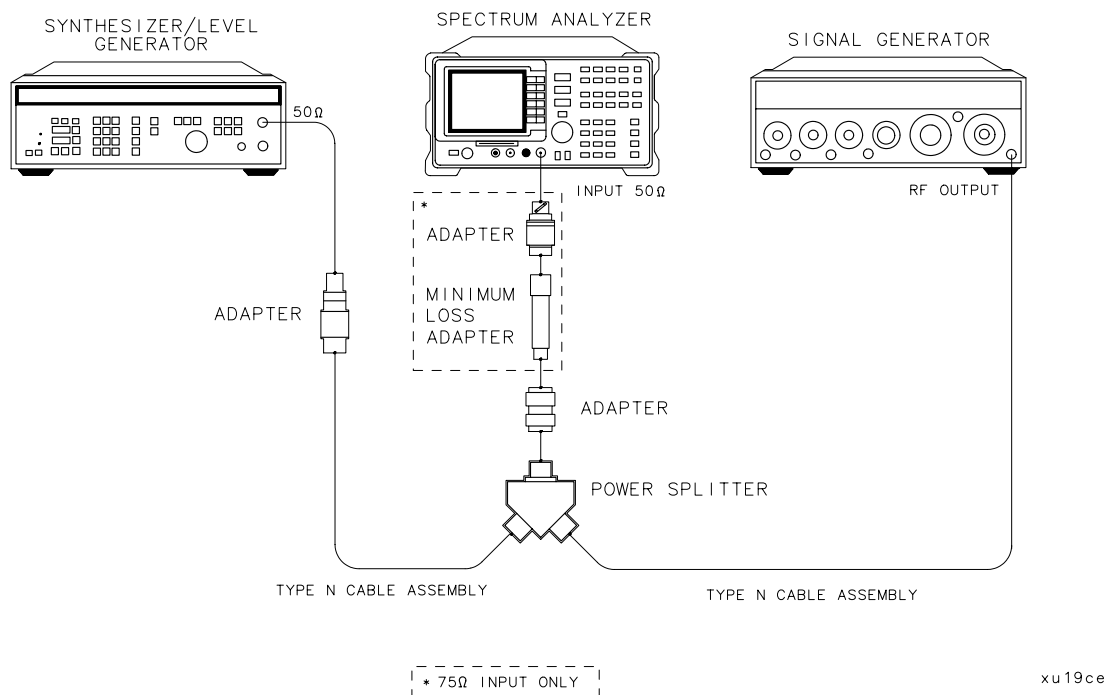
The MKR reading should be within the 1446 MHz and 1554 MHz.

Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform “Part 1: 1800 MHz Frequency Span Readout Accuracy” before performing this procedure. An additional step to measure the frequency span accuracy at 1 kHz is included for spectrum analyzers equipped with Option 130.

1. Connect the equipment as shown in [Figure 2-10](#). Note that the power splitter is used as a combiner.

Figure 2-10 **10.1 MHz to 10 kHz Frequency Span Readout Accuracy Test Setup**



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

8. Frequency Span Readout Accuracy, 8591E and 8591C

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 70, MHz

SPAN 10.1 MHz

3. Press **INSTRUMENT PRESET** on the synthesized sweeper, then set the controls as follows:

CW 74 MHz

POWER LEVEL -5 dBm

4. Set the synthesizer/level generator controls as follows:

FREQUENCY 66 MHz

AMPLITUDE 0 dBm

5. Adjust the spectrum analyzer center frequency to center the two signals on the display.
6. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

7. Record the MKR- Δ frequency reading in the performance test record as TR Entry 2. The MKR- Δ frequency reading should be within the limits shown.
8. Press **MKR, More 1 of 2**, then **MARKER ALL OFF** on the spectrum analyzer.
9. Change to the next equipment settings listed in [Table 2-8](#).
10. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

11. Record the MKR- Δ frequency reading in the performance test record.
12. Repeat steps 8 through 11 for the remaining spectrum analyzer span settings listed in [Table 2-8](#).

If you are testing a spectrum analyzer equipped with Option 130 continue with step 13.

Performance verification test "Frequency Span Readout Accuracy" is now complete for all other spectrum analyzers.

Additional Steps for Option 130

13. Set the spectrum analyzer to measure the frequency span accuracy at 1 kHz by pressing the following keys:

MKR, More 1 of 2, MARKER ALL OFF

BW, 30, Hz

14. Change to the next spectrum analyzer span setting listed in [Table 2-8](#). Be sure to set the synthesized sweeper CW and synthesizer/level generator frequencies as shown in the table.

15. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

16. Record the MKR- Δ frequency reading in the performance test record as TR Entry 8.

Performance verification test “Frequency Span Readout Accuracy” is now complete for spectrum analyzers equipped with Option 130.

8. Frequency Span Readout Accuracy, 8591E and 8591C

Table 2-8 Frequency Span Readout Accuracy

Spectrum Analyzer Span Setting	Synthesizer/ Level Generator Frequency	Synthesized Sweeper Frequency	MKR- Δ Reading		
			Min.	TR Entry	Max.
10.10 MHz	66.000	74.000	7.70 MHz	(2)_____	8.30 MHz
10.00 MHz	66.000	74.000	7.80 MHz	(3)_____	8.20 MHz
100.00 kHz	69.960	70.040	78.00 kHz	(4)_____	82.00 kHz
99.00 kHz	69.960	70.040	78.00 kHz	(5)_____	82.06 kHz
10.00 kHz	69.996	70.004	7.80 kHz	(6)_____	8.20 kHz
<i>Option 130 Only:</i>					
1.00 kHz	69.9996	70.0004	0.78 kHz	(7)_____	0.82 kHz
300.00 Hz ^a	69.99988	70.00012	225.00 Hz	(8)_____	255.00 Hz

- a. This is not a spectrum analyzer specification; however, the 300 Hz span is tested to $\pm 5\%$ to keep the narrow bandwidth accuracy and residual FM measurement uncertainty at a minimum. If the 300 Hz span accuracy is $> 5\%$ the additional measurement uncertainty may need to be included for the bandwidth accuracy and residual FM measurement uncertainties.

9. Frequency Span Readout Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

For testing each frequency span, two synthesized sources are used to provide two precisely-spaced signals. The spectrum analyzer marker functions are used to measure this frequency difference and the marker reading is compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper

Synthesizer/level generator

Signal generator

Power splitter

Adapter, Type N (m) to Type N (m)

Adapter, Type N (f) to APC 3.5 (f)

Cable, Type N, 183 cm (72 in)

Cable, Type N, 152 cm (60 in) or Adapter, APC 3.5 (f) to Type N (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Procedure

This performance verification test consists of two parts:

Part 1: 1800 MHz Frequency Span Readout Accuracy

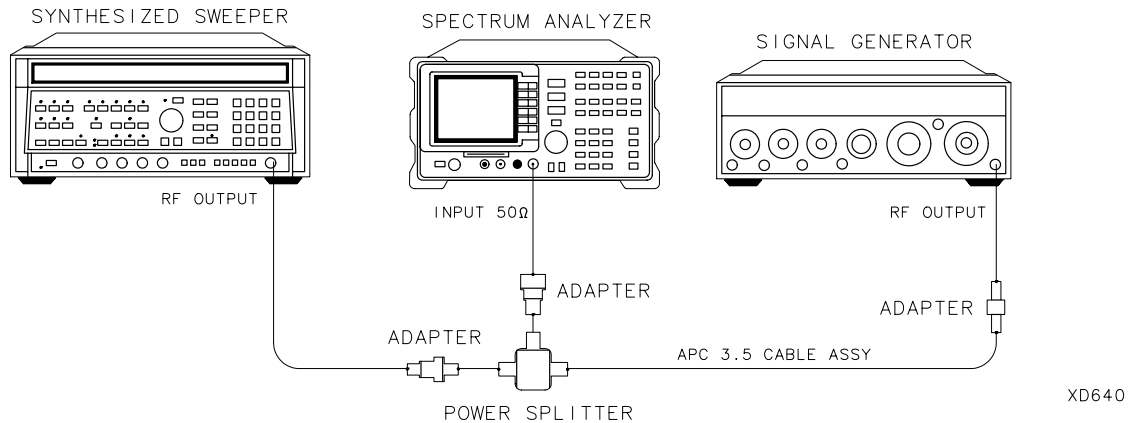
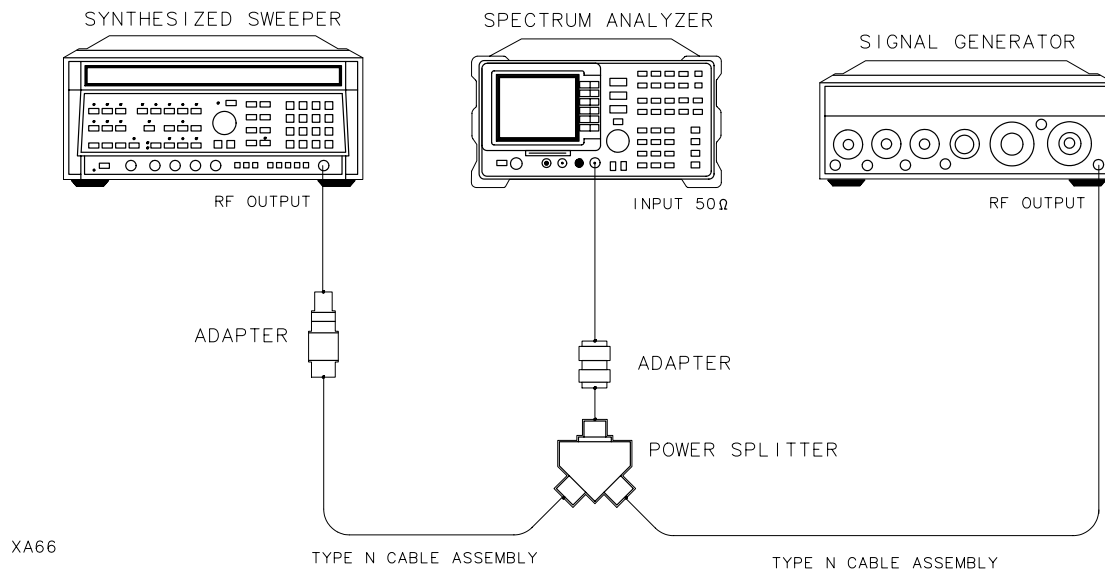
Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform “Part 1: 1800 MHz Frequency Span Readout Accuracy” before “Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy.”

9. Frequency Span Readout Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

Part 1: 1800 MHz Frequency Span Readout Accuracy

1. Connect the equipment as shown in [Figure 2-11](#), [Figure 2-12](#) for 8594E and 8594Q. Note that the power splitter is used as a combiner.

Figure 2-11 1800 MHz Frequency Span Readout Accuracy Test Setup**Figure 2-12 For 8594E and 8594Q Only - Frequency Span Readout Test Setup**

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 900, MHz

SPAN, 1800, MHz

9. Frequency Span Readout Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

- Press **INSTRUMENT PRESET** on the synthesized sweeper and set the controls as follows:

CW 1700 MHz

POWER LEVEL -5 dBm

- On the signal generator, set the controls as follows:

FREQUENCY (LOCKED MODE) 200 MHz

CW OUTPUT 0 dBm

- Adjust the spectrum analyzer center frequency, if necessary, to place the lower frequency on the second vertical graticule line (one division from the left-most graticule line).

- On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press **PEAK SEARCH**, **MARKER Δ**, **NEXT PEAK**.

The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

- Press **MARKER Δ**, then continue pressing **NEXT PK RIGHT**. The marker Δ should be on the right-most signal.

- Record the MKR Δ frequency reading as TR Entry 1 of the performance verification test record.

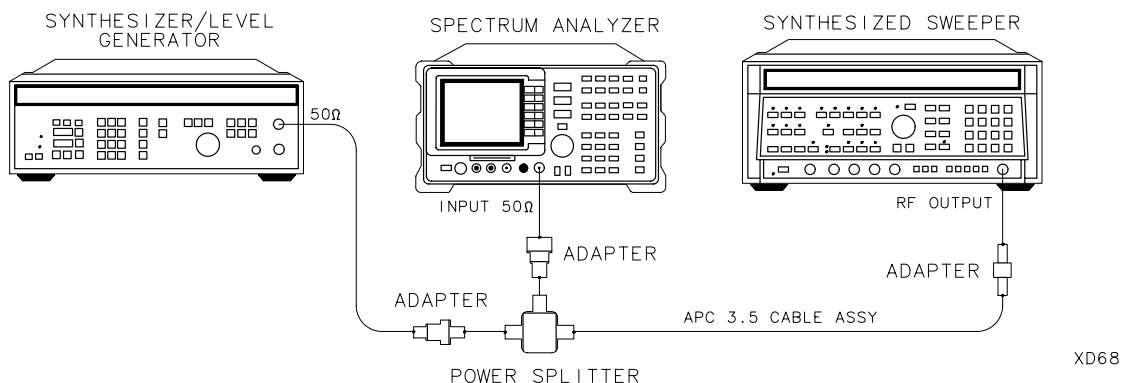
The MKR reading should be within the 1446 MHz and 1554 MHz.

Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform “Part 1: 1800 MHz Frequency Span Readout Accuracy” before performing this procedure. An additional step to measure the frequency span accuracy at 1 kHz is included for spectrum analyzers equipped with Option 130.

- Connect the equipment as shown in [Figure 2-13](#). Note that the power splitter is used as a combiner.

Figure 2-13 10.1 MHz to 10 kHz Frequency Span Readout Accuracy Test Setup



9. Frequency Span Readout Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 70, MHz

SPAN, 10.1, MHz

3. Press **INSTRUMENT PRESET** on the synthesized sweeper, then set the controls as follows:

CW 74 MHz

POWER LEVEL -5 dBm

4. Set the synthesizer/level generator controls as follows:

FREQUENCY 66 MHz

AMPLITUDE 0 dBm

5. Adjust the spectrum analyzer center frequency to center the two signals on the display.
6. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

7. Record the MKR- Δ frequency reading in the performance verification test record as TR Entry 2. The MKR- Δ frequency reading should be within the limits shown.
8. Press **MKR, MARKER 1 ON OFF (OFF)** on the spectrum analyzer.
9. Change to the next equipment settings listed in [Table 2-9](#).

10. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

11. Record the MKR- Δ frequency reading in the performance verification test record.
12. Repeat steps 8 through 11 for the remaining spectrum analyzer span settings listed in [Table 2-9](#).

If you are testing a spectrum analyzer equipped with Option 130 continue with step 13.

Performance verification test "Frequency Span Readout Accuracy" is now complete for all other spectrum analyzers.

Additional Steps for Option 130

13. Set the spectrum analyzer to measure the frequency span accuracy at 1 kHz by pressing the following keys:

MKR, More 1 of 2, MARKER ALL OFF

BW, 30, Hz

If necessary, adjust the center frequency to display the two signals.

14. Change to the next spectrum analyzer span setting listed in [Table 2-9](#). Be sure to set the synthesized sweeper CW and synthesizer/level generator frequencies as shown in the table.

15. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

16. Record the MKR- Δ frequency reading in the performance verification test record.

17. Repeat steps 14 and 15 for the 300 Hz spectrum analyzer span setting.

18. Verify that the 300 Hz span setting is within 225 Hz to 255 Hz.

Performance verification test "Frequency Span Readout Accuracy" is now complete for spectrum analyzers equipped with Option 130.

Table 2-9 Frequency Span Readout Accuracy

Spectrum Analyzer Span Setting	Synthesizer/Level Generator Frequency	Synthesized Sweeper Frequency	MKR- Δ Reading		
			Min.	TR Entry	Max.
10.10 MHz	66.000	74.000	7.70 MHz	(2)_____	8.30 MHz
10.00 MHz	66.000	74.000	7.80 MHz	(3)_____	8.20 MHz
100.00 kHz	69.960	70.040	78.00 kHz	(4)_____	82.00 kHz
99.00 kHz	69.960	70.040	78.00 kHz	(5)_____	82.00 kHz
10.00 kHz	69.996	70.004	7.80 kHz	(6)_____	8.20 kHz
<i>Option 130 only:</i>					
1.00 kHz	69.9996	70.0004	0.78 kHz	(7)_____	0.82 kHz
300.00 Hz ^a	69.99988	70.00012	225.00 Hz	(8)_____	255.00 Hz

- a. This is not a spectrum analyzer specification; however, the 300 Hz span is tested to $\pm 5\%$ to keep the narrow bandwidth accuracy and residual FM measurement uncertainty at a minimum. If the 300 Hz span accuracy is $>5\%$ the additional measurement uncertainty may need to be included for the bandwidth accuracy and residual FM measurement uncertainties.

10. Residual FM, 8591E and 8591C

This test measures the inherent short-term instability of the spectrum analyzer LO system. With the analyzer in zero span, a stable signal is applied to the input and slope-detected on the linear portion of the IF bandwidth filter skirt. Any instability in the LO transfers to the IF signal in the mixing process. The test determines the slope of the IF filter in Hz/dB and then measures the signal amplitude variation caused by the residual FM. Multiplying these two values yields the residual FM in Hz. The narrow bandwidth options use a 300 Hz span. This span is not specified, however, it is tested in “Frequency Span Accuracy.”

There are no related adjustment procedures for this performance test.

Equipment Required

Signal generator

Cable, Type N, 183 cm (72 in)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

This performance test consists of two parts:

Part 1: Residual FM

Part 2: Residual FM Measurement for Option 130

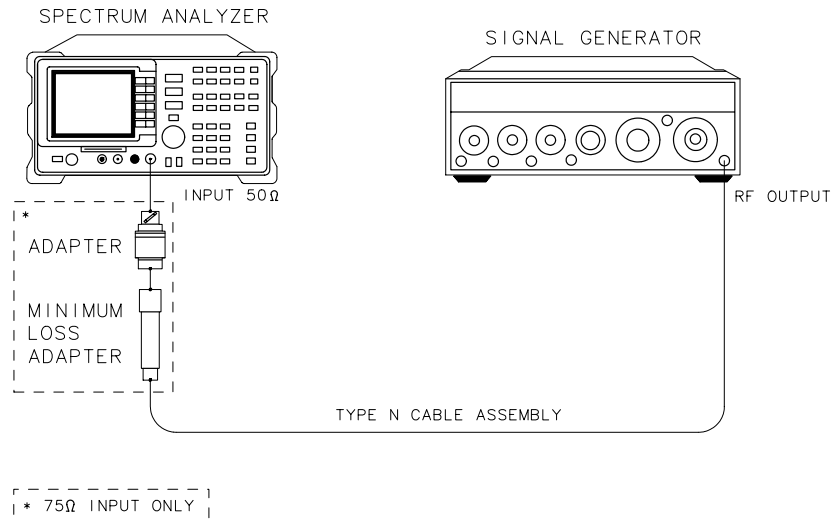
Perform part 2 in addition to part 1 only if your spectrum analyzer is equipped with Option 130. All other spectrum analyzers only perform part 1.

Part 1: Residual FM

Determining the IF Filter Slope

1. Connect the equipment as shown in Figure 2-14.

Figure 2-14 Residual FM Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Set the signal generator controls as follows:

FREQUENCY 500 MHz

CW OUTPUT -10 dBm

CW OUTPUT (75 Ω input only) -4 dBm

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 500, MHz

SPAN, 1, MHz

75 Ω input only: Press **AMPLITUDE, More 1 of 2, Amptd Units**, then **dBm**.

AMPLITUDE, -9, dBm

SCALE LOG LIN (LOG), 1, dB

BW, 1, kHz

4. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, kHz

Wait for the AUTO ZOOM message to disappear. Press the following spectrum analyzer keys:

MKR →, MARKER →REF LVL

MKR, MARKER 1 ON OFF (OFF)

5. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

If you have difficulty achieving the ± 0.1 dB setting, then make the following spectrum analyzer settings:

SPAN, 5, kHz

BW, VID BW AUTO MAN, 30, Hz

6. Rotate the spectrum analyzer knob counterclockwise until the MKR-Δ amplitude reads $-1 \text{ dB} \pm 0.1 \text{ dB}$. Press **MARKER Δ**. Rotate the knob counterclockwise until the MKR-Δ amplitude reads $-4 \text{ dB} \pm 0.1 \text{ dB}$.
7. Divide the MKR-Δ frequency in hertz by the MKR-Δ amplitude in dB to obtain the slope of the resolution bandwidth filter. For example, if the MKR-Δ frequency is 1.08 kHz and the MKR-Δ amplitude is 3.92 dB, the slope would be equal to 275.5 Hz/dB. Record the result below:

Slope _____ Hz/ dB

Measuring the Residual FM

8. On the spectrum analyzer, press **MKR, More 1 of 2, MARKER ALL OFF, PEAK SEARCH**, then **MARKER Δ**. Rotate the knob counterclockwise until the MKR-Δ amplitude reads $-3 \text{ dB} \pm 0.1 \text{ dB}$.

9. On the spectrum analyzer, press the following keys:

MKR, MARKER NORMAL

MKR →, MARKER →CF

SGL SWP

BW, VID BW AUTO MAN, 1, kHz

SPAN, 0, Hz

SWEEP, 100, ms

SGL SWP

NOTE

The displayed trace should be about three divisions below the reference level. If it is not, press **TRIG, SWEEP CONT SGL (CONT), FREQUENCY**, and use the knob to place the displayed trace about three divisions below the reference level. Press **SGL SWP**.

10. On the spectrum analyzer, press **MKR →, MORE 1 of 2, MARKER →PK-PK**. Read the MKR-Δ amplitude, take its absolute value, and record the result as the Deviation.

Deviation _____ dB

11. Calculate the Residual FM by multiplying the Slope recorded in [step 7](#) by the Deviation recorded in [step 10](#).

Record this value as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The residual FM should be less than 250 Hz.

If you are testing a spectrum analyzer equipped with Option 130 continue with "Part 2: Residual FM Measurement for Option 130." Performance verification test "Residual FM" is now complete for all other spectrum analyzers.

Part 2: Residual FM Measurement for Option 130

The following procedure is an additional test for testing the residual FM of spectrum analyzers equipped with Option 130. Perform “Part 1: Residual FM” before performing this procedure.

Determining the IF Filter Slope

1. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 500, MHz

SPAN, 1, MHz

75 Ω input only: Press **AMPLITUDE, More 1 of 3, Amptd Units,** then **dBm**.

AMPLITUDE, -9, dBm

SCALE LOG LIN (LOG), 1, dB

2. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 300, Hz

3. Wait for the AUTO ZOOM message to disappear. Then press the following spectrum analyzer keys:

MKR →, MARKER →REF LVL

MKR, MARKER 1 ON OFF (OFF)

BW, 30, Hz

SGL SWP

4. Wait for the completion of a new sweep. Then, on the spectrum analyzer, press **PEAK SEARCH, MARKER Δ** .
5. Rotate the spectrum analyzer knob counterclockwise until the MKR- Δ amplitude reads $-1 \text{ dB} \pm 0.2 \text{ dB}$. Press **MARKER Δ** . Rotate the knob counterclockwise until the MKR- Δ amplitude reads $-4 \text{ dB} \pm 0.3 \text{ dB}$.
6. Divide the MKR- Δ frequency in hertz by the MKR- Δ amplitude in dB to obtain the slope of the resolution bandwidth filter. For example, if the MKR- Δ frequency is 1.08 kHz and the MKR- Δ amplitude is 3.92 dB, the slope would be equal to 275.5 Hz/dB. Record the result below:

Slope _____ Hz/ dB

Measuring the Residual FM

7. On the spectrum analyzer, press the following keys:

TRIG, SWEEP CONT SGL (CONT)

MKR, MARKER 1 ON OFF (OFF)

SPAN, ZERO SPAN

SWEEP, SWP TIME AUTO MAN, 300, ms

8. On the spectrum analyzer, press **FREQUENCY**.

9. Rotate the spectrum analyzer knob until the displayed trace is approximately 3 divisions below the reference level, then press **SGL SWEEP**.

10. On the spectrum analyzer, press **MKR →, More 1 of 2, MARKER →PK-PK**. Read the MKR-Δ amplitude, take its absolute value, and record the result as the Deviation.

Deviation _____ dB

11. Calculate the Residual FM by multiplying the Slope recorded in [step 6](#) by the Deviation recorded in [step 10](#). Record this value as TR Entry 2 in the appropriate performance verification test record in Chapter 3. The residual FM should be less than 30 Hz.

Performance verification test “Residual FM” is now complete.

11. Residual FM, 8593E, 8594E, 8595E, 8596E, and 8594Q

This test measures the inherent short-term instability of the spectrum analyzer LO system. With the analyzer in zero span, a stable signal is applied to the input and slope-detected on the linear portion of the IF bandwidth filter skirt. Any instability in the LO transfers to the IF signal in the mixing process. The test determines the slope of the IF filter in Hz/dB and then measures the signal amplitude variation caused by the residual FM. Multiplying these two values yields the residual FM in Hz. The narrow bandwidth options use a 300 Hz span. This span is not specified, however, it is tested in “Frequency Span Accuracy.”

There are no related adjustment procedures for this performance test.

Equipment Required

Signal generator

Cable, Type N, 183 cm (72 in)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Procedure

This performance verification test consists of two parts:

Part 1: Residual FM

Part 2: Residual FM Measurement for Option 130

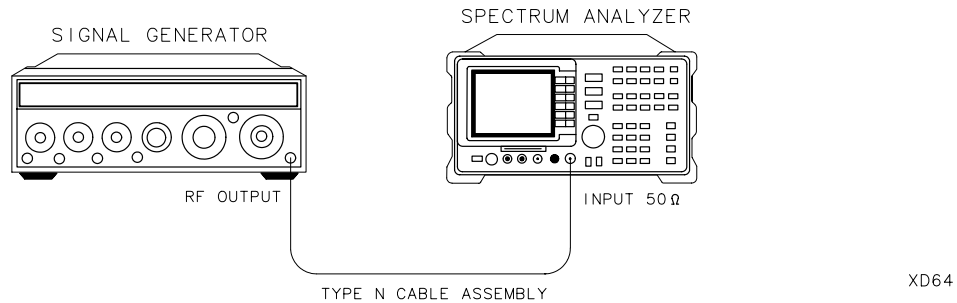
Perform part 2 in addition to part 1 only if your spectrum analyzer is equipped with Option 130. All other spectrum analyzers only perform part 1.

Part 1: Residual FM

Determining the IF Filter Slope

1. Connect the equipment as shown in [Figure 2-15](#).

Figure 2-15 Residual FM Test Setup



2. Set the signal generator controls as follows:

FREQUENCY 500 MHz

CW OUTPUT -10 dBm

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 500, MHz

SPAN, 1, MHz

AMPLITUDE, -9, dBm

SCALE LOG LIN (LOG), 1, dB

BW, 1, kHz

4. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, kHz

5. Wait for the **AUTO ZOOM** message to disappear. Press the following spectrum analyzer keys:

MKR →, MARKER →REF LVL

MKR, MARKER 1 ON OFF (OFF)

11. Residual FM, 8593E, 8594E, 8595E, 8596E, and 8594Q

6. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

If you have difficulty achieving the ± 0.1 dB setting, press the following spectrum analyzer keys:

SPAN, 5, kHz

BW, VID BW AUTO MAN, 30, Hz

7. Rotate the spectrum analyzer knob counterclockwise until the MKR- Δ amplitude reads -1 dB ± 0.1 dB. Press **MARKER Δ** . Rotate the knob counterclockwise until the MKR- Δ amplitude reads -4 dB ± 0.1 dB.
8. Divide the MKR- Δ frequency in hertz by the MKR- Δ amplitude in dB to obtain the slope of the resolution bandwidth filter. For example, if the MKR- Δ frequency is 1.08 kHz and the MKR- Δ amplitude is 3.92 dB, the slope would be equal to 275.5 Hz/dB. Record the result below:

Slope _____ Hz/ dB

Measuring the Residual FM

9. On the spectrum analyzer, press **MKR, More 1 of 2, MARKER ALL OFF, PEAK SEARCH**, then **MARKER Δ** . Rotate the knob counterclockwise until the MKR- Δ amplitude reads -3 dB ± 0.1 dB.
10. On the spectrum analyzer, press the following keys:

MKR, MARKER NORMAL

MKR $\rightarrow$, MARKER $\rightarrow$ CF

SGL SWP

BW, VID BW AUTO MAN, 1, kHz

SPAN, 0, Hz

SWEEP, 100, ms

SGL SWP

NOTE

The displayed trace should be about three divisions below the reference level. If it is not, press **TRIG, SWEEP CONT SGL (CONT), FREQUENCY**, and use the knob to place the displayed trace about three divisions below the reference level. Press **SGL SWP**.

11. On the spectrum analyzer, press **MKR →, More 1 of 2, MARKER →PK-PK**. Read the MKR-Δ amplitude, take its absolute value, and record the result as the Deviation.

Deviation _____dB

12. Calculate the Residual FM by multiplying the Slope recorded in [step 8](#) by the Deviation recorded in [step 11](#). Record this value as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The residual FM should be less than 250 Hz.

If you are testing a spectrum analyzer equipped with Option 130 continue with “Part 2: Residual FM Measurement for Option 130.”

Performance verification test “Residual FM” is now complete for all other spectrum analyzers.

Part 2: Residual FM Measurement for Option 130

The following procedure is an additional test for testing the residual FM of spectrum analyzers equipped with Option 130. Perform “Part 1: Residual FM” before performing this procedure.

Determining the IF Filter Slope

1. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 500, MHz

SPAN, 1, MHz

AMPLITUDE, -9, dBm

SCALE LOG LIN (LOG), 1, dB

2. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 300, Hz

3. Wait for the AUTO ZOOM message to disappear. Then press the following spectrum analyzer keys:

MKR →, MARKER →REF LVL

MKR, MARKER 1 ON OFF (OFF)

BW, 30, Hz

SGL SWP

4. Wait for the completion of a new sweep.

11. Residual FM, 8593E, 8594E, 8595E, 8596E, and 8594Q

5. On the spectrum analyzer, press **PEAK SEARCH, MARKER Δ**.
6. Rotate the spectrum analyzer knob counterclockwise until the MKR-Δ amplitude reads $-1 \text{ dB} \pm 0.2 \text{ dB}$. Press **MARKER Δ**. Rotate the knob counterclockwise until the MKR-Δ amplitude reads $-4 \text{ dB} \pm 0.3 \text{ dB}$.
7. Divide the MKR-Δ frequency in hertz by the MKR-Δ amplitude in dB to obtain the slope of the resolution bandwidth filter. For example, if the MKR-Δ frequency is 1.08 kHz and the MKR-Δ amplitude is 3.92 dB, the slope would be equal to 275.5 Hz/dB. Record the result below:

Slope _____ Hz/ dB

Measuring the Residual FM

8. On the spectrum analyzer, press the following keys:
TRIG, SWEEP CONT SGL (CONT)
MKR, MARKER 1 ON OFF (OFF)
SPAN, ZERO SPAN
SWEEP, SWP TIME AUTO MAN, 300, ms
FREQUENCY
9. Rotate the spectrum analyzer knob until the displayed trace is approximately 3 divisions below the reference level. Then press **SGL SWEEP**.
10. On the spectrum analyzer, press **MKR →, More 1 of 2, MARKER →PK-PK**. Record the absolute value of the MKR-Δ amplitude as the Deviation below:

Deviation _____ dB

11. Calculate the Residual FM by multiplying the Slope recorded in [step 7](#) by the Deviation recorded in [step 10](#). Record the Residual FM as TR Entry 2 in the appropriate performance verification test record in Chapter 3. The residual FM should be less than 30 Hz.

The performance verification test “Residual FM” is now complete.

12. Sweep Time Accuracy, 8590 E-Series, 8591C, and 8594Q

This test uses a synthesizer function generator to amplitude modulate a 500 MHz CW signal from another signal generator. The spectrum analyzer demodulates this signal in zero span to display the response in the time domain. The marker delta frequency function on the spectrum analyzer is used to read out the sweep time accuracy.

If you are testing a spectrum analyzer equipped with Option 101, perform “Fast Time Domain Sweeps” in addition to this procedure.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesizer/function generator

Signal generator

Cable, Type N, 152 cm (60 in)

Cable, BNC, 120 cm (48 in)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

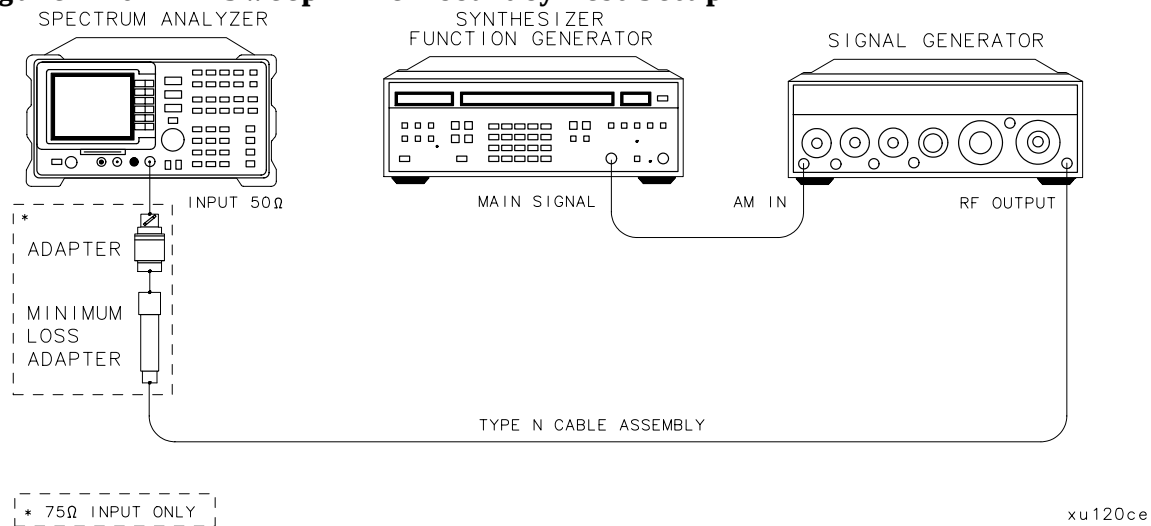
If you are testing a spectrum analyzer equipped with Option 101, perform “Fast Time Domain Sweeps,” in addition to this test.

1. Set the signal generator to output a 500 MHz, -10 dBm, CW signal. Set the AM and FM controls to off.

75 Ω input only: Set the output to -4 dBm.

2. Set the synthesizer/function generator to output a 500 Hz, $+5$ dBm triangle waveform signal.
3. Connect the equipment as shown in Figure 2-16.

Figure 2-16 Sweep Time Accuracy Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

4. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 500, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR, FCTN MK TRACK ON OFF (ON)

SPAN, 50, kHz

12. Sweep Time Accuracy, 8590 E-Series, 8591C, and 8594Q

5. Wait for the AUTO ZOOM routine to finish. Then press the following spectrum analyzer keys:

SPAN

ZERO SPAN

BW, 3, MHz

SWEEP, 20, ms

AMPLITUDE, SCALE LOG LIN (LIN)

6. Adjust signal amplitude for a midscreen display.
7. Set the signal generator AM switch to the AC position.
8. On the spectrum analyzer, press **TRIG** then **VIDEO**. Adjust the video trigger so that the spectrum analyzer is sweeping.
9. Press **SGL SWP**. After the completion of the sweep, press **PEAK SEARCH**. If necessary, press **NEXT PK LEFT** until the marker is on the left-most signal. This is the “marked signal.”
10. Press **MARKER DELTA** and press **NEXT PK RIGHT** 8 times so the marker delta is on the eighth signal peak from the “marked signal.” Record the marker Δ reading in [Table 2-10](#).
11. Repeat steps 9 through 10 for the remaining sweep time settings listed in [Table 2-10](#).
12. Record the marker Δ reading in the appropriate performance verification test record in Chapter 3.

Performance verification test “Sweep Time Accuracy” is now complete.

Table 2-10 Sweep Time Accuracy

Spectrum Analyzer Sweep Time Setting	Synthesizer/Function Generator Frequency	Minimum Reading	TR Entry MKR Δ	Maximum Reading
20 ms	500.0 Hz	15.4 ms	(1) _____	16.6 ms
100 ms	100.0 Hz	77.0 ms	(2) _____	83.0 ms
1 s	10.0 Hz	770.0 ms	(3) _____	830.0 ms
10 s	1.0 Hz	7.7 s	(4) _____	8.3 s

13. Scale Fidelity, 8590 E-Series, 8591C, and 8594Q

A 50 MHz CW signal is applied to the INPUT 50 Ω of the analyzer through two step attenuators. The attenuators increase the effective amplitude range of the source. The amplitude of the source is decreased in 10 dB steps and the analyzer marker functions are used to measure the amplitude difference between steps. The source's internal attenuator is used as the reference standard. The test is performed in both log and linear amplitude scales.

The related adjustment for this performance test is “Log and Linear Amplitude Adjustment.”

Equipment Required

- Synthesizer/level generator
- Attenuator, 1 dB step
- Attenuator, 10 dB step
- Cable, BNC, 122 cm (48 in)
- Cable, BNC, 20 cm (9 in)
- Adapter, Type N (m) to BNC (f)
- Adapter, BNC (m) to BNC (m)

Additional Equipment for Option 026

- Adapter, APC 3.5 (f) to Type N (f)

Additional Equipment for 75 Ω Input

- Adapter, minimum loss
- Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

Log Scale

1. Set the synthesizer/level generator controls as follows:

FREQUENCY 50 MHz

AMPLITUDE +10 dBm

AMPTD INCR 0.05 dB

OUTPUT 50 Ω

2. Connect the equipment as shown in [Figure 2-17](#). Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

75 Ω input only: Set the attenuation of the 10 dB step attenuator to 0 dB. Connect the minimum loss pad to the INPUT 75 Ω using adapters.

Figure 2-17 For 8591E Only - Scale Fidelity Test Setup

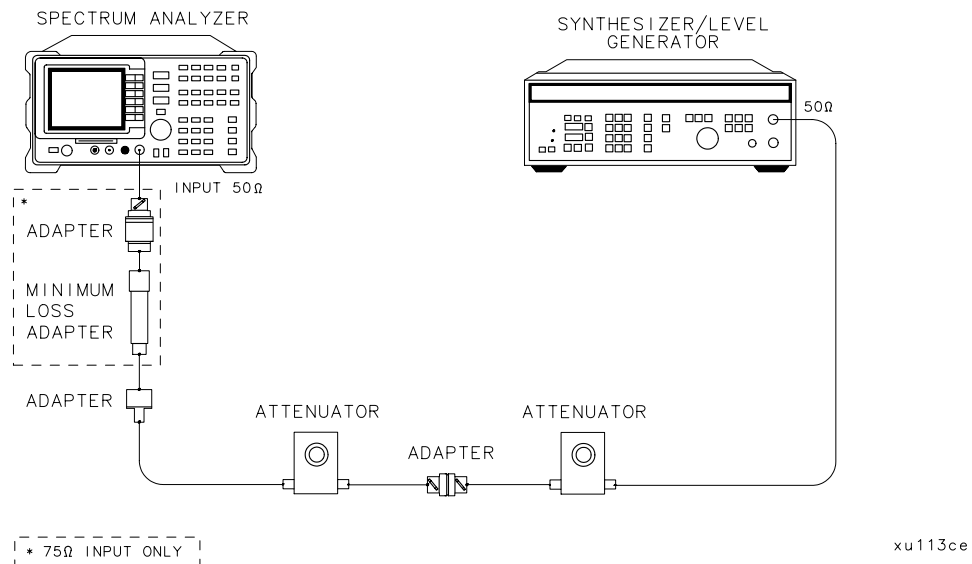
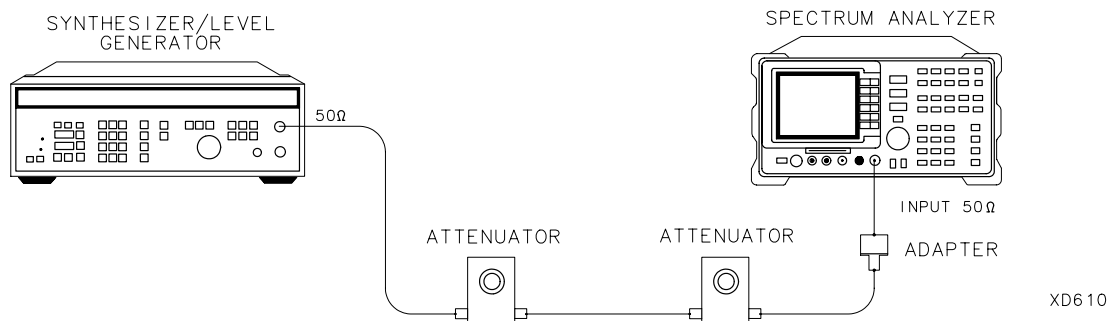


Figure 2-18 Scale Fidelity Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

75 Ω input only: Press **AMPLITUDE, More 1 of 2, Amptd Units,** then **dBm**.

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 50, kHz

Wait for the auto zoom routine to finish, then set the resolution bandwidth and the video bandwidth by pressing the following keys:

BW

RES BW AUTO MAN, 3, kHz

VID BW AUTO MAN, 30, Hz

4. If necessary, adjust the 1 dB step attenuator attenuation until the MKR amplitude reads between 0 dBm and -1 dBm.
5. On the synthesizer/level generator, press **AMPLITUDE** and use the increment keys to adjust the amplitude until the spectrum analyzer MKR amplitude reads 0 dBm $\pm$ 0.05 dB.

It may be necessary to decrease the resolution of the amplitude increment of the synthesizer/level generator to 0.01 dB to obtain a MKR reading of 0 dBm $\pm$ 0.05 dB.

6. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ** .
7. Set the synthesizer/level generator **AMPTD INCR** to 4 dB.
8. On the synthesizer/level generator, press **AMPLITUDE**, then increment down to step the synthesizer/level generator to the next lowest nominal amplitude listed in [Table 2-11](#).
9. Record the Actual MKR Δ amplitude reading in the performance verification test record as indicated in [Table 2-11](#). The MKR amplitude should be within the limits shown.
10. Repeat steps 8 through 9 for the remaining synthesizer/level generator Nominal Amplitudes listed in [Table 2-11](#).

11. For each Actual MKR Δ reading recorded in [Table 2-11](#), subtract the previous Actual MKR Δ reading. Add 4 dB to the number and record the result as the incremental error in the performance verification test record as indicated in [Table 2-11](#). The incremental error should not exceed 0.4 dB/4 dB.

If you are testing a spectrum analyzer equipped with Option 130, continue with step 12.

The “Log Scale” portion the performance verification test “Scale Fidelity” is now complete for all other spectrum analyzers. Proceed to step 14, “Linear Scale.”

Additional Steps for Option 130

12. Press the following spectrum analyzer keys:

BW, RES BW AUTO MAN, 300, Hz

SPAN, 10, kHz

13. Repeat steps 4 through 11 for the narrow bandwidths. Record the results as indicated in [Table 2-12](#).

The scale fidelity in log mode is complete for spectrum analyzers equipped with Option 130. Continue with step 14.

Linear Scale

14. Set the synthesizer/level generator controls as follows:

AMPLITUDE+10 dBm

AMPTD INCR0.05 dB

15. Set the 1 dB step attenuator to 0 dB attenuation.

16. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

AMPLITUDE, SCALE LOG LIN (LIN)

75 Ω input only: More 1 of 2, INPUT Z 50 Ω 75 Ω (50 Ω)

FREQUENCY, 50, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 50, kHz

13. Scale Fidelity, 8590 E-Series, 8591C, and 8594Q

Wait for the auto zoom routine to finish, then set the resolution bandwidth and the video bandwidth by pressing the following keys:

BW

RES BW AUTO MAN, 3, kHz

VID BW AUTO MAN, 30, Hz

17. If necessary, adjust the 1 dB step attenuator attenuation until the MKR reads approximately 223.6 mV. It may be necessary to decrease the resolution of the amplitude increment of the synthesizer/level generator to 0.01 dB to obtain a MKR reading of $223.6 \text{ mV} \pm 0.4 \text{ mV}$.
18. On the synthesizer/level generator, press **AMPLITUDE**, then use the increment keys to adjust the amplitude until the spectrum analyzer MKR amplitude reads $223.6 \text{ mV} \pm 0.4 \text{ mV}$.
19. On the spectrum analyzer, press **PEAK SEARCH, MKR FCTN, MK TRACK ON OFF (OFF)**.
20. Set the synthesizer/level generator amplitude increment to 3 dB.
21. On the synthesizer/level generator, press **AMPLITUDE**, then increment down to step the synthesizer/level generator to the next lowest Nominal Amplitude listed in [Table 2-13](#).
22. Record the MKR amplitude reading in the performance verification test record as indicated in [Table 2-13](#). The MKR amplitude should be within the limits shown.
23. Repeat steps 21 and 22 for the remaining synthesizer/level generator Nominal Amplitudes listed in [Table 2-13](#).

If you are testing a spectrum analyzer equipped with Option 130, continue with step 24.

The “Linear Scale” portion of the performance verification test “Scale Fidelity” is now complete for all other spectrum analyzers. Proceed to step 26, “Log to Linear Switching.”

Additional Steps for Option 130

24. Press the following spectrum analyzer keys:

BW, RES BW AUTO MAN, 300, Hz

SPAN, 10, kHz

25. Repeat steps 17 through 22 for the narrow bandwidths. Record the results as indicated in [Table 2-14](#).

The “Linear Scale” portion of the performance verification test “Scale Fidelity” is now complete for spectrum analyzers equipped with Option 130. Proceed to step 26, “Log to Linear Switching.”

Log to Linear Switching

26. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

27. Set the synthesizer controls as follows:

FREQUENCY 50 MHz

AMPLITUDE +6 dBm

28. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

BW, 300, kHz

29. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR →, MARKER →REF LVL

PEAK SEARCH

30. Record the peak marker reading in Log mode below.

Log Mode Amplitude Reading _____ dBm

31. Press **AMPLITUDE, SCALE LOG LIN (LIN)** to change the scale to linear, then press **More 1 of 2, Amptd Units**, and **dBm** to set the amplitude units to dBm.

32. Press **PEAK SEARCH**, then record the peak marker amplitude reading in linear mode.

Linear Mode Amplitude Reading _____ dBm

33. Subtract the Linear Mode Amplitude Reading from the Log Mode Amplitude Reading, then record this value as the Log/Linear Error.

Log/Linear Error _____ dB

34. If the Log/Linear Error is less than 0 dB, record this value as TR Entry 73 in the performance verification test record. The absolute value of the reading should be less than 0.25 dB. If the Log/Linear Error is greater than 0 dB, continue with the next step.

35. On the spectrum analyzer, press the following keys:

MKR →, MARKER →REF LVL

PEAK SEARCH

36. Record the peak marker amplitude reading in linear mode.

Linear Mode Amplitude Reading _____ dBm

37. On the spectrum analyzer, press the following keys:

AMPLITUDE, SCALE LOG LIN (LOG)

PEAK SEARCH

38. Record the peak marker reading in Log mode below.

Log Mode Amplitude Reading _____ dBm

39. Subtract the Log Mode Amplitude Reading from the Linear Mode Amplitude Reading, then record this value as the Linear/Log Error.

Linear/Log Error _____ dB

40. Record the Linear/Log Error as TR Entry 73 in the performance verification test record. The absolute value of the reading should be less than 0.25 dB.

If you are testing a spectrum analyzer equipped with Option 130, continue with step 42.

The performance verification test “Scale Fidelity” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

41. Press the following spectrum analyzer keys:

AMPLITUDE, SCALE LOG LIN (LOG)

BW, RES BW AUTO MAN, 300, Hz

SPAN, 10, kHz

42. Repeat steps 29 through 39 for the narrow bandwidths. Record the results in the performance verification test record as TR Entry 74.

Performance verification test “Scale Fidelity” is now complete for spectrum analyzers equipped with Option 130.

Table 2-11 Cumulative and Incremental Error, Log Mode

Synthesizer/ Level Generator Nominal Amplitude	dB from Ref Level (nominal)	TR Entry Cumulative Error (MKR Δ Reading)			TR Entry Incremental Error
		Min. (dB)	Actual (dB)	Max. (dB)	
+10 dBm	0	0 (Ref)	0 (Ref)	0 (Ref)	0 (Ref)
+6 dBm	-4	-4.34	(1)_____	-3.66	(18)_____
+2 dBm	-8	-8.38	(2)_____	-7.62	(19)_____
-2 dBm	-12	-12.42	(3)_____	-11.58	(20)_____
-6 dBm	-16	-16.46	(4)_____	-15.54	(21)_____
-10 dBm	-20	-20.50	(5)_____	-19.50	(22)_____
-14 dBm	-24	-24.54	(6)_____	-23.46	(23)_____
-18 dBm	-28	-28.58	(7)_____	-27.42	(24)_____
-22 dBm	-32	-32.62	(8)_____	-31.38	(25)_____
-26 dBm	-36	-36.66	(9)_____	-35.34	(26)_____
-30 dBm	-40	-40.70	(10)_____	-39.30	(27)_____
-34 dBm	-44	-44.74	(11)_____	-43.26	(28)_____
-38 dBm	-48	-48.78	(12)_____	-47.22	(29)_____
-42 dBm	-52	-52.82	(13)_____	-51.18	(30)_____
-46 dBm	-56	-56.86	(14)_____	-55.14	(31)_____
-50 dBm	-60	-60.90	(15)_____	-59.10	(32)_____
-54 dBm	-64	-64.94	(16)_____	-63.06	N/A
-58 dBm	-68	-68.98	(17)_____	-67.02	N/A

Table 2-12 Cumulative and Incremental Error, Log Mode for Option 130

Synthesizer/ Level Generator Nominal Amplitude	dB from Ref Level (nominal)	TR Entry Cumulative Error (MKR Δ Reading)			TR Entry Incremental Error
		Min. (dB)	Actual (dB)	Max. (dB)	
+10 dBm	0	0 (Ref)	0 (Ref)	0 (Ref)	0 (Ref)
+6 dBm	-4	-4.44	(33)_____	-3.56	(50)_____
+2 dBm	-8	-8.48	(34)_____	-7.52	(51)_____
-2 dBm	-12	-12.52	(35)_____	-11.48	(52)_____
-6 dBm	-16	-16.56	(36)_____	-15.44	(53)_____
-10 dBm	-20	-20.60	(37)_____	-19.40	(54)_____
-14 dBm	-24	-24.64	(38)_____	-23.36	(55)_____
-18 dBm	-28	-28.68	(39)_____	-27.32	(56)_____
-22 dBm	-32	-32.72	(40)_____	-31.28	(57)_____
-26 dBm	-36	-36.76	(41)_____	-35.24	(58)_____
-30 dBm	-40	-40.80	(42)_____	-39.20	(59)_____
-34 dBm	-44	-44.84	(43)_____	-43.16	(60)_____
-38 dBm	-48	-48.88	(44)_____	-47.12	(61)_____
-42 dBm	-52	-52.92	(45)_____	-51.08	(62)_____
-46 dBm	-56	-56.96	(46)_____	-55.04	(63)_____
-50 dBm	-60	-61.00	(47)_____	-59.00	(64)_____
-54 dBm	-64	-65.04	(48)_____	-62.96	N/A
-58 dBm	-68	-69.08	(49)_____	-66.92	N/A

Table 2-13 Scale Fidelity, Linear Mode

Synthesizer/Level Generator Nominal Amplitude	% of Ref Level (nominal)	MKR Reading		
		Min. (mV)	TR Entry	Max. (mV)
+10 dBm	100	0 (Ref)	0 (Ref)	0 (Ref)
+7 dBm	70.7	151.59	(65)_____	165.01
+4 dBm	50	105.36	(66)_____	118.78
+1 dBm	35.48	72.63	(67)_____	86.05
–2 dBm	25	49.46	(68)_____	62.88

Table 2-14 Scale Fidelity, Linear Mode for Option 130

Synthesizer/Level Generator Nominal Amplitude	% of Ref Level (nominal)	MKR Reading		
		Min. (mV)	TR Entry	Max. (mV)
+10 dBm	100	0 (Ref)	0 (Ref)	0 (Ref)
+7 dBm	70.7	151.59	(69)_____	165.01
+4 dBm	50	105.36	(70)_____	118.78
+1 dBm	35.48	72.63	(71)_____	86.05
–2 dBm	25	49.46	(72)_____	62.88

14. Reference Level Accuracy, 8591E and 8591C

A 50 MHz CW signal is applied to the INPUT 50 Ω of the spectrum analyzer through two step attenuators. The attenuators increase the effective amplitude range of the source. The amplitude of the source is decreased in 10 dB steps and the spectrum analyzer marker functions are used to measure the amplitude difference between steps. The source's internal attenuator is used as the reference standard. The test is performed in both log and linear amplitude scales.

It is only necessary to test reference levels as low as -90 dBm (with 10 dB attenuation) since lower reference levels are a function of the spectrum analyzer microprocessor manipulating the trace data. There is no error associated with the trace data manipulation.

The related adjustment for this procedure is "A12 Cal Attenuator Error Correction."

Equipment Required

Synthesizer/level generator

Attenuator, 1 dB steps

Attenuator, 10 dB steps

Cable, BNC 122 cm (48 in) (2 required)

Adapter, Type N (m) to BNC (f)

Adapter, BNC (m) to BNC (m)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Adapter, Type N (f) to BNC (m) 75 Ω

Procedure

Log Scale

1. Set the synthesizer/level generator controls as follows:

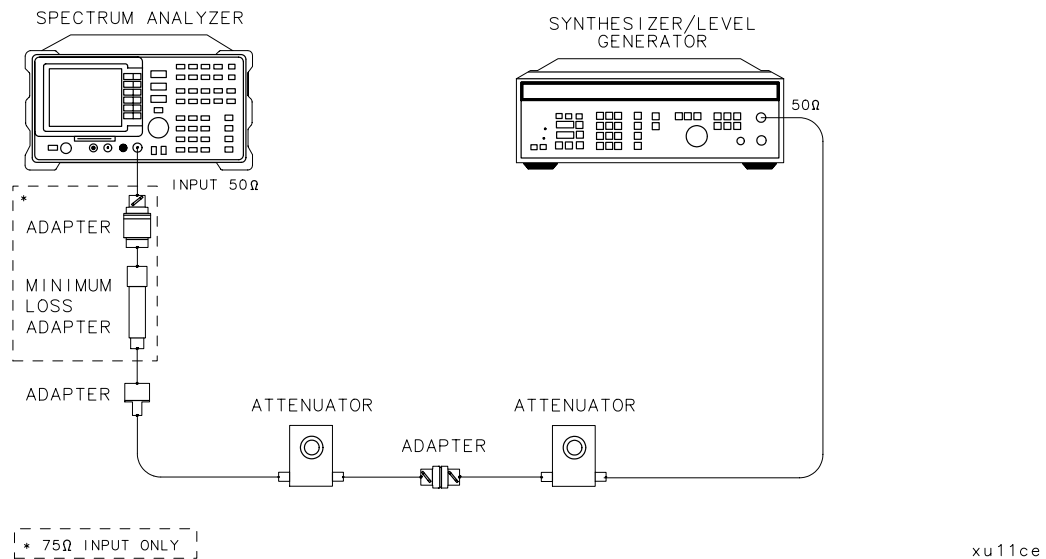
FREQUENCY	50 MHz
AMPLITUDE	-10 dBm
AMPTD INCR	10 dB
OUTPUT	50 Ω

14. Reference Level Accuracy, 8591E and 8591C

2. Connect the equipment as shown in Figure 2-19. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

75 Ω input only: Connect the minimum loss adapter to the RF input 75 Ω , using adapters, and set the 10 dB step attenuator to 0 dB attenuation.

Figure 2-19 Reference Level Accuracy Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press PRESET on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR, FCTN MK TRACK ON OFF (ON)

SPAN, 50, kHz

75 Ω input only: Press **AMPLITUDE, More 1 of 2, Amptd Units**, then **dBm**.

AMPLITUDE, -20, dBm, SCALE LOG LIN (LOG), 1, dB

BW, 3, kHz, VID BW AUTO MAN, 30, Hz

4. Set the 1 dB step attenuator to place the signal peak one to two dB (one to two divisions) below the reference level.
5. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

6. Set the synthesizer/level generator amplitude and spectrum analyzer reference level according to [Table 2-15](#). At each setting, press **SGL SWP** on the spectrum analyzer.
7. Record the MKR Δ amplitude reading in the performance test record as indicated in [Table 2-15](#). The MKR Δ reading should be within the limits shown.

Linear Scale

8. Set the synthesizer/level generator amplitude to -10 dBm.
9. Set the 1 dB step attenuator to 0 dB attenuation.
10. Set the spectrum analyzer controls as follows:

AMPLITUDE, -20 , dBm

SCALE LOG LIN (LIN)

AMPLITUDE, More 1 of 2, Amptd Units, dBm

SWEEP, SWEEP CONT SGL (CONT)

MKR, More 1 of 2, MARKER ALL OFF

11. Set the 1 dB step attenuator to place the signal peak one to two divisions below the reference level.
12. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

MKR FCTN, MK TRACK ON OFF (OFF)

13. Set the synthesizer/level generator amplitude and spectrum analyzer reference level according to [Table 2-16](#). At each setting, press **SGL SWP** on the spectrum analyzer.
14. Record the MKR Δ amplitude reading in [Table 2-16](#). The MKR Δ reading should be within the limits shown.

If you are testing a spectrum analyzer equipped with Option 130, continue with step 15.

Performance verification test “Reference Level Accuracy” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

15. Press the following spectrum analyzer keys:

AMPLITUDE, -20 dBm, **SCALE LOG LIN** (LOG), 1, dB

BW, RES BW AUTO MAN, 300, Hz

SPAN, 10, kHz

SWEEP, **SWEEP CONT SGL** (CONT)

16. Set the synthesizer/level generator to -10 dBm.

17. Repeat steps 4 through 6, using [Table 2-17](#) for the narrow resolution bandwidths.

18. Record the MKR Δ amplitude reading in the performance test record as indicated in [Table 2-17](#). The MKR Δ reading should be within the limits shown.

19. Repeat steps 8 through 13, using [Table 2-18](#) for the narrow resolution bandwidths.

20. Record the MKR Δ amplitude reading in the performance test record as indicated in [Table 2-18](#). The MKR Δ reading should be within the limits shown.

Performance verification test "Reference Level Accuracy" is now complete for spectrum analyzers equipped with Option 130.

Table 2-15 Reference Level Accuracy, Log Mode

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	(1)_____	+0.4
+10	0	-0.5	(2)_____	+0.5
-20	-30	-0.4	(3)_____	+0.4
-30	-40	-0.5	(4)_____	+0.5
-40	-50	-0.8	(5)_____	+0.8
-50	-60	-1.0	(6)_____	+1.0
-60	-70	-1.1	(7)_____	+1.1
-70	-80	-1.2	(8)_____	+1.2
-80	-90	-1.3	(9)_____	+1.3

Table 2-16 Reference Level Accuracy, Linear Mode

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	(10)_____	+0.4
+10	0	-0.5	(11)_____	+0.5
-20	-30	-0.4	(12)_____	+0.4
-30	-40	-0.5	(13)_____	+0.5
-40	-50	-0.8	(14)_____	+0.8
-50	-60	-1.0	(15)_____	+1.0
-60	-70	-1.1	(16)_____	+1.1
-70	-80	-1.2	(17)_____	+1.2
-80	-90	-1.3	(18)_____	+1.3

Table 2-17 Reference Level Accuracy, Log Mode for Option 130

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	(19)_____	+0.4
+10	0	-0.5	(20)_____	+0.5
-20	-30	-0.4	(21)_____	+0.4
-30	-40	-0.5	(22)_____	+0.5
-40	-50	-0.8	(23)_____	+0.8
-50	-60	-1.1	(24)_____	+1.1
-60	-70	-1.2	(25)_____	+1.2
-70	-80	-1.3	(26)_____	+1.3
-80	-90	-1.4	(27)_____	+1.4

Table 2-18 Reference Level Accuracy, Linear Mode for Option 130

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	(28)_____	+0.4
+10	0	-0.5	(29)_____	+0.5
-20	-30	-0.4	(30)_____	+0.4
-30	-40	-0.5	(31)_____	+0.5
-40	-50	-0.8	(32)_____	+0.8
-50	-60	-1.1	(33)_____	+1.1
-60	-70	-1.2	(34)_____	+1.2
-70	-80	-1.3	(35)_____	+1.3
-80	-90	-1.4	(36)_____	+1.4

15. Reference Level Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

A 50 MHz CW signal is applied to the INPUT 50 Ω of the spectrum analyzer through two step attenuators. The attenuators increase the effective amplitude range of the source. The amplitude of the source is decreased in 10 dB steps and the spectrum analyzer marker functions are used to measure the amplitude difference between steps. The source internal attenuator is used as the reference standard. The test is performed in both log and linear amplitude scales.

It is only necessary to test reference levels as low as -90 dBm (with 10 dB attenuation) since lower reference levels are a function of the spectrum analyzer microprocessor manipulating the trace data. There is no error associated with the trace data manipulation.

The related adjustment for this procedure is "A12 Cal Attenuator Error Correction."

Equipment Required

Synthesizer/level generator

Attenuator, 1 dB steps

Attenuator, 10 dB steps

Cable, BNC 122 cm (48 in) (*2 required*)

Adapter, Type N (m) to BNC (f)

Adapter, BNC (m) to BNC (m)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Adapter, BNC (f) to SMA (m)

Procedure

Log Scale

1. Set the synthesizer/level generator controls as follows:
 FREQUENCY 50 MHz
 AMPLITUDE -10 dBm
 AMPTD INCR 10 dB
 OUTPUT 50 Ω
2. Connect the equipment as shown in [Figure 2-20](#) or [Figure 2-21](#) (8594E and 8594Q Only). Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

Figure 2-20 Reference Level Accuracy Test Setup

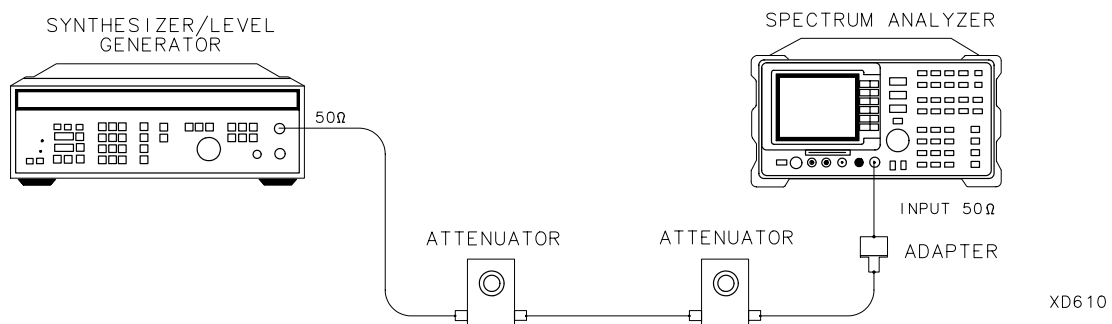
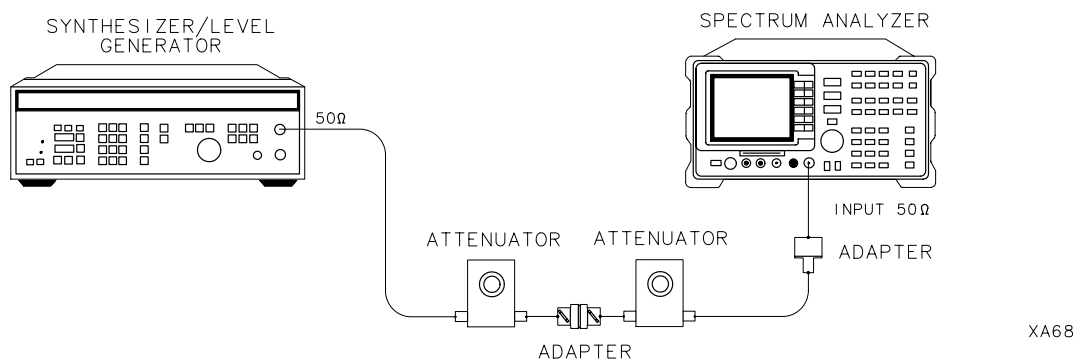


Figure 2-21 Reference Level Accuracy Test Setup, 8594E and 8594Q Only



15. Reference Level Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 50, MHz**
 - SPAN, 10, MHz**
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 50, kHz**
 - AMPLITUDE, -20, dBm, SCALE LOG LIN (LOG), 1, dB**
 - BW, 3, kHz, VID BW AUTO MAN, 30, Hz**
4. Set the 1 dB step attenuator to place the signal peak one to two dB (one to two divisions) below the reference level.
5. On the spectrum analyzer, press the following keys:
 - SGL SWP**
 - PEAK SEARCH, MARKER Δ**
6. Set the synthesizer/level generator amplitude and spectrum analyzer reference level according to [Table 2-19](#). At each setting, press **SGL SWP** on the spectrum analyzer.
7. Record the MKR Δ amplitude reading in the performance verification test record as indicated in [Table 2-19](#). The MKR Δ reading should be within the limits shown.

Linear Scale

8. Set the synthesizer/level generator amplitude to -10 dBm.
9. Set the 1 dB step attenuator to 0 dB attenuation.
10. Set the spectrum analyzer controls as follows:
 - AMPLITUDE, -20, dBm**
 - SCALE LOG LIN (LIN)**
 - AMPLITUDE, More 1 of 2, Amptd Units, dBm**
 - SWEEP, SWEEP CONT SGL (CONT)**
 - MKR, More 1 of 2, MARKER ALL OFF**
11. Set the 1 dB step attenuator to place the signal peak one to two divisions below the reference level.

12. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

13. Set the synthesizer/level generator amplitude and spectrum analyzer reference level according to [Table 2-20](#). At each setting, press **SGL SWP** on the spectrum analyzer.

14. Record the MKR Δ amplitude reading in [Table 2-20](#). The MKR Δ reading should be within the limits shown.

If you are testing a spectrum analyzer equipped with Option 130, continue with step 15.

Performance verification test “Reference Level Accuracy” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

15. Press the following spectrum analyzer keys:

AMPLITUDE, -20 dBm, SCALE LOG LIN (LOG), 1, dB

BW, RES BW AUTO MAN, 300, Hz

SPAN, 10, kHz

SWEEP, SWEEP CONT SGL (CONT)

16. Set the synthesizer/level generator to -10 dBm.

17. Set the 1 dB step attenuator to place the signal peak one to two dB (one to two divisions) below the reference level.

18. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

19. Set the synthesizer/level generator amplitude and spectrum analyzer reference level according to [Table 2-19](#). At each setting, press **SGL SWP** on the spectrum analyzer.

20. Record the MKR Δ amplitude reading in the performance verification test record as indicated in [Table 2-21](#). The MKR Δ reading should be within the limits shown.

21. Repeat steps 8 through 13 for the narrow resolution bandwidths, using [Table 2-22](#).

22. Record the MKR Δ amplitude reading in the performance verification test record as indicated in [Table 2-22](#). The MKR Δ reading should be within the limits shown.

Performance verification test “Reference Level Accuracy” is now complete.

15. Reference Level Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

Table 2-19 Reference Level Accuracy, Log Mode

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	(1)_____	+0.4
+10	0	-0.5	(2)_____	+0.5
-20	-30	-0.4	(3)_____	+0.4
-30	-40	-0.5	(4)_____	+0.5
-40	-50	-0.8	(5)_____	+0.8
-50	-60	-1.0	(6)_____	+1.0
-60	-70	-1.1	(7)_____	+1.1
-70	-80	-1.2	(8)_____	+1.2
-80	-90	-1.3	(9)_____	+1.3

Table 2-20 Reference Level Accuracy, Linear Mode

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	(10)_____	+0.4
+10	0	-0.5	(11)_____	+0.5
-20	-30	-0.4	(12)_____	+0.4
-30	-40	-0.5	(13)_____	+0.5
-40	-50	-0.8	(14)_____	+0.8
-50	-60	-1.0	(15)_____	+1.0
-60	-70	-1.1	(16)_____	+1.1
-70	-80	-1.2	(17)_____	+1.2
-80	-90	-1.3	(18)_____	+1.3

Table 2-21 Reference Level Accuracy, Log Mode for Option 130

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	(19)_____	+0.4
+10	0	-0.5	(20)_____	+0.5
-20	-30	-0.4	(21)_____	+0.4
-30	-40	-0.5	(22)_____	+0.5
-40	-50	-0.8	(23)_____	+0.8
-50	-60	-1.1	(24)_____	+1.1
-60	-70	-1.2	(25)_____	+1.2
-70	-80	-1.3	(26)_____	+1.3
-80	-90	-1.4	(27)_____	+1.4

Table 2-22 Reference Level Accuracy, Linear Mode for Option 130

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	(28)_____	+0.4
+10	0	-0.5	(29)_____	+0.5
-20	-30	-0.4	(30)_____	+0.4
-30	-40	-0.5	(31)_____	+0.5
-40	-50	-0.8	(32)_____	+0.8
-50	-60	-1.1	(33)_____	+1.1
-60	-70	-1.2	(34)_____	+1.2
-70	-80	-1.3	(35)_____	+1.3
-80	-90	-1.4	(36)_____	+1.4

16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties, 8590 E-Series, 8591C, and 8594Q

To measure the absolute amplitude calibration uncertainty the input signal is measured after the self-cal routine is finished.

To measure the resolution bandwidth switching uncertainty an amplitude reference is taken with the resolution bandwidth set to 3 kHz using the marker-delta function. The resolution bandwidth is changed to settings between 3 MHz and 1 kHz and the amplitude variation is measured at each setting and compared to the specification. The span is changed as necessary to maintain approximately the same aspect ratio.

The related adjustment procedure for this performance test is “Crystal and LC Bandwidth Adjustment.”

Equipment Required

Cable, BNC, 23 cm (9 in)

Adapter, Type N (m) to BNC (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Additional Equipment for 75 Ω Input

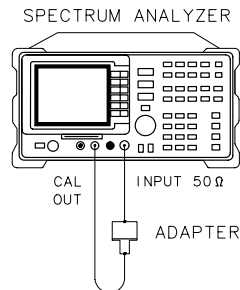
Cable, BNC, 75 Ω , 30 cm (12 in)

Absolute Amplitude Uncertainty

1. Connect the CAL OUT to the spectrum analyzer input using the BNC cable and adapter, as shown in Figure 2-22.

75 Ω input only: Use the 75 Ω cable and omit the adapter.

Figure 2-22 **Uncertainty Test Setup**



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer controls by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR, FCTN MK TRACK ON OFF (ON)

SPAN, 50, kHz

BW, 3, kHz

VID BW AUTO MAN, 300, Hz

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd, Units, dBm**

AMPLITUDE, SCALE LOG LIN (LIN)

More 1 of 3, Amptd Units, then dBm

AMPLITUDE, -20, dBm

3. Press **PEAK SEARCH**, then record the marker reading in TR Entry 1 of the performance verification test record.

The marker reading should be within -20.15 and -19.85 dB.

16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties, 8590 E-Series, 8591C, and 8594Q**Resolution Bandwidth Switching Uncertainty**

4. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer controls by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

SPAN, 50, kHz

AMPLITUDE, -20, dBm

SCALE LOG LIN (LOG), 1, dB

BW, 3, kHz

VID BW AUTO MAN, 1, kHz

5. Press **AMPLITUDE** and use the knob to adjust the reference level until the signal appears one division below the reference level, then press the following keys:

PEAK SEARCH, MARKER Δ

MKR FCTN, MK TRACK ON OFF (ON)

6. Set the spectrum analyzer resolution bandwidth and span according to [Table 2-23](#).
7. Press **PEAK SEARCH**, then record the MKR Δ TRK amplitude reading as indicated in [Table 2-23](#).

The amplitude reading should be within the limits shown.

8. Repeat steps 6 through 7 for each of the remaining resolution bandwidth and span settings listed in [Table 2-23](#).
9. Record TR Entry 2 through TR Entry 10 in the appropriate performance verification test record in Chapter 3.

If you are testing a spectrum analyzer equipped with Option 130, continue with step 9.

Performance verification test “Resolution Bandwidth Switching Uncertainty” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

10. Press the following spectrum analyzer keys:

SPAN, 50, kHz

BW, 3, kHz

PEAK SEARCH, MARKER Δ

MKR FCTN, MK TRACK ON OFF (ON)

11. Set the resolution bandwidth and span according to [Table 2-24](#).

12. Press **PEAK SEARCH**, then record the MKR Δ TRK amplitude reading in the performance verification test record as indicated in Table 2-20.

The amplitude reading should be within the limits shown.

13. Repeat steps 10 through 11 for each of the remaining resolution bandwidth and span settings listed in Table 2-20.

It is normal for the 200 Hz resolution bandwidth shape to have a dip in the center of the response.

14. Record TR Entry 11 through TR Entry 14 in the appropriate performance verification test record in Chapter 3.

Performance verification test “Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties” is now complete.

16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties, 8590
E-Series, 8591C, and 8594Q

Table 2-23 Resolution Bandwidth Switching Uncertainty

Spectrum Analyzer		MKR Δ TRK Amplitude Reading		
RES BW Setting	SPAN Setting	Min. (dB)	TR Entry	Max. (dB)
3 kHz	50 kHz	0 (Ref)	0 (Ref)	0 (Ref)
1 kHz	50 kHz	-0.5	(2)_____	+0.5
9 kHz	50 kHz	-0.4	(3)_____	+0.4
10 kHz	50 kHz	-0.4	(4)_____	+0.4
30 kHz	500 kHz	-0.4	(5)_____	+0.4
100 kHz	500 kHz	-0.4	(6)_____	+0.4
120 kHz	500 kHz	-0.4	(7)_____	+0.4
300 kHz	5 MHz	-0.4	(8)_____	+0.4
1 MHz	10 MHz	-0.4	(9)_____	+0.4
3 MHz	10 MHz	-0.4	(10)_____	+0.4

Table 2-24 Resolution Bandwidth Switching Uncertainty for Option 130

Spectrum Analyzer		MKR Δ TRK Amplitude Reading		
RES BW Setting	SPAN Setting	Min. (dB)	TR Entry	Max. (dB)
3 kHz	50 kHz	0 (Ref)	0 (Ref)	0 (Ref)
300 Hz	1 kHz	-0.6	(11)_____	+0.6
200 Hz	1 kHz	-0.6	(12)_____	+0.6
100 Hz	1 kHz	-0.6	(13)_____	+0.6
30 Hz	1 kHz	-0.6	(14)_____	+0.6

17. Resolution Bandwidth Accuracy, 8590 E-Series, 8591C, and 8594Q

The output of a synthesizer/level generator is connected to the input of the spectrum analyzer. Measurements are performed in zero span to reduce the measurement uncertainty.

The frequency of the synthesizer/level generator is set to the center of the bandwidth-filter response. The synthesizer output is then reduced in amplitude by either 3 dB or 6 dB to determine the reference point. A marker reference is set and the synthesizer output is increased to its previous level.

The frequency of the synthesizer is reduced then recorded when the resulting marker amplitude matches the previously set marker reference. The synthesizer frequency is increased so that it is tuned on the opposite point on the skirt of the filter response. The frequency is once again recorded and the difference between the two frequencies is compared to the specification.

The related adjustments for this performance test are “CAL AMPTD and CAL FREQ Self-Cal Routines” and “Crystal and LC Filter Adjustments.”

Equipment Required

Synthesizer/level generator

Cable, BNC, 122 cm (48 in)

Adapter, Type N (m) to BNC (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Additional Equipment for 75 Ω Input

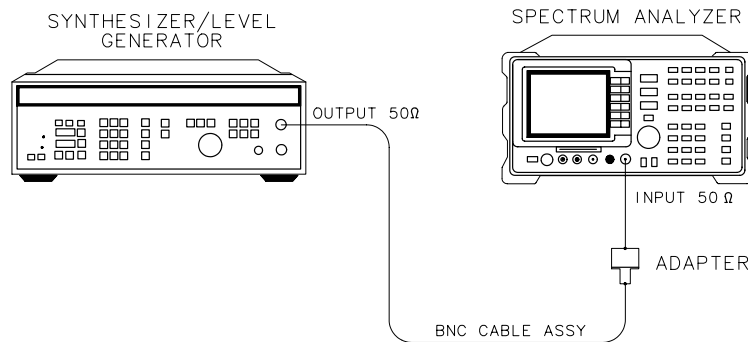
Cable, BNC (75 Ω), 122 cm (48 in)

Procedure

1. Connect the equipment as shown in Figure 2-23.

75 Ω input: Connect the 75 Ω cable to the OUTPUT 75 Ω connector of the synthesizer/level generator.

Figure 2-23 Resolution Bandwidth Accuracy Test Setup



XC612

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3 dB Bandwidths

2. Set the synthesizer/level generator controls as follows:

75 Ω input only: Set the 50 Ω /75 Ω switch to 75 Ω

AMPLITUDE0 dBm

AMPTD INCR3 dB

FREQUENCY 50 MHz

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, ZERO SPAN

BW, 3, MHz

VID BW AUTO MAN, 30, Hz

AMPLITUDE, SCALE LOG LIN (LOG), 1, dB

4. On the synthesizer/level generator set MANUAL TUNE ON/OFF to ON.
5. On the spectrum analyzer press **MKR**.

6. Adjust the frequency of the synthesizer/level generator for a maximum marker reading.

It will be necessary to adjust the MANUAL TUNE DIGIT resolution on the synthesizer/level generator for the best compromise between tuning speed and resolution.

Adjust the synthesizer/level generator amplitude to place the peak of the signal at or below the top graticule.
7. On the synthesizer/level generator, press AMPLITUDE and INCR ↓ (step-down key).
8. Press **MARKER** Δ on the spectrum analyzer.
9. On the synthesizer/level generator, press INCR ↑ (step-up key).
10. On the synthesizer/level generator, press FREQUENCY. Lower the frequency of the synthesizer/level generator by adjusting the knob until the marker delta amplitude is 0.0 ± 0.05 dB.
11. Record the synthesizer/level generator frequency readout in column 1 of [Table 2-25](#).
12. Using the synthesizer/level generator knob, raise the frequency so that the marker-delta amplitude is maximum. Continue increasing the frequency until the marker reads 0.0 ± 0.05 dB.
13. Record the synthesizer/level generator frequency readout in column 2 of [Table 2-25](#).
14. Adjust the synthesizer/level generator frequency for maximum amplitude.
15. Repeat steps 5 through 14 for each of the RES BW settings listed in [Table 2-25](#).
16. Subtract the Synthesizer Lower Frequency from the Synthesizer Upper Frequency. Record the difference as the Resolution Bandwidth Accuracy, in the performance verification test record as indicated in [Table 2-25](#).

$$\text{RES BW Accuracy} = \text{Upper Frequency} - \text{Lower Frequency}$$

6 dB EMI Bandwidths

17. Set the synthesizer/level generator AMPTD INCR to 6 dB.
18. On the spectrum analyzer, press the following keys:

BW, EMI BW MENU, 9 kHz EMI BW

MKR, MARKER NORMAL
19. On the synthesizer/level generator, press FREQUENCY. Adjust the frequency for a maximum marker reading.
20. On the synthesizer/level generator, press AMPLITUDE and INCR ↓ (step-down key).

17. Resolution Bandwidth Accuracy, 8590 E-Series, 8591C, and 8594Q

21. Press **MARKER DELTA** on the spectrum analyzer.
22. On the synthesizer/level generator, press INCR $\uparrow$ (step-up key).
23. On the synthesizer/level generator, press **FREQUENCY**. Lower the frequency of the synthesizer/level generator by adjusting the knob until the marker-delta amplitude is 0.0 ± 0.05 dB.
24. Record the synthesizer/level generator frequency readout in column 1 of [Table 2-26](#).
25. Using the synthesizer/level generator knob, increase the frequency so that the marker-delta amplitude is maximum. Continue increasing the frequency until the marker reads 0.0 ± 0.05 dB.
26. Record the synthesizer/level generator frequency readout in column 2 of [Table 2-26](#).
27. Adjust the synthesizer/level generator frequency for maximum marker amplitude.
28. Repeat steps 18 through 26 for the **120 kHz EMI RES BW**.
29. Subtract the Synthesizer Lower Frequency from the Synthesizer Upper Frequency. Record the difference as the Resolution Bandwidth Accuracy, in the performance verification test record as indicated in [Table 2-26](#).

$$\text{RES BW Accuracy} = \text{Upper Frequency} - \text{Lower Frequency}$$

If you are testing a spectrum analyzer equipped with Option 130, continue with step 30.

Performance test “Resolution Bandwidth Accuracy” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

30. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 1, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 1, kHz

Wait for the auto zoom routine to finish, then press the following keys:

MKR, MARKER 1 ON OFF (OFF)

MEAS/USER, N dB PTS ON OFF, 3, dB

AMPLITUDE, SCALE LOG LIN (LOG), 1, dB

BW, 300, Hz

31. Set the spectrum analyzer resolution bandwidth and span according to [Table 2-27](#).

32. Press **SGL SWP**. Record the –3 dB POINTS: readout in the performance verification test record as indicated in [Table 2-27](#).

33. Repeat steps 31 through 32 for each of the Resolution Bandwidth settings listed in [Table 2-27](#).

6 dB EMI 200 Hz Bandwidths

It is normal for the 200 Hz resolution bandwidth shape to have a dip in the center of the response.

34. Press the following spectrum analyzer keys:

MEAS/USER, N dB PTS ON OFF, 6, dB

BW, 200, Hz

35. Press **SGL SWP**. Record the –6 dB POINTS: readout in the performance verification test record as TR Entry 14.

Performance verification test “Resolution Bandwidth Accuracy” is now complete for spectrum analyzers equipped with Option 130.

17. Resolution Bandwidth Accuracy, 8590 E-Series, 8591C, and 8594Q

Table 2-25 3 dB Resolution Bandwidth Accuracy

Spectrum Analyzer RES BW	Column 1 Synthesizer Lower Frequency	Column 2 Synthesizer Upper Frequency	TR Entry Resolution Bandwidth Accuracy
3 MHz	_____	_____	(1)_____
1 MHz	_____	_____	(2)_____
300 kHz	_____	_____	(3)_____
100 kHz	_____	_____	(4)_____
30 kHz	_____	_____	(5)_____
10 kHz	_____	_____	(6)_____
3 kHz	_____	_____	(7)_____
1 kHz	_____	_____	(8)_____

Table 2-26 EMI Resolution Bandwidth Accuracy

Spectrum Analyzer RES BW	Column 1 Synthesizer Lower Frequency	Column 2 Synthesizer Upper Frequency	TR Entry Resolution Bandwidth Accuracy
9 kHz	_____	_____	(9)_____
120 kHz	_____	_____	(10)_____

Table 2-27 Resolution Bandwidth Accuracy for Option 130

Resolution Bandwidth	Frequency Span	TR Entry –3 dB Readout)
300 Hz	1 kHz	(11)_____
100 Hz	1 kHz	(12)_____
30 Hz	300 Hz	(13)_____

18. Calibrator Amplitude Accuracy, 8590 E-Series, 8591C, and 8594Q

This test measures the accuracy of the spectrum analyzer CAL OUT signal. The first part of the test characterizes the insertion loss of a Low Pass Filter (LPF) and 10 dB Attenuator. The harmonics of the CAL OUT signal are suppressed with the LPF before the amplitude accuracy is measured using a power meter.

Calibrator Frequency is not included in this procedure because it is a function of the Frequency Reference (CAL OUT Frequency = $300 \text{ MHz} \pm [300 \text{ MHz} \times \text{Frequency Reference}]$). Perform the 10 MHz Frequency Reference Output Accuracy test (Test 1 for standard or Test 2 for an Option 004) to verify the CAL OUT frequency.

The related adjustment for this performance test is the “Calibrator Amplitude Adjustment.”

Equipment Required

Synthesized sweeper

Measuring receiver (*used as a power meter*)

Power meter

Power sensor, low power with a 50 MHz reference attenuator

Power sensor, 100 kHz to 1800 MHz

Power splitter

10 dB attenuator, Type N (m to f), dc-12.4 GHz

Filter, low pass (300 MHz)

Cable, Type N, 152 cm (60 in)

Adapter, APC 3.5 (f) to Type N (f)

Adapter, Type N (f) to BNC (m) (*2 required*)

Adapter, Type N (m) to BNC (f)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Adapter, mechanical, 75 Ω to 50 Ω

Adapter, Type N (f) 75 Ω to BNC (m) 75 Ω

Procedure

This performance test consists of two parts:

Part 1: LPF, Attenuator and Adapter Insertion Loss Characterization

Part 2: Calibrator Amplitude Accuracy

Perform “Part 1: LPF, Attenuator and Adapter Insertion Loss Characterization” before “Part 2: Calibrator Amplitude Accuracy.”

A worksheet is provided at the end of this procedure for calculating the corrected insertion loss and the calibrator amplitude accuracy.

Part 1: LPF, Attenuator and Adapter Insertion Loss Characterization

1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in LOG mode as described in the measuring receiver operation manual.

CAUTION

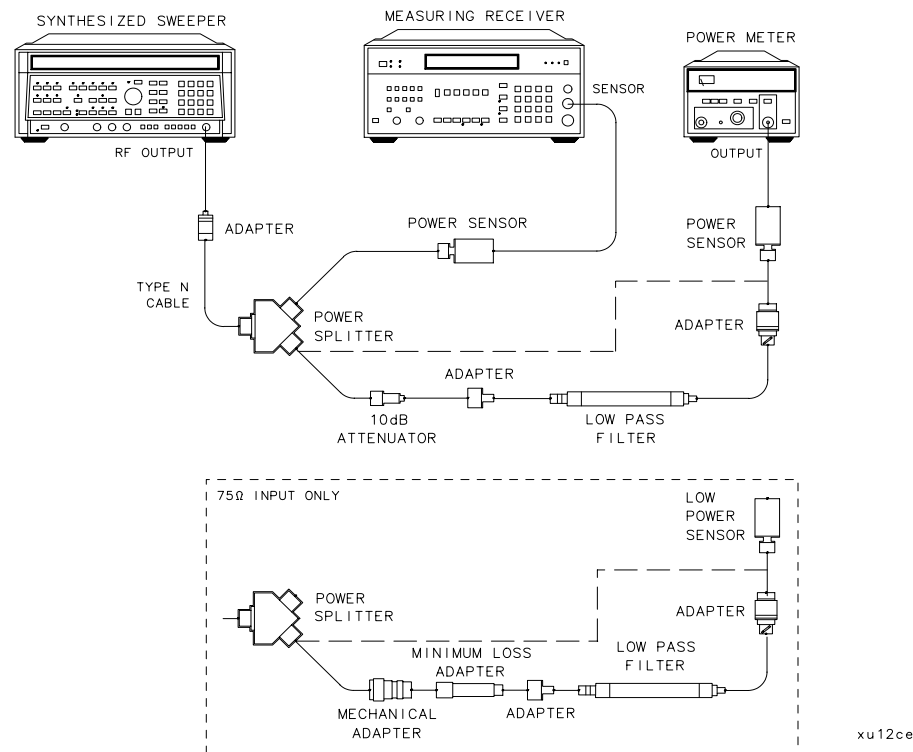
Do not attempt to calibrate the low-power power sensor without the reference attenuator or damage to the low-power power sensor will occur.

2. Zero and calibrate the power meter and low-power power sensor, as described in the power meter operation manual.
3. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 300 MHz

POWER LEVEL -15 dBm

4. Connect the equipment as shown in [Figure 2-24](#). Connect the low-power power sensor directly to the power splitter (bypass the LPF, attenuator, and adapters). Wait for the power sensor to settle before proceeding with the next step.
5. On the measuring receiver, press RATIO mode. The power indication should be 0 dB.
6. On the power meter, press the dB REF mode key. The power indication should be 0 dB.
7. Connect the LPF, attenuator and adapters as shown in [Figure 2-24](#).

Figure 2-24 LPF Characterization

8. Record the measuring receiver reading in dB in [Table 2-28](#) as the Mismatch Error. This is the relative error due to mismatch.
9. Record the power meter reading in dB in [Table 2-28](#) as the Uncorrected Insertion Loss. This is the relative uncorrected insertion loss of the LPF, attenuator and adapters.
10. Subtract the Mismatch Error, recorded in [step 8](#), from the Uncorrected Insertion Loss, recorded in [step 9](#). This is the corrected insertion loss. Record this value in the worksheet as the Corrected Insertion Loss.

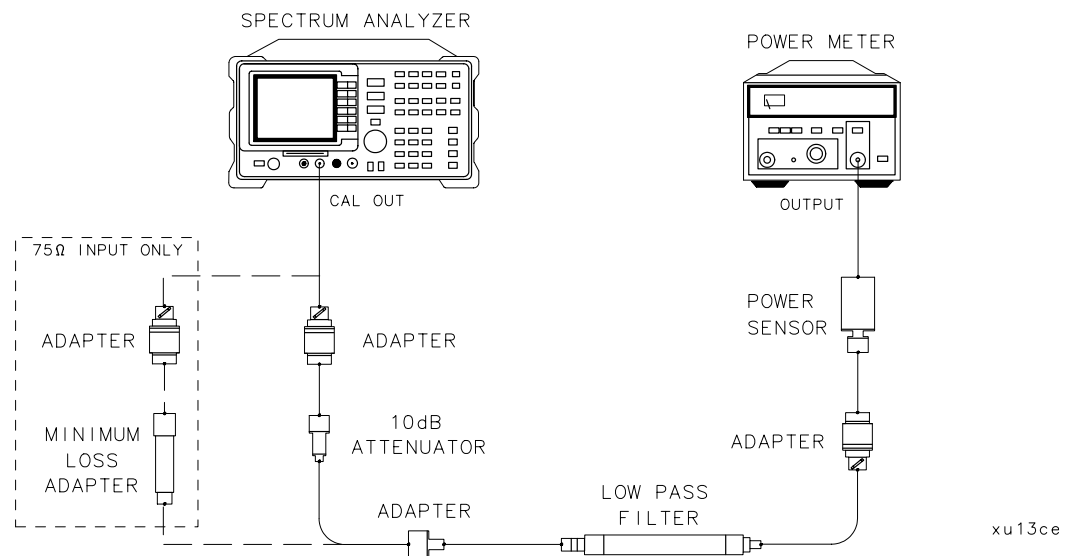
Example: If the Mismatch Error is +0.3 dB and the Uncorrected Insertion Loss is -10.2 dB, subtract the mismatch error from the insertion loss to yield a corrected reading of -10.5 dB.

Part 2: Calibrator Amplitude Accuracy

Perform “Part 1: LPF, Attenuator and Adapter Insertion Loss Characterization” before performing this procedure.

1. Connect the equipment as shown in [Figure 2-25](#). The spectrum analyzer should be positioned so that the setup of the adapters, LPF and attenuator do not bind. It may be necessary to support the center of gravity of the devices.

Figure 2-25 Calibrator Amplitude Accuracy Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. On the power meter, press the dBm mode key. Record the power meter reading in dBm in the worksheet as the Power Meter Reading.
3. Subtract the Corrected Insertion Loss (CIR), recorded in [step 10](#), from the Power Meter Reading (PMR), recorded in [step 9](#), to determine the CAL OUT Power.

$$\text{CAL OUT Power} = \text{PMR} - \text{CIL}$$

For example, if the Corrected Insertion Loss is -10.0 dB, and the Power Meter Reading is -30 dB, then the CAL OUT Power is:

$$\text{CAL OUT Power} = (-30 \text{ dB}) - (-10.0 \text{ dB}) = -20 \text{ dB}.$$

4. Record this value as TR Entry 1 in the performance verification test record as the CAL OUT power. The CAL OUT should be $-20 \text{ dBm} \pm 0.4 \text{ dB}$.

75 Ω input only: The Cal Out Power Measured On 75 Ω Instruments Will Be The Same As 50 Ω Instruments. To Convert From Dbm To Dbmv Use The Following Equation, Then Record This Value As TR Entry 2 In The Appropriate Performance Verification Test Record In Chapter 3.

$$\text{Dbmv} = \text{Dbm} + 48.75 \text{ Db}$$

Performance verification test “Calibrator Amplitude Accuracy” is now complete.

Table 2-28

Calibrator Amplitude Accuracy Worksheet

Description	Measurement
Mismatch Error	_____dB
Uncorrected Insertion Loss	_____dB
Corrected Insertion Loss	_____dB
Power Meter Reading	_____dBm

19. Frequency Response, 8591E and 8591C

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper's power level is adjusted at 300 MHz to place the displayed signal at the spectrum analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new sweeper frequency and spectrum analyzer center frequency setting, the sweeper's power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency).

The related adjustment for this performance test is "Frequency Response Error Correction."

Testing the flatness of 8591C's or spectrum analyzers equipped with INPUT 75 Ω is accomplished by first performing a system flatness characterization.

Equipment Required

- Synthesized sweeper
- Measuring receiver (*used as a power meter*)
- Synthesizer/level generator
- Power sensor, 100 kHz to 1800 MHz
- Power splitter
- Adapter, Type N (f) to APC 3.5 (f)
- Adapter, Type N (m) to Type N (m)
- Cable, BNC, 122 cm (48 in)
- Cable, Type N, 183 cm (72 in)

Additional Equipment for 75 Ω Input

- Power meter
- Power sensor, 1 MHz to 2 GHz
- Cable, BNC, 120 cm (48 in) 75 Ω
- Adapter, Type N (f) 75 Ω to Type N (m) 50 Ω
- Adapter, Type N (m) to BNC (m), 75 Ω

System Characterization Procedure for 75 Ω Input

The following procedure is only for spectrum analyzers equipped with 75 Ω input. If your spectrum analyzer is *not* equipped with 75 Ω input, proceed with step 1 of “Frequency Response ≥ 50 MHz.”

1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor as described in the measuring receiver operation manual.
2. Zero and calibrate the power meter and 1 MHz to 2 GHz power sensor as described in the power meter operation manual.
3. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

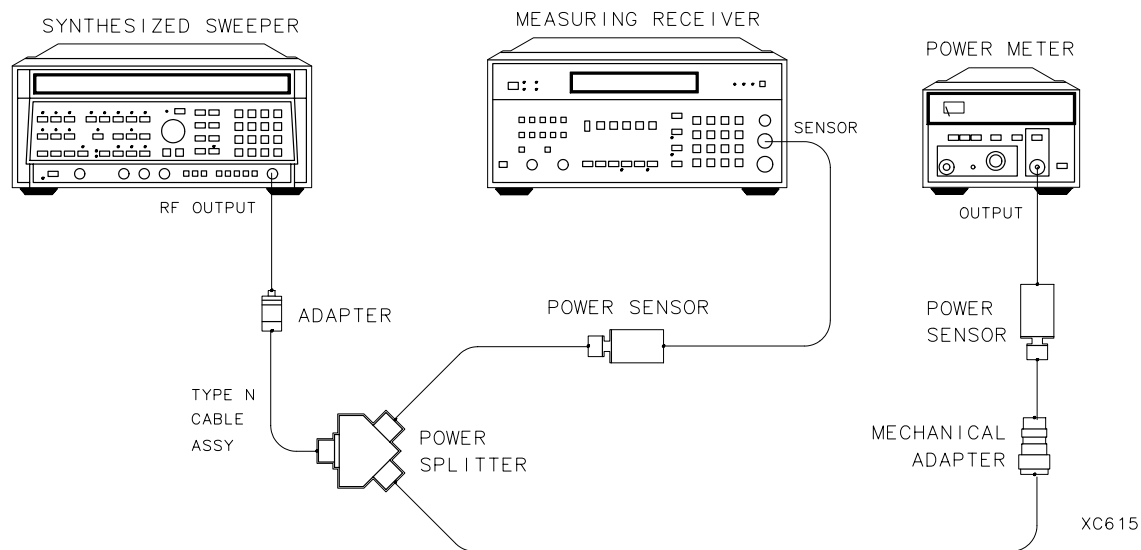
CW 50 MHz

FREQ STEP 50 MHz

POWER LEVEL 5 dBm

4. Connect the equipment as shown in [Figure 2-26](#).

Figure 2-26 System Characterization Test Setup for 75 Ω Input



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

5. Adjust the synthesized sweeper power level for a 0 dBm reading on the measuring receiver.
6. Record the power meter reading as the System Error in [Table 2-29](#), taking into account the Cal Factors of both the 100 kHz to 4.2 GHz power sensor and the 1 MHz to 2 GHz power sensor.

7. On the synthesized sweeper, press CW, and $\uparrow$ (step-up key), to step through the remaining frequencies listed in Table 2-29.

At each new frequency repeat steps 5 and 6, entering each power sensor's Cal Factor into the respective power meter.

System characterization is now complete for 8591C Cable TV analyzers and spectrum analyzers equipped with 75 Ω Input. Continue with step 1 of the "Frequency Response ≥ 50 MHz" below.

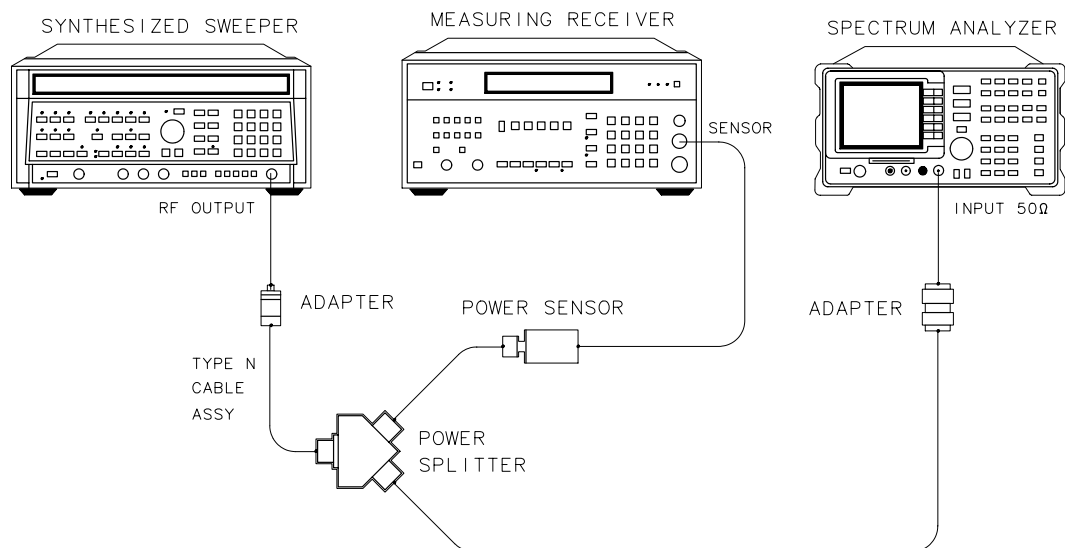
Frequency Response, ≥ 50 MHz

If your spectrum analyzer is equipped with 75 Ω input, perform "Procedure for System Characterization for 75 Ω Input" before proceeding with this procedure.

1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in Figure 2-27.

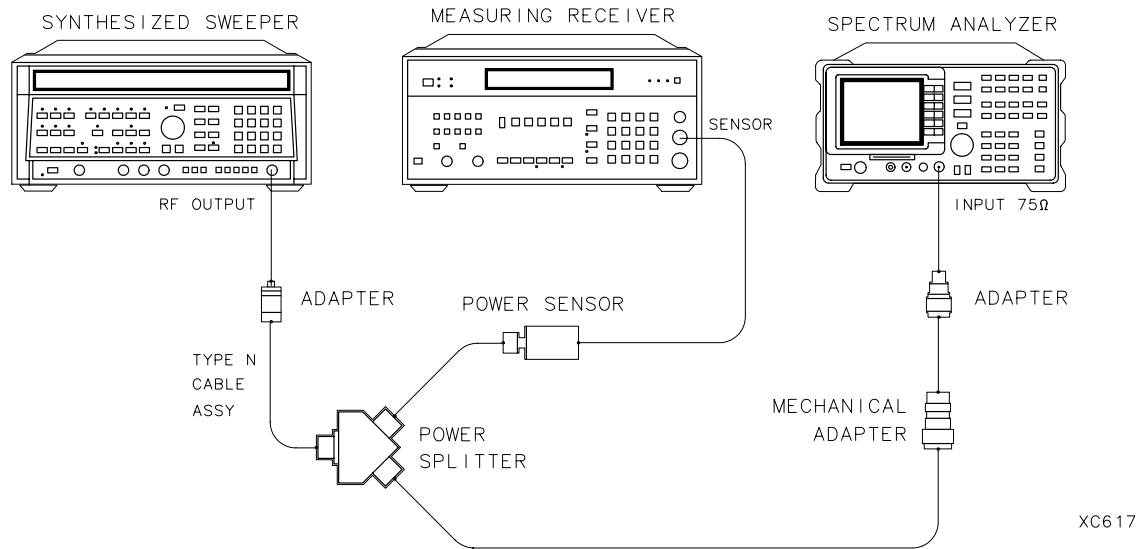
75 Ω input only: Refer to Figure 2-28.

Figure 2-27 Frequency Response Test Setup, ≥ 50 MHz



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

Figure 2-28 Frequency Response Test Setup, ≥ 50 MHz, for 75 Ω Input

3. Press **INSTRUMENT PRESET** on the synthesized sweeper. Set the synthesized sweeper controls as follows:

CW 300 MHz

FREQ STEP 50 MHz

POWER LEVEL -8 dBm

4. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 50, MHz

SPAN, 5, MHz

75 Ω input only: Press **AMPLITUDE, More 1 of 2, Amptd Units,** then **dBm**.

AMPLITUDE, -10, dBm

SCALE LOG LIN (LOG), 1, dB

BW, 1, MHz

VID BW AUTO MAN, 3, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

5. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of -14 dBm ± 0.05 dB.
6. Set the sensor Cal Factor on the measuring receiver, then press **RATIO**.

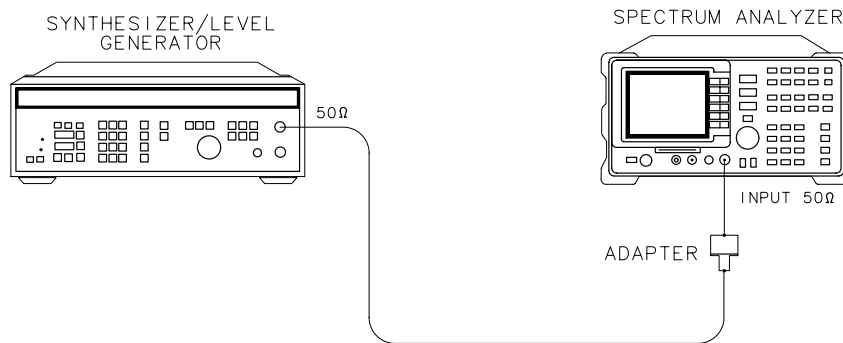
7. Set the synthesized sweeper CW to 50 MHz.
 8. Press **FREQUENCY**, 50, **MHz** on the spectrum analyzer.
 9. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.05 \text{ dB}$.
 10. Set the sensor Cal Factor on the measuring receiver, then record the negative of the power ratio displayed on the measuring receiver in [Table 2-29](#) as the Error Relative to 300 MHz at 50 MHz.
 11. Set the synthesized sweeper CW to 100 MHz.
 12. Press **FREQUENCY**, 100, **MHz** on the spectrum analyzer.
 13. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.05 \text{ dB}$.
 14. Set the sensor Cal Factor on the measuring receiver, then record the negative of the power ratio displayed on the measuring receiver in [Table 2-29](#) as the Error Relative to 300 MHz at 100 MHz.
 15. On the synthesized sweeper, press CW, and $\uparrow$ (step-up key), then on the spectrum analyzer, press **FREQUENCY**, and $\uparrow$ (step-up key).
 16. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-29](#) as the Error Relative to 300 MHz.
 17. Repeat steps 15 through 16 for each new frequency, entering the power sensor Cal Factor into the measuring receiver for each frequency setting as indicated in [Table 2-29](#).
- 75 Ω input only:* Starting with the error at 50 MHz, subtract the System Error from the Error Relative to 300 MHz and record the result as the Corrected Error in [Table 2-29](#).

Frequency Response, ≤ 50 MHz

18. Using a cable, connect the frequency synthesizer directly to the INPUT 50 Ω . Refer to [Figure 2-29](#).

75 Ω input only: Using a 75 Ω cable, connect the frequency synthesizer from the 75 Ω OUTPUT to the INPUT 75 Ω . Set the frequency synthesizer 50–75 Ω switch to the 75 Ω position.

Figure 2-29 Frequency Response Test Setup, < 50 MHz

**CAUTION**

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

19. Set the frequency synthesizer controls as follows:

FREQUENCY 50 MHz

AMPLITUDE -15 dBm

AMPTD INCR 0.05 dB

20. On the spectrum analyzer, press the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

BW, 3, kHz, VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

Wait for the AUTO ZOOM routine to finish.

21. Adjust the frequency synthesizer amplitude until the MKR-TRK reads -14 dBm. This corresponds to the amplitude at 50 MHz recorded in step 10. Record the frequency synthesizer amplitude in [Table 2-30](#) as the Frequency Synthesizer Amplitude at 50 MHz.

22. On the spectrum analyzer, press **PEAK SEARCH, MARKER Δ** .
23. Set the spectrum analyzer and the frequency synthesizer to the next frequency settings listed in [Table 2-30](#).
24. At each frequency, adjust the frequency synthesizer amplitude for a MKR- Δ -TRK amplitude reading of 0.00 ± 0.05 dB.
25. Record the frequency synthesizer amplitude setting in column 2 of [Table 2-30](#) as the frequency synthesizer amplitude.
75 Ω input only: Do not test below 1 MHz.
26. Repeat steps 23 through 25 for each frequency setting listed in [Table 2-30](#).
27. For each of the frequencies in [Table 2-30](#), subtract the Frequency Synthesizer Amplitude from the Frequency Synthesizer Amplitude at 50 MHz recorded in step 21. Record the result as the Response Relative to 50 MHz in [Table 2-30](#).
28. Add to each of the Response Relative to 50 MHz entries in [Table 2-30](#) the Error Relative to 300 MHz at 50 MHz recorded in step 10. Record the results as the Response Relative to 300 MHz in [Table 2-30](#).
75 Ω input only: Starting with the error at 50 MHz, subtract the System Error from the Error Relative to 300 MHz and record the result as the Corrected Error in [Table 2-30](#).

Test Results

Perform the following steps to verify the frequency response of the spectrum analyzer.

1. Enter the most positive Response Relative to 300 MHz from [Table 2-30](#):
_____ dB
2. Enter the most positive Error Relative to 300 MHz from [Table 2-29](#):
75 Ω input only: Enter the most positive Corrected Error from [Table 2-29](#).
_____ dB
3. Record the more positive of the numbers from steps 1 and 2 as TR Entry 1 in the appropriate performance verification test record in Chapter 3.
4. Enter the most negative Response Relative to 300 MHz from [Table 2-30](#):
_____ dB
5. Enter the most negative Error Relative to 300 MHz from [Table 2-29](#):
75 Ω input only: Enter the most negative Corrected Error from [Table 2-29](#).
_____ dB
6. Record the more negative of the numbers from steps 4 and 5 as TR Entry 2 in the appropriate performance verification test record in Chapter 3.
7. Subtract the result of step 6 from the result of step 3. Record this value as TR Entry 3 in the appropriate performance verification test record in Chapter 3.

The result should be less than 2.0 dB.

The absolute values in steps 3 and 6 should be less than 1.5 dB.

Table 2-29 Frequency Response Errors Worksheet

Spectrum Analyzer Frequency (MHz)	Error Relative to 300 MHz (dB)	CAL FACTOR Frequency (GHz)	System Error (75 Ω input only) (dB)	Corrected Error (75 Ω input only) (dB)
50	_____	0.03	_____	_____
100	_____	0.1	_____	_____
150	_____	0.1	_____	_____
200	_____	0.3	_____	_____
250	_____	0.3	_____	_____
300 (Ref)	_____	0.3	_____	_____
350	_____	0.3	_____	_____
400	_____	0.3	_____	_____
450	_____	0.3	_____	_____
500	_____	0.3	_____	_____
550	_____	1.0	_____	_____
600	_____	1.0	_____	_____
650	_____	1.0	_____	_____
700	_____	1.0	_____	_____
750	_____	1.0	_____	_____
800	_____	1.0	_____	_____
850	_____	1.0	_____	_____
900	_____	1.0	_____	_____
950	_____	1.0	_____	_____
1000	_____	1.0	_____	_____
1050	_____	1.0	_____	_____
1100	_____	1.0	_____	_____
1150	_____	1.0	_____	_____
1200	_____	1.0	_____	_____
1250	_____	1.0	_____	_____
1300	_____	1.0	_____	_____
1350	_____	1.0	_____	_____
1400	_____	1.0	_____	_____

Table 2-29 Frequency Response Errors Worksheet (Continued)

Spectrum Analyzer Frequency (MHz)	Error Relative to 300 MHz (dB)	CAL FACTOR Frequency (GHz)	System Error (75 Ω input only) (dB)	Corrected Error (75 Ω input only) (dB)
1450	_____	1.0	_____	_____
1500	_____	1.0	_____	_____
1550	_____	2.0	_____	_____
1600	_____	2.0	_____	_____
1650	_____	2.0	_____	_____
1700	_____	2.0	_____	_____
1750	_____	2.0	_____	_____
1800	_____	2.0	_____	_____

Table 2-30 Frequency Response, ≤ 50 MHz Worksheet

Spectrum Analyzer Frequency	Frequency Synthesizer Amplitude (dBm)	Response Relative to 50 MHz	Response Relative to 300 MHz
50 MHz	_____	0 (Ref)	_____
20 MHz	_____	_____	_____
10 MHz	_____	_____	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____
9 kHz	_____	_____	_____

20. Frequency Response, 8593E

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper power level is adjusted at 300 MHz to place the displayed signal at the analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new synthesized sweeper frequency and analyzer center frequency setting, the synthesized sweeper power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency).

The related adjustments for this performance verification test are “YTF Adjustment”, “Dual Mixer Bias Adjustment”, and “Frequency Response Adjustment.”

Equipment Required

Synthesized sweeper

Measuring receiver (*used as a power meter*)

Synthesizer/level generator

Power sensor, 50 MHz to 26.5 GHz

Power splitter

Termination, 50 Ω

Adapter, Type N (m) to APC 3.5 (m)

Adapter, Type N (f) to BNC (f)

Adapter, 3.5 mm (f) to 3.5mm (f)

Adapter, BNC (f) to SMA (m)

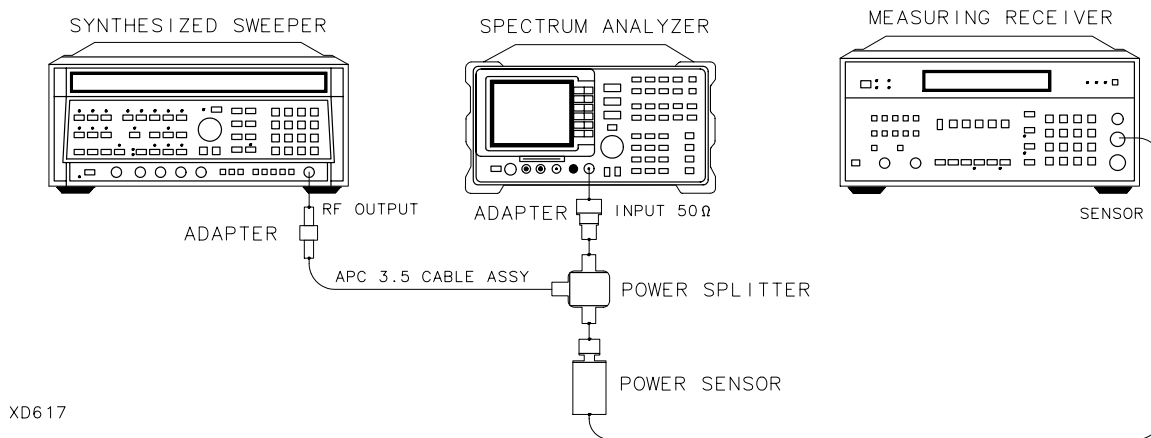
Cable, BNC, 122 cm (48 in)

Cable, APC 3.5, 91 cm (36 in) (*2 required*)

Procedure

1. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor in LOG mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in [Figure 2-30](#).
75 Ω input only: Connect the output of the power splitter to the spectrum analyzer input directly.

Figure 2-30 Frequency Response Test Setup, ≥ 50 MHz



XD617

3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:
 CW 300 MHz
 FREQ STEP 100 MHz
 POWER LEVEL -8 dBm
4. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the following analyzer keys:
 FREQUENCY, Band Lock, 0-2.9 GHz BAND 0
 FREQUENCY, 300, MHz
 CF STEP AUTO MAN, 100, MHz
 SPAN, 10, MHz
 AMPLITUDE, REF LVL, 10, -dBm
 SCALE LOG LIN (LOG), 1, dB
 BW, RES BW AUTO MAN, 1, MHz
 VID BW AUTO MAN, 10, kHz

5. On the spectrum analyzer, press **PEAK SEARCH, MKR FCTN, MK TRACK ON OFF (ON)**.
6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
7. Press **RATIO** on the measuring receiver.

Frequency Response, Band 0, $\geq 50 \text{ MHz}$

8. Set the synthesized sweeper **CW FREQUENCY** to 50 MHz.
9. Set the spectrum analyzer **CENTER FREQUENCY** to 50 MHz.
10. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
11. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-31](#) as the Measuring Receiver Reading at 50 MHz.
12. Set the synthesized sweeper **CW FREQUENCY** to 100 MHz.
13. Set the spectrum analyzer **CENTER FREQUENCY** to 100 MHz.
14. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
15. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-31](#) as the measuring receiver Reading.
16. On the synthesized sweeper, press **CW**, and $\uparrow$ (step up) key and on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-31](#).
17. At each new frequency repeat steps 13 through 15, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-31](#).

Frequency Response, Band 1

18. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75 - 6.5 BAND 1

FREQUENCY, 2.75, GHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

19. Set the synthesized sweeper **CW** to 2.75 GHz.

20. On the spectrum analyzer, press **AMPLITUDE**, **PRESEL PEAK**.
21. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
22. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-32](#) as the Measuring Receiver Reading.
23. Set the synthesized sweeper CW and the spectrum analyzer Center Frequency to 2.8 GHz. Repeat steps 20 through 22.
24. On the synthesized sweeper, press **CW**, and $\uparrow$ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-32](#).
25. At each new frequency repeat steps 20 through 22, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-32](#).

Frequency Response, Band 2

26. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock 6.0 -12.8 BAND 2

FREQUENCY, 6.0, GHz

CF STEP AUTO MAN, 200, MHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

27. Set the synthesized sweeper CW to 6.0 GHz.
28. On the spectrum analyzer, press **AMPLITUDE**, **PRESEL PEAK**.
29. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
30. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-33](#) as the Measuring Receiver Reading.
31. On the synthesized sweeper, press **CW**, and $\uparrow$ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, and $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-33](#).
32. At each new frequency repeat steps 28 through 30, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-33](#).

Frequency Response, Band 3

33. On the spectrum analyzer, press the following keys:

FREQUENCY, Band Lock, 12.4-19. BAND 3

FREQUENCY, 12.4, GHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

34. Set the synthesized sweeper CW to 12.4 GHz.

35. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.

36. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.

37. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-34](#) as the Measuring Receiver Reading.

38. On the synthesized sweeper, press CW, and $\uparrow$ (step up), then on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2-34](#).

39. At each new frequency repeat steps 35 through 37, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-34](#).

Frequency Response, Band 4

40. On the spectrum analyzer, press the following keys:

FREQUENCY, Band Lock, 19.1-22 BAND 4

FREQUENCY, 19.1, GHz

CF STEP AUTO MAN, 100, MHz

CF STEP AUTO MAN, (Option 026), 200, MHz

SPAN, 5, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

41. Set the synthesized sweeper CW to 19.1 GHz.

42. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.

43. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
44. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-35](#) as the Measuring Receiver Reading
Option 026 or 027 only: Use [Table 2-36](#).
45. On the synthesized sweeper, press CW, and $\uparrow$ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-35](#).
46. At each new frequency repeat steps 42 through 44, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-35](#), column 2.

Frequency Response, Band 0, <50 MHz

47. Set the frequency synthesizer controls as follows:

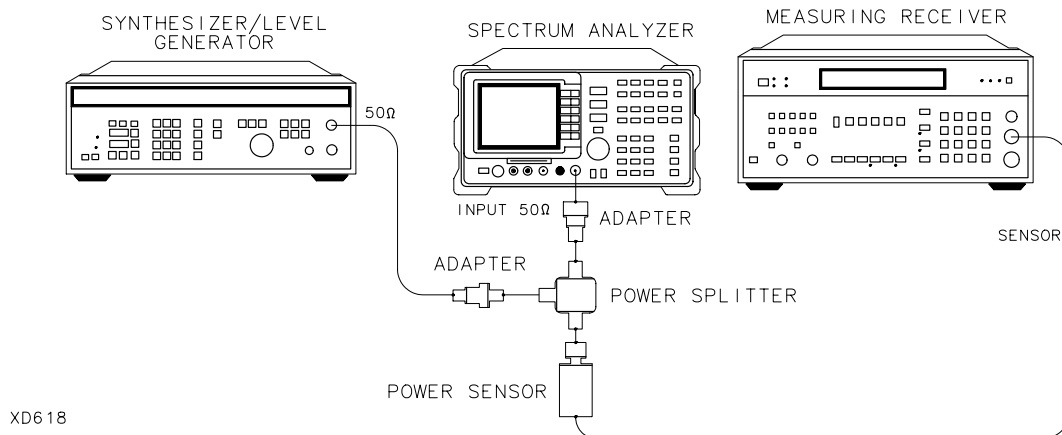
FREQUENCY 50 MHz
 AMPLITUDE -8 dBm
 AMPTD INCR 0.05 dB

48. On the spectrum analyzer, press the following keys:

MKR, MARKERS OFF
FREQUENCY, Band Lock, BND LOCK ON OFF (OFF)
FREQUENCY, 50, MHz
SPAN, 10, MHz
PEAK SEARCH
MKR FCTN, MKR TRACK ON
SPAN, 100, kHz
BW, RES BW AUTO MAN, 10, kHz

49. Connect the equipment as shown in [Figure 2-31](#), with the power sensor connected to power splitter.

Option 026 or 027 only: Connect the power splitter to the analyzer input directly.

Figure 2-31 Frequency Response Test Setup, <50 MHz

50. Enter the power sensor 50 MHz Cal Factor into the measuring receiver.
51. Adjust the frequency synthesizer amplitude until the measuring receiver display reads the same value as recorded in step 11. Record the frequency synthesizer amplitude in [Table 2-37](#).
52. Replace the 50 MHz to 26.5 GHz power sensor with the 50 Ω termination.
53. On the spectrum analyzer, press the following keys:
PEAK SEARCH, MARKER Δ
MKR FCTN, MK TRACK ON OFF (ON)
54. Set the spectrum analyzer center frequency and the synthesizer frequency to the frequencies listed in [Table 2-37](#).
55. At each frequency, adjust the frequency synthesizer amplitude for a MKR Δ-TRK amplitude reading of 0.00 dBm ±0.05 dB. Record the frequency synthesizer Amplitude Setting in [Table 2-37](#) as the frequency synthesizer Amplitude.
56. For each of the frequencies in [Table 2-37](#), subtract the Frequency Synthesizer Amplitude Reading from the Frequency Synthesizer Amplitude Setting at 50 MHz recorded in step 51. Record the result as the Response Relative to 50 MHz in [Table 2-37](#).
57. Add to each of the Response Relative to 50 MHz entries in [Table 2-37](#) the measuring receiver Reading for 50 MHz listed in [Table 2-31](#). Record the results as the Response Relative to 300 MHz in [Table 2-37](#).

Test Results

Frequency Response, Band 0

1. Enter the most positive Measuring Receiver Reading from [Table 2-37](#):
_____ dB
2. Enter the most positive Measuring Receiver Reading from [Table 2-31](#):
_____ dB
3. Enter the more positive of numbers from step 1 and step 2 as TR Entry 1 of the performance verification test record (absolute referenced to 300 MHz).
4. Enter the most negative Measuring Receiver Reading from [Table 2-37](#):
_____ dB
5. Enter the most negative Measuring Receiver Reading from [Table 2-31](#):
_____ dB
6. Enter the more negative of numbers from step 4 and step 5 as TR Entry 2 in the performance verification test record.
7. Subtract step 6 from step 3. Enter this value as TR Entry 3 in the performance verification test record (relative flatness).

Frequency Response, Band 1

1. Enter the most positive Measuring Receiver Reading from [Table 2-32](#) as TR Entry 4 in the performance verification test record.
2. Enter the most negative Measuring Receiver Reading from [Table 2-32](#) as TR Entry 5 in the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as TR Entry 6 in the performance verification test record.

Frequency Response, Band 2

1. Enter the most positive Measuring Receiver Reading from [Table 2-33](#) as TR Entry 7 in the performance verification test record.
2. Enter the most negative Measuring Receiver Reading from [Table 2-33](#) as TR Entry 8 in the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as TR Entry 9 of the performance verification test record.

Frequency Response, Band 3

1. Enter the most positive Measuring Receiver Reading from [Table 2-34](#) as TR Entry 10 in the performance verification test record.
2. Enter the most negative Measuring Receiver Reading from [Table 2-34](#) as TR Entry 11 in the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as TR Entry 12 of the performance verification test record.

Frequency Response, Band 4

Option 026 or 027 only: Proceed to “Frequency Response, Band 4 for Option 026 or 027.”

1. Enter the most positive Measuring Receiver Reading from [Table 2-35](#) as TR Entry 13 in the performance verification test record.
2. Enter the most negative Measuring Receiver Reading from as TR Entry 14 in the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as TR Entry 15 of the performance verification test record.

Frequency Response, Band 4 for Option 026 or 027

1. Enter the most positive Measuring Receiver Reading from [Table 2-36](#) as TR Entry 13 in the performance verification test record.
2. Enter the most negative Measuring Receiver Reading from [Table 2-36](#) as TR Entry 14 in the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as TR Entry 15 of the performance verification test record.

Performance verification test “Frequency Response” is now complete.

Table 2-31 Frequency Response Band 0, ≥ 50 MHz

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
50	_____	0.05
100	_____	0.05
200	_____	0.05
300	_____	0.05
400	_____	0.05
500	_____	0.05
600	_____	0.05
700	_____	0.05
800	_____	0.05
900	_____	0.05
1000	_____	0.05
1100	_____	2.0
1200	_____	2.0
1300	_____	2.0
1400	_____	2.0
1500	_____	2.0
1600	_____	2.0
1700	_____	2.0
1800	_____	2.0
1900	_____	2.0
2000	_____	2.0
2100	_____	2.0
2200	_____	2.0
2300	_____	2.0
2400	_____	2.0
2500	_____	3.0
2600	_____	3.0

Table 2-31 Frequency Response Band 0, ≥ 50 MHz (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2700	_____	3.0
2800	_____	3.0
2900	_____	3.0

Table 2-32 Frequency Response Band 1

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
2.75	_____	3.0
2.8	_____	3.0
2.9	_____	3.0
3.0	_____	3.0
3.1	_____	3.0
3.2	_____	3.0
3.3	_____	3.0
3.4	_____	3.0
3.5	_____	4.0
3.6	_____	4.0
3.7	_____	4.0
3.8	_____	4.0
3.9	_____	4.0
4.0	_____	4.0
4.1	_____	4.0
4.2	_____	4.0
4.3	_____	4.0
4.4	_____	4.0
4.5	_____	5.0
4.6	_____	5.0
4.7	_____	5.0
4.8	_____	5.0

Table 2-32 Frequency Response Band 1

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
4.9	_____	5.0
5.0	_____	5.0
5.1	_____	5.0
5.2	_____	5.0
5.3	_____	5.0
5.4	_____	5.0
5.5	_____	6.0
5.6	_____	6.0
5.7	_____	6.0
5.8	_____	6.0
5.9	_____	6.0
6.0	_____	6.0
6.1	_____	6.0
6.2	_____	6.0
6.3	_____	6.0
6.4	_____	6.0
6.5	_____	6.0

Table 2-33 Frequency Response Band 2

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
6.0	_____	6.0
6.2	_____	6.0
6.4	_____	6.0
6.6	_____	7.0
6.8	_____	7.0
7.0	_____	7.0
7.2	_____	7.0

Table 2-33 Frequency Response Band 2 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
7.4	_____	7.0
7.6	_____	8.0
7.8	_____	8.0
8.0	_____	8.0
8.2	_____	8.0
8.4	_____	8.0
8.6	_____	9.0
8.8	_____	9.0
9.0	_____	9.0
9.2	_____	9.0
9.4	_____	9.0
9.6	_____	10.0
9.8	_____	10.0
10.0	_____	10.0
10.2	_____	10.0
10.4	_____	10.0
10.6	_____	11.0
10.8	_____	11.0
11.0	_____	11.0
11.2	_____	11.0
11.4	_____	11.0
11.6	_____	12.0
11.8	_____	12.0
12.0	_____	12.0
12.2	_____	12.0
12.4	_____	12.0
12.6	_____	13.0
12.8	_____	13.0

Table 2-34 Frequency Response Band 3

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
12.4	_____	12.0
12.6	_____	13.0
12.8	_____	13.0
13.0	_____	13.0
13.2	_____	13.0
13.4	_____	13.0
13.6	_____	14.0
13.8	_____	14.0
14.0	_____	14.0
14.2	_____	14.0
14.4	_____	14.0
14.6	_____	15.0
14.8	_____	15.0
15.0	_____	15.0
15.2	_____	15.0
15.4	_____	15.0
15.6	_____	16.0
15.8	_____	16.0
16.0	_____	16.0
16.2	_____	16.0
16.4	_____	16.0
16.6	_____	17.0
16.8	_____	17.0
17.0	_____	17.0
17.2	_____	17.0
17.4	_____	17.0
17.6	_____	18.0
17.8	_____	18.0

Table 2-34 Frequency Response Band 3 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
18.0	_____	18.0
18.2	_____	18.0
18.4	_____	18.0
18.6	_____	19.0
18.8	_____	19.0
19.0	_____	19.0
19.2	_____	19.0
19.4	_____	19.0

Table 2-35 Frequency Response Band 4

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
19.1	_____	19.0
19.2	_____	19.0
19.3	_____	19.0
19.4	_____	19.0
19.5	_____	20.0
19.6	_____	20.0
19.7	_____	20.0
19.8	_____	20.0
19.9	_____	20.0
20.0	_____	20.0
20.1	_____	20.0
20.2	_____	20.0
20.3	_____	20.0
20.4	_____	20.0
20.5	_____	21.0
20.6	_____	21.0

Table 2-35 Frequency Response Band 4 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
20.7	_____	21.0
20.8	_____	21.0
20.9	_____	21.0
21.0	_____	21.0
21.1	_____	21.0
21.2	_____	21.0
21.3	_____	21.0
21.4	_____	21.0
21.5	_____	22.0
21.6	_____	22.0
21.7	_____	22.0
21.8	_____	22.0
21.9	_____	22.0
22.0	_____	22.0

Table 2-36 Frequency Response Band 4, Option 026 or 027

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
19.1	_____	19.0
19.3	_____	19.0
19.5	_____	20.0
19.7	_____	20.0
19.9	_____	20.0
20.1	_____	20.0
20.3	_____	20.0
20.5	_____	21.0
20.7	_____	21.0
20.9	_____	21.0

Table 2-36 Frequency Response Band 4, Option 026 or 027 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
21.1	_____	21.0
21.3	_____	21.0
21.5	_____	22.0
21.7	_____	22.0
21.9	_____	22.0
22.1	_____	22.0
22.3	_____	22.0
22.5	_____	23.0
22.7	_____	23.0
22.9	_____	23.0
23.1	_____	23.0
23.3	_____	23.0
23.5	_____	24.0
23.7	_____	24.0
23.9	_____	24.0
24.1	_____	24.0
24.3	_____	24.0
24.5	_____	25.0
24.7	_____	25.0
24.9	_____	25.0
25.1	_____	25.0
25.3	_____	25.5
25.5	_____	25.5
25.7	_____	25.5
25.9	_____	26.0
26.1	_____	26.0
26.3	_____	26.5
26.5	_____	26.5

Table 2-37 Frequency Response Band 0, <50 MHz

Spectrum Analyzer Frequency Synthesizer Frequency	Frequency Synthesizer Amplitude (dBm)	Response Relative to 50 MHz	Response Relative to 300 MHz
50 MHz	_____	0 (Reference)	_____
20 MHz	_____	_____	_____
10 MHz	_____	_____	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____

21. Frequency Response, 8594E and 8594Q

The RF INPUT coupling is first set to the dc coupled mode. The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper's power level is adjusted at 300 MHz to place the displayed signal at the analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new sweeper frequency and analyzer center frequency setting, the sweeper's power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency).

The related adjustments for this performance verification test are:

- Dual Mixer Bias Adjustment

- Frequency Response Adjustment

Equipment Required

- Synthesized sweeper

- Measuring receiver (*used as a power meter*)

- Synthesizer/level generator

- Power sensor, 50 MHz to 2.9 GHz

- Power splitter

- Termination, 50 Ω

- Adapter, Type N (m) to APC 3.5 (m)

- Adapter, Type N (f) to APC 3.5 (m)

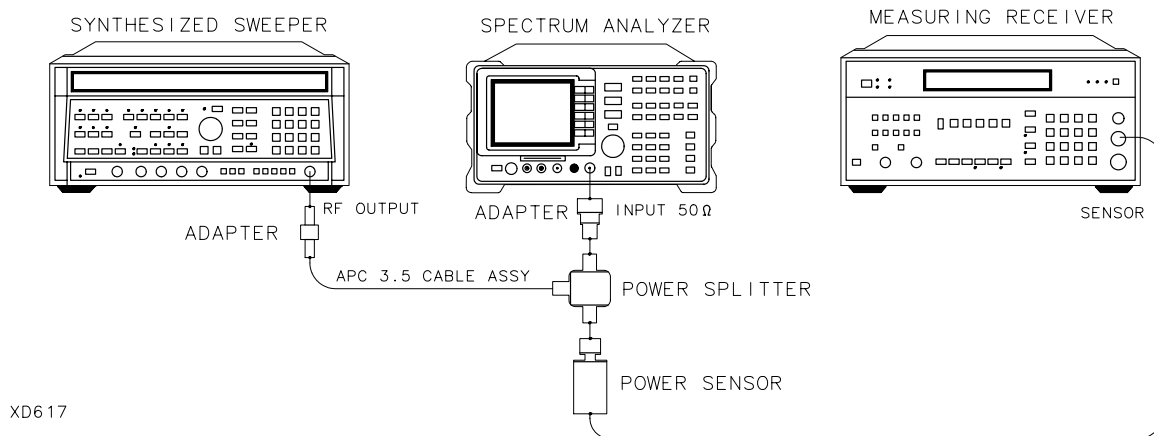
- Adapter, 3.5 mm (f) to 3.5mm (f)

- Cable, BNC, 122 cm (48 in)

- Cable, APC 3.5, 91 cm (36 in)

Frequency Response, ≥ 50 MHz

1. Zero and calibrate the measuring receiver and 50 MHz to 2.9 GHz power sensor in log mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in [Figure 2-32](#).

Figure 2-32 Frequency Response Test Setup, ≥ 50 MHz

3. Press **INSTRUMENT PRESET** on the synthesized sweeper, then set the controls as follows:

CW 300 MHz
 FREQ STEP 100 MHz
 POWER LEVEL -8 dBm

4. On the spectrum analyzer, press **PRESET**. Wait for the preset to finish, then set the spectrum analyzer controls by pressing the following keys:

FREQUENCY, 300, MHz
CF STEP AUTO MAN, 100, MHz
SPAN, 5, MHz
AMPLITUDE, -10, dBm
SCALE LOG LIN (LOG), 1, dB
AMPLITUDE, More 1 of 3, More 2 of 3, COUPLE AC DC (DC)
BW, 1, MHz
VID BW AUTO MAN, 10, kHz

5. On the spectrum analyzer, press **PEAK SEARCH, SIGNAL TRACK (ON)**.

6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
7. Set the power sensor cal factor for the measuring receiver, then press **RATIO**.
8. Set the synthesized sweeper CW to 50 MHz.
9. Press **FREQUENCY**, 50 **MHz** on the spectrum analyzer.
10. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
11. Set the power sensor cal factor for the measuring receiver, then record the power ratio displayed on the measuring receiver below. Record the negative of the power ratio in [Table 2-38](#).

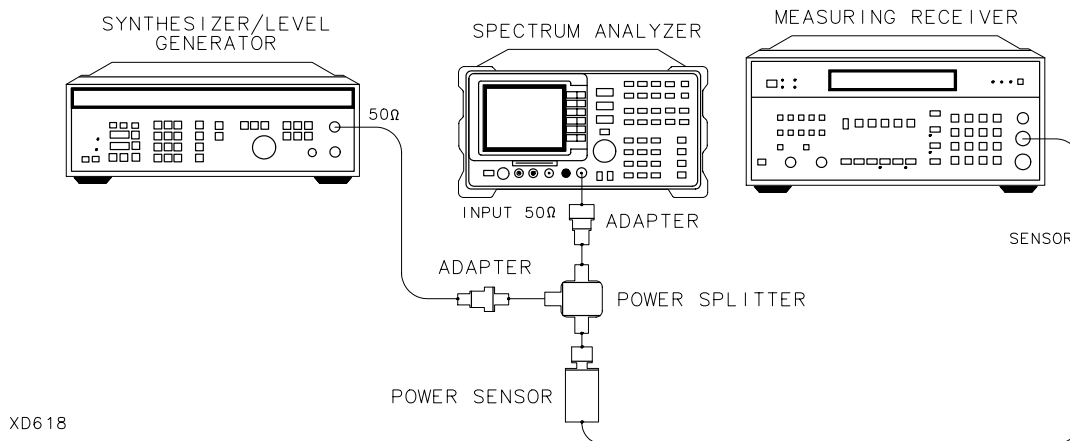
Measuring Receiver Reading at 50 MHz _____dB

12. Set the synthesized sweeper CW to 100 MHz.
13. Press **FREQUENCY**, 100 **MHz** on the spectrum analyzer.
14. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
15. Set the power sensor cal factor for the measuring receiver, then record the negative of the power ratio displayed on the measuring receiver in [Table 2-38](#) as the Measuring Receiver Reading at 100 MHz.
16. On the synthesized sweeper, press CW, and $\uparrow$ (step up) key.
17. On the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-38](#).

At each new frequency repeat steps 14 through 16, entering the power sensor's Cal Factor into the measuring receiver as indicated in [Table 2-38](#).

Frequency Response, <50 MHz

1. Connect the equipment as shown in [Figure 2-33](#), with the power sensor connected to power splitter.

Figure 2-33 Frequency Response Test Setup, <50 MHz

XD618

2. Set the synthesizer/level generator controls as follows:
 - FREQUENCY 50 MHz
 - AMPLITUDE -8 dBm
 - AMPTD INCR 0.05 dB
3. On the spectrum analyzer, press **MKR, MARKERS OFF**, then set the controls by pressing the following keys:
 - FREQUENCY, 50, MHz**
 - SPAN, 100, kHz**
 - BW, 10, kHz**
4. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.
5. Adjust the synthesizer/level generator amplitude until the measuring receiver display reads the same value as recorded in step 11. Record the synthesizer/level generator amplitude here and in [Table 2-39](#).
 - Synthesizer/Level Generator Amplitude _____ dBm
6. Replace the power sensor with the 50 Ω termination.
7. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - MKR, MARKER Δ**

8. Set the spectrum analyzer center frequency and the synthesizer/level generator frequency to the frequencies listed in [Table 2-39](#). At each frequency, adjust the synthesizer/level generator amplitude for a MKR Δ -TRK amplitude reading of 0.00 ± 0.05 dB. Record the synthesizer/level generator amplitude setting in [Table 2-39](#) as the Synthesizer/Level Generator Amplitude.
9. For each of the frequencies in [Table 2-39](#), subtract the Synthesizer/Level Generator Amplitude Reading from the Synthesizer/Level Generator Amplitude Setting (50 MHz) recorded in step 22. Record the result as the Response Relative to 50 MHz in [Table 2-39](#).
10. Add to each of the Response Relative to 50 MHz entries in [Table 2-39](#) the Measuring Receiver Reading for 50 MHz listed in [Table 2-38](#). Record the results as the Response Relative to 300 MHz in [Table 2-39](#).

Test Results

1. Enter the most positive Response Relative to 300 MHz from [Table 2-39](#):
_____ dB
 2. Enter the most positive Measuring Receiver Reading from [Table 2-38](#):
_____ dB
 3. Enter the more positive number from steps 1 and 2 as TR Entry 1 in the performance verification test record. (Absolute referenced to 300 MHz.)
 4. Enter the most negative Response Relative to 300 MHz from [Table 2-39](#):
_____ dB
 5. Enter the most negative Measuring Receiver Reading from [Table 2-38](#):
_____ dB
 6. Enter the more negative number from step 4 and 5 as TR Entry 2 in the performance verification test record.
 7. Subtract step 6 from step 3. Enter this value as TR Entry 3 in the performance verification test record. (Relative flatness.)
- Performance verification test "Frequency Response" is now complete.

Table 2-38 Frequency Response, ≥ 50 MHz

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
50	_____	0.05
100	_____	0.05
200	_____	0.05
300	_____	0.05
400	_____	0.05
500	_____	0.05
600	_____	0.05
700	_____	0.05
800	_____	0.05
900	_____	0.05
1000	_____	0.05
1100	_____	2.0
1200	_____	2.0
1300	_____	2.0
1400	_____	2.0
1500	_____	2.0
1600	_____	2.0
1700	_____	2.0
1800	_____	2.0
1900	_____	2.0
2000	_____	2.0
2100	_____	2.0
2200	_____	2.0
2300	_____	2.0
2400	_____	2.0
2500	_____	3.0

Table 2-38 Frequency Response, ≥ 50 MHz (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2600	_____	3.0
2700	_____	3.0
2800	_____	3.0
2900	_____	3.0

Table 2-39 Frequency Response, < 50 MHz

Spectrum Analyzer Synthesizer/Level Generator Frequency	Synthesizer Level Generator Amplitude (dBm)	Response Relative to 50 MHz	Response Relative to 300 MHz
50 MHz	_____	0 (Reference)	_____
20 MHz	_____	_____	_____
10 MHz	_____	_____	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____

22. Frequency Response, 8595E

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper power level is adjusted at 300 MHz to place the displayed signal at the analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new synthesized sweeper frequency and analyzer center frequency setting, the synthesized sweeper power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency).

The related adjustments for this performance verification test are “YTF Adjustment,” “Dual Mixer Bias Adjustment,” and “Frequency Response Adjustment.”

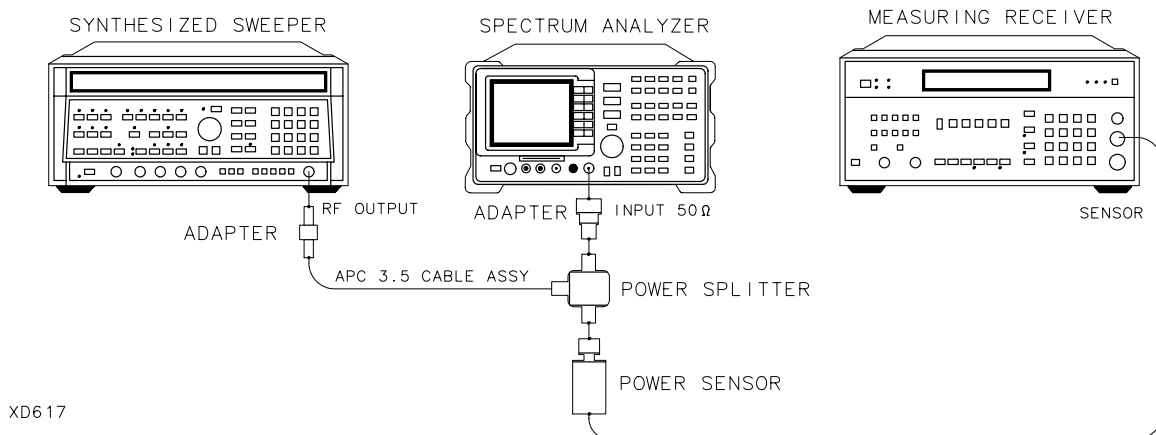
Equipment Required

- Synthesized sweeper
- Measuring receiver (*used as a power meter*)
- Frequency synthesizer
- Power sensor, 50 MHz to 6.5 GHz
- Power splitter
- Termination, 50 Ω
- Adapter, Type N (m) to APC 3.5 (m)
- Adapter, Type N (f) to BNC (f)
- Adapter, 3.5 mm (f) to 3.5mm (f)
- Adapter, BNC (f) to SMA (m)
- Cable, BNC, 122 cm (48 in)
- Cable, APC 3.5, 91 cm (36 in)

Procedure

1. Zero and calibrate the measuring receiver and 50 MHz to 6.5 GHz power sensor in LOG mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in [Figure 2-34](#).

Figure 2-34 Frequency Response Test Setup, ≥ 50 MHz



XD617

3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:
 - CW 300 MHz
 - FREQ STEP 100 MHz
 - POWER LEVEL -8 dBm
4. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the following analyzer keys:
 - FREQUENCY, Band Lock, 0-2.9 GHz BAND 0**
 - FREQUENCY, 300, MHz**
 - CF STEP AUTO MAN, 100, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, REF LVL, 10, -dBm**
 - AMPLITUDE, More 1 of 3, More 2 of 3, COUPLE AC DC (DC)**
 - SCALE LOG LIN (LOG), 1, dB**
 - BW, RES BW AUTO MAN, 1, MHz**
 - VID BW AUTO MAN, 10, kHz**
5. On the spectrum analyzer, press **PEAK SEARCH, MKR FCTN, MK TRACK ON OFF (ON)**.

6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
7. Press **RATIO** on the measuring receiver.

Frequency Response, Band 0, $\geq 50 \text{ MHz}$

8. Set the synthesized sweeper CW FREQUENCY to 50 MHz.
9. Set the spectrum analyzer CENTER FREQUENCY to 50 MHz.
10. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
11. Record the power ratio displayed on the measuring receiver below, then record the negative of this value in [Table 2-38](#) as the Measuring Receiver Reading at 50 MHz.

Measuring Receiver Reading at 50 MHz _____ dB

12. Set the synthesized sweeper CW FREQUENCY to 100 MHz.
13. Set the spectrum analyzer CENTER FREQUENCY to 100 MHz.
14. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
15. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-38](#) as the Measuring Receiver Reading.
16. On the synthesized sweeper, press **CW**, and $\uparrow$ (step up) key and on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-38](#).
17. At each new frequency repeat steps 13 through 15, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-38](#).

Frequency Response, Band 1

18. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75 - 6.5 BAND 1

FREQUENCY, 2.75, GHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

19. Set the synthesized sweeper CW to 2.75 GHz.
20. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.

21. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
22. Record the negative of the power ratio displayed on the measuring receiver in Table 2-39 as the Measuring Receiver Reading.
23. Set the synthesized sweeper CW and the spectrum analyzer Center Frequency to 2.8 GHz. Repeat steps 20 through 22.
24. On the synthesized sweeper, press CW, and $\uparrow$ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) key to step through the remaining frequencies listed in Table 2-39.
25. At each new frequency repeat steps 20 through 22, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-39.

Frequency Response, Band 0, <50 MHz

26. Set the frequency synthesizer controls as follows:

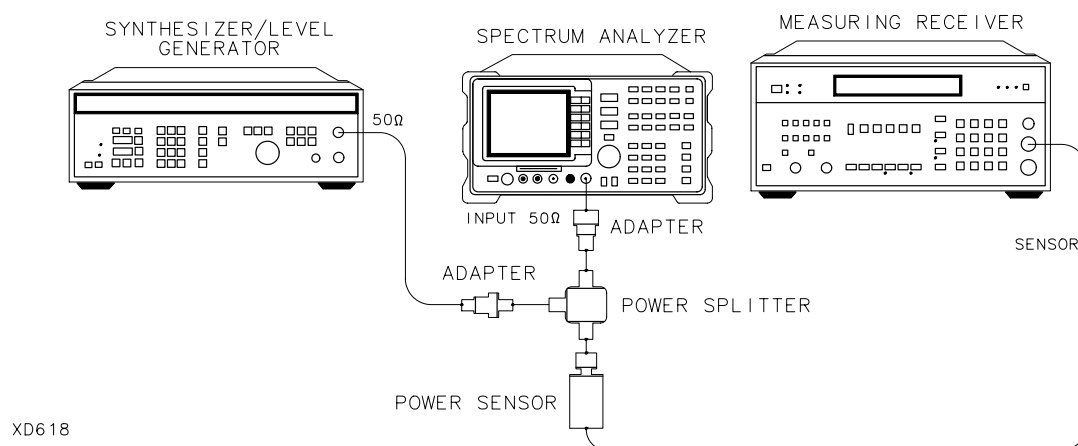
FREQUENCY 50 MHz

AMPLITUDE -8 dBm

AMPTD INCR 0.05 dB

27. Connect the equipment as shown in Figure 2-35, with the power sensor connected to power splitter.

Figure 2-35 Frequency Response Test Setup, <50 MHz



XD618

28. On the spectrum analyzer, press the following keys:

MKR, MARKER 1 ON OFF (OFF)

FREQUENCY, Band Lock, BND LOCK ON OFF (OFF)

FREQUENCY, 50, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MKR TRACK ON

SPAN, 100, kHz

BW, RES BW AUTO MAN, 10, kHz

29. Enter the power sensor 50 MHz Cal Factor into the measuring receiver.

30. Adjust the frequency synthesizer amplitude until the measuring receiver display reads the same value as recorded in step 11. Record the Frequency Synthesizer Amplitude in [Table 2-42](#).

31. Replace the power sensor with the 50 Ω termination.

32. On the spectrum analyzer, press the following keys:

PEAK SEARCH, MARKER Δ

MKR FCTN, MK TRACK ON OFF (ON)

33. Set the spectrum analyzer center frequency and the synthesizer frequency to the frequencies listed in [Table 2-42](#).

34. At each frequency, adjust the frequency synthesizer amplitude for a MKR Δ -TRK amplitude reading of 0.00 ± 0.05 dB. Record the Frequency Synthesizer Amplitude Setting in [Table 2-42](#) as the Frequency Synthesizer Amplitude.

35. For each of the frequencies in [Table 2-42](#), subtract the Frequency Synthesizer Amplitude Reading from the Frequency Synthesizer Amplitude Setting (50 MHz) recorded in step 30. Record the result as the Response Relative to 50 MHz in [Table 2-42](#).

36. Add to each of the Response Relative to 50 MHz entries in [Table 2-42](#) the Measuring Receiver Reading for 50 MHz listed in [Table 2-40](#). Record the results as the Response Relative to 300 MHz in [Table 2-42](#).

Test Results

Frequency Response, Band 0

1. Enter the most positive Response Relative to 300 MHz from [Table 2-42](#):
_____ dB
2. Enter the most positive Measuring Receiver Reading from [Table 2-40](#):
_____ dB
3. Enter the more positive of numbers from step 1 and step 2 as TR Entry 1 in the performance verification test record (absolute referenced to 300 MHz).
4. Enter the most negative Response Relative to 300 MHz from [Table 2-42](#):
_____ dB
5. Enter the most negative Measuring Receiver Reading from [Table 2-40](#):
_____ dB
6. Enter the more negative of numbers from step 4 and step 5 as TR Entry 2 in the performance verification test record.
7. Subtract step 6 from step 3. Enter this value as TR Entry 3 in the performance verification test record (relative flatness).

Frequency Response, Band 1

1. Enter the most positive Measuring Receiver Reading from [Table 2-41](#) as TR Entry 4 in the performance verification test record.
2. Enter the most negative Measuring Receiver Reading from [Table 2-41](#) in TR Entry 5 of the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as TR Entry 6 in the performance verification test record.

Performance verification test “Frequency Response” is now complete.

Table 2-40 Frequency Response Band 0, ≥ 50 MHz

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
50	_____	0.05
100	_____	0.05
200	_____	0.05
300	_____	0.05
400	_____	0.05
500	_____	0.05
600	_____	0.05
700	_____	0.05
800	_____	0.05
900	_____	0.05
1000	_____	0.05
1100	_____	2.0
1200	_____	2.0
1300	_____	2.0
1400	_____	2.0
1500	_____	2.0
1600	_____	2.0
1700	_____	2.0
1800	_____	2.0
1900	_____	2.0
2000	_____	2.0
2100	_____	2.0
2200	_____	2.0
2300	_____	2.0

Table 2-40 Frequency Response Band 0, ≥ 50 MHz (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2400	_____	2.0
2500	_____	3.0
2600	_____	3.0
2700	_____	3.0
2800	_____	3.0
2900	_____	3.0

Table 2-41 Frequency Response Band 1

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
2.75	_____	3.0
2.8	_____	3.0
2.9	_____	3.0
3.0	_____	3.0
3.1	_____	3.0
3.2	_____	3.0
3.3	_____	3.0
3.4	_____	3.0
3.5	_____	4.0
3.6	_____	4.0
3.7	_____	4.0
3.8	_____	4.0
3.9	_____	4.0
4.0	_____	4.0
4.1	_____	4.0
4.2	_____	4.0
4.3	_____	4.0
4.4	_____	4.0

Table 2-41 Frequency Response Band 1 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
4.5	_____	5.0
4.6	_____	5.0
4.7	_____	5.0
4.8	_____	5.0
4.9	_____	5.0
5.0	_____	5.0
5.1	_____	5.0
5.2	_____	5.0
5.3	_____	5.0
5.4	_____	5.0
5.5	_____	6.0
5.6	_____	6.0
5.7	_____	6.0
5.8	_____	6.0
5.9	_____	6.0
6.0	_____	6.0
6.1	_____	6.0
6.2	_____	6.0
6.3	_____	6.0
6.4	_____	6.0
6.5	_____	6.0

Table 2-42 Frequency Response Band 0, <50 MHz

Spectrum Analyzer Frequency Synthesizer Frequency	Frequency Synthesizer Amplitude (dBm)	Response Relative to 50 MHz	Response Relative to 300 MHz
50 MHz	_____	0 (Reference)	_____
20 MHz	_____	_____	_____
10 MHz	_____	_____	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____

23. Frequency Response, 8596E

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper power level is adjusted at 300 MHz to place the displayed signal at the analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new synthesized sweeper frequency and analyzer center frequency setting, the synthesized sweeper power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency).

The related adjustments for this performance verification test are “YTF Adjustment,” “Dual Mixer Bias Adjustment,” and “Frequency Response Adjustment.”

Equipment Required

- Synthesized sweeper
- Measuring receiver (*used as a power meter*)
- Frequency synthesizer
- Power sensor, 50 MHz to 12.8 GHz
- Power splitter
- Termination, 50 Ω
- Adapter, Type N (m) to APC 3.5 (m)
- Adapter, Type N (f) to BNC (f)
- Adapter, 3.5 mm (f) to 3.5mm (f)
- Adapter, BNC (f) to SMA (m)
- Cable, BNC, 122 cm (48 in)
- Cable, APC 3.5, 91 cm (36 in)

Procedure

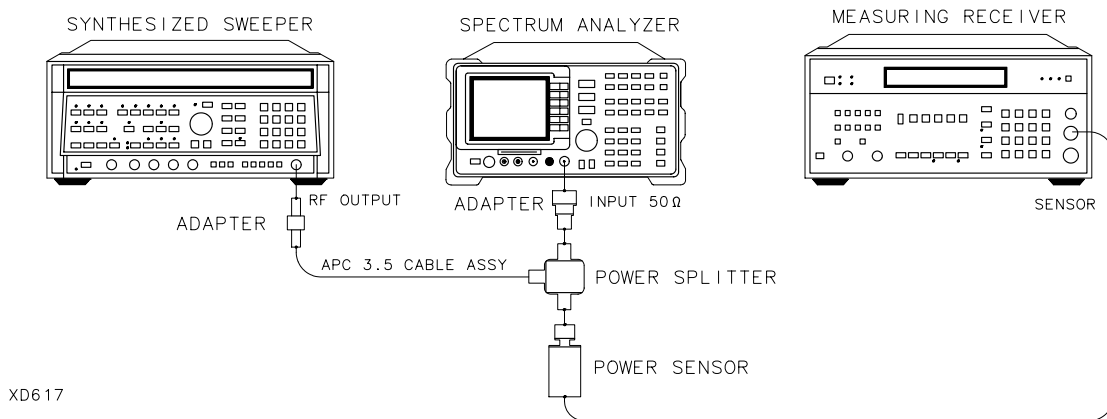
1. Zero and calibrate the measuring receiver and 50 MHz to 12.8 GHz power sensor in LOG mode as described in the measuring receiver operation manual.

2. Connect the equipment as shown in Figure 2-36.

Option 026 only: Connect the output of the power splitter to the spectrum analyzer input directly.

Option 027 only: Connect the output of the power splitter to the SMA adapter included with spectrum analyzer. Note that the SMA adapter is required to meet specifications.

Figure 2-36 Frequency Response Test Setup, ≥50 MHz



3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:

CW 300 MHz

FREQ STEP 100 MHz

POWER LEVEL -8 dBm

4. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the following analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 100, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, 10, -dBm

SCALE LOG LIN (LOG), 1, dB

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

5. On the spectrum analyzer, press **PEAK SEARCH**, **MKR FCTN**, **MK TRACK ON OFF** (ON).
6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
7. Press **RATIO** on the measuring receiver.

Frequency Response, Band 0, $\geq 50 \text{ MHz}$

8. Set the synthesized sweeper CW FREQUENCY to 50 MHz.
9. Set the spectrum analyzer CENTER FREQUENCY to 50 MHz.
10. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
11. Record the power ratio displayed on the measuring receiver below, then record the negative of this value in [Table 2-43](#) as the Measuring Receiver Reading at 50 MHz.

Measuring Receiver Reading at 50 MHz _____ dB

12. Set the synthesized sweeper CW FREQUENCY to 100 MHz.
13. Set the spectrum analyzer CENTER FREQUENCY to 100 MHz.
14. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
15. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-43](#) as the measuring receiver Reading.
16. On the synthesized sweeper, press **CW**, and $\uparrow$ (step up) key and on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-43](#).
17. At each new frequency repeat steps 13 through 15, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-43](#).

Frequency Response, Band 1

18. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75 - 6.5 BAND 1

FREQUENCY, 2.75, GHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

19. Set the synthesized sweeper CW to 2.75 GHz.

20. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.

21. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.

22. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-44](#) as the Measuring Receiver Reading.

23. Set the synthesized sweeper CW and the spectrum analyzer Center Frequency to 2.8 GHz. Repeat steps 20 through 22.

24. On the synthesized sweeper, press CW, and $\uparrow$ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-44](#).

25. At each new frequency repeat steps 20 through 22, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-44](#).

Frequency Response, Band 2

26. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 6.0 -12.8 BAND 2

FREQUENCY, 6.0, GHz

CF STEP AUTO MAN, 200, MHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

27. Set the synthesized sweeper CW to 6.0 GHz.

28. On the spectrum analyzer, press **AMPLITUDE**, **PRESEL PEAK**.
29. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
30. Record the negative of the power ratio displayed on the measuring receiver in [Table 2-45](#) as the Measuring Receiver Reading.
31. On the synthesized sweeper, press **CW**, and $\uparrow$ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, and $\uparrow$ (step up) key to step through the remaining frequencies listed in [Table 2-45](#).
32. At each new frequency repeat steps 28 through 30, entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2-45](#).

Frequency Response, Band 0, <50 MHz

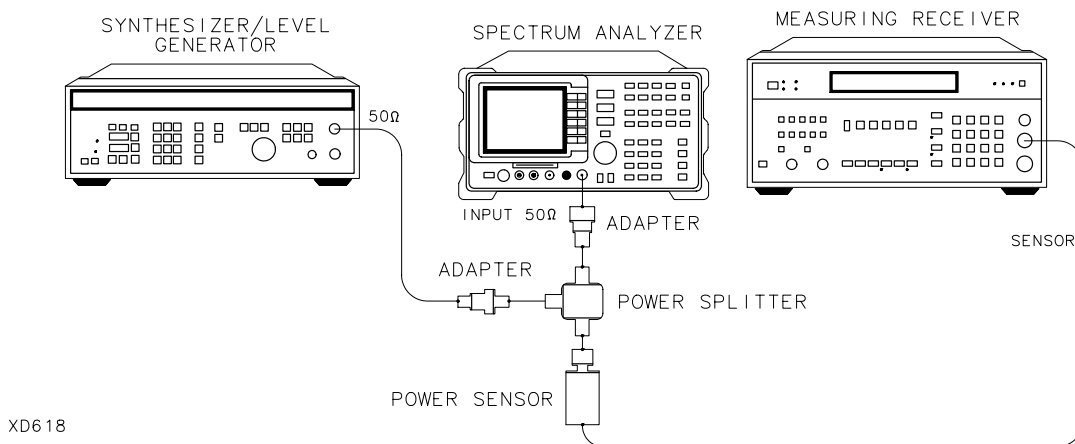
33. Set the frequency synthesizer controls as follows:

FREQUENCY 50 MHz
 AMPLITUDE -8 dBm
 AMPTD INCR 0.05 dB

34. Connect the equipment as shown in [Figure 2-37](#), with the power sensor connected to power splitter.

Option 026 or 027 only: Connect the power splitter to the analyzer input directly.

Figure 2-37 Frequency Response Test Setup, <50 MHz



35. On the spectrum analyzer, press the following keys:

MKR, MARKER 1 ON OFF (OFF)

FREQUENCY, Band Lock, BND LOCK ON OFF (OFF)

FREQUENCY, 50, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MKR TRACK ON

SPAN, 100, kHz

BW, RES BW AUTO MAN, 10, kHz

36. Enter the power sensor 50 MHz Cal Factor into the measuring receiver.

37. Adjust the frequency synthesizer amplitude until the measuring receiver display reads the same value as recorded in step 11. Record the frequency synthesizer amplitude in [Table 2-46](#).

38. Replace the 50 MHz to 12.8 GHz power sensor with the 50 Ω termination.

39. On the spectrum analyzer, press the following keys:

PEAK SEARCH, MARKER Δ

MKR FCTN, MK TRACK ON OFF (ON)

40. Set the spectrum analyzer center frequency and the synthesizer frequency to the frequencies listed in [Table 2-46](#).

41. At each frequency, adjust the frequency synthesizer amplitude for a MKR Δ -TRK amplitude reading of 0.00 ± 0.05 dB. Record the Frequency Synthesizer Amplitude Setting in [Table 2-46](#) as the Frequency Synthesizer Amplitude.

42. For each of the frequencies in [Table 2-46](#), subtract the frequency synthesizer Amplitude Reading (column 2) from the frequency synthesizer Amplitude Setting (50 MHz) recorded in step 37. Record the result as the Response Relative to 50 MHz of [Table 2-46](#).

43. Add to each of the Response Relative to 50 MHz entries in [Table 2-46](#) the measuring receiver Reading for 50 MHz listed in [Table 2-43](#). Record the results as the Response Relative to 300 MHz in [Table 2-46](#).

Test Results

Frequency Response, Band 0

1. Enter the most positive Response Relative to 300 MHz from [Table 2-46](#):
_____dB
2. Enter the most positive Measuring Receiver Reading from [Table 2-43](#), column 2:
_____dB
3. Enter the more positive of numbers from step 1 and step 2 as TR Entry 1 of the performance verification test record (absolute referenced to 300 MHz).
4. Enter the most negative Response Relative to 300 MHz from [Table 2-46](#):
_____dB
5. Enter the most negative Measuring Receiver Reading from [Table 2-43](#), column 2:
_____dB
6. Enter the more negative of numbers from step 4 and step 5 as TR Entry 2 in the performance verification test record.
7. Subtract step 6 from step 3. Enter this value as TR Entry 3 in the performance verification test record (relative flatness).

Frequency Response, Band 1

8. Enter the most positive Measuring Receiver Reading from [Table 2-44](#) as TR Entry 4 in the performance verification test record.
9. Enter the most negative Measuring Receiver Reading from [Table 2-44](#) as TR Entry 5 in the performance verification test record.
10. Subtract step 9 from step 8. Enter this value as TR Entry 6 in the performance verification test record.

Frequency Response, Band 2

11. Enter the most positive Measuring Receiver Reading from [Table 2-45](#) as TR Entry 7 in the performance verification test record.
12. Enter the most negative Measuring Receiver Reading from [Table 2-45](#) as TR Entry 8 in the performance verification test record.
13. Subtract step 12 from step 11. Enter this value as TR Entry 9 in the performance verification test record.

Performance verification test “Frequency Response” is now complete.

Table 2-43 Frequency Response Band 0, ≥ 50 MHz

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
50	_____	0.05
100	_____	0.05
200	_____	0.05
300	_____	0.05
400	_____	0.05
500	_____	0.05
600	_____	0.05
700	_____	0.05
800	_____	0.05
900	_____	0.05
1000	_____	0.05
1100	_____	2.0
1200	_____	2.0
1300	_____	2.0
1400	_____	2.0
1500	_____	2.0
1600	_____	2.0
1700	_____	2.0
1800	_____	2.0
1900	_____	2.0
2000	_____	2.0
2100	_____	2.0
2200	_____	2.0
2300	_____	2.0

Table 2-43 Frequency Response Band 0, ≥ 50 MHz (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2400	_____	2.0
2500	_____	3.0
2600	_____	3.0
2700	_____	3.0
2800	_____	3.0
2900	_____	3.0

Table 2-44 Frequency Response Band 1

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2.75	_____	3.0
2.8	_____	3.0
2.9	_____	3.0
3.0	_____	3.0
3.1	_____	3.0
3.2	_____	3.0
3.3	_____	3.0
3.4	_____	3.0
3.5	_____	4.0
3.6	_____	4.0
3.7	_____	4.0
3.8	_____	4.0
3.9	_____	4.0
4.0	_____	4.0
4.1	_____	4.0

Table 2-44 Frequency Response Band 1 (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
4.2	_____	4.0
4.3	_____	4.0
4.4	_____	4.0
4.5	_____	5.0
4.6	_____	5.0
4.7	_____	5.0
4.8	_____	5.0
4.9	_____	5.0
5.0	_____	5.0
5.1	_____	5.0
5.2	_____	5.0
5.3	_____	5.0
5.4	_____	5.0
5.5	_____	6.0
5.6	_____	6.0
5.7	_____	6.0
5.8	_____	6.0
5.9	_____	6.0
6.0	_____	6.0
6.1	_____	6.0
6.2	_____	6.0
6.3	_____	6.0
6.4	_____	6.0
6.5	_____	6.0

Table 2-45 Frequency Response Band, 2

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
6.0	_____	6.0
6.2	_____	6.0
6.4	_____	6.0
6.6	_____	7.0
6.8	_____	7.0
7.0	_____	7.0
7.2	_____	7.0
7.4	_____	7.0
7.6	_____	8.0
7.8	_____	8.0
8.0	_____	8.0
8.2	_____	8.0
8.4	_____	8.0
8.6	_____	9.0
8.8	_____	9.0
9.0	_____	9.0
9.2	_____	9.0
9.4	_____	9.0
9.6	_____	10.0
9.8	_____	10.0
10.0	_____	10.0
10.2	_____	10.0
10.4	_____	10.0
10.6	_____	11.0

Table 2-45 Frequency Response Band, 2 (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
10.8	_____	11.0
11.0	_____	11.0
11.2	_____	11.0
11.4	_____	11.0
11.6	_____	12.0
11.8	_____	12.0
12.0	_____	12.0
12.2	_____	12.0
12.4	_____	12.0
12.6	_____	13.0
12.8	_____	13.0

Table 2-46 Frequency Response Band 0, <50 MHz

Spectrum Analyzer Frequency Synthesizer Frequency	Frequency Synthesizer Amplitude (dBm)	Response Relative to 50 MHz	Response Relative to 300 MHz
50 MHz	_____	0 (Reference)	_____
20 MHz	_____	_____	_____
10 MHz	_____	_____	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____

24. Other Input Related Spurious Responses, 8591C and 8591E

A synthesized source and the spectrum analyzer are set to the same frequency and the amplitude of the source is set to -20 dBm. A marker-amplitude reference is set on the spectrum analyzer. The source is then tuned to several different frequencies where image responses could occur. At each source frequency, the source amplitude is set to -20 dBm and the amplitude of the response, if any, is measured using the spectrum analyzer marker function. The marker-amplitude difference is then compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

- Synthesized sweeper
- Measuring receiver (*used as a power meter*)
- Power sensor, 100 kHz to 1800 MHz
- Adapter, Type N (f) to APC 3.5 (f)
- Adapter, Type N (f) to Type N (f)
- Cable, Type N, 183 cm (72 in)

Additional Equipment for 75 Ω Input

- Power sensor, 75 Ω
- Adapter, minimum loss
- Adapter, Type N (f) to BNC (m), 75 Ω
- Adapter, Type N (f) to Type N (f), 75 Ω

Procedure

1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor's 542.8 MHz Cal Factor into the measuring receiver.

75 Ω input only: Use 75 Ω power sensor.

2. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:

CW 542.8 MHz

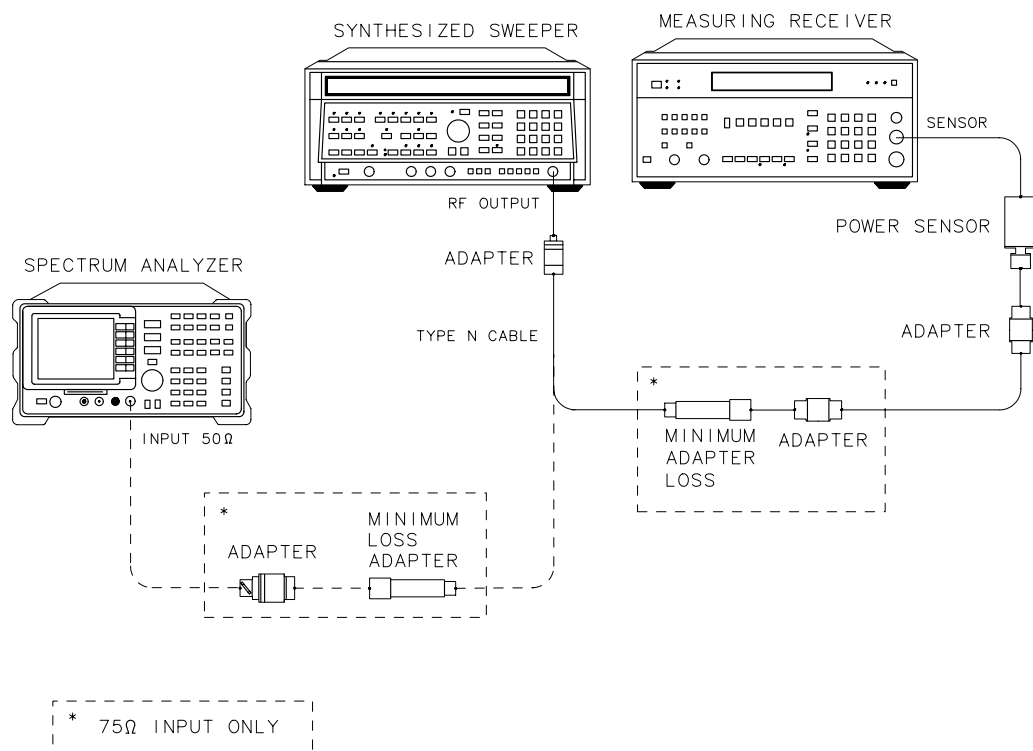
POWER LEVEL -20 dBm

75 Ω input only: POWER LEVEL -14.3 dBm

3. Connect the equipment as shown in Figure 2-38. Connect the output of the synthesizer to the 100 kHz to 1800 MHz power sensor using adapters.

75 Ω input only: Use the minimum loss adapter and 75 Ω adapter to connect to the 75 Ω power sensor.

Figure 2-38 Other Input Related Spurious Responses Test Setup



xu14ce

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

24. Other Input Related Spurious Responses, 8591C and 8591E

4. Adjust the synthesized sweeper power level for a $-20 \text{ dBm} \pm 0.1 \text{ dB}$ reading on the measuring receiver.
5. On the synthesized sweeper, press **SAVE 1**.
6. Enter the power sensor's Cal Factor for 1142.8 MHz into the measuring receiver.
7. Set the CW frequency on the synthesized sweeper to 1142.8 MHz.
8. Adjust the synthesized sweeper power level for a $-20 \text{ dBm} \pm 0.1 \text{ dB}$ reading on the measuring receiver.
9. On the synthesized sweeper, press **SAVE 2**.
10. Enter the power sensor's Cal Factor for 500 MHz into the measuring receiver.
11. Set the CW frequency on the synthesized sweeper to 500 MHz.
12. Adjust the synthesized sweeper power level for a $-20 \text{ dBm} \pm 0.1 \text{ dB}$ reading on the measuring receiver.
13. Connect the synthesized sweeper to the RF INPUT of the spectrum analyzer using the appropriate cable and adapters.

75 Ω input only: Use the minimum loss adapter and 75 Ω adapter as shown in [Figure 2-38](#).

14. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 500, MHz

SPAN, 10, MHz

75 Ω input only: Press **AMPLITUDE, More 1 of 2, Amptd Units**, then **dBm**.

AMPLITUDE, -10, dBm

15. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

24. Other Input Related Spurious Responses, 8591C and 8591E

16. Wait for the AUTO ZOOM message to disappear. Then press the following spectrum analyzer keys:

PEAK SEARCH

MKR →, MARKER →REF LVL

MKR FCTN, MK TRACK ON OFF (OFF)

PEAK SEARCH, MARKER Δ

AMPLITUDE, ↓ (step-down key).

SGL SWP

17. For each of the frequencies listed in [Table 2-47](#), do the following:

- Set the synthesized sweeper to the listed CW frequency by pressing **RECALL 1** for a CW frequency of 542.8 MHz or **RECALL 2** for a CW frequency of 1142.8 MHz.
- Press **SGL SWP** and wait for the completion of a new sweep.
- On the spectrum analyzer, press **PEAK SEARCH** and record the marker-delta amplitude reading in [Table 2-47](#) as the Actual MKR Δ Amplitude.

The Actual MKR Δ Amplitude should be less than the Maximum MKR Δ Amplitude listed in the table below.

NOTE

The Maximum MKR Δ Amplitude is 10 dB more positive than the specification. This is due to the 10 dB change in reference level made in [step 14](#).

18. Record the Maximum MKR Δ Amplitude from [Table 2-47](#) as TR Entry 1 in the appropriate performance verification test record in Chapter 3.

Table 2-47 Image Responses

Synthesized Sweeper CW Frequency	TR Entry Actual MKR Δ Amplitude (dBc)	Maximum MKR Δ Amplitude (dBc)
542.8 MHz	_____	–55
1142.8 MHz	_____	–55

25. Other Input Related Spurious Responses, 8593E

A synthesized source and the spectrum analyzer are set to the same frequency and the amplitude of the source is set to -20 dBm. A marker-amplitude reference is set on the spectrum analyzer. The source is then tuned to several different frequencies which should generate image, multiple, and out-of-band responses. At each source frequency, the source amplitude is set to -20 dBm and the amplitude of the response, if any, is measured using the spectrum analyzer marker function. The marker-amplitude difference is then compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 26.5 GHz

Power splitter

Adapter, Type N (m) to APC 3.5 (m)

Adapter, APC 3.5 (f) to APC 3.5 (f)

Cable, APC 3.5, 91 cm (36 in)

Procedure

Band 0

1. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:

CW 2000 MHz

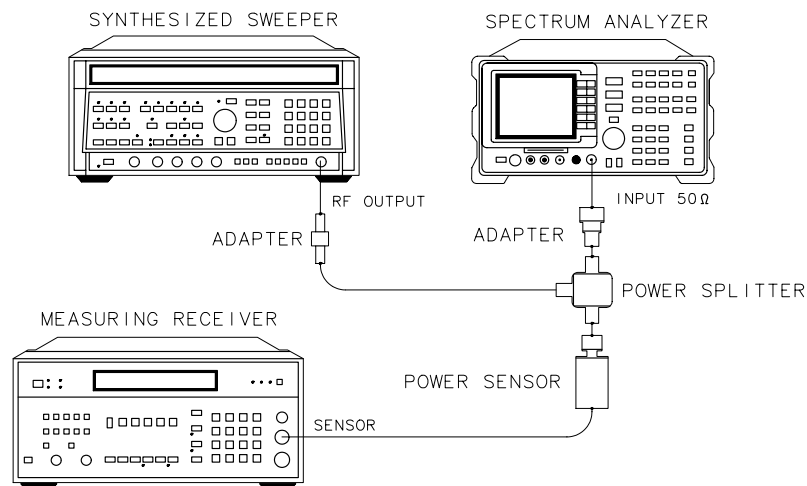
POWER LEVEL -4 dBm

3. Connect the equipment as shown in Figure 2-39. Connect the output of the synthesizer to the 50 MHz to 26.5 GHz power sensor using adapters.

Option 026 only: Connect the power splitter to the spectrum analyzer input directly.

Figure 2-39

Other Input Related Spurious Responses Test Setup



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4. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 2.0, GHz

SPAN, 1, MHz

AMPLITUDE, REF LVL, 10, -dBm

ATTEN AUTO MAN, 0, dB

5. Adjust the synthesized sweeper power level for a $-20 \text{ dBm} \pm 0.1 \text{ dB}$ reading on the measuring receiver.
6. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

7. Wait for the AUTO ZOOM message to disappear. Then press the following spectrum analyzer keys:

PEAK SEARCH

MKR →, MARKER →, REF LVL

MKR FCTN, MK TRACK ON OFF (OFF)

PEAK SEARCH, MARKER Δ

AMPLITUDE, ↓ (step-down key).

SGL SWP

8. For each of the frequencies listed in [Table 2-48](#), do the following:
 - a. Set the synthesized sweeper to the listed CW frequency.
 - b. Enter the appropriate power sensor CAL Factor into the measuring receiver.
 - c. Set the synthesized sweeper power level for -20 dBm reading on the measuring receiver.
 - d. Press **SGL SWP** and wait for the completion of a new sweep.
 - e. On the spectrum analyzer, press **PEAK SEARCH** and record the marker-delta amplitude reading in [Table 2-48](#) as the Actual MKR Δ Amplitude.

The Actual MKR Δ Amplitude should be less than the Maximum MKR Δ Amplitude listed in [Table 2-48](#).

NOTE

Note that the Maximum MKR Δ Amplitude is 10 dB more positive than the specification. This is due to the 10 dB change in reference level made in [step 4](#).

9. Press the following spectrum analyzer keys:

MKR, MARKERS OFF

HOLD

AUTO COUPLE, AUTO ALL

SPAN, 1, MHz

AMPLITUDE, REF LVL, 10, -dBm

ATTEN AUTO MAN, 0, dB

SWEEP, SWEEP CONT SGL (CONT)

Band 1

10. On the spectrum analyzer, press **FREQUENCY, 4, GHz**.

11. Set the synthesized sweeper CW to 4 GHz.

12. Enter the power sensor 4 GHz CAL Factor into the measuring receiver.

13. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

14. Wait for the CAL: PEAKING message to disappear, then press **MKR, MARKERS OFF**.

15. Repeat [step 5](#) through [step 9](#) for the synthesized sweeper CW frequencies listed in [Table 2-48](#) for Band 1.

Band 2

16. On the spectrum analyzer, press **FREQUENCY, 9, GHz**.

17. Set the synthesized sweeper CW to 9 GHz.

18. Enter the power sensor 9 GHz CAL Factor into the measuring receiver.

19. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

20. Wait for the CAL: PEAKING message to disappear, then press **MKR, MARKERS OFF**.

21. Repeat [step 5](#) through [step 9](#) for the synthesized sweeper CW frequencies listed in [Table 2-48](#) for Band 2.

Band 3

22. On the spectrum analyzer, press **FREQUENCY**, 15, **GHz**.
23. Set the synthesized sweeper CW to 15 GHz.
24. Enter the power sensor 15 GHz CAL Factor into the measuring receiver.
25. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

26. Wait for the CAL: PEAKING message to disappear, then press **MKR, MARKERS OFF**.
27. Repeat [step 5](#) through [step 9](#) for the synthesized sweeper CW frequencies listed in [Table 2-48](#) for Band 3.

Band 4

28. On the spectrum analyzer, press **FREQUENCY**, 21, **GHz**.
29. Set the synthesized sweeper CW to 21 GHz.
30. Enter the power sensor 21 GHz CAL Factor into the measuring receiver.
31. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

32. Wait for the CAL: PEAKING message to disappear, then press **MKR, MARKERS OFF**.
33. Repeat [step 5](#) through [step 9](#) for the synthesized sweeper CW frequencies listed in [Table 2-48](#) for Band 4.

Band 4 for Option 026 or 027

Perform this section only if your spectrum analyzer is equipped with Option 026 or 027.

34. On the spectrum analyzer, press **FREQUENCY**, 24 GHz.

35. Set the synthesized sweeper CW to 24 GHz.

36. Enter the power sensor 24 GHz CAL Factor into the measuring receiver.

37. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

38. Wait for the CAL: PEAKING message to disappear, then press **MKR, MARKERS OFF**.

39. Repeat [step 5](#) through [step 9](#) for the synthesized sweeper CW frequencies listed in [Table 2-48](#) for Band 4 for Option 026 or 027.

Specification Summary

40. Record the maximum Actual MKR Δ Amplitude from [Table 2-48](#) for Band 0 as TR Entry 1 of the performance verification test record.

41. Record the maximum Actual MKR Δ Amplitude from [Table 2-48](#) for Bands 1, 2, and 3 as TR Entry 2 of the performance verification test record.

42. Record the maximum Actual MKR Δ Amplitude from [Table 2-48](#) for Band 4 as TR Entry 4 of the performance verification test record.

Option 026 or 027 only: Record the maximum Actual MKR Δ Amplitude from [Table 2-48](#) for band 4, Option 026 or 027 as TR Entry 3 of the performance verification test record.

Performance verification test "Other Input Related Spurious Responses" is now complete.

Table 2-48 Other Input Related Spurious Worksheet

Band	Spectrum Analyzer Center Frequency	Synthesized Sweeper CW Frequency	MKR Δ Amplitude	
			Actual (dBc)	Max. (dBc)
0	2.0	2042.8 [*]	_____	-55
	2.0	2642.8 [*]	_____	-55
	2.0	9842.8 [†]	_____	-55
	2.0	7921.4 [†]	_____	-55
	2.0	1820.8 [‡]	_____	-55
	2.0	278.5 [‡]	_____	-55
1	4.0	4042.8 [*]	_____	-55
	4.0	4642.8 [*]	_____	-55
	4.0	8321.4 [†]	_____	-55
	4.0	3742.9 [‡]	_____	-55
2	9.0	9042.8 [*]	_____	
	9.0	9642.8 [*]	_____	-55
	9.0	4982.1 [†]	_____	-55
	9.0	9342.8 [‡]	_____	-55
3	15.0	15042.8 [*]	_____	-55
	15.0	15642.8 [*]	_____	-55
	15.0	4785.8 [†]	_____	-55
	15.0	15669.65 [‡]	_____	-55

Table 2-48 Other Input Related Spurious Worksheet (Continued)

Band	Spectrum Analyzer Center Frequency	Synthesized Sweeper CW Frequency	MKR Δ Amplitude	
4	21.0	21042.8 [*]		–50
	21.0	21642.8 [*]	_____	–50
	21.0	5008.95 [†]	_____	–55
	21.0	21342.8 [‡]	_____	–50
4 <i>Option 026</i> <i>or</i> <i>027 Only</i>	24	24042.8 [*]	_____	–50
	21.0	24642.8 [*]	_____	–50
	21.0	11839.3 [†]	_____	–55
	21.0	20019.65 [‡]	_____	–50
[*] Image Response [†] Out-of-Band Response [‡] Multiple Response				

26. Other Input Related Spurious Responses, 8594E and 8594Q

A synthesized source and the spectrum analyzer are set to the same frequency and the amplitude of the source is set to -20 dBm. A marker amplitude reference is set on the analyzer. The source is then tuned to several different frequencies which should generate image, multiple, and out-of-band responses. At each source frequency, the source amplitude is set to -20 dBm and the amplitude of the response, if any, is measured using the analyzer marker function. The marker amplitude difference is then compared to the specification.

There are no related adjustment procedures for this performance verification test.

Equipment Required

Synthesized sweeper

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 2.9 GHz

Power splitter

Adapter, Type N (m) to APC 3.5 (m)

Adapter, APC 3.5 (f) to APC 3.5 (f)

Cable, APC 3.5 male connectors, 91 cm (36 in)

Procedure

1. Zero and calibrate the measuring receiver and 50 MHz to 2.9 GHz power sensor in log mode (power reads out in dBm). Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

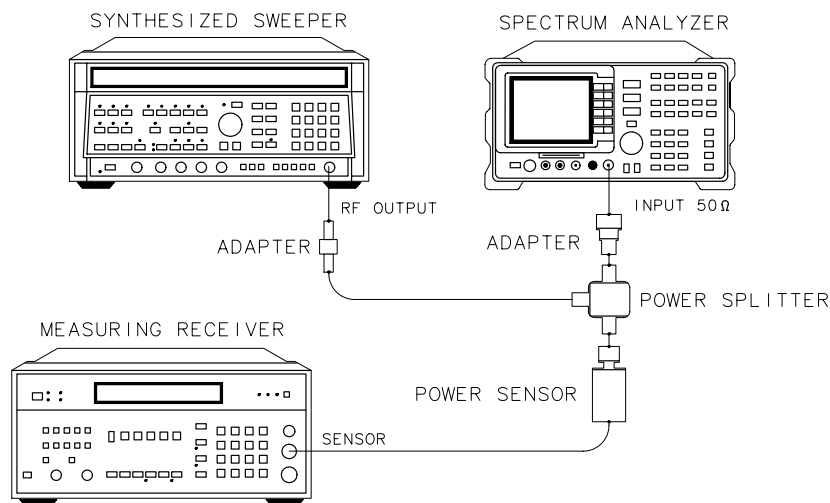
CW 2000 MHz

POWER LEVEL -4 dBm

3. Connect the equipment as shown in [Figure 2-40](#).

Figure 2-40

Other Input Related Spurious Responses Test Setup



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4. On the spectrum analyzer, press **PRESET** and wait for the preset to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 2.0, GHz

SPAN, 1, MHz

AMPLITUDE, -10, dBm

ATTEN AUTO MAN, 0, dB

5. Adjust the synthesized sweeper power level for a -20 dBm ± 0.1 dB reading on the measuring receiver.
6. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

26. Other Input Related Spurious Responses, 8594E and 8594Q

7. Wait for the AUTO ZOOM message to disappear. Then press the following analyzer keys:

PEAK SEARCH, MKR →, MARKER → REF LVL

PEAK SEARCH, MARKER Δ

AMPLITUDE, ↓ (step-down key)

SGL SWP

8. For each of the frequencies listed in [Table 2-49](#) for a center frequency of 2.0 GHz, do the following:
- Set the synthesized sweeper to the listed CW frequency.
 - Enter the appropriate power sensor Cal Factor into the measuring receiver.
 - Set the synthesized sweeper power level for a -20 dBm reading on the measuring receiver.
 - Press **SGL SWP** and wait for completion of a new sweep.
 - On the spectrum analyzer, press **PEAK SEARCH** and record the MKR Δ amplitude reading in [Table 2-49](#) as the Actual MKR Δ Amplitude.

The Actual MKR Δ Amplitude should be less than the Max MKR Δ Amplitude listed in the table.

NOTE

Note that the Max MKR Δ Amplitude is 10 dB more positive than the specification. This is due to the 10 dB change in reference level made in step 6.

9. Record the maximum Actual MKR Δ Amplitude from [Table 2-49](#) as TR Entry 1 in the appropriate performance verification test record in Chapter 3.

Performance verification test “Other Input Related Spurious Responses” is now complete.

26. Other Input Related Spurious Responses, 8594E and 8594Q

Table 2-49 Other Input Related Spurious Worksheet

Spectrum Analyzer Center Frequency GHz	Synthesized Sweeper CW Frequency MHz	MKR Δ Amplitude	
		Actual (dBc)	Max (dBc)
2.0	2042.8 [*]	_____	–55
2.0	2642.8 [*]	_____	–55
2.0	9842.8 [†]	_____	–55
2.0	7921.4 [†]	_____	–55
2.0	1820.8 [‡]	_____	–55
2.0	278.5 [‡]	_____	–55
[*] Image Response [†] Out-of-Band Response [‡] Multiple Response			

27. Other Input Related Spurious Responses, 8595E

A synthesized source and the spectrum analyzer are set to the same frequency and the amplitude of the source is set to -20 dBm. A marker-amplitude reference is set on the spectrum analyzer. The source is then tuned to several different frequencies which should generate image, multiple, and out-of-band responses. At each source frequency, the source amplitude is set to -20 dBm and the amplitude of the response, if any, is measured using the spectrum analyzer marker function. The marker-amplitude difference is then compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 6.5 GHz

Power splitter

Adapter, Type N (m) to APC 3.5 (m)

Adapter, APC 3.5 (f) to APC 3.5 (f)

Cable, APC 3.5, 91 cm (36 in)

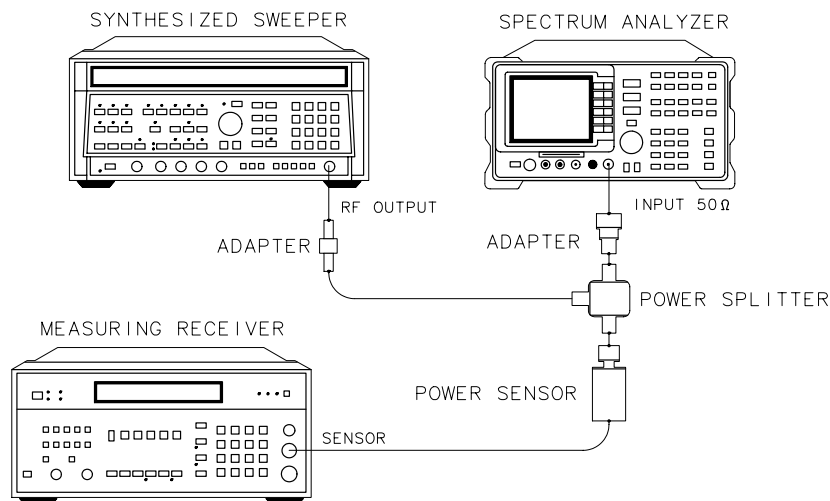
Procedure

Band 0

1. Zero and calibrate the measuring receiver and 50 MHz to 6.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:
 CW 2000 MHz
 POWER LEVEL -4 dBm
3. Connect the equipment as shown in Figure 2-41. Connect the output of the synthesizer to the 50 MHz to 6.5 GHz power sensor using adapters.

Figure 2-41

Other Input Related Spurious Responses Test Setup



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4. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 FREQUENCY, 2.0, GHz
 SPAN, 1, MHz
 AMPLITUDE, REF LVL, 10, -dBm
 ATTEN AUTO MAN, 0, dB
5. Adjust the synthesized sweeper power level for a $-20 \text{ dBm} \pm 0.1 \text{ dB}$ reading on the measuring receiver.

6. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

7. Wait for the AUTO ZOOM message to disappear. Then press the following spectrum analyzer keys:

PEAK SEARCH

MKR →, MARKER →REF LVL

PEAK SEARCH, MARKER Δ

AMPLITUDE, ↓ (step-down key).

SGL SWP

8. For each of the frequencies listed in [Table 2-50](#), do the following:
- Set the synthesized sweeper to the listed CW frequency.
 - Enter the appropriate power sensor CAL Factor into the measuring receiver.
 - Set the synthesized sweeper power level for –20 dBm reading on the measuring receiver.
 - Press **SGL SWP** and wait for the completion of a new sweep.
 - On the spectrum analyzer, press **PEAK SEARCH** and record the marker-delta amplitude reading in [Table 2-50](#) as the Actual MKR Δ Amplitude.

The Actual MKR Δ Amplitude should be less than the Maximum MKR Δ Amplitude listed in [Table 2-50](#).

NOTE

Note that the Maximum MKR Δ Amplitude is 10 dB more positive than the specification. This is due to the 10 dB change in reference level made in step 6.

9. Press the following spectrum analyzer keys:

MKR, MARKER 1 ON OFF (OFF)

HOLD

AUTO COUPLE, AUTO ALL

SPAN, 1, MHz

AMPLITUDE, REF LVL, 10, –dBm

ATTEN AUTO MAN, 0, dB

SWEEP, SWEEP CONT SGL (CONT)

Band 1

10. On the spectrum analyzer, press **FREQUENCY**, 4, **GHz**.
11. Set the synthesized sweeper CW to 4 GHz.
12. Enter the power sensor 4 GHz CAL Factor into the measuring receiver.
13. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

NOTE

Wait for the CAL: PEAKING message to disappear, then press **MKR, MARKERS OFF**.

14. Repeat [step 5](#) through [step 9](#) for the synthesized sweeper CW frequencies listed in [Table 2-50](#) for Band 1.

Specification Summary

1. Record the maximum Actual MKR Δ Amplitude from [Table 2-50](#) for Band 0 as TR Entry 1 of the performance verification test record.
2. Record the maximum Actual MKR Δ Amplitude from [Table 2-50](#) for Bands 1 as TR Entry 2 of the performance verification test record.

Performance verification test “Other Input Related Spurious Responses” is now complete.

Table 2-50 Other Input Related Spurious Worksheet

Band	Spectrum Analyzer Center Frequency GHz	Synthesized Sweeper CW Frequency MHz	MKR Δ Amplitude	
			Actual (dBc)	Max. (dBc)
0	2.0	2042.8 [*]	_____	-55
	2.0	2642.8 [*]	_____	-55
	2.0	9842.8 [†]	_____	-55
	2.0	7921.4 [†]	_____	-55
	2.0	1820.8 [‡]	_____	-55
	2.0	278.5 [‡]	_____	-55
1	4.0	4042.8 [*]	_____	-55
	2.0	4642.8 [*]	_____	-55
	2.0	8321.4 [†]	_____	-55
	2.0	3742.9 [‡]	_____	-55
[*] Image Response [†] Out-of-Band Response [‡] Multiple Response				

28. Other Input Related Spurious Responses, 8596E

A synthesized source and the spectrum analyzer are set to the same frequency and the amplitude of the source is set to -20 dBm. A marker-amplitude reference is set on the spectrum analyzer. The source is then tuned to several different frequencies which should generate image, multiple, and out-of-band responses. At each source frequency, the source amplitude is set to -20 dBm and the amplitude of the response, if any, is measured using the spectrum analyzer marker function. The marker-amplitude difference is then compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 12.8 GHz

Power splitter

Adapter, Type N (m) to APC 3.5 (m)

Adapter, APC 3.5 (f) to APC 3.5 (f)

Cable, APC 3.5, 91 cm (36 in)

Procedure

Band 0

1. Zero and calibrate the measuring receiver and 50 MHz to 12.8 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:

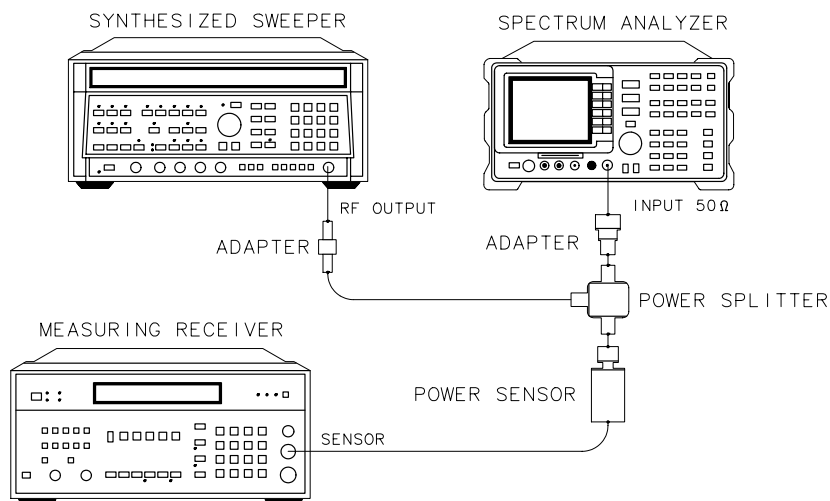
CW 2000 MHz

POWER LEVEL -4 dBm

3. Connect the equipment as shown in [Figure 2-42](#). Connect the output of the synthesizer to the 50 MHz to 12.8 GHz power sensor using adapters.

Figure 2-42

Other Input Related Spurious Responses Test Setup



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4. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 2.0, GHz

SPAN, 1, MHz

AMPLITUDE, REF LVL, 10, -dBm

ATTEN AUTO MAN, 0, dB

5. Adjust the synthesized sweeper power level for a $-20 \text{ dBm} \pm 0.1 \text{ dB}$ reading on the measuring receiver.

6. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

7. Wait for the AUTO ZOOM message to disappear. Then press the following spectrum analyzer keys:

PEAK SEARCH

MKR →, MARKER →REF LVL

PEAK SEARCH, MARKER Δ

AMPLITUDE, ↓ (step-down key).

SGL SWP

8. For each of the frequencies listed in [Table 2-51](#), do the following:

- a. Set the synthesized sweeper to the listed CW frequency.
- b. Enter the appropriate power sensor CAL Factor into the measuring receiver.
- c. Set the synthesized sweeper power level for -20 dBm reading on the measuring receiver.
- d. Press **SGL SWP** and wait for the completion of a new sweep.
- e. On the spectrum analyzer, press **PEAK SEARCH** and record the marker-delta amplitude reading in [Table 2-51](#) as the Actual MKR Δ Amplitude.

The Actual MKR Δ Amplitude should be less than the Maximum MKR Δ Amplitude listed in [Table 2-51](#).

NOTE

Note that the Maximum MKR Δ Amplitude is 10 dB more positive than the specification. This is due to the 10 dB change in reference level made in step 6.

9. Press the following spectrum analyzer keys:

MKR, MARKER 1 ON OFF (OFF)

DISPLAY

HOLD

AUTO COUPLE, AUTO ALL

SPAN, 1, MHz

AMPLITUDE, REF LVL, 10, -dBm

ATTEN AUTO MAN, 0, dB

SWEEP, SWEEP CONT SGL (CONT)

Band 1

10. On the spectrum analyzer, press **FREQUENCY, 4, GHz**.

11. Set the synthesized sweeper CW to 4 GHz.

12. Enter the power sensor 4 GHz CAL Factor into the measuring receiver.

13. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

14. Wait for the CAL: PEAKING message to disappear, then press **MKR, MARKERS OFF**.

15. Repeat [step 5](#) through [step 9](#) for the synthesized sweeper CW frequencies listed in [Table 2-51](#) for Band 1.

Band 2

16. On the spectrum analyzer, press **FREQUENCY, 9, GHz**.

17. Set the synthesized sweeper CW to 9 GHz.

18. Enter the power sensor 9 GHz CAL Factor into the measuring receiver.

19. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

20. Wait for the CAL: PEAKING message to disappear, then press **MKR, MARKERS OFF**.

21. Repeat [step 5](#) through [step 9](#) for the synthesized sweeper CW frequencies listed in [Table 2-51](#) for Band 2.

Specification Summary

1. Record the maximum Actual MKR Δ Amplitude from Table 2-51 for Band 0 as TR Entry 1 of the performance verification test record.
2. Record the maximum Actual MKR Δ Amplitude from Table 2-51 for Bands 1 and 2 as TR Entry 2 of the performance verification test record.

Performance verification test “Other Input Related Spurious Responses” is now complete.

Table 2-51 Other Input Related Spurious Worksheet

Band	Spectrum Analyzer Center Frequency GHz	Synthesized Sweeper CW Frequency MHz	MKR Δ Amplitude	
			Actual (dBc)	Max. (dBc)
0	2.0	2042.8 [*]	_____	–55
	2.0	2642.8 [*]	_____	–55
	2.0	9842.8 [†]	_____	–55
	2.0	7921.4 [†]	_____	–55
	2.0	1820.8 [‡]	_____	–55
	2.0	278.5 [‡]	_____	–55
1	4.0	4042.8 [*]	_____	–55
	4.0	4642.8 [*]	_____	–55
	4.0	8321.4 [†]	_____	–55
	4.0	3742.9 [‡]	_____	–55
2	9.0	9042.8 [*]	_____	–55
	9.0	9642.8 [*]	_____	–55
	9.0	4982.1 [†]	_____	–55
	9.0	9342.8 [‡]	_____	–55
[*] Image Response [†] Out-of-Band Response [‡] Multiple Response				

29. Spurious Response, 8591C and 8591E

This test is performed in two parts. Part 1 measures second harmonic distortion; part 2 measures third order intermodulation distortion.

To test second harmonic distortion, a 50 MHz low pass filter is used to filter the source output, ensuring that harmonics read by the spectrum analyzer are internally generated and not coming from the source. To measure the distortion products, the power at the mixer is set 25 dB higher than specified. New test limits have been developed based on this higher power.

With -45 dBm at the input mixer and the distortion products suppressed by 70 dBc, the equivalent Second Order Intercept (SOI) is $+25$ dBm (-45 dBm + 70 dBc). Therefore, with -20 dBm at the mixer, and the distortion products suppressed by 45 dBc, the equivalent SOI is also $+25$ dBm (-20 dBm + 45 dBc).

For third order intermodulation distortion, two signals are combined in a directional bridge (for isolation) and are applied to the spectrum analyzer input. The power level of the two signals is 8 dB higher than specified, so the distortion products should be suppressed by 16 dB less than specified. In this manner, the equivalent third order intercept (TOI) is measured.

With two -30 dBm signals at the input mixer and the distortion products suppressed by 70 dBc, the equivalent TOI is $+5$ dBm (-30 dBm + 70 dBc/2). However, if two -22 dBm signals are present at the input mixer and the distortion products are suppressed by 54 dBc, the equivalent TOI is also $+5$ dBm (-22 dBm + 54 dBc/2).

Performing the test with a higher power level maintains the measurement integrity while reducing both test time and the dependency upon the source's noise sideband performance.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesizer/level generator
Synthesized sweeper
Measuring receiver (*used as a power meter*)
Power sensor, 100 kHz to 1800 MHz
50 MHz low pass filter
Directional bridge
Cable, BNC, 120 cm (48 in) (*2 required*)
Adapter, Type N (f) to APC 3.5 (f)
Adapter, Type N (f) to BNC (m)
Adapter, Type N (m) to BNC (f)
Adapter, Type N (m) to BNC (m)

Additional Equipment for 75 Ω Input

Power sensor, 75 Ω
Adapter, mechanical, 75 Ω to 50 Ω
Adapter, minimum loss
Adapter, Type N (f) to BNC (m), 75 Ω
Adapter, BNC (m) to BNC (m)

Procedure

This performance test consists of two parts:

Part 1: Second Harmonic Distortion, 30 MHz

Part 2: Third Order Intermodulation Distortion, 50 MHz

Perform “Part 1: Second Harmonic Distortion, 30 MHz” before “Part 2: Third Order Intermodulation Distortion, 50 MHz.”

Part 1: Second Harmonic Distortion, 30 MHz

1. Set the synthesizer level generator controls as follows:

FREQUENCY 30 MHz

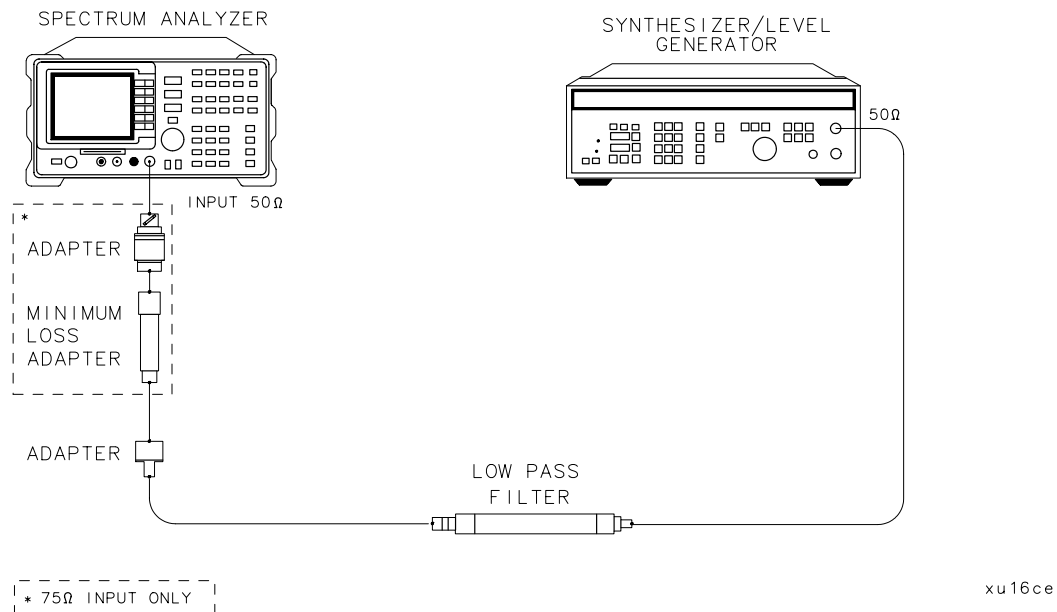
AMPLITUDE -10 dBm

AMPLITUDE (75 Ω input only:) -4.3 dBm

2. Connect the equipment as shown in Figure 2-43.

75 Ω input only: Connect the minimum loss adapter between the LPF and INPUT 75 Ω

Figure 2-43 Second Harmonic Distortion Test Setup, 30 MHz

**CAUTION**

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 30, MHz

SPAN 10 MHz

75 Ω input only: Press **AMPLITUDE, More 1 of 2, Amptd Units**, then **dBm**.

AMPLITUDE, -10, dBm

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 1, MHz

4. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:
MKR FCTN, MK TRACK ON OFF (OFF)
BW, 30, kHz
5. Adjust the synthesizer level generator amplitude to place the peak of the signal at the reference level (−10 dBm).
6. Set the spectrum analyzer control as follows:
BW, 1, kHz
VID BW AUTO MAN, 100, Hz
7. Wait for two sweeps to finish, then press the following spectrum analyzer keys:
PEAK SEARCH
MKR →, MKR →CF STEP
MKR, MARKER Δ
FREQUENCY.
8. Press the $\uparrow$ (step-up key) on the spectrum analyzer to step to the second harmonic (at 60 MHz). Press **PEAK SEARCH**. Record the MKR Δ Amplitude reading in the performance verification test record as TR Entry 1.

Part 2: Third Order Intermodulation Distortion, 50 MHz

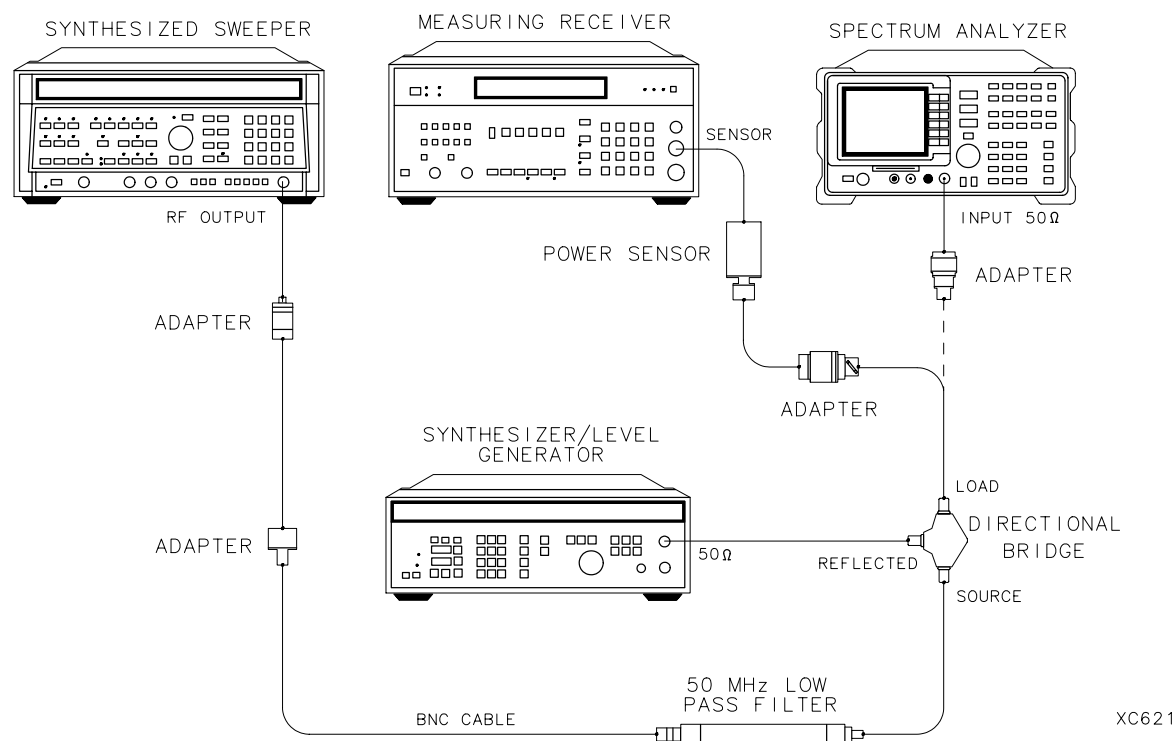
1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.

75 Ω input only: Use a 75 Ω power sensor.

2. Connect the equipment as shown in [Figure 2-44](#) with the output of the directional bridge connected to the 100 kHz to 1.8 GHz power sensor.

75 Ω input only: Use the 75 Ω power sensor with a Type N (f) to BNC (m) 75 Ω adapter and use a BNC (m) to BNC (m) 75 Ω adapter in place of the 50 Ω adapter.

The power measured at the output of the 50 Ω directional bridge by the 75 Ω power sensor, is the equivalent power “seen” by the 75 Ω spectrum analyzer.

Figure 2-44 Third Order Intermodulation Distortion Test Setup**CAUTION**

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:

POWER LEVEL -6 dBm
 CW 50 MHz
 RF OFF

4. Set the synthesizer/level generator controls as follows:

FREQUENCY 50.050 MHz
 AMPLITUDE -6 dBm
 50 Ω /75 Ω SWITCH 75 Ω (no RF output)

5. On the spectrum analyzer, press **PRESET**, then wait until the preset routine is finished. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

75 Ω input only: Press **AMPLITUDE, More 1 of 2, Amptd Units**, then **dBm**.

AMPLITUDE, -10, dBm

PEAK SEARCH, More 1 of 2, PEAK EXCURSN, 3, dB

DISPLAY, More 1 of 2, THRESHLD ON OFF (ON), 90, -dBm

6. On the synthesized sweeper, set RF on. Adjust the power level until the measuring receiver reads $-12 \text{ dBm} \pm 0.05 \text{ dB}$.
7. Disconnect the 100 kHz to 4.2 GHz power sensor from the directional bridge. Connect the directional bridge directly to the spectrum analyzer RF INPUT using an adapter (do not use a cable).

75 Ω input only: Use a 75 Ω adapter, BNC (m) to BNC (m).

8. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

PEAK SEARCH

MKR →, MARKER →REF LVL

9. On the synthesized level generator, set the 50 Ω /75 Ω switch to the 50 Ω position (RF ON). Adjust the amplitude until the two signals are displayed at the same amplitude.
10. If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display, then set the spectrum analyzer by pressing the following keys:

BW, 3, kHz

VID BW AUTO MAN, 300, Hz

11. Press **PEAK SEARCH, DISPLAY, DSP LINE ON OFF (ON)**. Set the display line to a value 54 dB below the current reference level setting.

The third order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line.

12. If the distortion products can be seen, proceed as follows:

- a. On the spectrum analyzer, press **PEAK SEARCH, MARKER Δ**.
- b. Repeatedly press **NEXT PEAK** until the active marker is on the highest distortion product.
- c. Record the MKR Δ amplitude reading below and as TR Entry 1 in the performance verification test record. The MKR Δ reading should be less than -54 dBc.

Third Order Intermodulation Distortion, 50 MHz _____ dBc

13. If the distortion products cannot be seen, proceed as follows:

- a. On both the synthesized sweeper and the synthesized level generator, increase the POWER LEVEL by 5 dB. Distortion products should now be visible at this higher power level.
- b. On the spectrum analyzer, press **PEAK SEARCH, MARKER Δ**.
- c. Repeatedly press **NEXT PEAK** until the active marker is on the highest distortion products.
- d. On both the synthesized sweeper and the synthesizer level generator, reduce the power level by 5 dB and wait for the completion of a new sweep.
- e. Record the MKR Δ amplitude reading below and as TR Entry 2 in the performance verification test record. The MKR Δ reading should be less than -54 dBc.

Third Order Intermodulation Distortion, 50 MHz _____ dBc

Performance verification test "Spurious Response" is now complete.

30. Spurious Response, 8593E

This test is performed in four parts. The first two parts measure the second harmonic distortion; the last two parts measure the third order intermodulation distortion. Second harmonic distortion and third order intermodulation distortion is checked in both low band (50 kHz to 2.9 GHz) and high band (2.75 to 22 GHz).

To test second harmonic distortion, 50 MHz and 4.4 GHz low pass filters are used to filter the source output, ensuring that harmonics read by the analyzer are internally generated and not coming from the source. The distortion products are measured using the spectrum analyzer marker functions.

For third order intermodulation distortion, two signals are combined in a directional coupler (for isolation) and are applied to the analyzer input. The power level of the two signals is 8 dB higher than specified, so the distortion products should be suppressed by 16 dB less than specified. In this manner, the equivalent Third Order Intercept (TOI) is measured.

With two -30 dBm signals at the input mixer and the distortion products suppressed by 70 dBc, the equivalent TOI is $+5$ dBm (-30 dBm + 70 dBc/2). However, if two -22 dBm signals are present at the input mixer and the distortion products are suppressed by 54 dBc, the equivalent TOI is also $+5$ dBm (-22 dBm + 54 dBc/2).

Performing the test with a higher power level maintains the measurement integrity while reducing both test time and the dependency upon the source noise sideband performance.

There are no related adjustments for this performance test.

Equipment Required

Synthesized sweeper (*2 required*)

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 26.5 GHz

Power splitter

Low pass filter, 50 MHz

Low pass filter, 4.4 GHz (*2 required*)

Directional coupler

Cable, APC 3.5 91 cm (36 in)

Cable, BNC 120 cm (48 in)

Adapter, Type N (m) to APC 3.5 (m)

Adapter, APC 3.5 (f) to APC 3.5 (f) (*2 required*)

Adapter, Type N (f) to APC 3.5 (f)

Adapter, Type N (m) to BNC (f) (*2 required*)

Adapter, Type N (m) to APC 3.5 (f)

Adapter, Type N (f) to BNC (m)

Additional Equipment for Option 026

Adapter, BNC (f) to SMA (m)

Procedure

This performance verification test consists of four parts:

- Part 1: Second Harmonic Distortion, <2.9 GHz
- Part 2: Second Harmonic Distortion, >2.9 GHz
- Part 3: Third Order Intermodulation Distortion, <2.9 GHz
- Part 4: Third Order Intermodulation Distortion, >2.9 GHz

Part 1: Second Harmonic Distortion, <2.9 GHz

1. Press **PRESET** on the synthesized sweeper, then set the controls as follows:

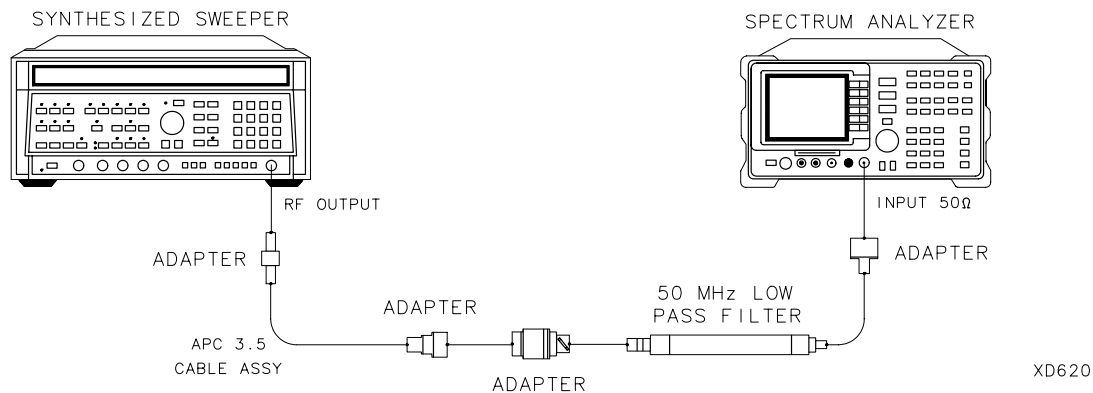
CW 30 MHz

POWER LEVEL -30 dBm

2. Connect the equipment as shown in Figure 2-45.

Option 026 only: Use the BNC to SMA adapter with an APC 3.5 (f) to (f) adapter.

Figure 2-45 Second Harmonic Distortion Test Setup



3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 30, MHz

SPAN, 1, MHz

AMPLITUDE, REF LVL, 30, -dBm

BW, RES BW AUTO MAN, 30, kHz

4. Adjust the synthesized sweeper power level to place the peak of the signal displayed on the spectrum analyzer at the reference level (−30 dBm).
5. Press the following spectrum analyzer keys:
BW, RES BW AUTO MAN, 1, kHz
VID BW AUTO MAN, 100, Hz
6. Wait for two sweeps to finish, then press the following spectrum analyzer keys:
PEAK SEARCH
MKR →, MKR → CF STEP
MKR, MARKER Δ
FREQUENCY
7. Press ↑ (step up) on the spectrum analyzer to step to the second harmonic (at 60 MHz). Set the reference level to −50 dBm.
8. Wait for one full sweep, then press **PEAK SEARCH**.
9. Record the MKR Δ Amplitude reading as TR Entry 1 of the performance verification test record. The amplitude reading should be less than the specified limit.

NOTE

The Maximum MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of changing the reference level from −30 dBm to −50 dBm.

Part 2: Second Harmonic Distortion, >2.9 GHz

10. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 3 GHz Cal Factor into the measuring receiver.

11. Measure the noise level at 5.6 GHz using the following steps:

- a. Remove any cable or adapters from the spectrum analyzer
INPUT 50 Ω
- b. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 5.6, GHz

SPAN, 0, Hz

AMPLITUDE, REF LVL, 40, -dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

VID AVG ON OFF (ON), 10, ENTER

SWEEP, SWP TIME AUTO MAN, 5.0, sec

- c. Press **SGL SWP**. Wait until AVG 10 is displayed along the left side of the CRT display.
- d. Press **PEAK SEARCH** on the spectrum analyzer and record the marker amplitude reading as the Noise Level at 5.6 GHz in [Table 2-52](#).

12. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

SPAN, Band Lock 2.75-6.5, BAND 1

FREQUENCY, 2.8, GHz

SPAN, 10, MHz

13. Connect the equipment as shown in [Figure 2-46](#), with the output of the synthesized sweeper connected to the input of the power splitter, and the power splitter outputs connected to the spectrum analyzer and the power sensor.

Option 026 only: Use the BNC to SMA adapter with an APC 3.5 (f) to (f) adapter.

14. On the synthesized sweeper, press INSTRUMENT PRESET, then set the controls as follows:

CW 2.8 GHz

POWER LEVEL 0 dBm

15. On the spectrum analyzer, press the following keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

Wait for the CAL: PEAKING message to disappear.

16. Press **PEAK SEARCH**, **MARKER** Δ , then record the power meter reading at 2.8 GHz in [Table 2-52](#).

17. Set the synthesized sweeper CW to 5.6 GHz.

18. Press the following spectrum analyzer keys:

FREQUENCY, 5.6, GHz

PEAK SEARCH

AMPLITUDE, PRESEL PEAK.

19. Wait for the CAL: PEAKING message to disappear.

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

20. Adjust the synthesized sweeper power level until the Marker Δ Amplitude reads 0 dB $\pm$ 0.20 dB.

21. Enter the power sensor 6 GHz Cal Factor into the power meter.

22. Record the Power Meter Reading at 5.6 GHz in [Table 2-52](#).

23. Subtract the Power Meter Reading (PMR) at 5.6 GHz from the Power Meter Reading (PMR) at 2.8 GHz, then record this value as the Frequency Response Error (FRE) in [Table 2-52](#). For example, if the Power Meter Reading at 5.6 GHz is -6.45 dBm and the Power Meter Reading at 2.8 GHz is -7.05 dBm, the Frequency Response Error would be $-7.05 \text{ dBm} - (-6.45 \text{ dBm}) = -0.60 \text{ dB}$.

$$\text{FRE} = \text{PMR (2.8 GHz)} - \text{PMR (5.6 GHz)}$$

Table 2-52

Second Harmonic Distortion Worksheet

Description	Measurement
Noise Level at 5.6 GHz	_____dBm
Power Meter Reading at 2.8 GHz	_____dBm
Power Meter Reading at 5.6 GHz	_____dBm
Frequency Response Error (FRE)	_____dB
Distortion-limited Specification	_____dBc
Noise-limited Specification	_____dBc

24. Calculate the desired maximum marker amplitude reading as follows:

- Add the Frequency Response Error (FRE) to -60 dBc (specification is -100 dBc, but reference level will be changed by 40 dB to yield the required dynamic range), then record as the Distortion-limited Specification in [Table 2-52](#).

$$\text{Distortion-limited Specification} = -60 \text{ dBc} + \text{FRE}$$

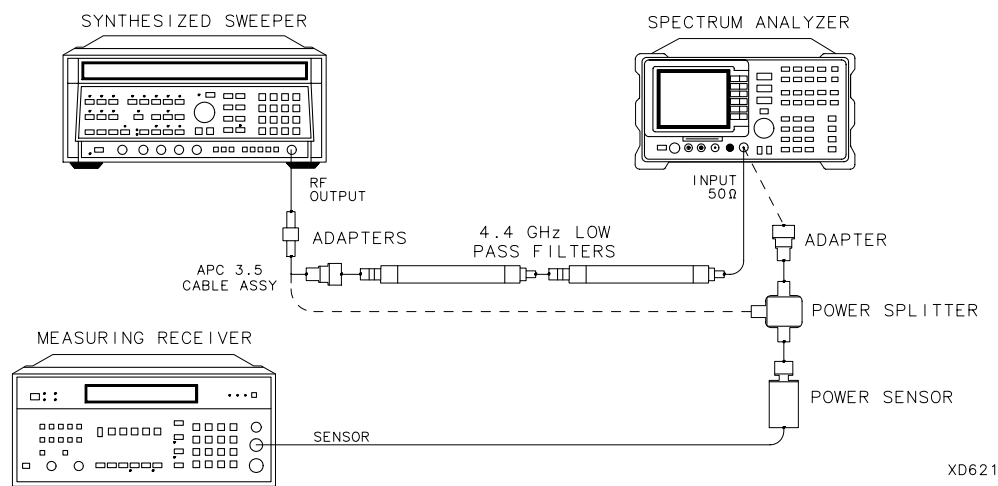
- Subtract -40 dBm (reference level setting) from Noise Level at 5.6 GHz, then record in [Table 2-52](#).

$$\text{Noise-limited Specification} = \text{Noise Level (5.6 GHz)} + 40 \text{ dBm}$$

- Record the more positive of the values recorded in steps a and b above as TR Entry 2 of the performance verification test record. For example, if the value in step a is -59 dBc and the value in step b is -61 dBc, record -59 dBc.

25. Connect the equipment as shown in [Figure 2-46](#) with the filters in place.

Figure 2-46 Second Harmonic Distortion Test Setup, >2.9 GHz



26. Set the synthesized sweeper controls as follows:

CW 2.8 GHz

POWER LEVEL 0 dBm

27. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 2.8, GHz

MKR, MARKERS OFF

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

28. Wait for the CAL: PEAKING message to disappear.

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

29. Adjust the synthesized sweeper power level for a spectrum analyzer marker amplitude reading of 0 dBm $\pm$ 0.2 dB.

30. On the spectrum analyzer, press the following keys:

MKR FCTN, MK TRACK ON OFF (OFF)

PEAK SEARCH, MARKER Δ

FREQUENCY, 5.6, GHz

SPAN, 10, MHz

31. Remove the filters and connect the synthesized sweeper output directly to the spectrum analyzer INPUT 50 Ω

32. On the spectrum analyzer, press the following keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

33. Wait for the CAL: PEAKING message to disappear.

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

34. Reinstall the filters between the synthesized sweeper output and the spectrum analyzer INPUT 50 Ω

35. Set the spectrum analyzer by pressing the following keys:

AMPLITUDE, REF LVL, 40, -dBm

BW, VID BW AUTO MAN, 30, Hz

VID AVG ON OFF (ON), 10, ENTER

SGL SWP

36. Wait until **AVG 10** is displayed along the left side of the CRT display. Then press **PEAK SEARCH**, then record the Marker Amplitude Reading as TR Entry 3 of the performance verification test record.

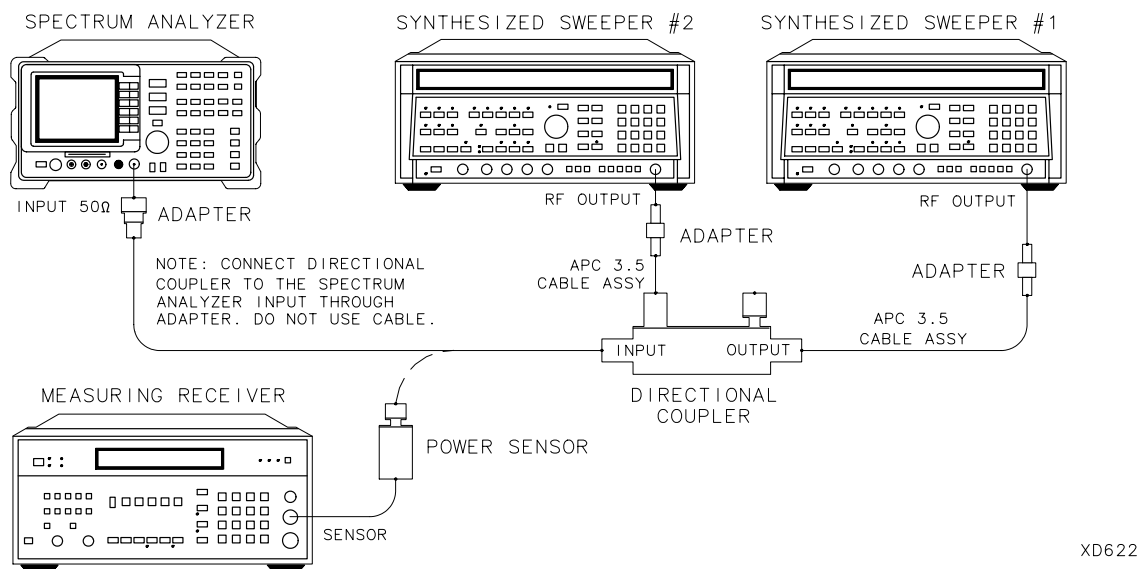
The Marker Amplitude Reading should be more negative than the Specification previously recorded as TR Entry 2 of the performance verification test record.

Part 3: Third Order Intermodulation Distortion, < 2.9 GHz

37. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 3 GHz Cal Factor into the measuring receiver.

38. Connect the equipment as shown in [Figure 2-47](#) with the input of the directional coupler connected to the power sensor.

Figure 2-47 Third-Order Intermodulation Distortion Test Setup



39. Press **INSTRUMENT PRESET** on each synthesized sweeper. Set each of the synthesized sweeper controls as follows:

POWER LEVEL -15 dBm
 CW (synthesized sweeper #1) 2.800 GHz
 CW (synthesized sweeper #2) 2.80005 GHz
 RF OFF

40. On the spectrum analyzer, press **PRESET**, then wait until the preset routine is finished. Set the controls as follows:

FREQUENCY, 2.8, GHz

SPAN, 1, MHz

AMPLITUDE, REF LVL, 10, -dBm

PEAK SEARCH, PEAK EXCURSN, 3, dB

DISPLAY, THRESHLD ON OFF (ON), 90, -dBm

41. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads $-12 \text{ dBm} \pm 0.05 \text{ dB}$.

42. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50Ω using an adapter (do not use a cable).

Option 026 only: Connect the directional coupler directly to the spectrum analyzer INPUT 50Ω

43. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

44. Wait for the AUTO ZOOM message to disappear. Then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

FREQUENCY, $\uparrow$ (step-up key)

PEAK SEARCH

MKR $\rightarrow$, MARKER $\rightarrow$ REF LVL

45. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display.

46. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 100, Hz

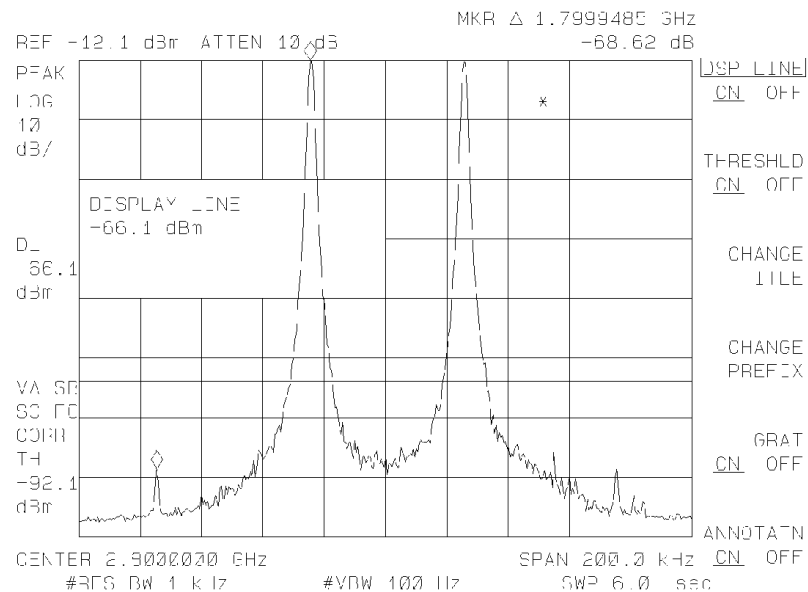
47. Press the following analyzer keys:

PEAK SEARCH, MARKER Δ

DISPLAY, DSP LINE ON OFF (ON)

48. Set the display line to a value 54 dB below the current reference level setting.
49. The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See Figure 2-48.

Figure 2-48 Third Order Intermodulation Distortion



50. If the distortion products can be seen, proceed as follows:
- On the spectrum analyzer, press **MKR →** and **Peak Menu**.
 - Repeatedly press **NEXT PEAK** until the active marker is on the desired distortion product.
 - Record the MKR Δ amplitude reading as TR Entry 4 in the performance verification test record. The MKR Δ reading should be less than the specified limit.

- 51.If the distortion products cannot be seen, proceed as follows:
- On each synthesized sweeper, increase the power level by 5 dB. Distortion products should now be visible at this higher power level.
 - On the spectrum analyzer, press **MKR →** and **Peak Menu**.
 - Repeatedly press **NEXT PEAK** until the active marker is on one of the distortion products.
 - On each synthesized sweeper, reduce the power level by 5 dB and wait for completion of a new sweep.
 - Record the MKR Δ amplitude reading in as TR Entry 4 in the performance verification test record. The MKR Δ reading should be less than the specified limit.

Part 4: Third Order Intermodulation Distortion, >2.9 GHz

- 52.Enter the power sensor 4 GHz Cal Factor into the measuring receiver.
- 53.Disconnect the directional coupler from the spectrum analyzer, then connect the power sensor to the output of the directional coupler.
- 54.Set each of the synthesized sweeper controls as follows:
- | | |
|-----------------------------------|-------------|
| POWER LEVEL | –15 dBm |
| CW (synthesized sweeper #1) | 4.000 GHz |
| CW (synthesized sweeper #2) | 4.00005 GHz |
| RF | OFF |
- 55.On the spectrum analyzer, press **PRESET**, then wait until the preset routine is finished. Set the spectrum analyzer by pressing the following keys:
- | |
|---|
| FREQUENCY, 4.0, GHz |
| SPAN, 1, MHz |
| BW, REF LVL, 10, –dBm |
| PEAK SEARCH, PEAK EXCURSN, 3, dB |
| DISPLAY, THRESHLD ON OFF, 90, –dBm |
- 56.On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads –12 dBm $\pm$ 0.05 dB.

57. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω using an adapter (do not use a cable).

Option 026 only: Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω

58. On the spectrum analyzer, press the following keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

Wait for the CAL: PEAKING message to disappear.

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

FREQUENCY, $\uparrow$ (step-up key)

PEAK SEARCH

MKR $\rightarrow$, MARKER $\rightarrow$ REF LVL

59. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display.

60. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 100, Hz

61. Press **PEAK SEARCH, MARKER Δ** then set the DISPLAY LINE to a value 54 dB below the current reference level setting.

The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See [Figure 2-48](#).

62.If the distortion products can be seen, proceed as follows:

- a. On the spectrum analyzer, press **MKR →** and **Peak Menu**.
- b. Repeatedly press **NEXT PEAK** until the active marker is on the desired distortion product.
- c. Record the MKR Δ amplitude reading as TR Entry 5 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

63.If the distortion products cannot be seen, proceed as follows:

- a. On each synthesized sweeper, increase the power level by 5 dB.
Distortion products should now be visible at this higher power level.
- b. On the spectrum analyzer, press **MKR →** and **Peak Menu**.
- c. Repeatedly press **NEXT PEAK** until the active marker is on one of the distortion products.
- d. On each synthesized sweeper, reduce the power level by 5 dB, then wait for completion of a new sweep.
- e. Record the MKR Δ amplitude reading in as TR Entry 5 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

Performance verification test “Spurious Response” is now complete.

31. Spurious Response, 8594E and 8594Q

This test is performed in two parts. The first part measures second harmonic distortion; the second part measures third order intermodulation distortion.

To test second harmonic distortion, a 50 MHz low pass filter is used to filter the source output, ensuring that harmonics read by the analyzer are internally generated and not coming from the source. The distortion products are measured using the analyzer marker functions.

For third order intermodulation distortion, two signals are combined in a directional coupler (for isolation) and are applied to the analyzer input. The power level of the two signals is 8 dB higher than specified, so the distortion products should be suppressed by 16 dB less than specified. In this manner, the equivalent Third Order Intercept (TOI) is measured.

With two -30 dBm signals at the input mixer and the distortion products suppressed by 70 dBc, the equivalent TOI is +5 dBm (-30 dBm + 70 dBc/2). However, if two -22 dBm signals are present at the input mixer and the distortion products are suppressed by 54 dBc, the equivalent TOI is also +5 dBm (-22 dBm + 54 dBc/2).

Performing the test with a higher power level maintains the measurement integrity while reducing both test time and the dependency upon the source's noise sideband performance.

There are no related adjustment procedures for this performance verification test.

Equipment Required

- Synthesized sweeper (*2 required*)
- Measuring receiver (*used as a power meter*)
- Power sensor, 50 MHz to 2.9 GHz
- Power splitter
- Low pass filter, 50 MHz
- Directional coupler
- Cable, APC 3.5 Cable 91 cm (36 in)
- Cable, BNC 120 cm (48 in)
- Adapter, Type N (m) to APC 3.5 (m)
- Adapter, APC 3.5 (f) to APC 3.5 (f) (*2 required*)
- Adapter, Type N (f) to APC 3.5 (f)
- Adapter, Type N (m) to BNC (f) (*2 required*)
- Adapter, Type N (m) to APC 3.5 (f)
- Adapter, Type N (f) to BNC (m)

Procedure

Second Harmonic Distortion

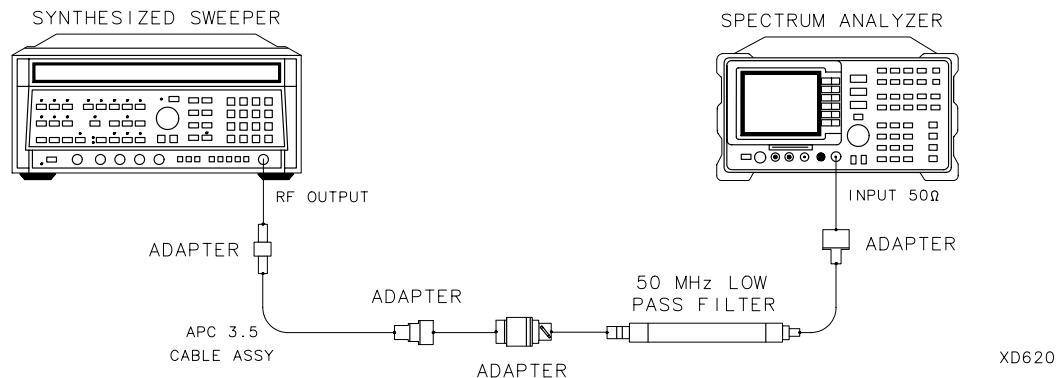
1. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 30 MHz

POWER LEVEL -30 dBm

2. Connect the equipment as shown in [Figure 2-49](#).

Figure 2-49 Second Harmonic Distortion Test Setup



3. Press **PRESET** on the spectrum analyzer, then wait for the preset to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 30, MHz

SPAN, 1, MHz

AMPLITUDE, -30, dBm

BW, 30, kHz

4. Adjust the synthesized sweeper power level to place the peak of the signal at the reference level (-30 dBm).

5. Set the spectrum analyzer by pressing the following keys:

BW, 1, kHz

VID BW AUTO MAN, 100, Hz

6. Wait for two sweeps to finish, then press the following spectrum analyzer keys:

PEAK SEARCH

MKR →, MKR → CF STEP

MKR, MARKER Δ

FREQUENCY

31. Spurious Response, 8594E and 8594Q

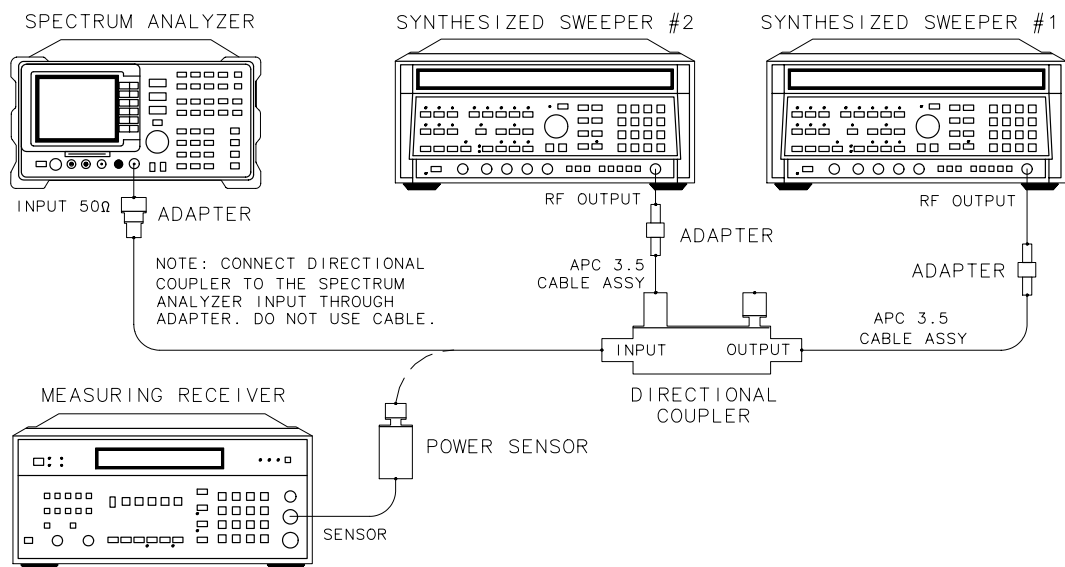
7. Press $\uparrow$ (step up) on the spectrum analyzer to step to the second harmonic (at 60 MHz). Set the reference level to -50 dBm. Wait for a full sweep to finish, then press **PEAK SEARCH**.
8. Record the MKR Δ Amplitude reading as TR Entry 1 of the performance verification test record.

NOTE

The Maximum MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of where the marker position is when the **PEAK SEARCH**, **MARKER Δ** function was invoked in [step 6](#).

Third Order Intermodulation Distortion

9. Zero and calibrate the measuring receiver and 50 MHz to 2.9 GHz power sensor combination in log mode (RF power readout in dBm). Enter the power sensor 3 GHz Cal Factor into the measuring receiver.
10. Connect the equipment as shown in [Figure 2-50](#) with the input of the directional coupler connected to the power sensor.

Figure 2-50 Third-Order Intermodulation Distortion Test Setup

11. Press **INSTRUMENT PRESET** on each synthesized sweeper. Set each of the synthesized sweeper controls as follows:

POWER LEVEL -15 dBm
 CW (synthesized sweeper #1) 2.800 GHz
 CW (synthesized sweeper #2) 2.80005 GHz
 RF OFF

12. On the spectrum analyzer, press **PRESET** and wait until the preset routine is finished. Press the following spectrum analyzer keys:

FREQUENCY, 2.8, GHz

SPAN, 1, MHz

AMPLITUDE, -10, dBm

PEAK SEARCH, More 1 of 2, PEAK EXCURSN, 3, dB

DISPLAY, More 1 of 2, THRESHLD ON OFF (ON), -90, dBm

13. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads $-12 \text{ dBm} \pm 0.05 \text{ dB}$.

14. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50Ω using an adapter (do not use a cable).

15. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN 200 kHz

16. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

FREQUENCY, $\uparrow$ (step-up key)

PEAK SEARCH

MKR $\rightarrow$, MARKER $\rightarrow$ REF LVL

17. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

18. If necessary, adjust the spectrum analyzer Center Frequency until the two signals are centered on the display. Press the following spectrum analyzer keys:

BW, 1, kHz

VID BW AUTO MAN, 100, Hz

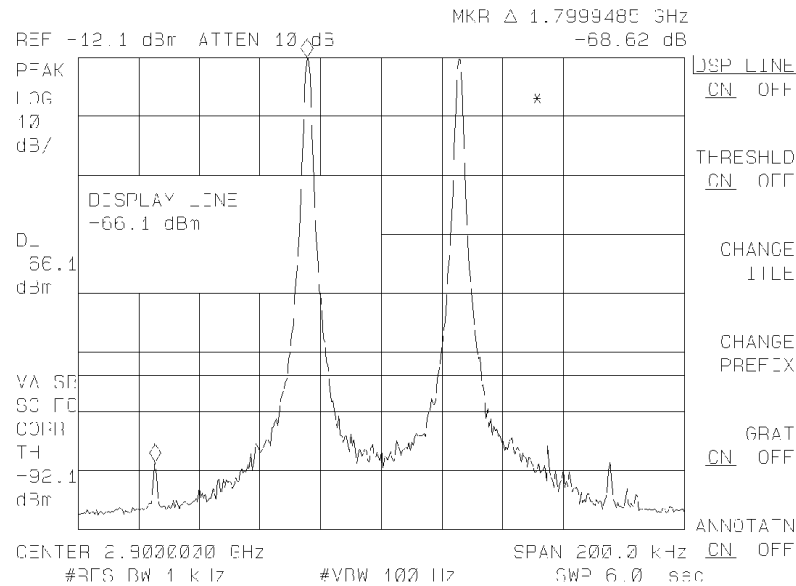
PEAK SEARCH, MARKER Δ

DISPLAY, DSP LINE ON OFF (ON)

19. Set the display line to a value 54 dB below the current reference level setting.

20. The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See Figure 2-51.

Figure 2-51 Third Order Intermodulation Distortion



21. If the distortion products can be seen, proceed as follows:

- On the spectrum analyzer, press **MKR** →, **More 1 of 2, PEAK MENU**.
- Repeatedly press **PEAK SEARCH** until the active marker is on the desired distortion product.
- Record the MKR Δ amplitude reading as TR Entry 2 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

22.If the distortion products cannot be seen, proceed as follows:

- a. On each synthesized sweeper, increase the power level by 5 dB. Distortion products should now be visible at this higher power level.
- b. On the spectrum analyzer, press **MKR** → and **PEAK MENU**.
- c. Repeatedly press **PEAK SEARCH** until the active marker is on one of the distortion products.
- d. On each synthesized sweeper, reduce the power level by 5 dB and wait for completion of a new sweep.
- e. Record the MKR Δ amplitude reading as TR Entry 2 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

Performance verification test “Spurious Response” is now complete.

32. Spurious Response, 8595E

This test is performed in four parts. The first two parts measure the second harmonic distortion; the last two parts measure the third order intermodulation distortion. Second harmonic distortion and third order intermodulation distortion is checked in both low band (50 kHz to 2.9 GHz) and high band (2.75 to 22 GHz).

To test second harmonic distortion, 50 MHz and 4.4 GHz low pass filters are used to filter the source output, ensuring that harmonics read by the analyzer are internally generated and not coming from the source. The distortion products are measured using the spectrum analyzer marker functions.

For third order intermodulation distortion, two signals are combined in a directional coupler (for isolation) and are applied to the analyzer input. The power level of the two signals is 8 dB higher than specified, so the distortion products should be suppressed by 16 dB less than specified. In this manner, the equivalent Third Order Intercept (TOI) is measured.

With two -30 dBm signals at the input mixer and the distortion products suppressed by 70 dBc, the equivalent TOI is +5 dBm (-30 dBm + 70 dBc/2). However, if two -22 dBm signals are present at the input mixer and the distortion products are suppressed by 54 dBc, the equivalent TOI is also +5 dBm (-22 dBm + 54 dBc/2).

Performing the test with a higher power level maintains the measurement integrity while reducing both test time and the dependency upon the source noise sideband performance.

There are no related adjustments for this performance test.

Equipment Required

Synthesized sweeper (*2 required*)

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 6.5 GHz

Power splitter

Low pass filter, 50 MHz

Low pass filter, 4.4 GHz (*2 required*)

Directional coupler

Cable, APC 3.5 91 cm (36 in)

Cable, BNC 120 cm (48 in)

Adapter, Type N (m) to APC 3.5 (m)

Adapter, APC 3.5 (f) to APC 3.5 (f) (*2 required*)

Adapter, Type N (f) to APC 3.5 (f)

Adapter, Type N (m) to BNC (f) (*2 required*)

Adapter, Type N (m) to APC 3.5 (f)

Adapter, Type N (f) to BNC (m)

Procedure

This performance verification test consists of four parts:

Part 1: Second Harmonic Distortion, <2.9 GHz

Part 2: Second Harmonic Distortion, >2.9 GHz

Part 3: Third Order Intermodulation Distortion, <2.9 GHz

Part 4: Third Order Intermodulation Distortion, >2.9 GHz

Part 1: Second Harmonic Distortion, <2.9 GHz

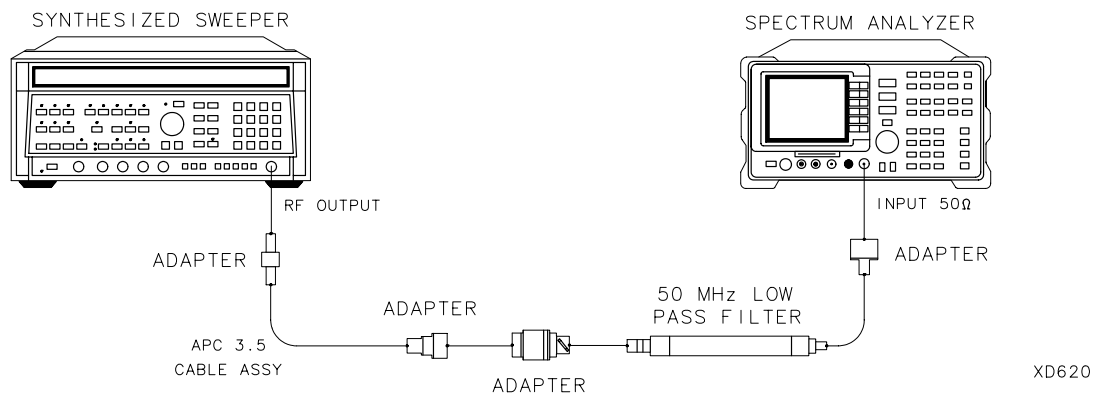
1. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 30 MHz

POWER LEVEL -30 dBm

2. Connect the equipment as shown in Figure 2-52.

Figure 2-52 Second Harmonic Distortion Test Setup



3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 30, MHz

SPAN, 1, MHz

AMPLITUDE, REF LVL, 30, -dBm

BW, RES BW AUTO MAN, 30, kHz

4. Adjust the synthesized sweeper power level to place the peak of the signal displayed on the spectrum analyzer at the reference level (-30 dBm).

5. Press the following spectrum analyzer keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 100, Hz

6. Wait for two sweeps to finish, then press the following spectrum analyzer keys:

PEAK SEARCH

MKR →, MKR → CF STEP

MKR, MARKER Δ

FREQUENCY

7. Press $\uparrow$ (step up) on the spectrum analyzer to step to the second harmonic (at 60 MHz). Set the reference level to -50 dBm.
8. Wait for one full sweep, then press **PEAK SEARCH**.
9. Record the MKR Δ Amplitude reading as TR Entry 1 of the performance verification test record. The amplitude reading should be less than the specified limit.

Note that the Max. MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of changing the reference level from -30 dBm to -50 dBm.

Part 2: Second Harmonic Distortion, >2.9 GHz

10. Zero and calibrate the measuring receiver and 50 MHz to 6.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 3 GHz Cal Factor into the measuring receiver.

11. Measure the noise level at 5.6 GHz using the following steps:

- Remove any cable or adapters from the spectrum analyzer
INPUT 50 Ω
- Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 5.6, GHz

SPAN, 0, Hz

AMPLITUDE, REF LVL, 40, $-$ dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

VID AVG ON OFF (ON), 10, ENTER

SWEEP, SWP TIME AUTO MAN, 5.0, sec

- c. Press **SGL SWP**. Wait until AVG 10 is displayed along the left side of the CRT display.
 - d. Press **PEAK SEARCH** on the spectrum analyzer and record the marker amplitude reading as the Noise Level at 5.6 GHz in [Table 2-53](#).
12. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

SPAN, Band Lock 2.75-6.5, BAND 1

FREQUENCY, 2.8, GHz

SPAN, 10, MHz
13. Connect the equipment as shown in [Figure 2-53](#), with the output of the synthesized sweeper connected to the input of the power splitter, and the power splitter outputs connected to the spectrum analyzer and the power sensor.
14. On the synthesized sweeper, press INSTRUMENT PRESET, then set the controls as follows:

CW 2.8 GHz

POWER LEVEL 0 dBm
15. On the spectrum analyzer, press the following keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK
16. Wait for the CAL: PEAKING message to disappear. Press **PEAK SEARCH, MARKER Δ**, then record the power meter reading at 2.8 GHz in [Table 2-53](#).
17. Set the synthesized sweeper CW to 5.6 GHz.
18. Press the following spectrum analyzer keys:

FREQUENCY, 5.6, GHz

PEAK SEARCH

AMPLITUDE, PRESEL PEAK.
19. Wait for the CAL: PEAKING message to disappear.

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)
20. Adjust the synthesized sweeper power level until the Marker Δ Amplitude reads 0 dB $\pm$ 0.20 dB.
21. Enter the power sensor 6 GHz Cal Factor into the power meter.

22. Record the power meter reading at 5.6 GHz in [Table 2-53](#).

23. Subtract the power meter reading (PMR) at 5.6 GHz from the power meter reading (PMR) at 2.8 GHz. Record this value as the frequency response error (FRE) in [Table 2-53](#).

$$\text{FRE} = \text{PMR} (2.8 \text{ GHz}) - \text{PMR} (5.6 \text{ GHz})$$

For example, if the power meter reading at 5.6 GHz is -6.45 dBm and the power meter reading at 2.8 GHz is -7.05 dBm , the frequency response error is:

$$\text{FRE} = -7.05 \text{ dBm} - (-6.45 \text{ dBm}) = -0.60 \text{ dB}$$

24. Calculate the desired maximum marker amplitude reading as follows:

- a. Add the Frequency Response Error (FRE) to -60 dBc (specification is -100 dBc , but reference level will be changed by 40 dB to yield the required dynamic range), then record the Distortion-limited Specification in [Table 2-53](#).

$$\text{Distortion-limited Specification} = -60 \text{ dBc} + \text{FRE}$$

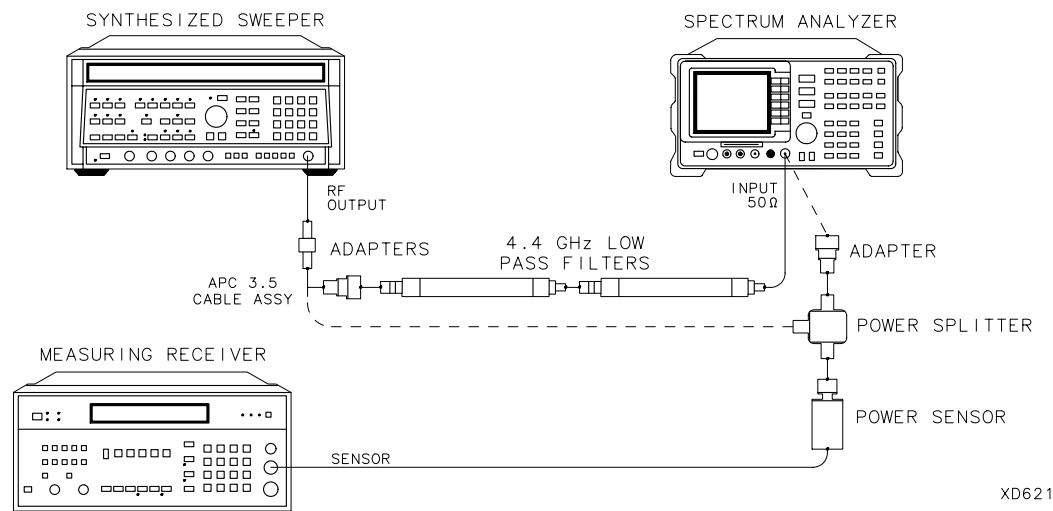
- b. Subtract -40 dBm (reference level setting) from Noise Level at 5.6 GHz, then record in [Table 2-53](#).

$$\text{Noise-limited Specification} = \text{Noise Level} (5.6 \text{ GHz}) + 40 \text{ dBm}$$

- c. Record the more positive of the values recorded in step a and b above as TR Entry 2 of the performance verification test record. For example, if the value in step a is -59 dBc and the value in step b is -61 dBc , record -59 dBc .

25. Connect the equipment as shown in [Figure 2-53](#) with the filters in place.

Figure 2-53 Second Harmonic Distortion Test Setup, >2.9 GHz



26. Set the synthesized sweeper controls as follows:

CW 2.8 GHz
POWER LEVEL 0 dBm

27. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 2.8, GHz
MKR, MARKERS OFF
PEAK SEARCH
AMPLITUDE, PRESEL PEAK

28. Wait for the CAL: PEAKING message to disappear.

MKR FCTN, MK TRACK ON OFF (ON)
SPAN, 100, kHz

29. Adjust the synthesized sweeper power level for a spectrum analyzer marker amplitude reading of 0 dBm ± 0.2 dB.

30. On the spectrum analyzer, press the following keys:

MKR FCTN, MK TRACK ON OFF (OFF)
PEAK SEARCH, MARKER Δ
FREQUENCY, 5.6, GHz
SPAN, 10, MHz

31. Remove the filters and connect the synthesized sweeper output directly to the spectrum analyzer INPUT 50 Ω

32. On the spectrum analyzer, press the following keys:

PEAK SEARCH
AMPLITUDE, PRESEL PEAK

33. Wait for the CAL: PEAKING message to disappear.

MKR FCTN, MK TRACK ON OFF (ON)
SPAN, 100, kHz

34. Reinstall the filters between the synthesized sweeper output and the spectrum analyzer INPUT 50 Ω

35. Set the spectrum analyzer by pressing the following keys:

AMPLITUDE, REF LVL, 40, -dBm
BW, VID BW AUTO MAN, 30, Hz
VID AVG ON OFF (ON), 10, ENTER
SGL SWP

36.Wait until AVG 10 is displayed along the left side of the CRT display. Then, press **PEAK SEARCH**, and record the Marker Amplitude Reading as TR Entry 3 of the performance verification test record.

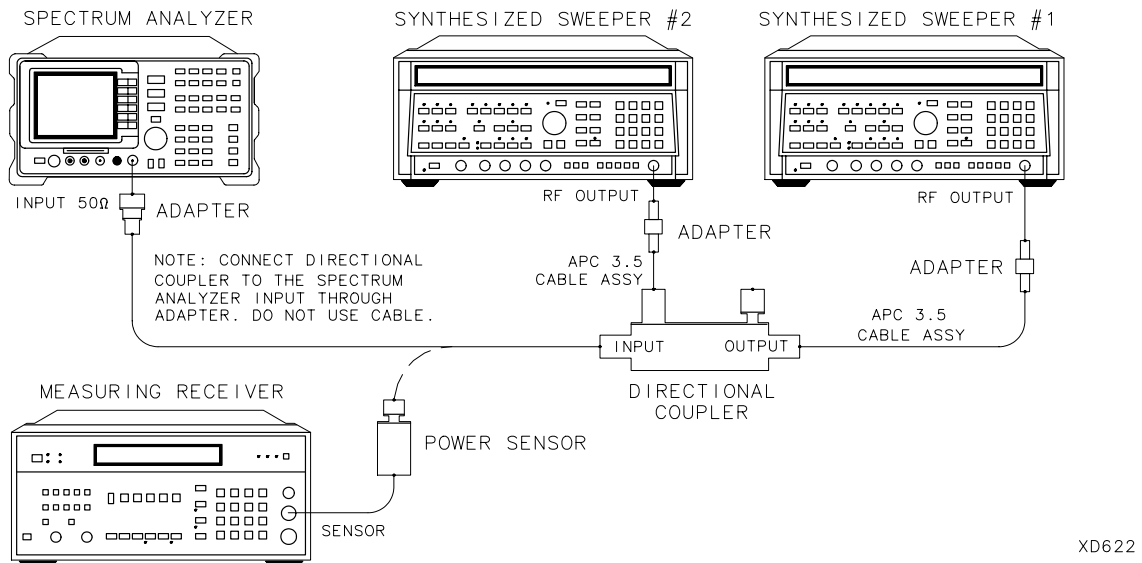
The Marker Amplitude Reading should be more negative than the Specification previously recorded as TR Entry 2 of the performance verification test record.

Part 3: Third Order Intermodulation Distortion, <2.9 GHz

37.Zero and calibrate the measuring receiver and 50 MHz to 6.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 3 GHz Cal Factor into the measuring receiver.

38.Connect the equipment as shown in Figure 2-54 with the input of the directional coupler connected to the power sensor.

Figure 2-54 Third-Order Intermodulation Distortion Test Setup



39.Press **INSTRUMENT PRESET** on each synthesized sweeper. Set each of the synthesized sweeper controls as follows:

POWER LEVEL -15 dBm
CW (synthesized sweeper #1) 2.800 GHz
CW (synthesized sweeper #2) 2.80005 GHz
RF OFF

40. On the spectrum analyzer, press **PRESET**, then wait until the preset routine is finished. Set the controls as follows:

FREQUENCY, 2.8, GHz

SPAN, 1, MHz

AMPLITUDE, REF LVL, 10, -dBm

PEAK SEARCH, More 1 of 2, PEAK EXCURSN, 3, dB

DISPLAY, More 1 of 2, THRESHLD ON OFF (ON), 90, -dBm

41. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads $-12 \text{ dBm} \pm 0.05 \text{ dB}$.

42. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50Ω using an adapter (do not use a cable).

43. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

44. Wait for the AUTO ZOOM message to disappear.

MKR FCTN, MK TRACK ON OFF (OFF)

FREQUENCY, $\uparrow$ (step-up key)

PEAK SEARCH

MKR $\rightarrow$, MARKER $\rightarrow$ REF LVL

45. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display.

46. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 100, Hz

47. Press the following analyzer keys:

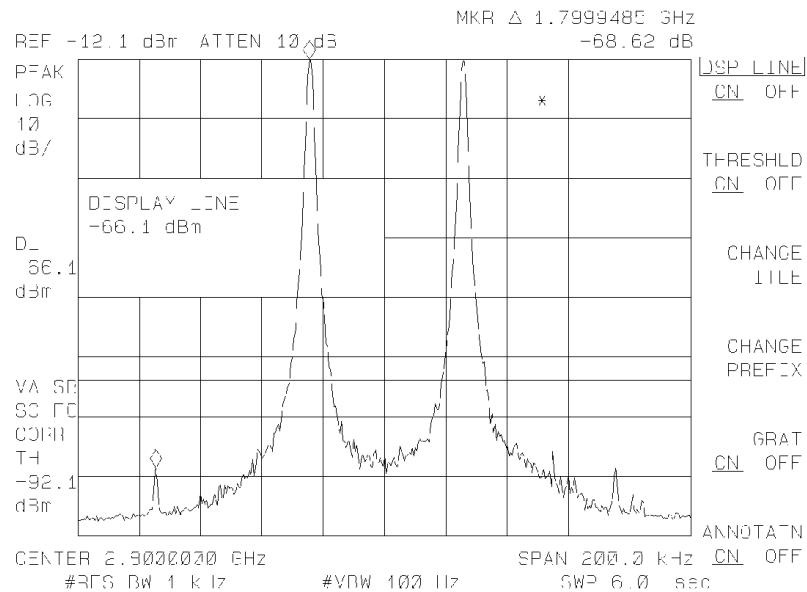
PEAK SEARCH, MARKER Δ

DISPLAY, DSP LINE ON OFF (ON)

48. Set the display line to a value 54 dB below the current reference level setting.

49. The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See [Figure 2-55](#).

Figure 2-55 Third Order Intermodulation Distortion



50. If the distortion products can be seen, proceed as follows:
- On the spectrum analyzer, press **MKR** →, **More 1 of 2**, and **Peak Menu**.
 - Repeatedly press **NEXT PEAK** until the active marker is on the desired distortion product.
 - Record the MKR Δ amplitude reading as TR Entry 4 in the performance verification test record. The MKR Δ reading should be less than the specified limit.
51. If the distortion products cannot be seen, proceed as follows:
- On each synthesized sweeper, increase the power level by 5 dB. Distortion products should now be visible at this higher power level.
 - On the spectrum analyzer, press **MKR** →, **More 1 of 2**, and **Peak Menu**.
 - Repeatedly press **NEXT PEAK** until the active marker is on one of the distortion products.

- d. On each synthesized sweeper, reduce the power level by 5 dB and wait for completion of a new sweep.
- e. Record the MKR Δ amplitude reading in as TR Entry 4 in the performance verification test record. The MKR Δ reading should be less than the specified limit.

Part 4: Third Order Intermodulation Distortion, >2.9 GHz

- 52. Enter the power sensor 4 GHz Cal Factor into the measuring receiver.
- 53. Disconnect the directional coupler from the spectrum analyzer, then connect the power sensor to the output of the directional coupler.
- 54. Set each of the synthesized sweeper controls as follows:

POWER LEVEL -15 dBm
 CW (synthesized sweeper #1) 4.000 GHz
 CW (synthesized sweeper #2) 4.00005 GHz
 RF OFF

- 55. On the spectrum analyzer, press **PRESET**, then wait until the preset routine is finished. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 4.0, GHz
SPAN, 1, MHz
BW, REF LVL, 10, -dBm
PEAK SEARCH, More 1 of 2, PEAK EXCURSN, 3, dB
DISPLAY, THRESHLD ON OFF, 90, -dBm

- 56. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads -12 dBm $\pm$ 0.05 dB.
- 57. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω using an adapter (do not use a cable).
- 58. On the spectrum analyzer, press the following keys:

PEAK SEARCH
AMPLITUDE, PRESEL PEAK

- 59. Wait for the CAL: PEAKING message to disappear.

MKR FCTN, MK TRACK ON OFF (ON)
SPAN, 200, kHz

60. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

FREQUENCY, $\uparrow$ (step-up key)

PEAK SEARCH

MKR $\rightarrow$, MARKER $\rightarrow$ REF LVL

61. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display.

62. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 100, Hz

63. Press **PEAK SEARCH, MARKER Δ** then set the DISPLAY LINE to a value 54 dB below the current reference level setting.

The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See [Figure 2-55](#).

64. If the distortion products can be seen, proceed as follows:

- a. On the spectrum analyzer, press **MKR $\rightarrow$, More 1 of 2**, and **Peak Menu**.
- b. Repeatedly press **NEXT PEAK** until the active marker is on the desired distortion product.
- c. Record the MKR Δ amplitude reading as TR Entry 5 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

65. If the distortion products cannot be seen, proceed as follows:

- a. On each synthesized sweeper, increase the power level by 5 dB. Distortion products should now be visible at this higher power level.
- b. On the spectrum analyzer, press **MKR $\rightarrow$, More 1 of 2**, and **Peak Menu**.

- c. Repeatedly press **NEXT PEAK** until the active marker is on one of the distortion products.
- d. On each synthesized sweeper, reduce the power level by 5 dB, then wait for completion of a new sweep.
- e. Record the MKR Δ amplitude reading in as TR Entry 5 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

Performance verification test “Spurious Response” is now complete.

Table 2-53

Second Harmonic Distortion Worksheet

Description	Measurement
Noise Level at 5.6 GHz	_____dBm
Power Meter Reading at 2.8 GHz	_____dBm
Power Meter Reading at 5.6 GHz	_____dBm
Frequency Response Error (FRE)	_____dB
Distortion-limited Specification	_____dBc
Noise-limited Specification	_____dBc

33. Spurious Response, 8596E

This test is performed in four parts. The first two parts measure the second harmonic distortion; the last two parts measure the third order intermodulation distortion. Second harmonic distortion and third order intermodulation distortion is checked in both low band (50 kHz to 2.9 GHz) and high band (2.75 to 12.8 GHz).

To test second harmonic distortion, 50 MHz and 4.4 GHz low pass filters are used to filter the source output, ensuring that harmonics read by the analyzer are internally generated and not coming from the source. The distortion products are measured using the spectrum analyzer marker functions.

For third order intermodulation distortion, two signals are combined in a directional coupler (for isolation) and are applied to the analyzer input. The power level of the two signals is 8 dB higher than specified, so the distortion products should be suppressed by 16 dB less than specified. In this manner, the equivalent Third Order Intercept (TOI) is measured.

With two -30 dBm signals at the input mixer and the distortion products suppressed by 70 dBc, the equivalent TOI is $+5$ dBm (-30 dBm + 70 dBc/2). However, if two -22 dBm signals are present at the input mixer and the distortion products are suppressed by 54 dBc, the equivalent TOI is also $+5$ dBm (-22 dBm + 54 dBc/2).

Performing the test with a higher power level maintains the measurement integrity while reducing both test time and the dependency upon the source noise sideband performance.

There are no related adjustments for this performance test.

Equipment Required

Synthesized sweeper (*2 required*)
Measuring receiver (*used as a power meter*)
Power sensor, 50 MHz to 12.8 GHz
Power splitter
Low pass filter, 50 MHz
Low pass filter, 4.4 GHz (*2 required*)
Directional coupler
Cable, APC 3.5 91 cm (36 in)
Cable, BNC 120 cm (48 in)
Adapter, Type N (m) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f) (*2 required*)
Adapter, Type N (f) to APC 3.5 (f)
Adapter, Type N (m) to BNC (f) (*2 required*)
Adapter, Type N (m) to APC 3.5 (f)
Adapter, Type N (f) to BNC (m)

Procedure

This performance verification test consists of four parts:

Part 1: Second Harmonic Distortion, <2.9 GHz
Part 2: Second Harmonic Distortion, >2.9 GHz
Part 3: Third Order Intermodulation Distortion, <2.9 GHz
Part 4: Third Order Intermodulation Distortion, >2.9 GHz

Part 1: Second Harmonic Distortion, <2.9 GHz

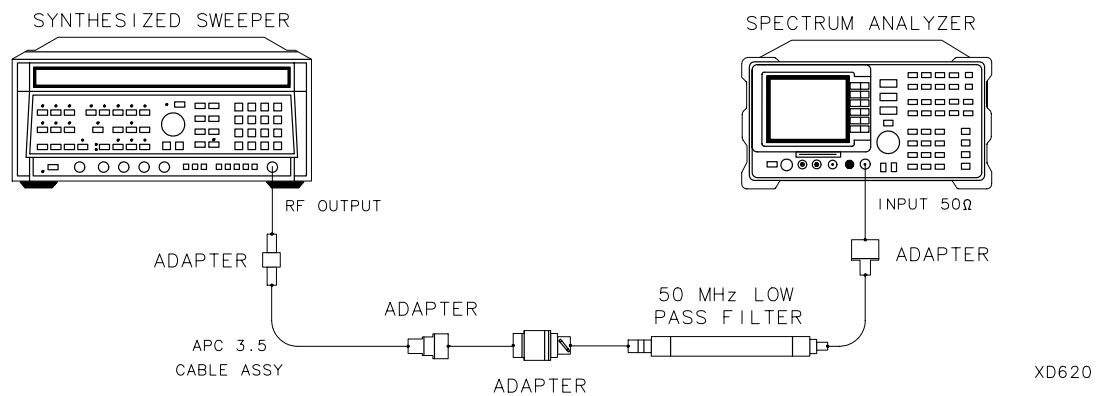
1. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 30 MHz

POWER LEVEL -30 dBm

2. Connect the equipment as shown in [Figure 2-56](#).

Figure 2-56 **Second Harmonic Distortion Test Setup**



3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 30, MHz

SPAN, 1, MHz

AMPLITUDE, REF LVL, 30, -dBm

BW, RES BW AUTO MAN, 30, kHz

4. Adjust the synthesized sweeper power level to place the peak of the signal displayed on the spectrum analyzer at the reference level (−30 dBm).
5. Press the following spectrum analyzer keys:
BW, RES BW AUTO MAN, 1, kHz
VID BW AUTO MAN, 100, Hz
6. Wait for two sweeps to finish, then press the following spectrum analyzer keys:
PEAK SEARCH
MKR →, MKR → CF STEP
MKR, MARKER Δ
FREQUENCY
7. Press $\uparrow$ (step up) on the spectrum analyzer to step to the second harmonic (at 60 MHz). Set the reference level to −50 dBm.
8. Wait for one full sweep, then press **PEAK SEARCH**.
9. Record the MKR Δ Amplitude reading as TR Entry 1 of the performance verification test record. The amplitude reading should be less than the specified limit.

Note that the Max. MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of changing the reference level from −30 dBm to −50 dBm.

Part 2: Second Harmonic Distortion, >2.9 GHz

10. Zero and calibrate the measuring receiver and 50 MHz to 12.8 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 3 GHz Cal Factor into the measuring receiver.
11. Measure the noise level at 5.6 GHz using the following steps:
 - a. Remove any cable or adapters from the spectrum analyzer
INPUT 50 Ω

- b. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 5.6, GHz

SPAN, 0, Hz

AMPLITUDE, REF LVL, 40, -dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

VID AVG ON OFF (ON), 10, ENTER

SWEEP, SWP TIME AUTO MAN, 5.0, sec

- c. Press **SGL SWP**. Wait until AVG 10 is displayed along the left side of the CRT display.
- d. Press **PEAK SEARCH** on the spectrum analyzer and record the marker amplitude reading as the Noise Level at 5.6 GHz in [Table 2-54](#).

12. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

FREQUENCY, 2.8, GHz

SPAN, 10, MHz

13. Connect the equipment as shown in [Figure 2-57](#), with the output of the synthesized sweeper connected to the input of the power splitter, and the power splitter outputs connected to the spectrum analyzer and the power sensor.

14. On the synthesized sweeper, press **INSTRUMENT PRESET**, then set the controls as follows:

CW 2.8 GHz

POWER LEVEL 0 dBm

15. On the spectrum analyzer, press the following keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

16. Wait for the CAL: PEAKING message to disappear. Press **PEAK SEARCH, MARKER Δ**, then record the power meter reading at 2.8 GHz in [Table 2-54](#).

17. Set the synthesized sweeper CW to 5.6 GHz.

18. Press the following spectrum analyzer keys:

FREQUENCY, 5.6, GHz

PEAK SEARCH

AMPLITUDE, PRESEL PEAK.

19. Wait for the CAL: PEAKING message to disappear.

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

20. Adjust the synthesized sweeper power level until the Marker Δ Amplitude reads 0 dB $\pm$ 0.20 dB.

21. Enter the power sensor 6 GHz Cal Factor into the power meter.

22. Record the Power Meter Reading at 5.6 GHz in [Table 2-54](#).

23. Subtract the Power Meter Reading (PMR) at 5.6 GHz from the Power Meter Reading (PMR) at 2.8 GHz, then record this value as the Frequency Response Error (FRE) in [Table 2-54](#).

$$\text{FRE} = \text{PMR (2.8 GHz)} - \text{PMR (5.6 GHz)}$$

For example, if the Power Meter Reading at 5.6 GHz is -6.45 dBm and the Power Meter Reading at 2.8 GHz is -7.05 dBm, the Frequency Response Error is:

$$\text{FRE} = -7.05 \text{ dBm} - (-6.45 \text{ dBm}) = -0.60 \text{ dB.}$$

24. Calculate the desired maximum marker amplitude reading as follows:

- a. Add the Frequency Response Error (FRE) to -60 dBc (specification is -100 dBc, but reference level will be changed by 40 dB to yield the required dynamic range), then record as the Distortion-limited Specification in [Table 2-54](#).

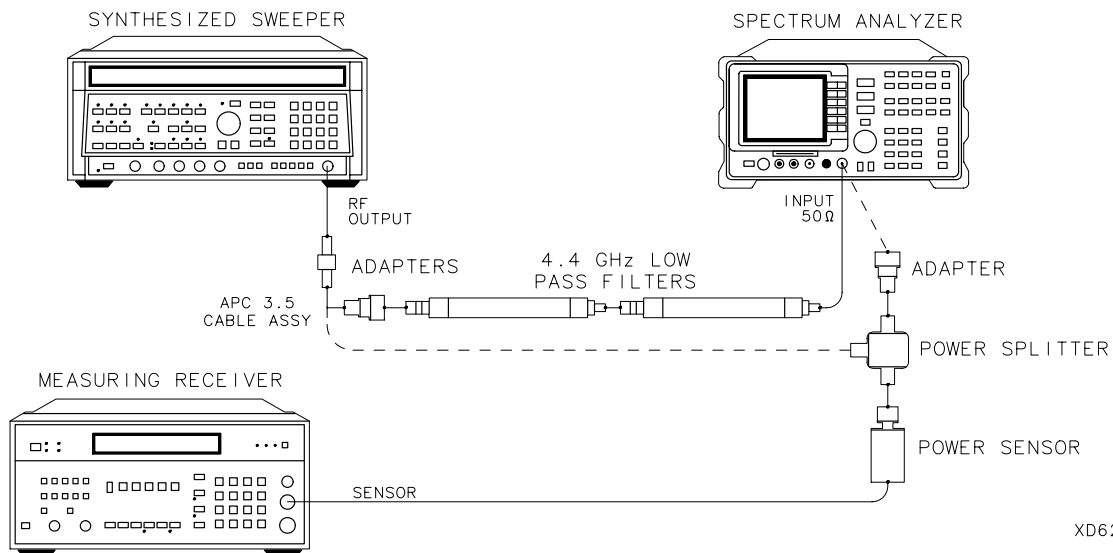
$$\text{Distortion-limited Specification} = -60 \text{ dBc} + \text{FRE}$$

- b. Subtract -40 dBm (reference level setting) from Noise Level at 5.6 GHz, then record in [Table 2-54](#).

$$\text{Noise-limited Specification} = \text{Noise Level at 5.6 GHz} + 40 \text{ dBm}$$

- c. Record the more positive of the values recorded in steps a and b above as TR Entry 2 of the performance verification test record. For example, if the value in step a is -59 dBc and the value in step b is -61 dBc, record -59 dBc.

25. Connect the equipment as shown in [Figure 2-57](#) with the filters in place.

Figure 2-57 Second Harmonic Distortion Test Setup, >2.9 GHz

26. Set the synthesized sweeper controls as follows:

CW 2.8 GHz

POWER LEVEL 0 dBm

27. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 2.8, GHz

MKR, MARKERS OFF

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

28. Wait for the CAL: PEAKING message to disappear.

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

29. Adjust the synthesized sweeper power level for a spectrum analyzer marker amplitude reading of 0 dBm $\pm$ 0.2 dB.

30. On the spectrum analyzer, press the following keys:

MKR FCTN, MK TRACK ON OFF (OFF)

PEAK SEARCH, MARKER Δ

FREQUENCY, 5.6, GHz

SPAN, 10, MHz

31. Remove the filters and connect the synthesized sweeper output directly to the spectrum analyzer INPUT 50 Ω

32. On the spectrum analyzer, press the following keys:

PEAK SEARCH

AMPLITUDE, PRESEL PEAK

33. Wait for the CAL: PEAKING message to disappear.

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

34. Reinstall the filters between the synthesized sweeper output and the spectrum analyzer INPUT 50 Ω

35. Set the spectrum analyzer by pressing the following keys:

AMPLITUDE, REF LVL, 40, -dBm

BW, VID BW AUTO MAN, 30, Hz

VID AVG ON OFF (ON), 10, ENTER

SGL SWP

36. Wait until AVG 10 is displayed along the left side of the CRT display. Then press **PEAK SEARCH** and record the Marker Δ Amplitude Reading as TR Entry 3 of the performance verification test record.

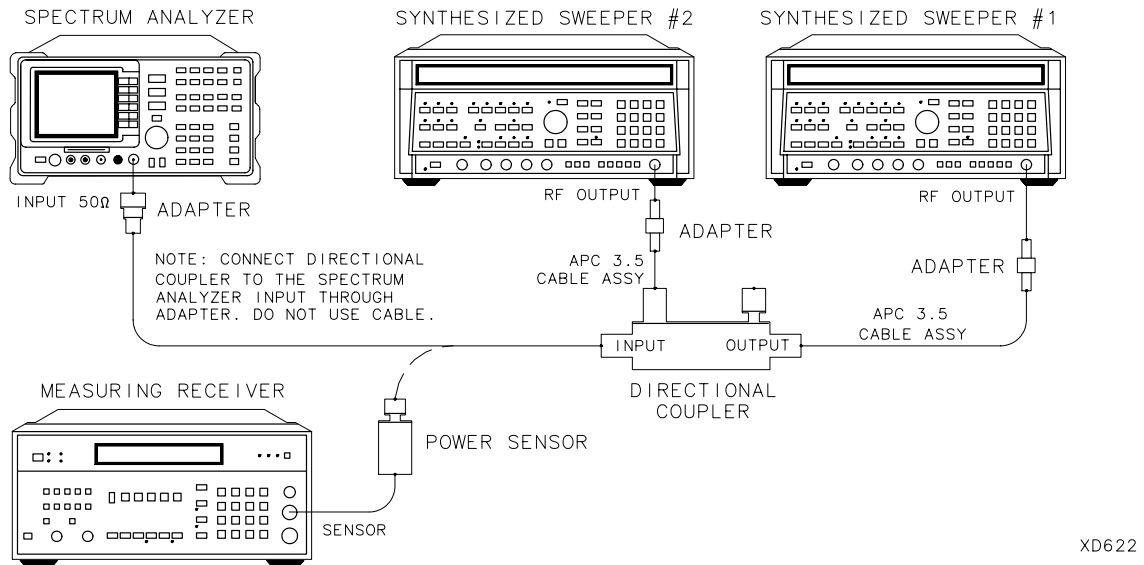
The Marker Amplitude Reading should be more negative than the Specification previously recorded as TR Entry 2 of the performance verification test record.

Part 3: Third Order Intermodulation Distortion, <2.9 GHz

37. Zero and calibrate the measuring receiver and 50 MHz to 12.8 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 3 GHz Cal Factor into the measuring receiver.

38. Connect the equipment as shown in [Figure 2-58](#) with the input of the directional coupler connected to the power sensor.

Figure 2-58 Third-Order Intermodulation Distortion Test Setup



39. Press **INSTRUMENT PRESET** on each synthesized sweeper. Set each of the synthesized sweeper controls as follows:

POWER LEVEL -15 dBm
CW (synthesized sweeper #1) 2.800 GHz
CW (synthesized sweeper #2) 2.80005 GHz
RF OFF

40. On the spectrum analyzer, press **PRESET**, then wait until the preset routine is finished. Set the controls as follows:

FREQUENCY, 2.8, GHz
SPAN, 1, MHz
AMPLITUDE, REF LVL, 10, -dBm
PEAK SEARCH, More 1 of 2, PEAK EXCURSN, 3, dB
DISPLAY, More 1 of 2, THRESHLD ON OFF (ON), 90, -dBm

41. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads -12 dBm $\pm$ 0.05 dB.

42. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω using an adapter (do not use a cable).

43. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

44. Wait for the AUTO ZOOM message to disappear.

MKR FCTN, MK TRACK ON OFF (OFF)

FREQUENCY, ↑ (step-up key)

PEAK SEARCH

MKR →, MARKER → REF LVL

45. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display.

46. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 100, Hz

47. Press the following analyzer keys:

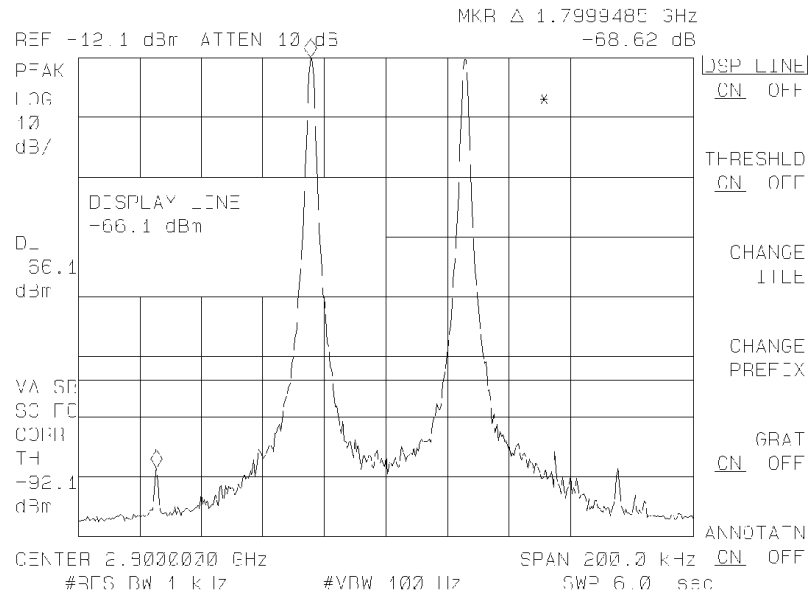
PEAK SEARCH, MARKER Δ

DISPLAY, DSP LINE ON OFF (ON)

48. Set the display line to a value 54 dB below the current reference level setting.

49. The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See [Figure 2-59](#).

Figure 2-59 Third Order Intermodulation Distortion



50.If the distortion products can be seen, proceed as follows:

- On the spectrum analyzer, press **MKR** →, **More 1 of 2**, and **Peak Menu**.
- Repeatedly press **NEXT PEAK** until the active marker is on the desired distortion product.
- Record the MKR Δ amplitude reading as TR Entry 4 in the performance verification test record. The MKR Δ reading should be less than the specified limit.

51.If the distortion products cannot be seen, proceed as follows:

- On each synthesized sweeper, increase the power level by 5 dB. Distortion products should now be visible at this higher power level.
- On the spectrum analyzer, press **MKR** →, **More 1 of 2**, and **Peak Menu**.
- Repeatedly press **NEXT PEAK** until the active marker is on one of the distortion products.
- On each synthesized sweeper, reduce the power level by 5 dB and wait for completion of a new sweep.
- Record the MKR Δ amplitude reading in as TR Entry 4 in the performance verification test record. The MKR Δ reading should be less than the specified limit.

Part 4: Third Order Intermodulation Distortion, >2.9 GHz

52. Enter the power sensor 4 GHz Cal Factor into the measuring receiver.
53. Disconnect the directional coupler from the spectrum analyzer, then connect the power sensor to the output of the directional coupler.
54. Set each of the synthesized sweeper controls as follows:
 - POWER LEVEL -15 dBm
 - CW (synthesized sweeper #1) 4.000 GHz
 - CW (synthesized sweeper #2) 4.00005 GHz
 - RF OFF
55. On the spectrum analyzer, press **PRESET**, then wait until the preset routine is finished. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 4.0, GHz**
 - SPAN, 1, MHz**
 - AMPLITUDE, REF LVL, 10, -dBm**
 - PEAK SEARCH, More 1 of 2, PEAK EXCURSN, 3, dB**
 - DISPLAY, More 1 of 2, THRESHLD ON OFF, 90, -dBm**
56. On synthesized sweeper #1, set RF ON. Adjust the power level until the measuring receiver reads -12 dBm $\pm$ 0.05 dB.
57. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω using an adapter (do not use a cable).
58. On the spectrum analyzer, press the following keys:
 - PEAK SEARCH**
 - AMPLITUDE, PRESEL PEAK**
59. Wait for the CAL: PEAKING message to disappear.
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 200, kHz**

60. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

FREQUENCY, $\uparrow$ (step-up key)

PEAK SEARCH

MKR $\rightarrow$, MARKER $\rightarrow$ REF LVL

61. On synthesized sweeper #2, set RF ON. Adjust the power level until the two signals are displayed at the same amplitude.

If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display.

62. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 100, Hz

63. Press **PEAK SEARCH, MARKER Δ** then set the DISPLAY LINE to a value 54 dB below the current reference level setting.

The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See [Figure 2-59](#).

64. If the distortion products can be seen, proceed as follows:

- a. On the spectrum analyzer, press **MKR $\rightarrow$, More 1 of 2, and Peak Menu**.
- b. Repeatedly press **NEXT PEAK** until the active marker is on the desired distortion product.
- c. Record the MKR Δ amplitude reading as TR Entry 5 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

65. If the distortion products cannot be seen, proceed as follows:

- a. On each synthesized sweeper, increase the power level by 5 dB. Distortion products should now be visible at this higher power level.
- b. On the spectrum analyzer, press **MKR $\rightarrow$, More 1 of 2, and Peak Menu**.

- c. Repeatedly press **NEXT PEAK** until the active marker is on one of the distortion products.
- d. On each synthesized sweeper, reduce the power level by 5 dB, then wait for completion of a new sweep.
- e. Record the MKR Δ amplitude reading in as TR Entry 5 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

Performance verification test “Gain Compression” is now complete.

Table 2-54

Second Harmonic Distortion Worksheet

Description	Measurement
Noise Level at 5.6 GHz	_____dBm
Power Meter Reading at 2.8 GHz	_____dBm
Power Meter Reading at 5.6 GHz	_____dBm
Frequency Response Error (FRE)	_____dB
Distortion-limited Specification	_____dBc
Noise-limited Specification	_____dBc

34. Gain Compression, 8591C and 8591E

Gain compression is measured by applying two signals, separated by 3 MHz. First, the test places a -20 dBm signal at the input of the spectrum analyzer (the spectrum analyzer reference level is also set to -20 dBm). Then, a 0 dBm signal is applied to the spectrum analyzer, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.

For spectrum analyzers equipped with Option 130 the signals are separated by 10 kHz, then the first signal is kept 10 dB below the reference level.

There are no related adjustment procedures for this performance test.

Equipment Required

- Synthesized sweeper
- Synthesizer/level generator
- Measuring receiver (*used as a power meter*)
- Power sensor, 100 kHz to 1800 MHz
- Directional bridge
- Cable, BNC, 120 cm (48 in) (*2 required*)
- Adapter, Type N (f) to BNC (m)
- Adapter, Type N (m) to BNC (m)
- Adapter, Type N (f) to APC 3.5 (f)
- Adapter, Type N (m) to BNC (f)

Additional Equipment for 75 Ω Input

- Power sensor, 75 Ω
- Adapter, Type N (f) to BNC (m), 75 Ω
- Adapter, BNC (m) to BNC (m), 75 Ω

Procedure

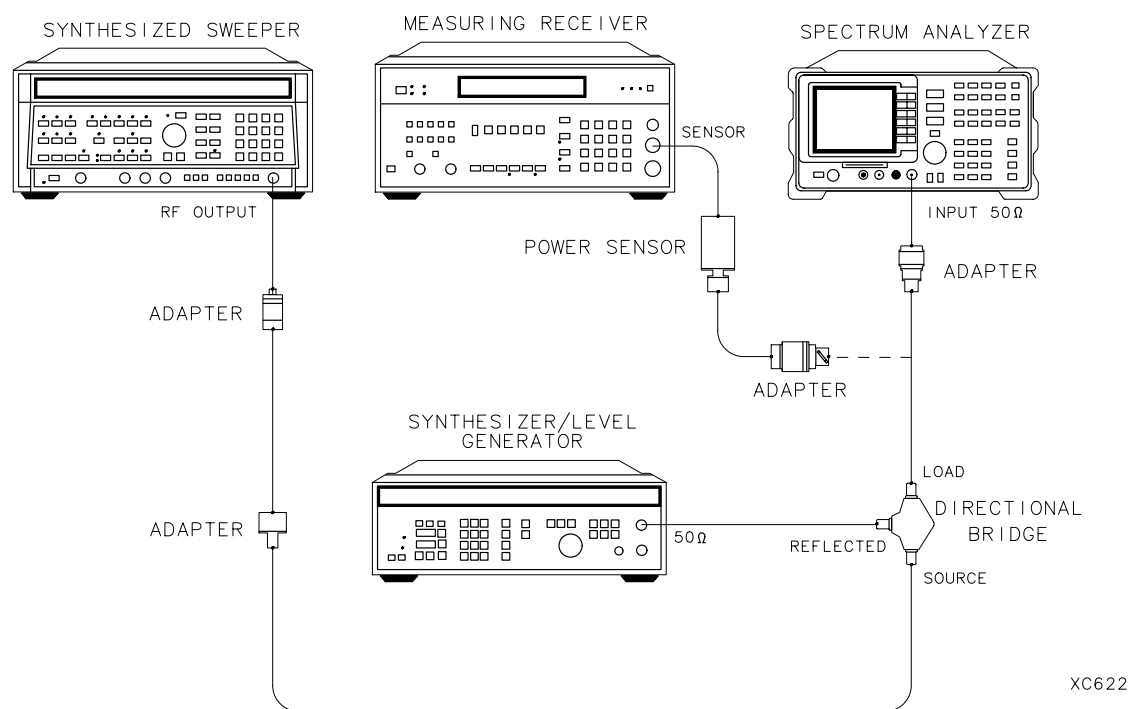
1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.

75 Ω input only: Calibrate the 75 Ω power sensor.

2. Connect the equipment as shown in Figure 2-60, with the load of the directional bridge connected to the power sensor.

75 Ω input only: Use the 75 Ω power sensor with a Type N (f) to BNC (m) 75 Ω adapter and a BNC (m) to BNC (m) adapter. The power measured at the output of the 50 Ω directional bridge by the 75 Ω power sensor, is the equivalent power “seen” by the 75 Ω spectrum analyzer.

Figure 2-60 Gain Compression Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on the 75 Ω input of an 75 Ω input, or damage to the input connector will occur.

3. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 53 MHz

POWER LEVEL 6 dBm

4. Set the synthesized/level generator controls as follows:

CW 50 MHz

AMPLITUDE -14 dBm

50 Ω /75 Ω SWITCH 75 Ω (no RF output)

5. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:

FREQUENCY, 50, MHz

SPAN, 20, MHz

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

AMPLITUDE, -20, dBm

SCALE LOG LIN (LOG), 1, dB

BW, 300, kHz

6. On the synthesized sweeper, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.
7. On the synthesizer/level generator, set the 50 Ω /75 Ω switch to 50 Ω
Note that the power level applied to the spectrum analyzer input is 10 dB greater than the specification to account for the 10 dB attenuation setting. A power level of 0 dBm at the spectrum analyzer input yields -10 dBm at the input mixer.
8. Disconnect the power sensor from the directional bridge and connect the directional bridge to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

75 Ω input only: Use a 75 Ω adapter, BNC (m) to BNC (m).

9. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, MHz

Wait for the AUTO ZOOM routine to finish.

10. On the synthesizer/level generator, adjust the amplitude to place the signal 1 dB below the spectrum analyzer reference level.
11. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ** .

12. On the synthesized sweeper, set RF to ON.

13. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.

The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

14. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 1. The absolute value of this amplitude should be less than 0.5 dB.

If you are testing a spectrum analyzer equipped with Option 130 continue with step 15.

Performance verification test "Gain Compression" is now complete for all other spectrum analyzers.

Additional Steps for Option 130

15. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 50.010 MHz

POWER LEVEL 6 dBm

16. Set the synthesized/level generator controls as follows:

FREQUENCY 50 MHz

AMPLITUDE -14 dBm

50 Ω /75 Ω SWITCH 75 Ω (no RF output)

17. On the synthesized sweeper, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

18. On the synthesizer/level generator, set the 50 Ω /75 Ω switch to 50 Ω

19. Disconnect the power sensor from the directional bridge and connect the directional bridge to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

75 Ω input only: Use a 75 Ω adapter, BNC (m) to BNC (m).

20. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:

FREQUENCY, 50, MHz

SPAN, 10, MHz

75 Ω input: Press **AMPLITUDE**, More 1 of 2, Amptd Units, then dBm.

AMPLITUDE, -10, dBm

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 2, kHz

Wait for the auto zoom routine to finish.

21. On the synthesizer/level generator, adjust the amplitude to place the signal 10 dB below the spectrum analyzer reference level.

22. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**, then **MARKER** Δ .

23. On the synthesized sweeper, set RF to ON.

24. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**, **MARKER** Δ .

25. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 2.

Performance verification test "Gain Compression" is now complete for spectrum analyzers equipped with Option 130.

35. Gain Compression, 8593E

This performance verification test measures gain compression in both low band and high band. Two signals, separated by 3 MHz, are used. First, the test places a -30 dBm signal at the input of the spectrum analyzer (the spectrum analyzer reference level is also set to -30 dBm). Then, a 0 dBm signal is applied to the spectrum analyzer, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.

For spectrum analyzers equipped with Option 130 the signals are separated by 10 kHz, then the first signal is kept 10 dB below the reference level.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper (2 required)

Measuring receiver (used as a power meter)

Power sensor, 50 MHz to 26.5 GHz

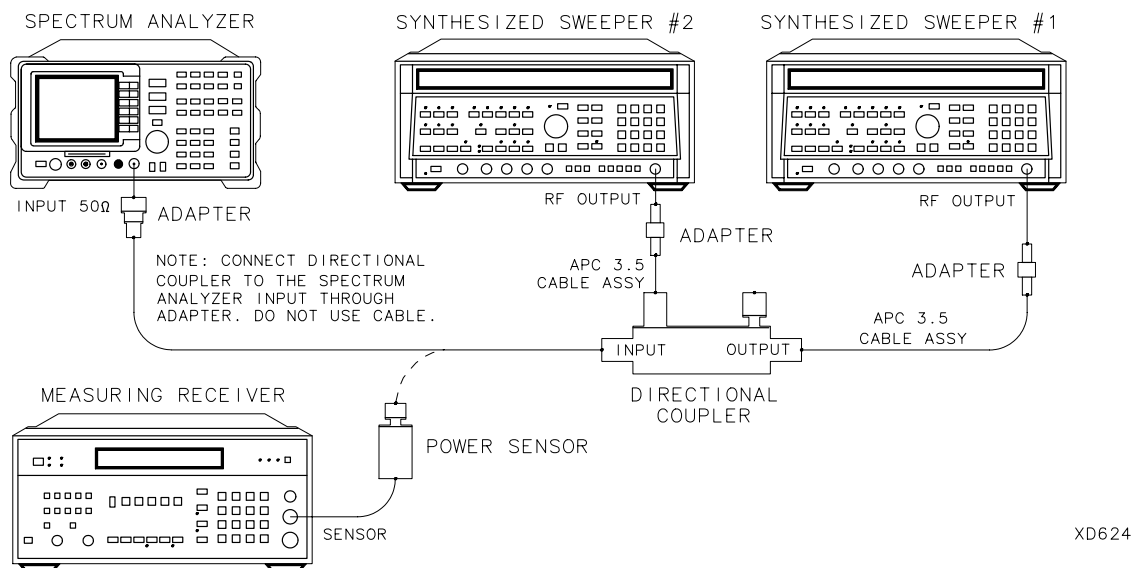
Directional coupler

Cable, APC 3.5, 91 cm (36 in) (2 required)

Adapter, Type N (m) to APC 3.5 (m)

Adapter, APC 3.5 (f) to APC 3.5 (f) (2 required)

Figure 2-61 Gain Compression Test Setup



Procedure

Gain Compression, <2.9 GHz

1. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Connect the equipment as shown in [Figure 2-61](#), with the output of the directional coupler connected to the power sensor.

Option 026 only: Connect the directional coupler to the spectrum analyzer directly.

3. Press INSTRUMENT PRESET on both synthesized sweepers.
4. Set synthesized sweeper #1 controls as follows:

CW 2.003 GHz

POWER LEVEL 0 dBm

5. Set synthesized sweeper #2 controls as follows:

CW 2.0 GHz

AMPLITUDE -14 dBm

6. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:

FREQUENCY, 2.0, GHz

SPAN, 20, MHz

AMPLITUDE REF LVL, 30, -dBm

SCALE LOG LIN (LOG), 1, dB

BW, RES BW AUTO MAN, 300, kHz

7. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

The power level applied to the spectrum analyzer input is 10 dB greater than the specification to account for the 10 dB attenuation setting. A power level of 0 dBm at the spectrum analyzer input yields -10 dBm at the input mixer.

8. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

9. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, MHz

10. Wait for the AUTO ZOOM routine to finish. Then, on synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.
11. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ**.
12. On synthesized sweeper #1, set RF to ON.
13. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.
The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.
14. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 1. The absolute value of this amplitude should be less than 0.5 dB.

Gain Compression, >2.9 GHz

15. Disconnect the directional coupler from the spectrum analyzer input, then connect the directional coupler to the power sensor.
16. Set the spectrum analyzer by pressing the following keys:
FREQUENCY, 4.0, GHz
SPAN, 20, MHz
MKR, MARKERS OFF
17. Set synthesized sweeper #1 controls as follows:
CW 4.003 GHz
POWER LEVEL 2 dBm
18. Set synthesized sweeper #2 controls as follows:
CW 4.0 GHz
POWER LEVEL -14 dBm
19. Enter the power sensor CAL Factor into the measuring receiver.
20. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.
21. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

22. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

23. Wait for the signal to be centered on screen. Then press the following keys:

AMPLITUDE, PRESEL PEAK

24. Wait for the CAL: PEAKING message to disappear. Then press the following keys:

SPAN, 10, MHz

25. Wait for the AUTO ZOOM message to disappear. Then, on synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.

26. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ**.

27. On synthesized sweeper #1, set RF to ON.

28. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.

The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

29. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 2. The absolute value of this amplitude should be less than or equal to 0.5 dB.

If you are testing a spectrum analyzer equipped with Option 130 continue with step 28.

Performance verification test "Gain Compression" is now complete for all other spectrum analyzers.

Additional Steps for Option 130

30. Connect the equipment as shown in [Figure 2-61](#).

31. Press INSTRUMENT PRESET on both synthesized sweepers.

32. Set synthesized sweeper #1 controls as follows:

CW 2.000 010 MHz

POWER LEVEL 0 dBm

33. Set synthesized sweeper #2 controls as follows:

CW 2.0 GHz
POWER LEVEL -14 dBm
RF OFF

34. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

35. On synthesized sweeper #2, set the RF to ON.

36. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

37. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:

FREQUENCY, 2.0, GHz
SPAN, 10, MHz
AMPLITUDE, -10, dBm
PEAK SEARCH
MKR FCTN, MK TRACK ON OFF (ON)
SPAN, 2, kHz

38. Wait for the AUTO ZOOM message to disappear. Then, on synthesized sweeper #2, adjust the amplitude to place the signal 10 dB below the spectrum analyzer reference level.

39. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**, then **MARKER Δ** .

40. On synthesized sweeper #1, set RF to ON.

41. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**, **MARKER Δ** .

42. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 3.

Performance verification test "Gain Compression" is now complete.

36. Gain Compression, 8594E and 8594Q

This performance verification test measures gain compression. Two signals, separated by 3 MHz, are used. First, the test places a -30 dBm signal at the input of the spectrum analyzer (the spectrum analyzer reference level is also set to -30 dBm). Then, a 0 dBm signal is applied to the spectrum analyzer, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.

For spectrum analyzers equipped with Option 130 the signals are separated by 10 kHz, then the first signal is kept 10 dB below the reference level.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper (*2 required*)

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 2.9 GHz

Directional coupler

Cable, APC 3.5, 91 cm (36 in) (*2 required*)

Adapter, Type N (m) to APC 3.5 (m)

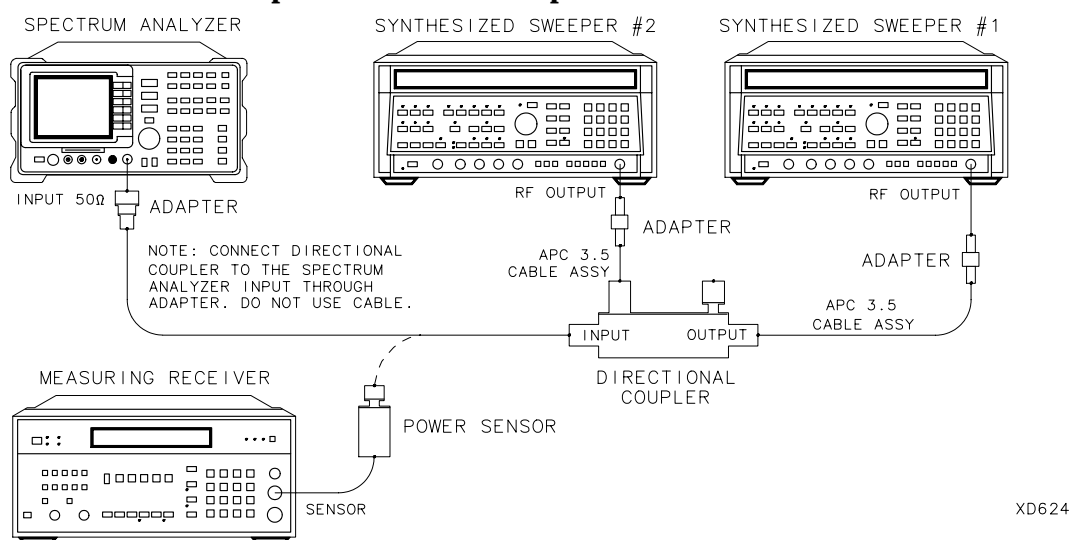
Adapter, APC 3.5 (f) to APC 3.5 (f) (*2 required*)

Procedure

Gain Compression, <2.9 GHz

1. Zero and calibrate the measuring receiver and 50 MHz to 2.9 GHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Connect the equipment as shown in Figure 2-62, with the output of the directional coupler connected to the power sensor.

Figure 2-62 Gain Compression Test Setup



3. Press INSTRUMENT PRESET on both synthesized sweepers.
4. Set synthesized sweeper #1 controls as follows:
 - CW 2.003 GHz
 - POWER LEVEL 0 dBm
5. Set synthesized sweeper #2 controls as follows:
 - CW 2.0 GHz
 - AMPLITUDE -14 dBm
6. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:
 - FREQUENCY, 2.0, GHz**
 - SPAN, 20, MHz**
 - AMPLITUDE, REF LVL, 30, -dBm**
 - SCALE LOG LIN (LOG), 1, dB**
 - BW, RES BW AUTO MAN, 300, kHz**

7. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

The power level applied to the spectrum analyzer input is 10 dB greater than the specification to account for the 10 dB attenuation setting. A power level of 0 dBm at the spectrum analyzer input yields -10 dBm at the input mixer.

8. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.
9. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, MHz

10. Wait for the AUTO ZOOM routine to finish. Then, on synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.
11. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ** .
12. On synthesized sweeper #1, set RF to ON.
13. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.

The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

14. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 1. The absolute value of this amplitude should be less than 0.5 dB.

Additional Steps for Option 130

15. Connect the equipment as shown in [Figure 2-62](#).
16. Press INSTRUMENT PRESET on both synthesized sweepers.
17. Set synthesized sweeper #1 controls as follows:

CW 2.000 010 GHz

POWER LEVEL 0 dBm

18. Set synthesized sweeper #2 controls as follows:

CW 2.0 GHz

POWER LEVEL -14 dBm

RF OFF

19. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

20. On synthesized sweeper #2, set the RF to ON.
21. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.
22. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:
- FREQUENCY, 2.0, GHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -10, dBm**
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 2, kHz**
23. Wait for the AUTO ZOOM message to disappear. Then, on synthesized sweeper #2, adjust the amplitude to place the signal 10 dB below the spectrum analyzer reference level.
24. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**, then **MARKER Δ** .
25. On synthesized sweeper #1, set RF to ON.
26. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**, **MARKER Δ** .
27. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 2.
- Performance verification test "Gain Compression" is now complete.

37. Gain Compression, 8595E

This performance verification test measures gain compression in both low band and high band. Two signals, separated by 3 MHz, are used. First, the test places a -30 dBm signal at the input of the spectrum analyzer (the spectrum analyzer reference level is also set to -30 dBm). Then, a 0 dBm signal is applied to the spectrum analyzer, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.

For spectrum analyzers equipped with Option 130 the signals are separated by 10 kHz, then the first signal is kept 10 dB below the reference level.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper (*2 required*)

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 6.5 GHz

Directional coupler

Cable, APC 3.5, 91 cm (36 in) (*2 required*)

Adapter, Type N (m) to APC 3.5 (m)

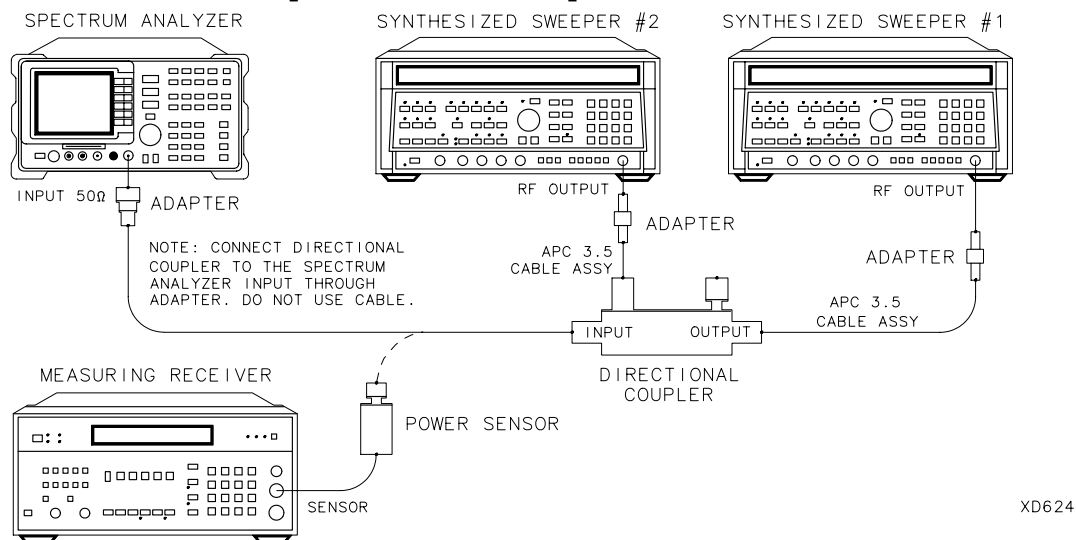
Adapter, APC 3.5 (f) to APC 3.5 (f) (*2 required*)

Procedure

Gain Compression, <2.9 GHz

1. Zero and calibrate the measuring receiver and 50 MHz to 6.5 GHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Connect the equipment as shown in [Figure 2-63](#), with the output of the directional coupler connected to the power sensor.

Figure 2-63 Gain Compression Test Setup



3. Press INSTRUMENT PRESET on both synthesized sweepers.
4. Set synthesized sweeper #1 controls as follows:
 CW 2.003 GHz
 POWER LEVEL 0 dBm
5. Set synthesized sweeper #2 controls as follows:
 CW 2.0 GHz
 AMPLITUDE -14 dBm
6. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:
 FREQUENCY, 2.0, GHz
 SPAN, 20, MHz
 AMPLITUDE, REF LVL, 30, -dBm
 SCALE LOG LIN (LOG), 1, dB
 BW, RES BW AUTO MAN, 300, kHz

7. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

The power level applied to the spectrum analyzer input is 10 dB greater than the specification to account for the 10 dB attenuation setting. A power level of 0 dBm at the spectrum analyzer input yields -10 dBm at the input mixer.

8. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.
9. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, MHz

10. Wait for the AUTO ZOOM routine to finish. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.

11. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ** .

12. On synthesized sweeper #1, set RF to ON.

13. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.

The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

14. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 1. The absolute value of this amplitude should be less than 0.5 dB.

Gain Compression, >2.9 GHz

15. Disconnect the directional coupler from the spectrum analyzer input, then connect the directional coupler to the power sensor.

16. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 4.0, GHz

SPAN, 20, MHz

MKR, MARKER 1 ON OFF (OFF)

17. Set synthesized sweeper #1 controls as follows:

CW 4.003 GHz

POWER LEVEL 2 dBm

18. Set synthesized sweeper #2 controls as follows:

CW 4.0 GHz

POWER LEVEL -14 dBm

19. Enter the power sensor CAL Factor into the measuring receiver.

20. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

21. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

22. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

23. Wait for the signal to be centered on screen.

AMPLITUDE, PRESEL PEAK

24. Wait for the CAL: PEAKING message to disappear.

SPAN, 10, MHz

25. Wait for the AUTO ZOOM message to disappear. Then, on synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.

26. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ** .

27. On synthesized sweeper #1, set RF to ON.

28. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.

The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

29. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 2. The absolute value of this amplitude should be less than or equal to 0.5 dB.

If you are testing a spectrum analyzer equipped with Option 130 continue with step 28.

Performance verification test, "Gain Compression," is now complete for all other spectrum analyzers.

Additional Steps for Option 130

30. Connect the equipment as shown in [Figure 2-63](#).
31. Press INSTRUMENT PRESET on both synthesized sweepers.
32. Set synthesized sweeper #1 controls as follows:
- CW 2.000 010 GHz
- POWER LEVEL 0 dBm
33. Set synthesized sweeper #2 controls as follows:
- CW 2.0 GHz
- POWER LEVEL -14 dBm
- RF OFF
34. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.
35. On synthesized sweeper #2, set the RF to ON.
36. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.
37. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:
- FREQUENCY, 2.0, GHz**
- SPAN, 10, MHz**
- AMPLITUDE, -10, dBm**
- PEAK SEARCH**
- MKR FCTN, MK TRACK ON OFF (ON)**
- SPAN, 2, kHz**
38. Wait for the AUTO ZOOM message to disappear. Then, on synthesized sweeper #2, adjust the amplitude to place the signal 10 dB below the spectrum analyzer reference level.
39. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**.
40. On synthesized sweeper #1, set RF to ON.
41. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**, **MARKER Δ** .
42. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 3.
- Performance verification test “Gain Compression” is now complete.

38. Gain Compression, 8596E

This performance verification test measures gain compression in both low band and high band. Two signals, separated by 3 MHz, are used. First, the test places a -30 dBm signal at the input of the spectrum analyzer (the spectrum analyzer reference level is also set to -30 dBm). Then, a 0 dBm signal is applied to the spectrum analyzer, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.

For spectrum analyzers equipped with Option 130 the signals are separated by 10 kHz, then the first signal is kept 10 dB below the reference level.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper (*2 required*)

Measuring receiver (*used as a power meter*)

Power sensor, 50 MHz to 12.8 GHz

Directional coupler

Cable, APC 3.5, 91 cm (36 in) (*2 required*)

Adapter, Type N (m) to APC 3.5 (m)

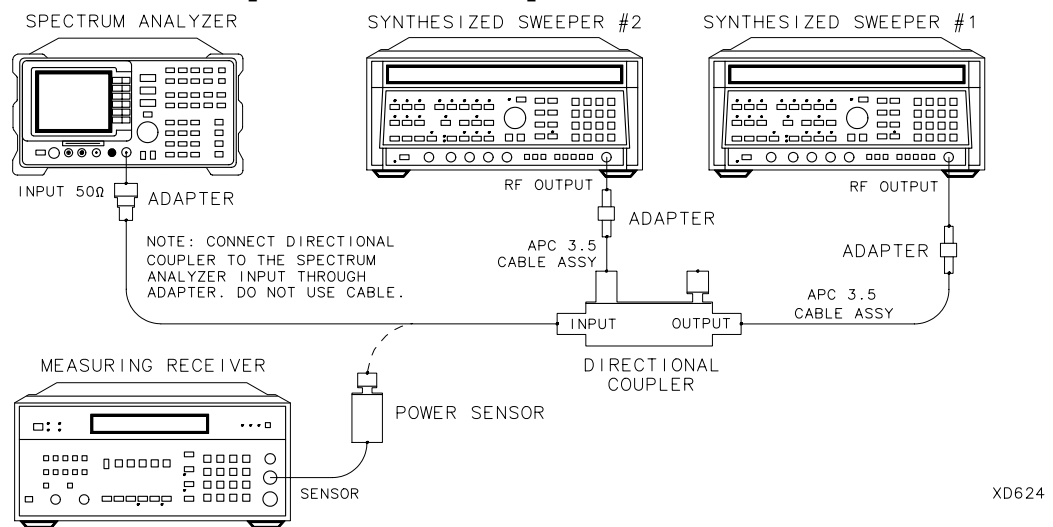
Adapter, APC 3.5 (f) to APC 3.5 (f) (*2 required*)

Procedure

Gain Compression, <2.9 GHz

1. Zero and calibrate the measuring receiver and 50 MHz to 12.8 GHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Connect the equipment as shown in Figure 2-64, with the output of the directional coupler connected to the power sensor.

Figure 2-64 Gain Compression Test Setup



3. Press INSTRUMENT PRESET on both synthesized sweepers.
4. Set synthesized sweeper #1 controls as follows:
 - CW 2.003 GHz
 - POWER LEVEL 0 dBm
5. Set synthesized sweeper #2 controls as follows:
 - CW 2.0 GHz
 - AMPLITUDE -14 dBm
6. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:
 - FREQUENCY, 2.0, GHz**
 - SPAN, 20, MHz**
 - AMPLITUDE, REF LVL, 30, -dBm**
 - SCALE LOG LIN (LOG), 1, dB**
 - BW, RES BW AUTO MAN, 300, kHz**

7. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

The power level applied to the spectrum analyzer input is 10 dB greater than the specification to account for the 10 dB attenuation setting. A power level of 0 dBm at the spectrum analyzer input yields -10 dBm at the input mixer.

8. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.
9. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, MHz

10. Wait for the AUTO ZOOM routine to finish. Then, on synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.

11. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ** .

12. On synthesized sweeper #1, set RF to ON.

13. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.

The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

14. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 1. The absolute value of this amplitude should be less than 0.5 dB.

Gain Compression, >2.9 GHz

15. Disconnect the directional coupler from the spectrum analyzer input, then connect the directional coupler to the power sensor.

16. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 4.0, GHz

SPAN, 20, MHz

MKR, MARKER 1 ON OFF (OFF)

17. Set synthesized sweeper #1 controls as follows:

CW 4.003 GHz

POWER LEVEL 2 dBm

18. Set synthesized sweeper #2 controls as follows:

CW 4.0 GHz

POWER LEVEL -14 dBm

19. Enter the power sensor CAL Factor into the measuring receiver.

20. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

21. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

22. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

23. Wait for the signal to be centered on screen. Then press the following spectrum analyzer keys:

AMPLITUDE, PRESEL PEAK

24. Wait for the CAL: PEAKING message to disappear. Then press the following spectrum analyzer keys:

SPAN, 10, MHz

25. Wait for the AUTO ZOOM message to disappear. Then, on synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.

26. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ** .

27. On synthesized sweeper #1, set RF to ON.

28. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.

The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

29. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 2. The absolute value of this amplitude should be less than or equal to 0.5 dB.

If you are testing a spectrum analyzer equipped with Option 130 continue with step 28.

Performance verification test, "Gain Compression" is now complete for all other spectrum analyzers.

Additional Steps for Option 130

30. Connect the equipment as shown in [Figure 2-64](#).
 31. Press INSTRUMENT PRESET on both synthesized sweepers.
 32. Set synthesized sweeper #1 controls as follows:
 - CW 50.010 MHz
 - POWER LEVEL 0 dBm
 33. Set synthesized sweeper #2 controls as follows:
 - CW 50 MHz
 - POWER LEVEL -14 dBm
 - RF OFF
 34. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.
 35. On synthesized sweeper #2, set the RF to ON.
 36. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.
 37. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:
 - FREQUENCY, 50, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -10, dBm**
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 2, kHz**
 38. Wait for the AUTO ZOOM message to disappear. Then, on synthesized sweeper #2, adjust the amplitude to place the signal 10 dB below the spectrum analyzer reference level.
 39. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**, then **MARKER Δ** .
 40. On synthesized sweeper #1, set RF to ON.
 41. On the spectrum analyzer, press **SGL SWP**, then wait for the completion of a new sweep. Press **PEAK SEARCH**.
 42. Read the MKR Δ amplitude and record in the performance verification test record as TR Entry 3.
- Performance verification test "Gain Compression" is now complete.

39. Displayed Average Noise Level, 8591C and 8591E

This performance test measures the displayed average noise level within the frequency range specified. The spectrum analyzer input is terminated in 50 Ω .

The LO feedthrough is used as a frequency reference for these measurements. The test tunes the spectrum analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

The related adjustment for this procedure is “Frequency Response Adjustment.”

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Displayed Average Noise Level for Option 130,” instead.

Equipment Required

- Termination, 50 Ω

- Cable, BNC, 23 cm (9 in)

- Adapter, Type N (m) to BNC (f)

Additional Equipment for 75 Ω input

- Cable, BNC 75 Ω , 30 cm (12 in)

- Termination, 75 Ω , Type N (m)

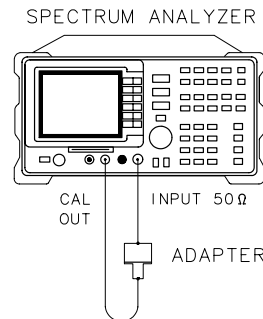
- Adapter, Type N (f) to BNC (m) 75 Ω

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-65.

75 Ω input only: Use a 75 Ω cable and omit the adapter.

Figure 2-65 **Displayed Average Noise Level Test Setup**



XC623

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 10, MHz

AMPLITUDE, -20, dBm

75 Ω input only: Press **AMPLITUDE, +28.75, dBmV**.

ATTEN AUTO MAN, 0, dB

3. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

4. Wait for the AUTO ZOOM message to disappear, then press the following keys:

BW, VID BW AUTO MAN, 30, Hz

MKR FCTN, MK TRACK ON OFF (OFF)

5. Press **SGL SWP** and wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, More 1 of 3, REF LVL OFFSET

6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter $+0.21$ dB (-20 dBm $- (-20.21$ dBm) $= +0.21$ dB).
Example for 75 Ω input: If the marker reads 26.4 dBmV, enter $+2.35$ dBmV (28.75 dBmV $- 26.4$ dBmV $= 2.35$ dBmV).

REF LVL OFFSET _____ dB

75 Ω input: REF LVL OFFSET _____ dBmV

7. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

75 Ω input only: Use the 75 Ω termination.

400 kHz

If testing an instrument equipped with a 75 Ω input, omit [step 8](#) through [step 14](#), then proceed to [step 15](#) ("1 MHz").

8. Press the following spectrum analyzer keys:

AUTO COUPLE, VID BW AUTO MAN (AUTO)

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, -10 , dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 800, kHz

10. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN MK TRACK ON OFF (OFF)

BW 3 kHz

11. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line. Set the spectrum analyzer by pressing the following keys:

SPAN, 50, kHz

AMPLITUDE, -50, dBm

BW, 1, kHz

VID BW AUTO MAN, 30, Hz

SWEEP, 5, sec

TRACE, More 1 of 3, DETECTOR PK SP NG (SP)

SGL SWP

12. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

13. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

14. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

15. Set the spectrum analyzer by pressing the following keys:

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, -10, dBm

75 Ω input only: **AMPLITUDE, +35, dBmV**

TRIG, SWEEP CONT SGL (CONT)

16. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

MKR →, MARKER →REF LVL

SPAN, 2, MHz

17.Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN** and **MK TRACK ON OFF (OFF)**.

18.Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then press the following spectrum analyzer keys:

SPAN, 50, kHz

AMPLITUDE, -50, dBm

19.75 Ω input only: Press **AMPLITUDE, -1.2, dBmV**.

AUTO COUPLE, VID BW AUTO MAN, 30, Hz

SGL SWP

20.Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

21.Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

22.Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 1.5 GHz

23.Press the following spectrum analyzer keys:

FREQUENCY, START FREQ, 1, MHz

STOP FREQ, 1.5, GHz

BW, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

24.Press **FREQUENCY** and adjust the center frequency setting, if necessary, to place the LO feedthrough just off-screen to the left.

25.Press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A

More 1 of 3, VID AVG ON OFF (ON), 10, Hz

39. Displayed Average Noise Level, 8591C and 8591E

26. Wait until **AVG 10** is displayed to the left of the graticule (the spectrum analyzer will take ten sweeps, then stop). Then press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in [Table 2-55](#) for 1 MHz to 1.5 GHz.

27. Press the following spectrum analyzer keys:

TRACE, More 1 of 3, VID AVG ON OFF (OFF)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 50, kHz

FREQUENCY

28. Set the center frequency to the Measurement Frequency recorded in [Table 2-55](#) for 1 MHz to 1.5 GHz.

29. Press the following spectrum analyzer keys:

BW, 1, kHz

VID BW AUTO MAN, 30, Hz

SGL SWP

30. Wait for the sweep to finish.

31. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

32. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

33. Record the display line amplitude setting as TR Entry 3 of the performance verification test record. The average noise level should be less than the specified limit.

1.5 GHz to 1.8 GHz

34. Press the following spectrum analyzer keys:

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 10, MHz

AMPLITUDE, -50, dBm

75 Ω input only: Press **AMPLITUDE, -1.2, dBmV**.

TRIG, SWEEP CONT SGL (CONT)

FREQUENCY, START FREQ, 1.5, GHz

STOP FREQ, 1.8, GHz

35. Repeat [step 24](#) through [step 30](#) above for frequencies from 1.5 GHz to 1.8 GHz.

If the Displayed Average Noise at 1.8 GHz is at or out of specification, it is recommended that a known frequency source be used as a frequency marker. This ensures that testing is within 1.8 GHz.

36. Record the display line amplitude setting as TR Entry 4 of the performance verification test record. The average noise level should be less than the specified limit.

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-55

Displayed Average Noise Level Worksheet

Frequency Range	Measurement Frequency	TR Entry Displayed Average Noise Level
400 kHz	400 kHz	(1) _____
1 MHz	1 MHz	(2) _____
1 MHz to 1.5 GHz	_____	(3) _____
1.5 GHz to 1.8 GHz	_____	(4) _____

40. Displayed Average Noise Level, 8593E

This test measures the displayed average noise level in all five frequency bands. The spectrum analyzer input is terminated in 50 Ω . In Band 0 (9 kHz to 2.9 GHz), the test first measures the average noise at 400 kHz and 1 MHz in zero span. The LO feedthrough is used as a frequency reference for these measurements. For the rest of Band 0 and for all of the remaining bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Displayed Average Noise Level for Option 130,” instead.

There are no related adjustments for this performance verification test.

Equipment Required

Cable, BNC, 23 cm (9 in)

Termination, 50 Ω

Adapter, Type N (m) to BNC (f)

Adapter, Type N (m) to APC 3.5 (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to APC 3.5 (f)

Adapter, BNC (m) to SMA (f)

Cable, cal comb

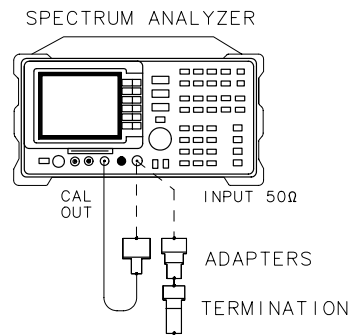
Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-46.

Option 026 only: Use the BNC to SMA adapter to connect the cal comb cable to CAL OUT. Use the APC 3.5 adapter to connect the cal cable to the INPUT 50 Ω

Figure 2-66

Displayed Average Noise Level Test Setup



XD625

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 10, MHz

AMPLITUDE, -20, dBm

ATTEN AUTO MAN, 0, dB

3. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

4. Wait for the AUTO ZOOM message to disappear, then press the following keys:

BW, VID BW AUTO MAN, 30, Hz

MKR FCTN, MK TRACK ON OFF (OFF)

5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, More 1 of 3, REF LVL OFFSET

6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter $+0.21$ dB (-20 dBm $- (-20.21$ dBm) = $+0.21$ dB).

REF LVL OFFSET _____ dB

7. Disconnect the cable from the INPUT $50\ \Omega$ connector of the spectrum analyzer. Connect the $50\ \Omega$ termination to the spectrum analyzer INPUT $50\ \Omega$ connector.

400 kHz

8. Press the following spectrum analyzer keys:

AUTO COUPLE, VID BW AUTO MAN (AUTO)

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -10 , dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 800, kHz

10. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

BW, 3, kHz

11. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line. Set the spectrum analyzer by pressing the following keys:

SPAN, 50, kHz

AMPLITUDE, REF LVL, -50 , dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

SWEEP, SWP TIME AUTO MAN, 5, sec

TRACE, More 1 of 3, DETECTOR PK SP NG (SP)

SGL SWP

12. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

13. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

14. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

15. Set the spectrum analyzer by pressing the following keys:

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -10, dBm

TRIG, SWEEP CONT SGL (CONT)

16. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 2, MHz

Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN** and **MK TRACK ON OFF (OFF)**.

17. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then press the following spectrum analyzer keys:

SPAN, 5, 0 kHz

AMPLITUDE, REF LVL, -50, dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

SGL SWP

18. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

19. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

20. Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 2.9 GHz

21. Press the following spectrum analyzer keys:

SPAN, Band Lock, 0-2.9 GHz BAND 0

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

22. Adjust the START FREQ setting, if necessary, to place the LO feedthrough just off-screen to the left.

23. Press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A, More 1 of 3

VID AVG ON OFF (ON), 10, Hz

24. Wait until AVG 10 is displayed to the left of the graticule (the analyzer will take ten sweeps, then stop). Then press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in the appropriate band under test in [Table 2-56](#).

25. Press the following spectrum analyzer keys:

TRACE, More 1 of 3, VID AVG (OFF)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 50, kHz

FREQUENCY

26. Set **CENTER FREQ** to the Measurement Frequency recorded in [Table 2-56](#) in the previous step, then press the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

27. Press **SGL SWP** on the spectrum analyzer, then wait for a new sweep to finish. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

28. Adjust the display line so that it is centered on the average noise trace, ignoring any residual responses (refer to Residual Response verification test for any suspected residuals).

29. Record the display line amplitude setting in the performance verification test record as indicated in [Table 2-56](#). The average noise level should be less than the specified limit.

30. Press **MKR** and **MARKER 1 ON OFF (OFF)** to turn the marker off.

2.75 to 6.5 GHz

31. Press the following spectrum analyzer keys:

SPAN, Band Lock, 2.75-6.5 BAND 1

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

32. Repeat above for Band 1 (2.75 to 6.5 GHz).

6.0 to 12.8 GHz

33. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 6.0-12.8 BAND 2

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

34. Repeat [step 23](#) through [step 30](#) above for Band 2 (6.0 to 12.8 GHz).

12.4 to 19.4 GHz

35. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 12.4-19. BAND 3

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

36. Repeat [step 23](#) through [step 30](#) above for Band 3 (12.4 to 19.4 GHz).

19.1 to 22 GHz

37. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 19.1-22 BAND 4

Option 026 or 027 only: **FREQUENCY, START FREQ, 19.1, GHz, STOP FREQ, 22, GHz**

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

38. Repeat [step 23](#) through [step 30](#) above for Band 4.

22 GHz to 26.5 GHz (*Option 026 or 027*)

39. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 19.1 - 22 BAND 4

FREQUENCY, START FREQ, 22, GHz

STOP FREQ, 26.5, GHz

40. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

41. Repeat [step 23](#) through [step 30](#) for frequencies from 22 to 26.5 GHz.

42. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish.

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-56 Displayed Average Noise Level Worksheet

Frequency Range	Measurement Frequency	TR Entry Displayed Average Noise Level
400 kHz	400 kHz	(1)_____
1MHz	1 MHz	(2)_____
1 MHz to 2.9 GHz	_____	(3)_____
2.75 to 6.5 GHz	_____	(4)_____
6.0 to 12.8 GHz	_____	(5)_____
12.4 to 19.4 GHz	_____	(6)_____
19.1 to 22.0 GHz	_____	(7)_____
19.1 to 26.5 GHz ^a	_____	(8)_____

a. Option 026 or 027 only

41. Displayed Average Noise Level, 8594E and 8594Q

This performance test measures the displayed average noise level within the frequency range specified. The spectrum analyzer input is terminated in 50 Ω

The test tunes the spectrum analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform verification test, "Displayed Average Noise Level for Option 130," instead.

The related adjustment for this procedure is "Frequency Response Adjustment."

Equipment Required

Termination, 50 Ω

Cable, BNC, 23 cm (9 in)

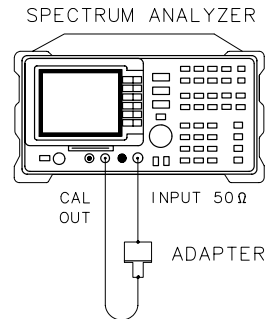
Adapter, Type N (m) to BNC (f)

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-67.

Figure 2-67

Displayed Average Noise Level Test Setup



XC623

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -20, dBm**
 - ATTEN AUTO MAN, 0, dB**
3. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 100, kHz**
4. Wait for the AUTO ZOOM message to disappear, then press the following keys:
 - BW, 1, kHz, VID BW AUTO MAN, 30, Hz**
 - MKR FCTN, MK TRACK ON OFF (OFF)**
5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - AMPLITUDE, More 1 of 3, REF LVL OFFSET**
6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB ($-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$).

REF LVL OFFSET _____ dB

41. Displayed Average Noise Level, 8594E and 8594Q

7. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

400 kHz

8. Press the following spectrum analyzer keys:

FREQUENCY, 400, kHz

SPAN, 50, kHz

AMPLITUDE, -90, dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

BW, 1, kHz

TRACE, More 1 of 3, DETECTOR PK SP NG (SP)

SGL SWP

10. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

11. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).
12. Record the display line amplitude setting as TR Entry 1 of the performance test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

4 MHz

13. Press the following spectrum analyzer keys:

FREQUENCY, 4, MHz

SGL SWP

Wait for the completion of a new sweep.

14. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

15. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).
16. Record the display line amplitude setting as TR Entry 2 of the performance test record as the noise level at 4 MHz. The average noise level should be less than the specified limit.

5 MHz to 2.9 GHz

17. Press the following spectrum analyzer keys:

FREQUENCY, START FREQ, 5, MHz

STOP FREQ, 2.9, GHz

BW, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

18. Press **FREQUENCY** and adjust the start frequency setting, if necessary, to place the LO feedthrough just off-screen to the left.

19. Press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A

More 1 of 3, VID AVG ON OFF (ON), 10, Hz

20. Wait until **AVG 10** is displayed to the left of the graticule (the spectrum analyzer will take ten sweeps, then stop). Then press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in [Table 2-57](#) for 5 MHz to 2.9 GHz.

21. Press the following spectrum analyzer keys:

TRACE, More 1 of 3

VID AVG ON OFF (OFF)

DETECTOR PK SP NG (SP)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 50, kHz

FREQUENCY

22. Set the center frequency to the Measurement Frequency recorded in [Table 2-57](#) for 5 MHz to 2.9 GHz.

23. Press the following spectrum analyzer keys:

BW, 1, kHz

VID BW AUTO MAN, 30, Hz

SGL SWP

41. Displayed Average Noise Level, 8594E and 8594Q

24.Wait for the sweep to finish. Then press the following spectrum analyzer keys:

DISPLAY,DSP LINE ON OFF (ON)

25.Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

26.Record the display line amplitude setting as TR Entry 3 of the performance test record. The average noise level should be less than the specified limit.

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-57 Displayed Average Noise Level Worksheet

Frequency Range	Measurement Frequency	TR Entry Displayed Average Noise Level
400 kHz	400 kHz	(1)_____
4 MHz	4 MHz	(2)_____
5 MHz to 2.9 GHz	_____	(3)_____

42. Displayed Average Noise Level, 8595E

This test measures the displayed average noise level in all five frequency bands. The spectrum analyzer input is terminated in 50 Ω . In Band 0 (9 kHz to 2.9 GHz), the test first measures the average noise at 400 kHz and 1 MHz in zero span. The LO feedthrough is used as a frequency reference for these measurements. For the rest of Band 0 and for all of the remaining bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

There are no related adjustments for this performance verification test.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Displayed Average Noise Level for Option 130,” instead.

Equipment Required

Cable, BNC, 23 cm (9 in)

Termination, 50 Ω

Adapter, Type N (m) to BNC (f)

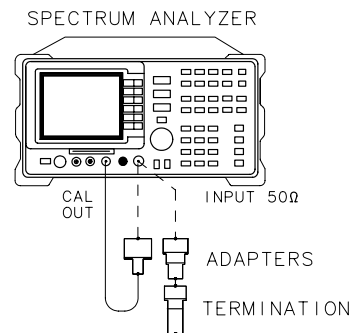
Adapter, Type N (m) to APC 3.5 (f)

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-68.

Figure 2-68

Displayed Average Noise Level Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -20, dBm**
 - ATTEN AUTO MAN, 0, dB**
3. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 100, kHz**
4. Wait for the AUTO ZOOM message to disappear, then press the following keys:
 - BW, VID BW AUTO MAN, 30, Hz**
 - MKR FCTN, MK TRACK ON OFF (OFF)**
5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - AMPLITUDE, More 1 of 3, REF LVL OFFSET**
6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB ($-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$).

REF LVL OFFSET _____ dB

7. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

400 kHz

8. Press the following spectrum analyzer keys:

AUTO COUPLE, VID BW AUTO MAN (AUTO)

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -10, dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 800, kHz

10. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

BW, 3, kHz

11. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line. Set the spectrum analyzer by pressing the following keys:

SPAN, 50, kHz

AMPLITUDE, REF LVL, -50, dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

SWEEP, SWP TIME AUTO MAN, 5, sec

TRACE, More 1 of 3, DETECTOR PK SMP (SMP)

SGL SWP

12. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

13. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).
14. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

15. Set the spectrum analyzer by pressing the following keys:

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -10, dBm

TRIG, SWEEP CONT SGL (CONT)

16. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 2, MHz

17. Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN** and **MK TRACK ON OFF (OFF)**. Then press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then press the following spectrum analyzer keys:

SPAN, 50, kHz

AMPLITUDE, REF LVL, -50, dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

SGL SWP

18. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

19. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).
20. Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 2.9 GHz

21. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

22. Adjust the START FREQ setting, if necessary, to place the LO feedthrough just off-screen to the left. Then press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A, More 1 of 3

VID AVG ON OFF (ON), 10, Hz

23. Wait until AVG 10 is displayed to the left of the graticule (the analyzer will take ten sweeps, then stop). Then press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in the appropriate band under test in [Table 2-58](#).

24. Press the following spectrum analyzer keys:

TRACE, More 1 of 3, VID AVG (OFF)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 50, kHz

FREQUENCY

25. Set **CENTER FREQ** to the Measurement Frequency recorded in [Table 2-58](#) in the previous step, then press the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

26. Press **SGL SWP** on the spectrum analyzer, then wait for a new sweep to finish. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

27. Adjust the display line so that it is centered on the average noise trace, ignoring any residual responses (refer to Residual Response verification test for any suspected residuals).

28. Record the display line amplitude setting in the performance verification test record as indicated in [Table 2-58](#). The average noise level should be less than the specified limit.

29. Press **MKR** and **MARKER 1 ON OFF (OFF)** to turn the marker off.

2.75 to 6.5 GHz

30. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

31. Repeat [step 21](#) through [step 28](#) above for Band 1 (2.75 to 6.5 GHz).

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-58

Displayed Average Noise Level Worksheet

Frequency Range	Measurement Frequency	Displayed Average Noise Level TR Entry
400 kHz	400 kHz	(1)_____
1MHz	1 MHz	(2)_____
1 MHz to 2.9 GHz	_____	(3)_____
2.75 to 6.5 GHz	_____	(4)_____

43. Displayed Average Noise Level, 8596E

This test measures the displayed average noise level in all five frequency bands. The spectrum analyzer input is terminated in 50 Ω . In Band 0 (9 kHz to 2.9 GHz), the test first measures the average noise at 400 kHz and 1 MHz in zero span. The LO feedthrough is used as a frequency reference for these measurements. For the rest of Band 0 and for all of the remaining bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Displayed Average Noise Level for Option 130,” instead.

There are no related adjustments for this performance verification test.

Equipment Required

Cable, BNC, 23 cm (9 in)

Termination, 50 Ω

Adapter, Type N (m) to BNC (f)

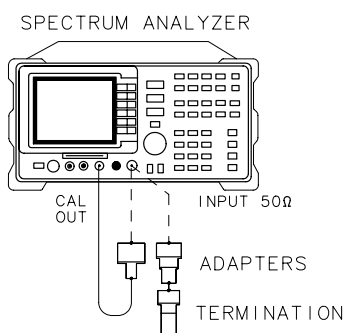
Adapter, Type N (m) to APC 3.5 (f)

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-69.

Figure 2-69

Displayed Average Noise Level Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -20, dBm**
 - ATTEN AUTO MAN, 0, dB**
3. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 100, kHz**
4. Wait for the AUTO ZOOM message to disappear, then press the following keys:
 - BW, VID BW AUTO MAN, 30, Hz**
 - MKR FCTN, MK TRACK ON OFF (OFF)**
5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - AMPLITUDE, More 1 of 3, REF LVL OFFSET**
6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB ($-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$).

REF LVL OFFSET _____ dB

7. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

400 kHz

8. Press the following spectrum analyzer keys:

AUTO COUPLE,VID BW AUTO MAN (AUTO)

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -10, dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 800, kHz

10. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

BW, 3, kHz

11. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line. Set the spectrum analyzer by pressing the following keys:

SPAN, 50, kHz

AMPLITUDE, REF LVL, -50, dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

SWEEP, SWP TIME AUTO MAN, 5, sec

TRACE, More 1 of 3, DETECTOR PK SMP (SMP)

SGL SWP

12. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

13. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses. Refer to the Residual Responses verification test for any suspect residuals.

14. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

15. Set the spectrum analyzer by pressing the following keys:

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -10, dBm

TRIG, SWEEP CONT SGL (CONT)

16. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 2, MHz

17. Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN** and **MK TRACK ON OFF (OFF)**.

18. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then press the following spectrum analyzer keys:

SPAN, 50, kHz

AMPLITUDE, REF LVL, -50, dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

SGL SWP

19. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

20. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses. Refer to the Residual Responses verification test for any suspect residuals.

21. Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 2.9 GHz

22. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

23. Adjust the START FREQ setting, if necessary, to place the LO feedthrough just off-screen to the left. Then press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A, More 1 of 3

VID AVG ON OFF (ON), 10, Hz

24. Wait until AVG 10 is displayed to the left of the graticule (the analyzer will take ten sweeps, then stop). Then press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in the appropriate band under test in [Table 2-59](#).

25. Press the following spectrum analyzer keys:

TRACE, More 1 of 3, VID AVG (OFF)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 50, kHz

FREQUENCY

26. Set **CENTER FREQ** to the Measurement Frequency recorded in [Table 2-59](#) in the previous step, then press the following keys:

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

27. Press **SGL SWP** on the spectrum analyzer, then wait for a new sweep to finish. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

43. Displayed Average Noise Level, 8596E

28. Adjust the display line so that it is centered on the average noise trace, ignoring any residual responses. Refer to Residual Response verification test for any suspected residuals.
29. Record the display line amplitude setting in the performance verification test record as indicated in [Table 2-59](#). The average noise level should be less than the specified limit.
30. Press **MKR** and **MARKER 1 ON OFF** (OFF) to turn the marker off.

2.75 to 6.5 GHz

31. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

32. Repeat [step 22](#) through [step 29](#) above for Band 1 (2.75 to 6.5 GHz).

6.0 to 12.8 GHz

33. Press the followings spectrum analyzer keys:

FREQUENCY, Band Lock, 6.0-12.8 BAND 2

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

34. Repeat [step 22](#) through [step 29](#) above for Band 2 (6.0 to 12.8 GHz).

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-59**Displayed Average Noise Level Worksheet**

Frequency Range	Measurement Frequency	Displayed Average Noise Level TR Entry
400 kHz	400 kHz	(1) _____
1MHz	1 MHz	(2) _____
1 MHz to 2.9 GHz	_____	(3) _____
2.75 to 6.5 GHz	_____	(4) _____
6.0 to 12.8 GHz	_____	(5) _____

44. Displayed Average Noise Level, 8591C and 8591E Option 130

This performance test measures the displayed average noise level within the frequency range specified. The spectrum analyzer input is terminated in 50 Ω .

The LO feedthrough is used as a frequency reference for these measurements. The test tunes the spectrum analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

If the spectrum analyzer is **not** equipped with Option 130, Narrow Bandwidth, perform verification test, "Displayed Average Noise Level," instead.

The related adjustment for this procedure is "Frequency Response Adjustment."

Equipment Required

- Termination, 50 Ω

- Cable, BNC, 23 cm (9 in)

- Adapter, Type N (m) to BNC (f)

Additional Equipment for 75 Ω input

- Cable, BNC 75 Ω , 30 cm (12 in)

- Termination, 75 Ω , Type N (m)

- Adapter, Type N (f) to BNC (m) 75 Ω

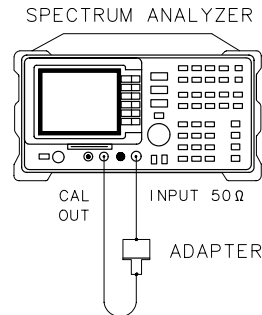
Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-70.

75 Ω input only: Use a 75 Ω cable and omit the adapter.

Figure 2-70

Displayed Average Noise Level Test Setup for Option 130



XC623

CAUTION

Use only 75 Ω cables, connectors, or adapters on the 75 Ω input of an instrument or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -20, dBm**

75 Ω input only: Press **AMPLITUDE, +28.75, dBmV**.

 - ATTEN AUTO MAN, 0, dB**
3. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 10, kHz**
4. Wait for the AUTO ZOOM message to disappear, then press the following keys:
 - BW, 300, Hz, VID BW AUTO MAN, 30, Hz**
 - MKR FCTN, MK TRACK ON OFF (OFF)**
5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - AMPLITUDE, More 1 of 3, REF LVL OFFSET**

44. Displayed Average Noise Level, 8591C and 8591E Option 130

6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter $+0.21$ dB (-20 dBm $- (-20.21$ dBm) = $+0.21$ dB).

For example, if the marker reads 26.4 dBmV, enter $+2.35$ dBmV (28.75 dBmV $- 26.4$ dBmV = 2.35 dBmV).

REF LVL OFFSET dB

REF LVL OFFSET (75 Ω input only) dBmV

7. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

75 Ω input only: Use the 75 Ω termination.

400 kHz

If testing an instrument equipped with a 75 Ω input, omit [step 8](#) through [step 12](#), then proceed to [step 13](#) ("1 MHz").

8. Press the following spectrum analyzer keys:

FREQUENCY, 400, kHz

SPAN, 20, kHz

AMPLITUDE, -70 , dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

BW, 30, Hz

TRACE, More 1 of 3, DETECTOR PK SP NG (SP)

SGL SWP

10. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

11. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

12. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

13. Press the following spectrum analyzer keys:

FREQUENCY, 1, MHz

SGL SWP

14. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

15. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

16. Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 1.5 GHz

17. Press the following spectrum analyzer keys:

FREQUENCY, START FREQ, 1, MHz

STOP FREQ, 1.5, GHz

BW, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

18. Press **FREQUENCY** and adjust the center frequency setting, if necessary, to place the LO feedthrough just off-screen to the left.

19. Press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A

More 1 of 3, VID AVG ON OFF (ON), 10, Hz

20. Wait until AVG 10 is displayed to the left of the graticule (the spectrum analyzer will take ten sweeps, then stop).

21. Then press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in [Table 2-60](#) for 1 MHz to 1.5 GHz.

44. Displayed Average Noise Level, 8591C and 8591E Option 130

22. Press the following spectrum analyzer keys:

TRACE, More 1 of 3

VID AVG ON OFF (OFF)

DETECTOR PK SP NG (SP)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 20, kHz

FREQUENCY

23. Set the center frequency to the Measurement Frequency recorded in [Table 2-60](#) for 1 MHz to 1.5 GHz.

24. Press the following spectrum analyzer keys:

BW, 30, Hz

VID BW AUTO MAN, 30, Hz

SGL SWP

25. Wait for the sweep to finish. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

26. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

27. Record the display line amplitude setting as TR Entry 3 of the performance verification test record. The average noise level should be less than the specified limit.

1.5 GHz to 1.8 GHz

28. Press the following spectrum analyzer keys:

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 10, MHz

TRIG, SWEEP CONT SGL (CONT)

FREQUENCY, START FREQ, 1.5, GHz

STOP FREQ, 1.8, GHz

29. Repeat [step 21](#) through [step 27](#) above for frequencies from 1.5 GHz to 1.8 GHz.

If the Displayed Average Noise at 1.8 GHz is at or out of specification, it is recommended that a known frequency source be used as a frequency marker. This ensures that testing is within 1.8 GHz.

30. Record the display line amplitude setting as TR Entry 4 of the performance verification test record. The average noise level should be less than the specified limit.

Table 2-60**Displayed Average Noise Level**

Frequency Range	Measurement Frequency	TR Entry (Displayed Average Noise Level)
400 kHz	400 kHz	(1)_____
1 MHz	1 MHz	(2)_____
1 MHz to 1.5 GHz	_____	(3)_____
1.5 GHz to 1.8 GHz	_____	(4)_____

45. Displayed Average Noise Level, 8593E Option 130

This test measures the displayed average noise level in all five frequency bands. The spectrum analyzer input is terminated in 50 Ω . In Band 0 (9 kHz to 2.9 GHz), the test first measures the average noise at 400 kHz and 1 MHz in zero span. The LO feedthrough is used as a frequency reference for these measurements. For the rest of Band 0 and for all of the remaining bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

If the spectrum analyzer is *not* equipped with Option 130, Narrow Bandwidth, perform “Displayed Average Noise Level,” instead.

There are no related adjustments for this performance verification test.

Equipment Required

- Cable, BNC, 23 cm (9 in)

- Termination, 50 Ω

- Adapter, Type N (m) to BNC (f)

- Adapter, Type N (m) to APC 3.5 (f)

Additional Equipment for Option 026

- Adapter, APC 3.5 (f) to APC 3.5 (f)

- Adapter, BNC (m) to SMA (f)

- Cable, cal comb

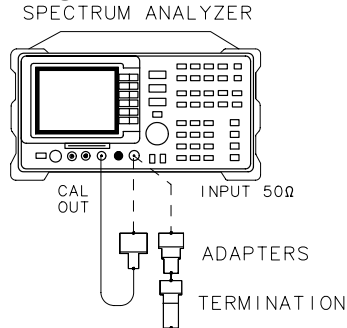
Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-71.

Option 026 only: Use the BNC to SMA adapter to connect the cal comb cable to CAL OUT. Use the APC 3.5 adapter to connect the cal cable to the INPUT 50 Ω .

Figure 2-71

Displayed Average Noise Level Test Setup for Option 130



XD625

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -20, dBm**
 - ATTEN AUTO MAN, 0, dB**
3. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 10, kHz**
4. Wait for the AUTO ZOOM message to disappear, then press the following keys:
 - BW, 300, Hz, VID BW AUTO MAN, 30, Hz**
 - MKR FCTN, MK TRACK ON OFF (OFF)**
5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - AMPLITUDE, More 1 of 3, REF LVL OFFSET**

6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter $+0.21$ dB (-20 dBm $- (-20.21$ dBm) = $+0.21$ dB).

REF LVL OFFSET _____ dB

7. Disconnect the cable from the INPUT $50\ \Omega$ connector of the spectrum analyzer. Connect the $50\ \Omega$ termination to the spectrum analyzer INPUT $50\ \Omega$ connector.

400 kHz

8. Press the following spectrum analyzer keys:

FREQUENCY, 400, kHz

SPAN, 20, kHz

AMPLITUDE, -70 , dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

BW, 30, Hz

TRACE, More 1 of 3, DETECTOR PK SP NG (SP)

SGL SWP

10. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

11. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

12. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

13. Press the following spectrum analyzer keys:

FREQUENCY, 1, MHz

SGL SWP

14. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

15. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

16. Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 2.9 GHz

17. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, START FREQ, 1, MHz

STOP FREQ, 2.9, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

18. Press **FREQUENCY**, then adjust the center frequency, if necessary, to place the LO feedthrough just off-screen to the left.

19. Press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A, More 1 of 3

VID AVG ON OFF (ON), 10, Hz

Wait until **AVG 10** is displayed to the left of the graticule (the analyzer will take ten sweeps, then stop).

20. Press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in the appropriate band under test in [Table 2-61](#).

21. Press the following spectrum analyzer keys:

TRACE, More 1 of 3, VID AVG (OFF)

DETECTOR PK SP NG (SP)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 10, kHz

FREQUENCY

22. Set **CENTER FREQ** to the Measurement Frequency recorded in [Table 2-61](#) in the previous step, then press the following keys:

BW, RES BW AUTO MAN, 30, Hz

VID BW AUTO MAN, 30, Hz

23. Press **SGL SWP** on the spectrum analyzer, then wait for a new sweep to finish. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

24. Adjust the display line so that it is centered on the average noise trace, ignoring any residual responses (refer to Residual Response verification test for any suspected residuals).

25. Record the display line amplitude setting in the performance verification test record as indicated in [Table 2-61](#). The average noise level should be less than the specified limit.

26. Press **MKR** and **MARKER 1 ON OFF (OFF)** to turn the marker off.

2.75 to 6.5 GHz

27. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

28. Repeat [step 19](#) through [step 26](#) above for Band 1 (2.75 to 6.5 GHz).

6.0 to 12.8 GHz

29. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 6.0-12.8 BAND 2

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

30. Repeat [step 19](#) through [step 26](#) above for Band 2 (6.0 to 12.8 GHz).

12.4 to 19.4 GHz

31. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 12.4-19. BAND 3

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

32. Repeat [step 19](#) through [step 26](#) above for Band 3 (12.4 to 19.4 GHz).

19.1 to 22 GHz

33. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 19.1-22 BAND 4

Option 026 or 027 only: **FREQUENCY, START FREQ, 19.1, GHz,
STOP FREQ, 22, GHz**

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

34. Repeat [step 19](#) through [step 26](#) above for Band 4.

22 GHz to 26.5 GHz (Option 026 or 027)

35. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 19.1 - 22 BAND 4

FREQUENCY, START FREQ, 22, GHz

STOP FREQ, 26.5, GHz

36. Set the spectrum analyzer by pressing the following keys:

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

45. Displayed Average Noise Level, 8593E Option 130

37.Repeat [step 19](#) through [step 26](#) for frequencies from 22 to 26.5 GHz.

38.Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish.

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-61

Displayed Average Noise Level Worksheet for Option 130

Frequency Range	Measurement Frequency	TR Entry Displayed Average Noise Level
400 kHz	400 kHz	(1)_____
1MHz	1 MHz	(2)_____
1 MHz to 2.9 GHz	_____	(3)_____
2.75 to 6.5 GHz	_____	(4)_____
6.0 to 12.8 GHz	_____	(5)_____
12.4 to 19.4 GHz	_____	(6)_____
19.1 to 22 GHz	_____	(7)_____
19.1 to 26.5 GHz ^a	_____	(8)_____

a. Option 026 or 027 only

46. Displayed Average Noise Level, 8594E Option 130

This performance test measures the displayed average noise level within the frequency range specified. The spectrum analyzer input is terminated in 50 Ω .

The test tunes the spectrum analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

If the spectrum analyzer is **not** equipped with Option 130, Narrow Bandwidth, perform verification test, "Displayed Average Noise Level," instead.

The related adjustment for this procedure is "Frequency Response Adjustment."

Equipment Required

Termination, 50 Ω

Cable, BNC, 23 cm (9 in)

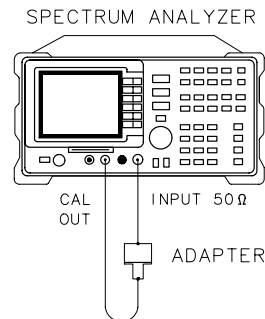
Adapter, Type N (m) to BNC (f)

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-72.

Figure 2-72

Displayed Average Noise Level Test Setup for Option 130



XC623

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -20, dBm**
 - ATTEN AUTO MAN, 0, dB**
3. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 10, kHz**
4. Wait for the AUTO ZOOM message to disappear, then press the following keys:
 - BW, 300, Hz, VID BW AUTO MAN, 30, Hz**
 - MKR FCTN, MK TRACK ON OFF (OFF)**
5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - AMPLITUDE, More 1 of 3, REF LVL OFFSET**
6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB ($-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$).

REF LVL OFFSET _____ dB

7. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

400 kHz

8. Press the following spectrum analyzer keys:

FREQUENCY, 400, kHz

SPAN, 20, kHz

AMPLITUDE, -90, dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

BW, 30, Hz

TRACE, More 1 of 3, DETECTOR PK SP NG (SP)

SGL SWP

10. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

11. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).
12. Record the display line amplitude setting as TR Entry 1 of the performance test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

4 MHz

13. Press the following spectrum analyzer keys:

FREQUENCY, 4, MHz

SGL SWP

14. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

15. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).
16. Record the display line amplitude setting as TR Entry 2 of the performance test record as the noise level at 4 MHz. The average noise level should be less than the specified limit.

5 MHz to 2.9 GHz

17. Press the following spectrum analyzer keys:

FREQUENCY, START FREQ, 5, MHz

STOP FREQ, 2.9, GHz

BW, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

18. Press **FREQUENCY** and adjust the start frequency setting, if necessary, to place the LO feedthrough just off-screen to the left.

19. Press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A

More 1 of 3, VID AVG ON OFF (ON), 10, Hz

Wait until AVG 10 is displayed to the left of the graticule (the spectrum analyzer will take ten sweeps, then stop).

20. Press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in [Table 2-62](#) for 5 MHz to 2.9 GHz.

21. Press the following spectrum analyzer keys:

TRACE, More 1 of 3

VID AVG ON OFF (OFF)

DETECTOR PK SP NG (SP)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 20, kHz

FREQUENCY

22. Set the center frequency to the Measurement Frequency recorded in [Table 2-62](#) for 5 MHz to 2.9 GHz.

23. Press the following spectrum analyzer keys:

BW, 30, Hz

VID BW AUTO MAN, 30, Hz

SGL SWP

24.Wait for the sweep to finish. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

25.Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

26.Record the display line amplitude setting as TR Entry 3 of the performance test record. The average noise level should be less than the specified limit.

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-62

Displayed Average Noise Level Worksheet

Frequency Range	Measurement Frequency	TR Entry Displayed Average Noise Level
400 kHz	400 kHz	(1)_____
4 MHz	4 MHz	(2)_____
5 MHz to 2.9 GHz	_____	(3)_____

47. Displayed Average Noise Level, 8595E Option 130

This test measures the displayed average noise level in all five frequency bands. The spectrum analyzer input is terminated in 50 Ω . In Band 0 (9 kHz to 2.9 GHz), the test first measures the average noise at 400 kHz and 1 MHz in zero span. The LO feedthrough is used as a frequency reference for these measurements. For the rest of Band 0 and for all of the remaining bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

If the spectrum analyzer is **not** equipped with Option 130, Narrow Bandwidth, perform “Displayed Average Noise Level,” instead.

There are no related adjustments for this performance verification test.

Equipment Required

Cable, BNC, 23 cm (9 in)

Termination, 50 Ω

Adapter, Type N (m) to BNC (f)

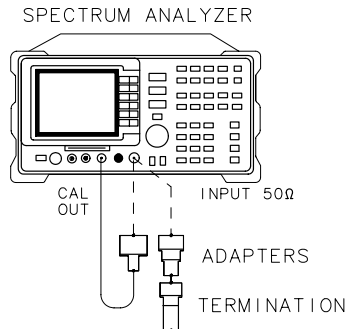
Adapter, Type N (m) to APC 3.5 (f)

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-73.

Figure 2-73

Displayed Average Noise Level Test Setup for Option 130



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, -20, dBm**
 - ATTEN AUTO MAN, 0, dB**
3. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 10, kHz**
4. Wait for the AUTO ZOOM message to disappear, then press the following keys:
 - BW, 300, Hz, VID BW AUTO MAN, 30, Hz**
 - MKR FCTN, MK TRACK ON OFF (OFF)**
5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:
 - PEAK SEARCH**
 - AMPLITUDE, More 1 of 3, REF LVL OFFSET**
6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB ($-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$).

REF LVL OFFSET _____ dB

7. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

400 kHz

8. Press the following spectrum analyzer keys:

FREQUENCY, 400, kHz

SPAN, 20, kHz

AMPLITUDE, -70, dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

BW, 30, Hz

TRACE, More 1 of 3, DETECTOR PK SMP (SMP)

SGL SWP

10. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

11. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

12. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

13. Press the following spectrum analyzer keys:

FREQUENCY, 1, MHz

SGL SWP

14. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

15. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

16. Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 2.9 GHz

17. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, START FREQ, 1, MHz

STOP FREQ, 2.9, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

18. Press **FREQUENCY**, then adjust the center frequency, if necessary, to place the LO feedthrough just off-screen to the left.

19. Press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A, More 1 of 3

VID AVG ON OFF (ON), 10, Hz

Wait until **AVG 10** is displayed to the left of the graticule (the analyzer will take ten sweeps, then stop).

20. Press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in the appropriate band under test in [Table 2-63](#).

21. Press the following spectrum analyzer keys:

TRACE, More 1 of 3, VID AVG (OFF)

DETECTOR PK SMP (SMP)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 10, kHz

FREQUENCY

22. Set **CENTER FREQ** to the Measurement Frequency recorded in [Table 2-63](#) in the previous step, then press the following keys:

BW, RES BW AUTO MAN, 30, Hz

VID BW AUTO MAN, 30, Hz

23. Press **SGL SWP** on the spectrum analyzer, then wait for a new sweep to finish. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

24. Adjust the display line so that it is centered on the average noise trace, ignoring any residual responses (refer to Residual Response verification test for any suspected residuals).

25. Record the display line amplitude setting in the performance verification test record as indicated in [Table 2-63](#). The average noise level should be less than the specified limit.

26. Press **MKR** and **MARKER 1 ON OFF (OFF)** to turn the marker off.

2.75 to 6.5 GHz

27. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

28. Repeat [step 20](#) through [step 25](#) above for Band 1 (2.75 to 6.5 GHz).

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-63

Displayed Average Noise Level Worksheet for Option 130

Frequency Range	Measurement Frequency	Displayed Average Noise Level TR Entry
400 kHz	400 kHz	(1)_____
1MHz	1 MHz	(2)_____
1 MHz to 2.9 GHz	_____	(3)_____
2.75 to 6.5 GHz	_____	(4)_____

48. Displayed Average Noise Level, 8596E Option 130

This test measures the displayed average noise level in all five frequency bands. The spectrum analyzer input is terminated in 50 Ω . In Band 0 (9 kHz to 2.9 GHz), the test first measures the average noise at 400 kHz and 1 MHz in zero span. The LO feedthrough is used as a frequency reference for these measurements. For the rest of Band 0 and for all of the remaining bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing **PRESET**.

If the spectrum analyzer is *not* equipped with Option 130, Narrow Bandwidth, perform “Displayed Average Noise Level,” instead.

There are no related adjustments for this performance verification test.

Equipment Required

Cable, BNC, 23 cm (9 in)

Termination, 50 Ω

Adapter, Type N (m) to BNC (f)

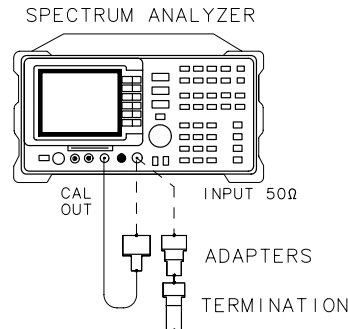
Adapter, Type N (m) to APC 3.5 (f)

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 2-74.

Figure 2-74

Displayed Average Noise Level Test Setup for Option 130



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 10, MHz

AMPLITUDE, -20, dBm

ATTEN AUTO MAN, 0, dB

3. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, kHz

4. Wait for the AUTO ZOOM message to disappear, then press the following keys:

BW, 300, Hz, VID BW AUTO MAN, 30, Hz

MKR FCTN, MK TRACK ON OFF (OFF)

5. Press **SGL SWP**, then wait for the completion of a new sweep. Press the following spectrum analyzer keys:

PEAK SEARCH

AMPLITUDE, More 1 of 3, REF LVL OFFSET

6. Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB ($-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$).

REF LVL OFFSET_____ dB

7. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

400 kHz

8. Press the following spectrum analyzer keys:

FREQUENCY, 400, kHz

SPAN, 20, kHz

AMPLITUDE, -70, dBm

TRIG, SWEEP CONT SGL (CONT)

9. Press the following spectrum analyzer keys:

BW, 30, Hz

TRACE, More 1 of 3, DETECTOR PK SMP (SMP)

SGL SWP

10. Wait for the completion of a new sweep. Then press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

11. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses. Refer to the Residual Responses verification test for any suspect residuals.

12. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

13. Press the following spectrum analyzer keys:

FREQUENCY, 1, MHz

SGL SWP

Wait for the completion of a new sweep.

14. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

15. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses. Refer to the Residual Responses verification test for any suspect residuals.

16. Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 2.9 GHz

17. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, START FREQ, 1, MHz

STOP FREQ, 2.9, GHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

18. Press **FREQUENCY**, then adjust the center frequency, if necessary, to place the LO feedthrough just off-screen to the left.

19. Press the following spectrum analyzer keys:

SGL SWP

TRACE, CLEAR WRITE A, More 1 of 3

VID AVG ON OFF (ON), 10, Hz

Wait until AVG 10 is displayed to the left of the graticule (the analyzer will take ten sweeps, then stop).

20. Press **PEAK SEARCH** and record the MKR frequency as the Measurement Frequency in the appropriate band under test in [Table 2-64](#).

21. Press the following spectrum analyzer keys:

TRACE, More 1 of 3, VID AVG (OFF)

DETECTOR PK SMP (SMP)

AUTO COUPLE, RES BW AUTO MAN (AUTO)

VID BW AUTO MAN (AUTO)

SPAN, 10, kHz

FREQUENCY

22. Set **CENTER FREQ** to the Measurement Frequency recorded in [Table 2-64](#) in the previous step, then press the following keys:

BW, RES BW AUTO MAN, 30, Hz

VID BW AUTO MAN, 30, Hz

23. Press **SGL SWP** on the spectrum analyzer, then wait for a new sweep to finish. Press the following spectrum analyzer keys:

DISPLAY, DSP LINE ON OFF (ON)

24. Adjust the display line so that it is centered on the average noise trace, ignoring any residual responses. Refer to Residual Response verification test for any suspected residuals.
25. Record the display line amplitude setting in the performance verification test record as indicated in [Table 2-64](#). The average noise level should be less than the specified limit.
26. Press **MKR** and **MARKER 1 ON OFF** (OFF) to turn the marker off.

2.75 to 6.5 GHz

27. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

28. Repeat [step 14](#) through [step 25](#) above for Band 1 (2.75 to 6.5 GHz).

6.0 to 12.8 GHz

29. Press the followings spectrum analyzer keys:

FREQUENCY, Band Lock, 6.0-12.8 BAND 2

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

TRIG, SWEEP CONT SGL (CONT)

30. Repeat above for Band 2 (6.0 to 12.8 GHz).

Performance verification test “Displayed Average Noise Level” is now complete.

Table 2-64

Displayed Average Noise Level Worksheet for Option 130

Frequency Range	Measurement Frequency	TR Entry Displayed Average Noise Level
400 kHz	400 kHz	(1)_____
1MHz	1 MHz	(2)_____
1 MHz to 2.9 GHz	_____	(3)_____
2.75 to 6.5 GHz	_____	(4)_____
6.0 to 12.8 GHz	_____	(5)_____

49. Residual Responses, 8591C and 8591E

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 1 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 1 MHz to 1.8 GHz range. Any responses above the specification are noted.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Residual Responses for Option 130,” instead.

There are no related adjustment procedures for this performance test.

Equipment Required

Termination, 50 Ω

Additional Equipment for 75 Ω input

Termination, 75 Ω , Type N (m)

Adapter, Type N (f) to BNC (m), 75 Ω

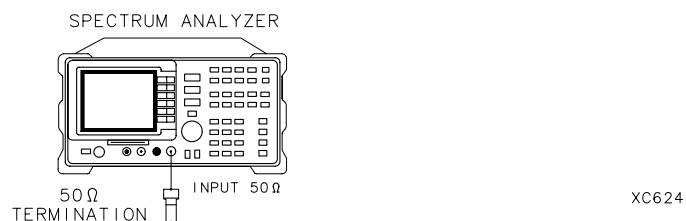
Procedure

150 kHz to 1 MHz

1. Connect the termination to the spectrum analyzer input as shown in [Figure 2-75](#).

75 Ω input only: Use the adapter to connect the 75 Ω termination, and proceed with [step 5](#).

Figure 2-75 **Residual Response Test Setup**



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω input, or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 1, MHz

Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN, MK TRACK ON OFF (OFF)**.

3. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough peak is on the left-most vertical graticule line. Set the spectrum analyzer by pressing the following keys:

PEAK SEARCH

MKR, MARKER Δ , 150, kHz

MARKER NORMAL

AMPLITUDE, -60, dBm

75 Ω input only: **AMPLITUDE, -11.25, dBmV**

ATTEN AUTO MAN, 0, dB

BW, 3, kHz

VID BW AUTO MAN, 1, kHz

DISPLAY, DSP LINE ON OFF, -90, dBm

75 Ω input only: **DISPLAY, DSP LINE ON OFF, -38, dBmV.**

4. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-65](#).

1 MHz to 1.8 GHz

5. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

FREQUENCY, 5, MHz

SPAN, 10, MHz

AMPLITUDE, -60, dBm

75 Ω input only: Press **AMPLITUDE, -11.25, dBmV**.

ATTEN AUTO MAN, 0, dB

6. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough (the “signal” near the left of the screen) is just off the left-most vertical graticule line. Press the following spectrum analyzer keys:

FREQUENCY, CF STEP AUTO MAN, 9.8, MHz

BW, 10, kHz

VID BW AUTO MAN, 3, kHz

DISPLAY, DSP LINE ON OFF (ON), -90, dBm

75 Ω input only: Press **DISPLAY, DSP LINE ON OFF (ON), -38, dBmV**.

7. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line. If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-65](#).

8. Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 7](#).

9. Repeat [step 8](#) until the range from 1 MHz to 1.8 GHz has been checked. (This requires 183 additional frequency steps.) The test for this band requires about 10 minutes to complete if no residuals are found.

If there are any residuals at or near the frequency specification limits (1 MHz or 1.8 GHz), it is recommended that a known frequency source be used as a frequency marker. This will ensure that testing is done at or below the specification limits.

10. Record the highest residual from [Table 2-65](#) as TR Entry 1 in the performance verification test record. If no residuals are found, then record “N/A” in the performance verification test record.

Performance verification test “Residual Responses” is now complete.

Table 2-65 Residual Responses above Display Line Worksheet

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

50. Residual Responses, 8593E

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 5 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 5 MHz to 6.5 GHz range. Any responses above the specification are noted.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Residual Responses for Option 130,” instead.

There are no related adjustment procedures for this performance test.

Equipment Required

Termination, 50 Ω

Adapter, Type N (m) to APC 3.5 (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to APC (f)

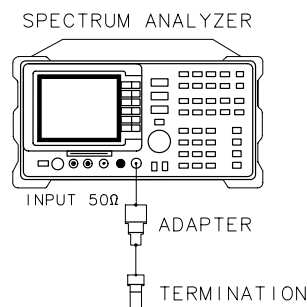
Procedure

150 kHz to 5 MHz

1. Connect the termination to the spectrum analyzer input as shown in Figure 2-76.

Figure 2-76

Residual Response Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 6, MHz

Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN, MK TRACK ON OFF (OFF)**.

3. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough peak is on the left-most vertical graticule line. Set the spectrum analyzer by pressing the following keys:

PEAK SEARCH, MARKER Δ , 150, kHz

MKR, MARKER NORMAL

AMPLITUDE, REF LVL, -60, dBm

ATTEN AUTO MAN, 0, dB

BW, RES BW AUTO MAN, 3, kHz

VID BW AUTO MAN, 1, kHz

DISPLAY, DSP LINE ON OFF (ON), -90, dBm

4. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line, to the right of the marker.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-66](#).

5 MHz to 2.75 GHz

5. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, 10, MHz

FREQUENCY, CF STEP SIZE AUTO MAN, 9.8, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -60, dBm

ATTEN AUTO MAN, 0, dBm

BW, RES BW AUTO MAN, 10, kHz

VID BW AUTO MAN, 3, kHz

DISPLAY, DSP LINE ON OFF, -90, dBm

6. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-66](#).

7. Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 6](#).
8. Repeat [step 7](#) until the range from 5 MHz to 2.9 GHz has been checked. (This requires 295 additional frequency steps.)

2.75 GHz to 6.5 GHz

9. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

FREQUENCY, 2755, MHz

DISPLAY, DSP LINE ON OFF, -90, dBm

SPAN, 10, MHz

BW, RES BW AUTO MAN, 10, kHz

VID BW AUTO MAN, 3, kHz

10. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-66](#).
11. Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 10](#).

Repeat [step 11](#) until the range from 2.75 GHz to 6.5 GHz has been checked. (This requires 372 additional frequency steps.)
12. Record the highest residual from [Table 2-66](#) as TR Entry 1 in the performance verification test record. If no residuals are found, then record "N/A" in the performance verification test record.

Performance verification test "Residual Responses" is now complete.

Table 2-66 Residual Responses above Display Line Worksheet

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

51. Residual Responses, 8594E and 8594Q

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 5 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 5 MHz to 2.9 GHz range. Any responses above the specification are noted.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Residual Responses for Option 130,” instead.

There are no related adjustment procedures for this performance test.

Equipment Required

Termination, 50 Ω

Adapter, Type N (m) to APC 3.5 (f)

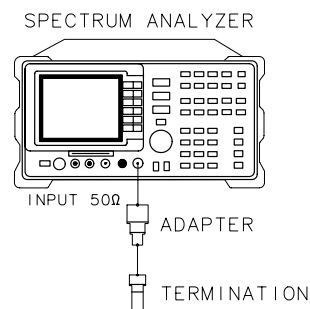
Procedure

150 kHz to 5 MHz

1. Connect the termination to the spectrum analyzer input as shown in [Figure 2-77](#).

Figure 2-77

Residual Response Test Setup



XD626

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:
PEAK SEARCH
MKR FCTN, MK TRACK ON OFF (ON)
SPAN, 6, MHz
3. Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN, MK TRACK ON OFF (OFF)**.

51. Residual Responses, 8594E and 8594Q

4. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough peak is on the left-most vertical graticule line. Set the spectrum analyzer by pressing the following keys:

PEAK SEARCH, MARKER Δ , 150, kHz

MKR, MARKER NORMAL

AMPLITUDE, REF LVL, -60, dBm

ATTEN AUTO MAN, 0, dB

BW, RES BW AUTO MAN, 3, kHz

VID BW AUTO MAN, 1, kHz

DISPLAY, DSP LINE ON OFF (ON), -90, dBm

5. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line, to the right of the marker.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-67](#).

5 MHz to 2.9 GHz

6. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

FREQUENCY, 10, MHz

FREQUENCY, CF STEP SIZE AUTO MAN, 9.8, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -60, dBm

ATTEN AUTO MAN, 0, dBm

BW, RES BW AUTO MAN, 10, kHz

VID BW AUTO MAN, 3, kHz

DISPLAY, DSP LINE ON OFF, -90, dBm

7. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-67](#).

8. Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 7](#).

9. Repeat [step 8](#) until the range from 5 MHz to 2.9 GHz has been checked. (This requires 295 additional frequency steps.)
10. Record the highest residual from [Table 2-67](#) as TR Entry 1 in the performance verification test record. If no residuals are found, then record “N/A” in the performance verification test record.

Performance verification test “Residual Responses” is now complete.

Table 2-67

Residual Responses above Display Line Worksheet

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

52. Residual Responses, 8595E

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 5 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 5 MHz to 6.5 GHz range. Any responses above the specification are noted.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Residual Responses for Option 130,” instead.

There are no related adjustment procedures for this performance test.

Equipment Required

Termination, 50 Ω

Adapter, Type N (m) to APC 3.5 (f)

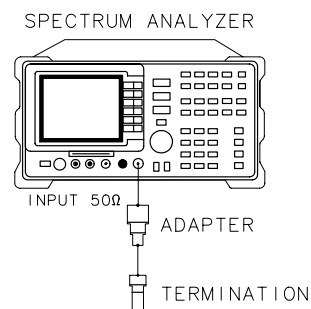
Procedure

150 kHz to 5 MHz

1. Connect the termination to the spectrum analyzer input as shown in [Figure 2-78](#).

Figure 2-78

Residual Response Test Setup



XD626

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:
FREQUENCY, Band Lock, 0-2.9 GHz BAND 0
PEAK SEARCH
MKR FCTN, MK TRACK ON OFF (ON)
SPAN, 6, MHz
3. Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN, MK TRACK ON OFF (OFF)**.

4. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough peak is on the left-most vertical graticule line. Set the spectrum analyzer by pressing the following keys:

PEAK SEARCH, MARKER Δ , 150, kHz

MKR, MARKER NORMAL

AMPLITUDE, REF LVL, -60, dBm

ATTEN AUTO MAN, 0, dB

BW, RES BW AUTO MAN, 3, kHz

VID BW AUTO MAN, 1, kHz

DISPLAY, DSP LINE ON OFF (ON), -90, dBm

5. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line, to the right of the marker.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-68](#).

5 MHz to 2.9 GHz

6. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, 10, MHz

FREQUENCY, CF STEP SIZE AUTO MAN, 9.8, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -60, dBm

ATTEN AUTO MAN, 0, dBm

BW, RES BW AUTO MAN, 10, kHz

VID BW AUTO MAN, 3, kHz

DISPLAY, DSP LINE ON OFF, -90, dBm

7. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-68](#).

8. Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 7](#).
9. Repeat [step 8](#) until the range from 5 MHz to 2.9 GHz has been checked. (This requires 295 additional frequency steps.)

2.75 GHz to 6.5 GHz

10. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

FREQUENCY, 2755, MHz

DISPLAY, DSP LINE ON OFF, -90, dBm

SPAN, 10, MHz

BW, RES BW AUTO MAN, 10, kHz

VID BW AUTO MAN, 3, kHz

11. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-68](#).

12. Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 11](#).
13. Repeat [step 12](#) until the range from 2.75 GHz to 6.5 GHz has been checked. (This requires 372 additional frequency steps.)
14. Record the highest residual from [Table 2-68](#) as TR Entry 1 in the performance verification test record. If no residuals are found, then record "N/A" in the performance verification test record.

Performance verification test "Residual Responses" is now complete.

Table 2-68

Residual Responses above Display Line Worksheet

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

53. Residual Responses, 8596E

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 5 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 5 MHz to 6.5 GHz range. Any responses above the specification are noted.

If the spectrum analyzer is equipped with Option 130, Narrow Bandwidth, perform “Residual Responses for Option 130,” instead.

There are no related adjustment procedures for this performance test.

Equipment Required

Termination, 50 Ω

Adapter, Type N (m) to APC 3.5 (f)

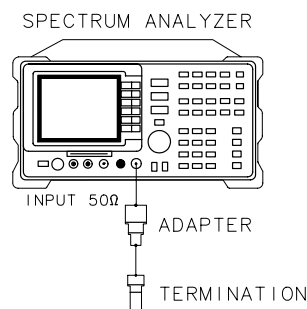
Procedure

150 kHz to 5 MHz

1. Connect the termination to the spectrum analyzer input as shown in [Figure 2-79](#).

Figure 2-79

Residual Response Test Setup



XD626

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 6, MHz

3. Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN, MK TRACK ON OFF (OFF)**.

4. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough peak is on the left-most vertical graticule line. Set the spectrum analyzer by pressing the following keys:

PEAK SEARCH, MARKER Δ , 150, kHz

MKR, MARKER NORMAL

AMPLITUDE, REF LVL, -60, dBm

ATTEN AUTO MAN, 0, dB

BW, RES BW AUTO MAN, 3, kHz

VID BW AUTO MAN, 1, kHz

DISPLAY, DSP LINE ON OFF (ON), -90, dBm

5. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line, to the right of the marker.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-69](#).

5 MHz to 2.9 GHz

6. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, 10, MHz

FREQUENCY, CF STEP SIZE AUTO MAN, 9.8, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -60, dBm

ATTEN AUTO MAN, 0, dBm

BW, RES BW AUTO MAN, 10, kHz

VID BW AUTO MAN, 3, kHz

DISPLAY, DSP LINE ON OFF, -90, dBm

7. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-69](#).

8. Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 7](#).
9. Repeat [step 8](#) until the range from 5 MHz to 2.9 GHz has been checked. (This requires 295 additional frequency steps.)

2.75 GHz to 6.5 GHz

10. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

FREQUENCY, 2755, MHz

DISPLAY, DSP LINE ON OFF, -90, dBm

SPAN, 10, MHz

BW, RES BW AUTO MAN, 10, kHz

VID BW AUTO MAN, 3, kHz

11. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line. If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-69](#).

12. Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 11](#).

13. Repeat [step 12](#) until the range from 2.75 GHz to 6.5 GHz has been checked. (This requires 372 additional frequency steps.)

Record the highest residual from [Table 2-69](#) as TR Entry 1 in the performance verification test record. If no residuals are found, then record "N/A" in the performance verification test record.

Performance verification test "Residual Responses" is now complete.

Table 2-69

Residual Responses above Display Line Worksheet

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

54. Residual Responses, 8591E and 8591C Option 130

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 1 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 1 MHz to 1.8 GHz range. Any responses above the specification are noted.

If the spectrum analyzer is *not* equipped with Option 130, Narrow Bandwidth, perform “Residual Responses,” instead.

There are no related adjustment procedures for this performance test.

Equipment

Termination, 50 Ω

Additional Equipment for 75 Ω input

Termination, 75 Ω , Type N (m)

Adapter, Type N (f) to BNC (m), 75 Ω

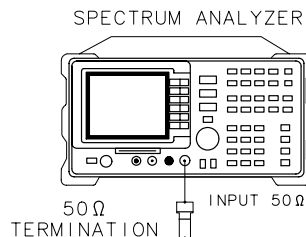
Procedure

150 kHz to 1 MHz

1. Connect the termination to the spectrum analyzer input as shown in [Figure 2-80](#).

75 Ω input only: Use the adapter to connect the 75 Ω termination, and proceed with [step 3](#).

Figure 2-80 **Residual Response Test Setup**



XC624

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

FREQUENCY

START FREQ, 150, kHz

STOP FREQ, 1, MHz

AMPLITUDE, -60, dBm, ATTN 0 Hz

BW, 300, Hz

DISPLAY, DISPLAY LINE ON OFF, -90, dBm

3. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-70](#).

1 MHz to 1.8 GHz

4. Connect the 300 MHz CAL OUT to the RF INPUT as shown in [Table 2-70](#).

5. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

FREQUENCY, 300, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 1, kHz

Wait for the AUTO ZOOM message to disappear.

6. Press the following spectrum analyzer keys:

BW, 300, Hz

SWEEP, 1, sec

AMPLITUDE, -20, dBm

ATTN AUTO MAN, 0, dB

7. Press the following spectrum analyzer keys:

SGL SWP

PEAK SEARCH, MARKER Δ

SPAN, 10, MHz

SGL SWP

PEAK SEARCH

8. Record the marker-Δ reading below as the MEAS UNCAL Amplitude Error.

MEAS UNCAL Amplitude Error _____ dB

9. Remove the cable from the spectrum analyzer input.
10. Reconnect the termination to the spectrum analyzer input as shown in [Table 2-70](#).
11. Press the following spectrum analyzer keys:

FREQUENCY, 5, MHz

AMPLITUDE, -60, dBm

75 Ω input only: Press **AMPLITUDE, -11.25, dBmV**.

TRIG, SWEEP CONT SGL (CONT)

12. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough (the “signal” near the left of the screen) is just off the left-most vertical graticule line. Press the following spectrum analyzer keys:

FREQUENCY, CF STEP AUTO MAN, 9.8, MHz

DISPLAY, DSP LINE ON OFF, -90, dBm

Add -90 dBm to the MEAS UNCAL Amplitude Error (recorded in [step 8](#)), then set the display line to this value.

For example, if the amplitude error in [step 8](#) is -19.5 dB, add -90 dBm to this value for a result of -109.5 dBm. Enter -109.5 dBm as the display line value.

75 Ω input only: Set the display line to -38 dBmV + the MEAS UNCAL Amplitude Error (recorded in [step 8](#)).

13. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-70](#).

14. Press **FREQUENCY**, then $\uparrow$ (step-up key) to step to the next frequency and repeat [step 13](#).
15. Repeat [step 14](#) until the range from 1 MHz to 1.8 GHz has been checked. (This requires 183 additional steps.)

Table 2-70

**Residual Responses above Display Line Worksheet
for Option 130**

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Confirming Residuals

16. Set the spectrum analyzer center frequency to a residual frequency recorded in [Table 2-70](#), then press the following keys:

PRESET

AMPLITUDE, -60, dBm, ATTN 0 Hz

SPAN, 20, kHz

SGL SWP

DISPLAY, DISPLAY LINE ON OFF, -90, dBm

75 Ω input only: Press **DISPLAY, DISPLAY LINE ON OFF, -38, dBmV**.

17. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-71](#).

18. Repeat [step 16](#) through [step 17](#) for all residuals recorded in [Table 2-70](#).

19. Record the highest residual from [Table 2-71](#) as TR Entry 1 in the performance verification test record. If no residuals are found, then record "N/A" in the performance verification test record.

Performance verification test "Residual Responses" is now complete.

Table 2-71 **Confirmed Residual Responses above Display Line for
Option 130**

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

55. Residual Responses, 8594E Option 130

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 1 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 1 MHz to 2.9 GHz range. Any responses above the specification are noted.

If the spectrum analyzer is *not* equipped with Option 130, Narrow Bandwidth, perform “Residual Responses,” instead.

There are no related adjustment procedures for this performance test.

Equipment

Termination, 50 Ω

Adapter, Type N (m) to APC 3.5 (f)

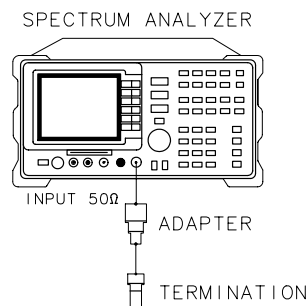
Procedure

150 kHz to 1 MHz

1. Connect the termination to the spectrum analyzer input as shown in [Figure 2-81](#).

Figure 2-81

Residual Response Test Setup for Option 130



XD626

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

FREQUENCY

START FREQ, 150, kHz

STOP FREQ, 1, MHz

AMPLITUDE, -60, dBm, ATTN AUTO MAN, 0, dBm

BW, 300, Hz

VID BW AUTO MAN, 300, Hz

DISPLAY, DSP LINE ON OFF, -90, dBm

3. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-72](#).

1 MHz to 2.9 GHz

4. Connect the 300 MHz CAL OUT to the RF INPUT as shown in [Figure 2-81](#).
5. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

FREQUENCY, 300, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 1, kHz

Wait for the AUTO ZOOM message to disappear.

6. Press the following spectrum analyzer keys:

BW, 300, Hz

SWEEP, 1, SEC

AMPLITUDE, -20, dBm

ATTN AUTO MAN, 0, dB

7. Press the following spectrum analyzer keys:

SGL SWP

PEAK SEARCH, MARKER Δ

SPAN, 1,0 MHz

SGL SWP

PEAK SEARCH

8. Record the marker-Δ reading below as the MEAS UNCAL Amplitude Error.

MEAS UNCAL Amplitude Error _____dB

9. Remove the cable from the spectrum analyzer input.
10. Reconnect the termination to the spectrum analyzer input as shown in [Figure 2-81](#).

11. Press the following spectrum analyzer keys:

FREQUENCY, 5, MHz

AMPLITUDE, -60, dBm

TRIG, SWEEP CONT SGL (CONT)

12. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough (the “signal” near the left of the screen) is just off the left-most vertical graticule line. Press the following spectrum analyzer keys:

FREQUENCY, CF STEP AUTO MAN, 9.8, MHz

DISPLAY, DSP LINE ON OFF, -90, dBm

Add -90 dBm to the MEAS UNCAL Amplitude Error (recorded in [step 8](#)), then set the display line to this value.

For example, if the amplitude error in [step 8](#) is -19.5 dB, add -90 dBm to this value for a result of -109.5 dBm. Enter -109.5 dBm as the display line value.

13. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-72](#).

14. Press **FREQUENCY**, then $\uparrow$ (step-up key) to step to the next frequency and repeat [step 13](#).

15. Repeat [step 14](#) until the range from 1 MHz to 2.9 GHz has been checked. (This requires 295 additional steps.)

Table 2-72

Residual Responses above Display Line Worksheet for Option 130

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Confirming Residuals

16. Set the spectrum analyzer center frequency to a residual frequency recorded in [Table 2-72](#), then press the following keys:

PRESET

AMPLITUDE, -60, dBm, ATTN 0 Hz

SPAN, 20, kHz

SGL SWP

DISPLAY, DISPLAY LINE ON OFF, -90, dBm

17. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-72](#).

18. Repeat [step 16](#) through [step 17](#) for all residuals recorded in [Table 2-73](#).

19. Record the highest residual from [Table 2-73](#) as TR Entry 1 in the performance verification test record. If no residuals are found, then record "N/A" in the performance verification test record.

Performance verification test "Residual Responses" is now complete.

Table 2-73

Confirmed Residual Responses above Display Line

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

56. Residual Responses, 8593E, 8595E, and 8596E Option 130

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 1 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 1 MHz to 6.5 GHz range. Any responses above the specification are noted.

If the spectrum analyzer is *not* equipped with Option 130, Narrow Bandwidth, perform “Residual Responses,” instead.

There are no related adjustment procedures for this performance test.

Equipment

Termination, 50 Ω

Adapter, Type N (m) to APC 3.5 (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to APC 3.5 (f)

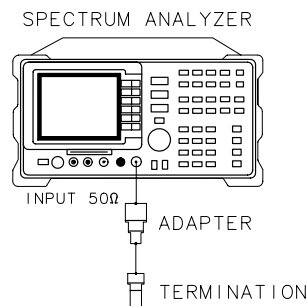
Procedure

150 kHz to 1 MHz

1. Connect the termination to the spectrum analyzer input as shown in [Figure 2-82](#).

Figure 2-82

Residual Response Test Setup for Option 130



XD626

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY

START FREQ, 150, kHz

STOP FREQ, 1, MHz

AMPLITUDE, -60, dBm], ATTN 0 Hz

BW, 300, Hz

VID BW AUTO MAN, 300, Hz

DISPLAY, DSP LINE ON OFF, -90, dBm

3. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-74](#).

1 MHz to 2.75 GHz

4. Connect the 300 MHz CAL OUT to the RF INPUT as shown in [Figure 2-82](#).
5. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

FREQUENCY, 300, MHz, BAND LOCK ON OFF (ON)

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 1, kHz

6. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

BW, 300, Hz

SWEEP, 1, SEC

AMPLITUDE, -20, dBm

ATTN AUTO MAN, 0, dB

7. Press the following spectrum analyzer keys:

SGL SWP

PEAK SEARCH, MARKER Δ

SPAN, 10, MHz

SGL SWP

PEAK SEARCH

8. Record the marker-Δ reading below as the MEAS UNCAL Amplitude Error.

MEAS UNCAL Amplitude Error _____dB

9. Remove the cable from the spectrum analyzer input.
10. Reconnect the termination to the spectrum analyzer input as shown in [Figure 2-82](#).
11. Press the following spectrum analyzer keys:

FREQUENCY, 5, MHz

AMPLITUDE, -60, dBm

TRIG, SWEEP CONT SGL (CONT)

12. Press **FREQUENCY**, then adjust the center frequency until the LO feedthrough (the “signal” near the left of the screen) is just off the left-most vertical graticule line. Press the following spectrum analyzer keys:

FREQUENCY, CF STEP AUTO MAN, 9.8, MHz

DISPLAY, DSP LINE ON OFF, -90, dBm

13. Add -90 dBm to the MEAS UNCAL Amplitude Error (recorded in [step 8](#)), then set the display line to this value.
14. For example, if the amplitude error in [step 8](#) is -19.5 dB, add -90 dBm to this value for a result of -109.5 dBm. Enter -109.5 dBm as the display line value.
15. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.
- If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-74](#).
16. Press **FREQUENCY**, then ↑ (step-up key) to step to the next frequency and repeat [step 15](#).

17.Repeat [step 16](#) until the range from 1 MHz to 2.9 GHz has been checked. (This requires 295 additional steps.)

2.75 GHz to 6.5 GHz

18.Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75-6.5 BAND 1

SPAN, 10, MHz

SWEEP, 1, SEC

FREQUENCY, 2755, MHz

BW,300, Hz

19.Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in [Table 2-74](#).

20.Press **FREQUENCY**, $\uparrow$ (step-up key), to step to the next frequency and repeat [step 19](#).

21.Repeat [step 20](#) until the range from 2.75 GHz to 6.5 GHz has been checked. (This requires 372 additional frequency steps.)

Table 2-74

Residual Responses above Display Line Worksheet for Option 130

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Confirming Residuals

22. Set the spectrum analyzer center frequency to a residual frequency recorded in [Table 2-74](#), then press the following keys:

PRESET

AMPLITUDE, -60, dBm, ATTN 0 Hz

SPAN, 20, kHz

SGL SWP

DISPLAY, DISPLAY LINE ON OFF, -90, dBm

23. Press **SGL SWP** and wait for a new sweep to finish. Look for any residual responses at or above the display line.

If a residual is suspected, press **SGL SWP** again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in [Table 2-74](#).

24. Repeat [step 22](#) through [step 23](#) for all residuals recorded in [Table 2-75](#).

25. Record the highest residual from [Table 2-75](#) as TR Entry 1 in the performance verification test record. If no residuals are found, then record "N/A" in the performance verification test record.

Performance verification test "Residual Responses" is now complete.

Table 2-75

Confirmed Residual Responses above Display Line

Frequency (MHz)	Amplitude (dBm)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

57. Fast Time Domain Sweeps, 8591E Option 101 and 8591C

The CAL OUT signal is used to compare the amplitude level of a normal sweep time (20 ms) to a fast sweep time (18 ms) using the marker delta function.

A synthesizer/level generator is used to amplitude modulate a 500 MHz, CW signal from another signal generator. The spectrum analyzer demodulates this signal in zero span to display the response in the time domain. The marker delta frequency function on the spectrum analyzer is used to read out the sweep time.

There are no related adjustment procedures for this performance test.

Equipment Required

- Synthesizer/level generator
- Signal generator
- Cable, BNC, 122 cm (48 in)
- Cable, BNC, 23 cm (9 in)
- Cable, Type N, 152 cm (60 in)
- Adapter, Type N (m) to BNC (f)

Additional Equipment for 75 Ω input

- Cable, BNC, 75 Ω , 30 cm (12 in)
- Adapter, minimum loss
- Adapter, Type N (f) to BNC (m), 75 Ω

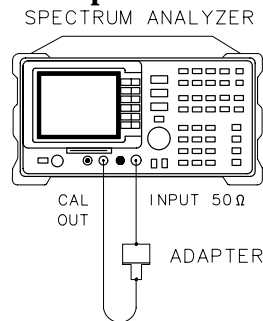
Procedure

Fast Sweep Time Amplitude Accuracy

1. Connect the equipment as shown in [Figure 2-83](#).

75 Ω input only: Use the 75 Ω cable and omit the adapter.

Figure 2-83 Fast Sweep Time Amplitude Test Setup



XC626

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 0, Hz

SWEEP, 20, ms

AMPLITUDE, SCALE LOG/LIN (LIN)

REF LVL, 25, mV

75 Ω input only: Press **REF LVL, 30, mV**.

MKR FCTN, MK NOISE ON OFF (ON)

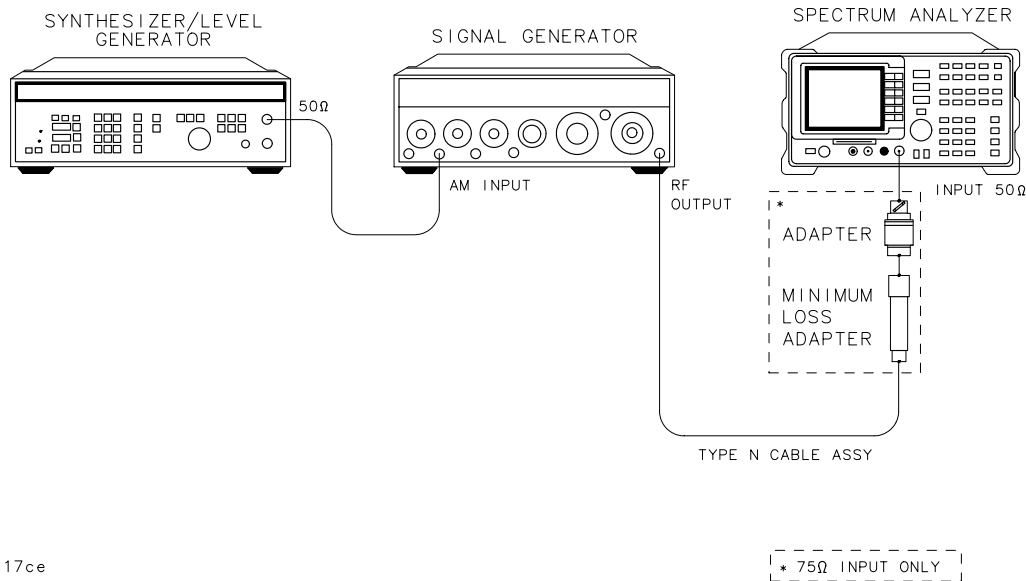
SGL SWP

MKR, MARKER Δ

3. Set the sweep time to 18 ms. Press **SGL SWP** and read the MKR Δ amplitude. Record the marker- Δ reading as TR Entry 1 of the performance verification test record. The amplitude should be within 1.007X and 0.993X.

Fast Sweep Time Accuracy

4. Connect the equipment as shown in Figure 2-84.

Figure 2-84 Fast Sweep Time Test Setup, 75 Ω input**CAUTION**

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

5. Set the signal generator to output a 300 MHz, -4 dBm, CW signal. Set the AM and FM controls to OFF.

75 Ω input only: Set the output to +2 dBm.

6. Set the synthesizer/level generator to output a 556 Hz, +5 dBm, signal.
7. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:
 - FREQUENCY, 300, MHz**
 - SPAN, ZERO SPAN**
 - AMPLITUDE, SCALE LOG LIN (LIN)**
8. Set the signal generator AM switch to the AC position. If necessary, adjust the output amplitude of the signal generator to position the top of the modulated waveform approximately one division below top screen.
9. Set the spectrum analyzer controls by pressing the following keys:

TRIG VIDEO

SWEEP, 18, ms

10. Press the following spectrum analyzer keys:

SGL SWP

PEAK SEARCH

If necessary, press **NEXT PEAK** or **NEXT PK LEFT** until the marker is on the left-most complete signal peak. This is the “marked signal.”

11. Press **MARKER Δ**, **MARKER Δ**, then press **NEXT PK RIGHT** until the marker Δ is on the eighth signal.

12. Record the MKR Δ frequency reading in the performance test record as shown in Table 2-76. The MKR reading should be within the limits shown.

13. Repeat steps 10 through 12 for the remaining sweep time settings listed in Table 2-76.

Performance verification test “Fast Time Domain Sweeps” is now complete.

Table 2-76 Fast Sweep Time Accuracy

Spectrum Analyzer Sweep Time	Synthesizer Function Generator Frequency	Minimum Reading	TR Entry MKR Δ Reading
18 ms	556 Hz	14.04 ms	(2) _____
10 ms	1 kHz	7.8 ms	(3) _____
1.0 ms	10 kHz	780 μs	(4) _____
100 μs	100 kHz	78 μs	(5) _____
20 μs	500 kHz	15.6 μs	(6) _____

58. Fast Time Domain Sweeps, 8593E, 8594E, 8595E, and 8596E Option 101

The CAL OUT signal is used to compare the amplitude level of a normal sweep time (20 ms) to a fast sweep time (18 ms) using the marker delta function.

A synthesizer/level generator is used to amplitude modulate a 500 MHz, CW signal from another signal generator. The spectrum analyzer demodulates this signal in zero span to display the response in the time domain. The marker delta frequency function on the spectrum analyzer is used to read out the sweep time.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesizer/level generator

Signal generator

Cable, BNC, 122 cm (48 in)

Cable, BNC, 23 cm (9 in)

Cable, Type N, 152 cm (60 in)

Adapter, Type N (m) to BNC (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

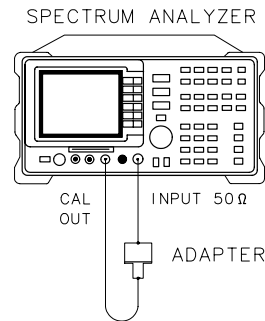
Procedure

Fast Sweep Time Amplitude Accuracy

1. Connect the equipment as shown in [Figure 2-85](#).

Option 026 only: Use the APC to Type N adapter.

Figure 2-85 Fast Sweep Time Amplitude Test Setup



XD628

2. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 0, Hz

SWEEP, 20, ms

AMPLITUDE, SCALE LOG/LIN (LIN)

REF LVL, 25, mV

MKR FCTN, MK NOISE ON OFF (ON)

SGL SWP

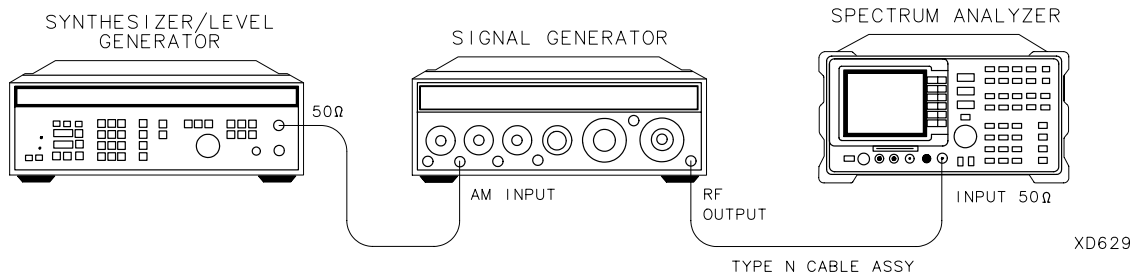
MKR, MARKER Δ

3. Set the sweep time to 18 ms. Press **SGL SWP** and read the MKR Δ amplitude. Record the marker-Δ reading as TR Entry 1 of the performance verification test record. The amplitude should be within 1.007X and 0.993X.

Fast Sweep Time Accuracy

4. Connect the equipment as shown in Figure 2-86.

Option 026 only: Use the APC to Type N adapter.

Figure 2-86 Fast Sweep Time Accuracy Test Setup

5. Set the signal generator to output a 300 MHz, -4 dBm, CW signal. Set the AM and FM controls to OFF.
6. Set the synthesizer/level generator to output a 556 Hz, $+5$ dBm, signal.
7. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 0, Hz**
 - AMPLITUDE, SCALE LOG LIN (LIN)**
8. Set the signal generator AM switch to the AC position. If necessary, adjust the output amplitude of the signal generator to position the top of the modulated waveform approximately one division below top screen.
9. Set the spectrum analyzer controls by pressing the following keys:
 - TRIG, VIDEO**
 - SWEEP, 18, ms**
10. Press the following spectrum analyzer keys:
 - SGL SWP**
 - PEAK SEARCH**

If necessary, press **NEXT PEAK** or **NEXT PK LEFT** until the marker is on the left-most complete signal peak. This is the "marked signal."
11. Press **MARKER Δ**, **MARKER Δ**, then press **NEXT PK RIGHT** until the marker Δ is on the eighth signal.

58. Fast Time Domain Sweeps, 8593E, 8594E, 8595E, and 8596E Option 101

12. Record the MKR Δ frequency reading in the performance verification test record as shown in Table 2-77. The MKR reading should be within the limits shown.

13. Repeat steps 10 through 12 for the remaining sweep time settings listed in Table 2-77.

Performance verification test “Fast Time Domain Sweeps” is now complete.

Table 2-77 Fast Sweep Time Accuracy

Spectrum Analyzer Sweep Time	Synthesizer Function Generator Frequency	Min. Reading	TR Entry (MKR Δ)
18 ms	556 Hz	14.04 ms	(2) _____
10 ms	1 kHz	7.8 ms	(3) _____
1.0 ms	10 kHz	780 μ s	(4) _____
100 μ s	100 kHz	78 μ s	(5) _____
20 μ s	500 kHz	15.6 μ s	(6) _____

59. Absolute Amplitude, Vernier, and Power Sweep Accuracy, 8591C and 8591E Option 010 or 011

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. A calibrated power sensor is then connected to the tracking generator output to measure the power level at 300 MHz.

The measuring receiver is set for RATIO mode so that future power level readings are in dB relative to the power level at -10 dBm (**75 W input only**: +38.8 dBmV). The output power level setting is decreased in 1 dB steps and the power level is measured at each step. The difference between the ideal and actual power levels is calculated at each step.

Since a power sweep is accomplished by stepping through the vernier settings, the peak-to-peak variation of the vernier accuracy is equal to the power sweep accuracy.

The related adjustment for this procedure is “Modulator Gain and Offset Adjustment.”

Equipment Required

Measuring receiver

Power sensor, 100 kHz to 1800 MHz

Cable, Type N, 62 cm (24 in)

Additional Equipment for 75 W Input

Power sensor, 75 Ω

Cable, BNC, 75 Ω

Adapter, Type N (f) to BNC (m), 75 Ω

Adapter, mechanical, Type N, 50 Ω (m) to 75 Ω (f)

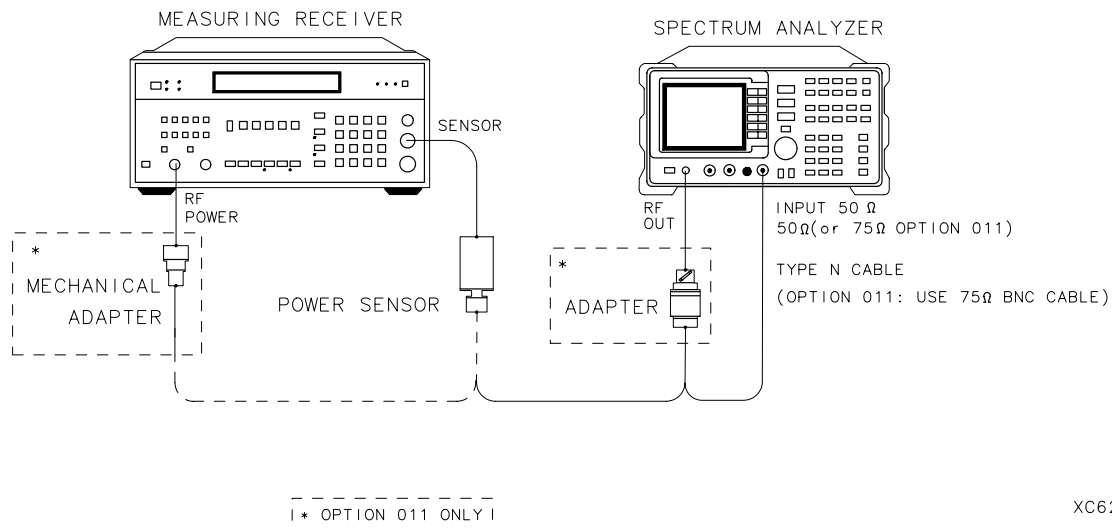
59. Absolute Amplitude, Vernier, and Power Sweep Accuracy, 8591C and 8591E Option 010 or 011

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See Figure 2-87.

75 W input only: Connect the BNC cable between the RF OUT 75 Ω and INPUT 75 Ω connectors on the spectrum analyzer.

Figure 2-87 Absolute Amplitude, Vernier, and Power Sweep Accuracy Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on the 75 Ω input of an Option 011 or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, ZERO SPAN

MKR

AUX CTRL, Track Gen

SRC PWR ON OFF (ON), -5, dBm

75 W input only: **AUX CTRL, Track Gen, SRC PWR ON OFF (ON), 42, dBm**

3. On the spectrum analyzer, press **TRACKING PEAK**. Wait for the **PEAKING** message to disappear.

59. Absolute Amplitude, Vernier, and Power Sweep Accuracy, 8591C and 8591E Option 010 or 011

4. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor's 300 MHz Cal Factor into the measuring receiver.
5. Disconnect the Type N cable from the RF OUT 50 Ω and connect the 100 kHz to 1800 MHz power sensor to the RF OUT 50 Ω as shown in [Figure 2-87](#).

75 W input only: Disconnect the BNC cable from the RF OUT 75 Ω and connect the 75 Ω power sensor to the RF OUT 75 Ω using an adapter.

6. On the spectrum analyzer, press:

-20 dBm, SGL SWP

75 W input only: 28.76, dBm, (+28.76 dBmV), SGL SWP

AUX CTRL, Track Gen, SRC ATN MAN AUTO (MAN)

7. Subtract -20 dBm from the power level displayed on the measuring receiver and record the resulting Absolute Amplitude Accuracy as TR Entry 1 in the performance verification test record.

8. On the spectrum analyzer, press:

AUX CTRL, Track Gen

SRC ATN MAN AUTO (MAN), 0, dBm

SRC PWR, -10, dBm

75 W input only: +38.76, dBm (+38.76 dBmV)

9. Press RATIO on the measuring receiver. Power levels now readout in dB relative to the power level just measured at the -10 dBm output power level setting.
10. Set the SRC POWER to the settings indicated in [Table 2-78](#). At each setting, record the power level displayed on the measuring receiver in [Table 2-78](#).
11. Calculate the Absolute Vernier Accuracy by subtracting the SRC POWER setting and 10 dB from the Measured Power Level (MPL) for each SRC POWER setting in [Table 2-78](#).

$\text{Absolute Vernier Accuracy} = \text{MPL} - \text{SRC POWER} - 10 \text{ dB}$

75 W Input: Calculate the vernier accuracy by subtracting the SRC POWER setting from the Measured Power Level, adding 38.76 dB to each SRC POWER setting in [Table 2-78](#).

$\text{Absolute Vernier Accuracy} = \text{MPL} - \text{SRC POWER} + 38.76 \text{ dB}$

59. Absolute Amplitude, Vernier, and Power Sweep Accuracy, 8591C and 8591E Option 010 or 011

12. Locate the most positive and most negative Absolute Vernier Accuracy values for SRC POWER levels greater than -10 dBm recorded in [Table 2-78](#). Record the Positive Vernier Accuracy as TR Entry 2 and the Negative Vernier Accuracy as TR Entry 3 in the performance verification test record.

75 W input only: Locate the most positive and most negative values for SRC POWER levels greater than and equal to $+38.76$ dBmV.

13. Locate the most positive and most negative Absolute Vernier Accuracy values for all SRC POWER levels in [Table 2-78](#) and record below.

Most Positive Power Sweep Accuracy _____ dB

Most Negative Power Sweep Accuracy _____ dB

14. Calculate the power sweep accuracy by subtracting the Negative Power Sweep Accuracy (NPSA) recorded in the previous step from the Positive Power Sweep Accuracy (PPSA) recorded in the previous step. Record this value as TR Entry 4 of the performance verification test record as the Power Sweep Accuracy.

Power Sweep Accuracy = PPSA – NPSA

Performance verification test “Absolute Amplitude, Vernier, and Power Sweep Accuracy” is now complete.

Table 2-78 Vernier Accuracy Worksheet

SRC POWER Setting		Measured Power Level (dB)	Vernier Accuracy (dB)
Opt 011, dBmV	Opt 010, dBm		
+38.76	−10	0 (Ref)	0 (Ref)
+39.76	−9	_____	_____
+40.76	−8	_____	_____
+41.76	−7	_____	_____
+42.76	−6	_____	_____
+43.76	−5	_____	_____
+44.76	−4	_____	_____
+45.76	−3	_____	_____
+46.76	−2	_____	_____
+47.76	−1	_____	_____
+33.76	−15	_____	_____
+34.76	−14	_____	_____
+35.76	−13	_____	_____
+36.76	−12	_____	_____
+37.76	−11	_____	_____

60. Absolute Amplitude Accuracy, 8593E, 8594E, 8595E, 8596E Option 010

The tracking generator output is connected to the spectrum analyzer INPUT 50 Ω and the tracking is adjusted at 300 MHz for a maximum signal level. A calibrated power sensor is then connected to the tracking generator output to measure the power level at 300 MHz.

The measuring receiver is then set into RATIO mode so that future power level readings will be in dB relative to the power level at 300 MHz. The output power level setting is decreased in 1 dB steps and the power level is measured at each step. The difference between the ideal and actual power levels is calculated at each step. The step-to-step error is also calculated.

The related adjustment for this performance verification test is the “Tracking Generator Power Level Adjustments.”

Equipment Required

Measuring receiver

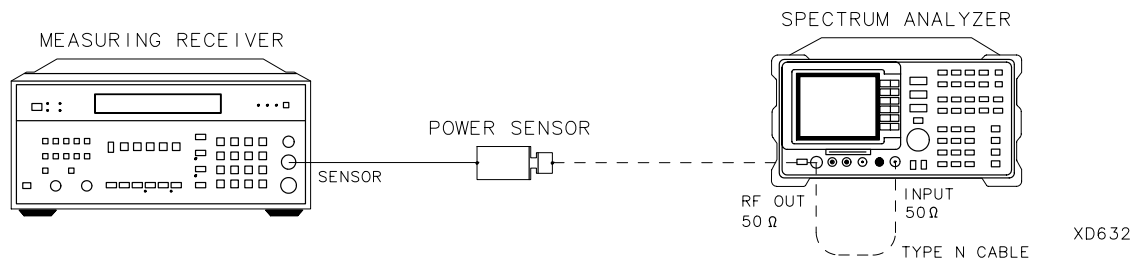
Power sensor, 100 kHz to 2.9 GHz

Cable, Type N, 62 cm (24 in)

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See [Figure 2-88](#).

Figure 2-88 Absolute Amplitude Accuracy Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 0, Hz**
 - BW, RES BW AUTO MAN, 30, kHz**
 - MKR**
 - AUX CTRL, TRACK GEN SRC POWER ON OFF (ON), -5, dBm**
3. Press **TRACKING PEAK** on the spectrum analyzer, then wait for the **PEAKING** message to disappear.
4. Zero and calibrate the measuring-receiver/power-sensor combination in log mode (power levels readout in dBm). Refer to the measuring receiver operation manual. Enter the power sensor 300 MHz Cal Factor into the measuring receiver.
5. Disconnect the Type N cable from the RF OUT 50 Ω and connect the 100 kHz to 2.9 GHz power sensor to the RF OUT 50 Ω . See [Figure 2-88](#).
6. On the spectrum analyzer, press **SRC POWER ON OFF (ON), -20 dBm, SRC POWER MAN AUTO (MAN), 16 dBm, SGL SWP**.
7. Record the power level displayed on the measuring receiver as the Absolute Amplitude Accuracy in the performance verification test record as TR Entry 1.
8. Press **RATIO** on the measuring receiver. Power levels will now readout in dB relative to the power level just measured at the -20 dBm output power level setting.
9. Set the spectrum analyzer SRC POWER to the settings indicated in [Table 2-79](#). At each setting, record the power level displayed on the measuring receiver.
10. Calculate the Absolute Vernier Accuracy by subtracting the SRC POWER setting from the Measured Power Level (MPL) for each SRC POWER setting in [Table 2-79](#).

$$\text{Absolute Vernier Accuracy} = \text{MPL} - \text{SRC POWER} - 20 \text{ dBm}$$

For example, if SRC POWER is -21 dBm and the Measured Power Level is -0.9 dBm, the Absolute Vernier Accuracy is:

$$\text{Absolute Vernier Accuracy} = (-0.9) - (-21) - 20 = 0.1 \text{ dBm}$$

60. Absolute Amplitude Accuracy, 8593E, 8594E, 8595E, 8596E Option 010

11. Calculate the Step-to-Step Accuracy for the -17 dBm to -26 dBm SRC POWER settings by subtracting the previous Absolute Vernier Accuracy from the current Absolute Vernier Accuracy. Start by subtracting the Absolute Vernier Accuracy for the -17 dBm SRC POWER setting from the Absolute Vernier Accuracy for the -18 dBm setting. Record this calculation in the Step-to-Step Accuracy column for SRC POWER -18 dBm.
12. Locate the most positive Absolute Vernier Accuracy value in [Table 2-79](#) and record as TR Entry 2 of the performance verification test record.
13. Locate the most negative Absolute Vernier Accuracy value in [Table 2-79](#) and record as TR Entry 3 of the performance verification test record.
14. Locate the largest Step-to-Step Accuracy values in [Table 2-79](#) and record as TR Entry 4 of the performance verification test record.
15. Locate the smallest Step-to-Step Accuracy values in [Table 2-79](#) and record as TR Entry 5 of the performance verification test record.

Performance verification test “Absolute Amplitude Accuracy” is now complete.

Table 2-79 Vernier Accuracy

SRC POWER	Measured Power Level (dB)	Absolute Vernier Accuracy (dB)	Step-to-Step Accuracy (dB)
-17	_____	_____	(n/a)
-18	_____	_____	_____
-19	_____	_____	_____
-20	0 (Ref)	0 (Ref)	_____
-21	_____	_____	_____
-22	_____	_____	_____
-23	_____	_____	_____
-24	_____	_____	_____
-25	_____	_____	_____
-26	_____	_____	_____

61. Power Sweep Range, 8593E, 8594E, 8595E, and 8596E

The tracking generator output is connected to the spectrum analyzer INPUT 50 Ω through a power splitter and the tracking is adjusted at 300 MHz for a maximum signal level. The other output of the power splitter is connected to a measuring receiver. The tracking generator is set to do a power sweep from -10 dBm to -1 dBm.

The markers are used to measure the displayed amplitude at the beginning and end of the sweep. The power sweep is then turned off and the power level of the tracking generator is adjusted until the displayed amplitude is the same as at the start of the sweep. This power level is measured on the measuring receiver and recorded. The tracking generator is then adjusted until the displayed amplitude is the same as at the end of the sweep. This power level is measured and recorded. The difference between the two measured power levels is calculated and recorded.

The related adjustment for this performance verification test is the "Tracking Generator Power Level Adjustments."

Equipment Required

Measuring receiver

Power sensor, 100 kHz to 2.9 GHz

Power splitter

Cable, Type N, 62 cm (24 in)

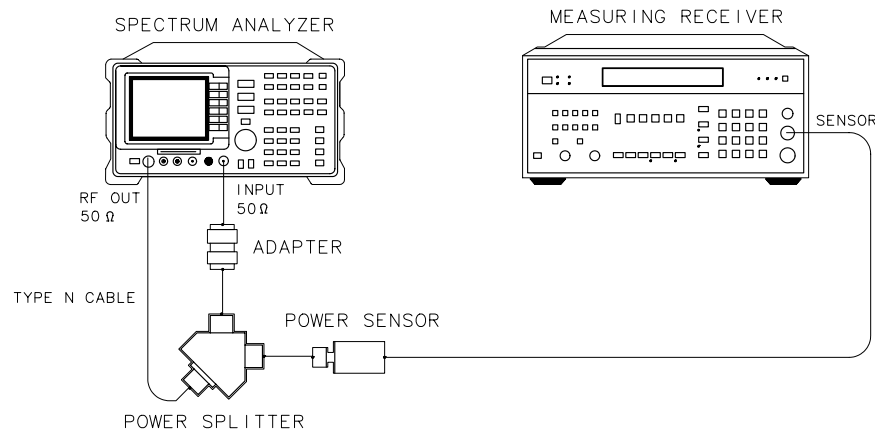
Adapter, Type N (m) to Type N (m)

Procedure

1. Connect the equipment as shown in [Figure 2-89](#). Do not connect the power sensor to the power splitter at this time.

Figure 2-89

Power Sweep Range Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
 - FREQUENCY, Band Lock, 0-2.9 GHz BAND 0**
The 8594E does not need to be band locked.
 - FREQUENCY, 300, MHz**
 - SPAN, 0, Hz**
 - BW, RES BW AUTO MAN, 30, kHz**
 - MKR**
 - AUX CTRL, TRACK GEN SRC PWR ON OFF (ON), -5, dBm**
3. On the spectrum analyzer, press **TRACKING PEAK**, then wait for the **PEAKING!** message to disappear.
4. Zero and calibrate the power-sensor/measuring-receiver in log mode (power levels read out in dBm). Refer to the measuring receiver operation manual. Enter the power sensor 300 MHz Cal Factor into the measuring receiver. Connect the power sensor to the power splitter. See [Figure 2-89](#).
5. On the spectrum analyzer, press the following keys:
 - SRC PWR ON OFF (ON), -10, dBm**
 - SCR ATN MAN AUTO, 0, dB**
 - PWR SWP ON OFF (ON), 10, dB**
 - AMPLITUDE, SCALE LOG LIN (LOG), 2, dB**

6. Press **REF LVL** on the spectrum analyzer, then adjust the reference level until the peak of the displayed ramp (along the right-most graticule) is one-half division down from the reference level.
 7. Press **MKR, MARKER NORMAL**. Use the knob to place the marker at the left-most graticule line. The marker should read 0 picosecond. Press **MARKER Δ**.
 8. Press **AUX CTRL, TRACK GEN, PWR SWP ON OFF (OFF)** to set power sweep off. The Δ MKR should read 0 dB $\pm$ 0.1 dB. If it does not, press **SRC PWR ON OFF (ON)**, and adjust the power level until the marker reads 0 dB $\pm$ 0.1 dB.
 9. Record the power level displayed on the measuring receiver as TR Entry 1 of the performance verification test record.
 10. Press **PWR SWP ON OFF (ON)** to set power sweep on. Wait for completion of a new sweep.
 11. Press **MKR, MARKER NORMAL**. Use the knob to place the marker at the right-most graticule line. Press **MARKER Δ**.
 12. Press **AUX CTRL, TRACK GEN, PWR SWP ON OFF (OFF)** to set power sweep off. Press **SRC PWR ON OFF (ON)** and adjust the SRC POWER level until the Δ MKR reads -1 dB $\pm$ 0.1 dB.
- Be sure to wait for the completion of a new sweep after each adjustment of the SRC POWER level.
13. Record the power level displayed on the measuring receiver as TR Entry 2 of the performance verification test record.
 14. Subtract Start Power Level (TR Entry 1) from the Stop Power Level (TR Entry 2) and record as the Power Sweep Range in the performance verification test record as TR Entry 3.

$$\text{Power Sweep Range} = \text{Stop Power Level} - \text{Start Power Level}$$

Performance verification test “Power Sweep Range” is now complete.

62. Tracking Generator Level Flatness, 8591C and 8591E Option 010 or 011

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. A calibrated power sensor is then connected to the tracking generator output to measure the power level at 300 MHz. The measuring receiver is set for RATIO mode so that future power level readings are in dB relative to the power level at 300 MHz.

The tracking generator is then stepped to several frequencies throughout its range. The output power difference relative to the power level at 300 MHz is measured at each frequency and recorded.

The related adjustment for this procedure is “Modulator Gain and Offset Adjustment.”

Equipment Required

- Measuring receiver

- Power sensor, 100 kHz to 1800 MHz

- Cable, Type N, 62 cm (24 in)

Additional Equipment for 75 Ω Input

- Power sensor, 75 Ω

- Cable, BNC, 75 Ω

- Adapter, Type N (f) to BNC (m), 75 Ω

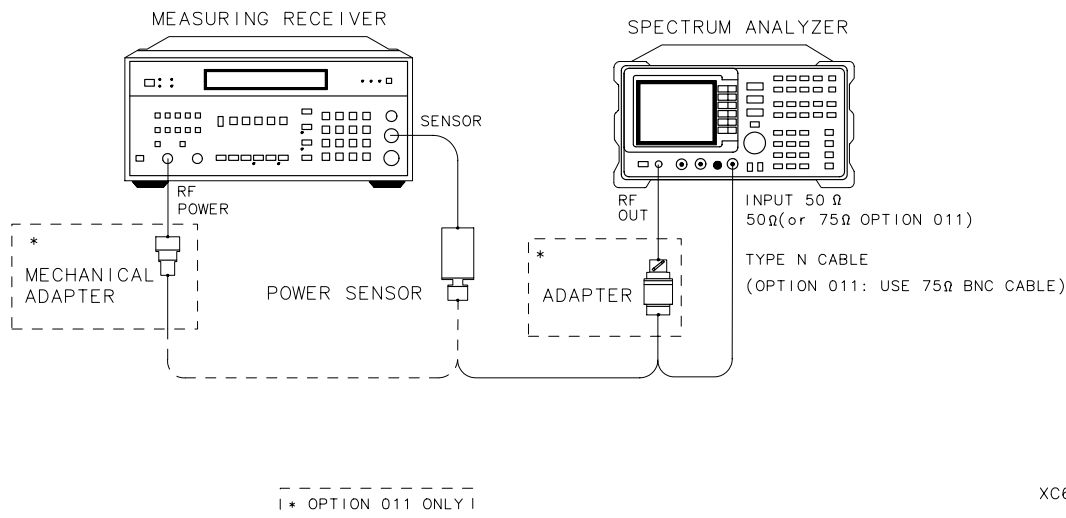
- Adapter, mechanical, Type N, 50 Ω (m) to 75 Ω (f)

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See Figure 2-90.

75 Ω input only: Connect the BNC cable between the RF OUT 75 Ω and INPUT 75 Ω connectors on the spectrum analyzer.

Figure 2-90 Tracking Generator Level Flatness Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on the 75 Ω input of an Option 011 or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
FREQUENCY, 300, MHz
CF STEP AUTO MAN, 100, MHz
SPAN, ZERO SPAN
3. On the spectrum analyzer, press **MKR, AUX CTRL, Track Gen, SRC PWR ON OFF (ON)**, and enter **-5 dBm**.
75 Ω input only: Press **42, dBm (+42 dBmV)**.
4. On the spectrum analyzer, press **TRACKING PEAK**. Wait for the **PEAKING** message to disappear.
5. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor's 300 MHz Cal Factor into the measuring receiver.

62. Tracking Generator Level Flatness, 8591C and 8591E Option 010 or 011

6. Disconnect the Type N cable from the RF OUT 50 Ω and connect the 100 kHz to 4.2 GHz power sensor to the RF OUT 50 Ω

75 Ω input only: Disconnect the BNC cable from the RF OUT 75 Ω and connect the 75 Ω power sensor to the RF OUT 75 Ω using an adapter.

7. On the spectrum analyzer, press **-11 dBm, SGL SWP.**

75 Ω input only: Press **31.8, dBm (+31.76 dBmV).**

8. Press **RATIO** on the measuring receiver. The measuring receiver readout is now in power levels relative to the power level at 300 MHz.

9. Set the spectrum analyzer center frequency to 100 kHz. Press **SGL SWP.**

75 Ω input only: Set the spectrum analyzer center frequency to 1 MHz. Press **SGL SWP.**

10. Enter the appropriate power sensor Cal Factor into the measuring receiver as indicated in [Table 2-80](#).

11. Record the power level displayed on the measuring receiver as the Level Flatness in [Table 2-80](#).

12. Repeat [step 9](#) through to [step 11](#) measure the flatness at each center frequency setting listed in [Table 2-80](#). The $\uparrow$ (step-up key) may be used to tune to center frequencies above 100 MHz.

NOTE

Spectrum analyzers equipped with Option 011 should be tested only at frequencies of 1 MHz to 1.8 GHz.

13. Locate the most positive Level Flatness reading in [Table 2-80](#) for the frequency ranges listed in [Table 2-81](#) and record as the Maximum Flatness in the performance verification test record as shown in [Table 2-81](#).

14. Locate the most negative Level Flatness reading in [Table 2-80](#) for the frequency ranges listed in [Table 2-82](#) and record as the Minimum Flatness in the performance verification test record as shown in [Table 2-82](#).

Performance verification test "Tracking Generator Level Flatness" is now complete.

Table 2-80 Tracking Generator Level Flatness Worksheet

Center Frequency	Level Flatness (dB)	Cal Factor (MHz)
100 kHz*	_____	0.1
300 kHz*	_____	0.3
500 kHz*	_____	0.3
1 MHz	_____	1
2 MHz	_____	3
5 MHz	_____	3
10 MHz	_____	10
20 MHz	_____	30
50 MHz	_____	50
100 MHz	_____	100
200 MHz	_____	300
300 MHz	0 (Ref)	300
400 MHz	_____	300
500 MHz	_____	300
600 MHz	_____	300
700 MHz	_____	1000
800 MHz	_____	1000
900 MHz	_____	1000
1000 MHz	_____	1000
1100 MHz	_____	1000
1200 MHz	_____	1000
1300 MHz	_____	1000
1400 MHz	_____	1000
1500 MHz	_____	2000
1600 MHz	_____	2000
1700 MHz	_____	2000
1800 MHz	_____	2000
*These frequencies are tested on spectrum analyzers equipped with Option 010 only.		

62. Tracking Generator Level Flatness, 8591C and 8591E Option 010 or 011

Table 2-81 Maximum Flatness

Description	TR Entry Maximum Flatness
For Option 010	
100 kHz	(1)_____
300 kHz to 5 MHz	(2)_____
10 MHz to 1800 MHz	(3)_____
For Option 011	
1 MHz to 1800 MHz	(4)_____

Table 2-82 Minimum Flatness

Description	TR Entry Minimum Flatness
For Option 010	
100 kHz	(5)_____
300 kHz to 5 MHz	(6)_____
10 MHz to 1800 MHz	(7)_____
For Option 011	
1 MHz to 1800 MHz	(8)_____

63. Tracking Generator Level Flatness, 8593E, 8594E, 8595E, and 8596E Option 010

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. A calibrated power sensor is then connected to the tracking generator output to measure the power level at 300 MHz. The measuring receiver is set for RATIO mode so that future power level readings are in dB relative to the power level at 300 MHz.

The tracking generator is then stepped to several frequencies throughout its range. The output power difference relative to the power level at 300 MHz is measured at each frequency and recorded.

For frequencies below 100 kHz, a digital voltmeter and precision 50 Ω termination are used to measure the power of the tracking generator output. The DVM is set to readout in dBm using the MATH function with R value set to 50 Ω . The dBm equation used is:

$$\text{dBm} = 10_{\text{LOG}} \left(\frac{\frac{E^2}{R}}{1\text{mW}} \right)$$

The DVM readout is corrected by making the readings relative to the 100 kHz reading from the power sensor.

The related adjustment for this procedure is “Tracking Generator Power Level Adjustments.”

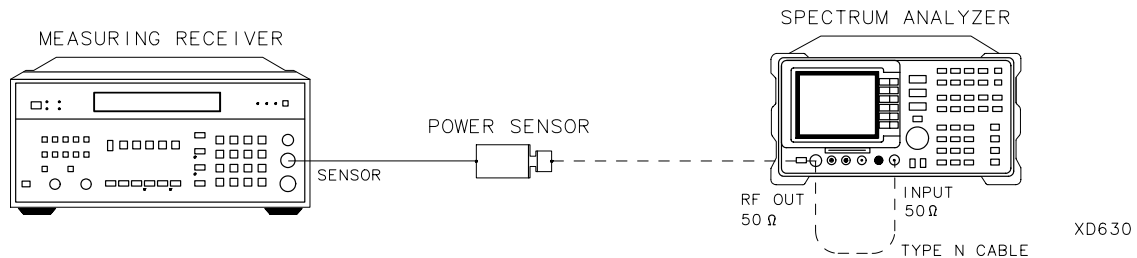
Equipment Required

- Measuring receiver
- Power sensor, 100 kHz to 2.9 GHz
- Cable, Type N, 62 cm (24 in)
- Digital voltmeter
- 50 Ohm termination
- Adapter, BNC (f) to dual banana plug
- Cable, BNC 91 cm (36 in)
- Adapter, Type N tee, (m) (f) (f)
- Adapter, Type N (m) to BNC (f)

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See Figure 2-91.

Figure 2-91 Tracking Generator Level Flatness Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

NOTE

The 8594E does not need to be band locked.

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 100, MHz

SPAN, 0, Hz

BW, RES BW AUTO MAN, 30, kHz

3. On the spectrum analyzer, press the following keys:

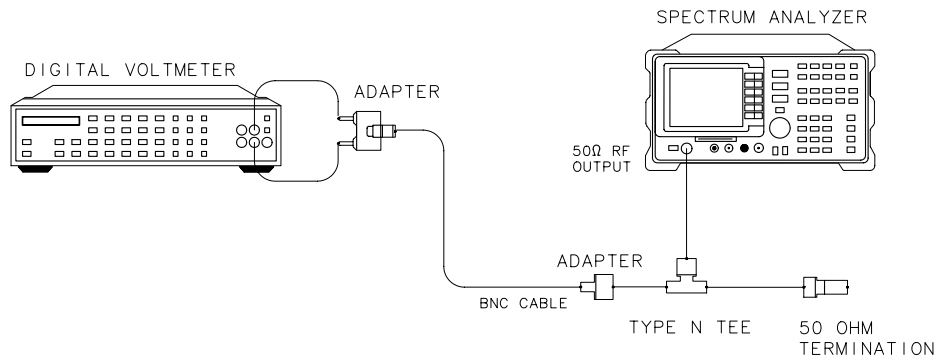
MKR

AUX CTRL, Track Gen, SRC PWR ON OFF (ON), -5, dBm

4. On the spectrum analyzer, press **TRACKING PEAK**. Wait for the **PEAKING** message to disappear.
5. Zero and calibrate the measuring receiver and 100 kHz to 2.9 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 300 MHz Cal Factor into the measuring receiver.
6. Disconnect the Type N cable from the RF OUT 50 Ω and connect the 100 kHz to 2.9 GHz power sensor to the RF OUT 50 Ω .
7. On the spectrum analyzer, press **SRC PWR ON OFF (ON), -20, dBm, SGL SWP**.
8. Press **RATIO** on the measuring receiver. The measuring receiver readout is now in power levels relative to the power level at 300 MHz.

63. Tracking Generator Level Flatness, 8593E, 8594E, 8595E, and 8596E Option 010

9. Set the spectrum analyzer center frequency to 100 kHz. Press **SGL SWP**.
10. Enter the appropriate power sensor Cal Factor into the measuring receiver as indicated in [Table 2-83](#).
11. Record the power level displayed on the measuring receiver as the Level Flatness in [Table 2-83](#).
12. Repeat [step 9](#) through [step 11](#) to measure the flatness at each center frequency setting listed in [Table 2-83](#). The $\uparrow$ (step-up key) may be used to tune to center frequencies above 100 MHz.
13. Disconnect the power sensor from the RF OUT 50 Ω and connect the equipment as shown in [Figure 2-92](#).

Figure 2-92 Tracking Generator Level Flatness, Center Frequency 100 kHz

wu11ce

14. Set the DVM to measure AC Volts. Press the following DVM keys so that it reads out in dBm:

5,0 **STORE**, 4**MATH**, 4

15. Set the spectrum analyzer center frequency to 9 kHz and press **SGL SWP**. Record the DVM readout in column 2 of [Table 2-84](#).
16. Repeat [step 15](#) for all center frequencies listed in [Table 2-84](#).
17. Subtract the 100 kHz Level Flatness readout in [Table 2-83](#) from the 100 kHz DVM Readout in [Table 2-84](#) and record as the DVM Offset at 100 kHz.

DVM Offset _____ dB

18. For example, if the Level Flatness reading from [Table 2-83](#) is +1.0 dB and the DVM Readout from [Table 2-84](#) is -15.0 dBm, the DVM offset would be +16.0 dB.

$$(\text{DVM}) - (\text{Power Meter}) = \text{DVM Offset}$$

63. Tracking Generator Level Flatness, 8593E, 8594E, 8595E, and 8596E Option 010

19. Add the DVM Offset from [step 16](#) to each of the DVM Readouts in [Table 2-84](#) and record as the Corrected Level Flatness in column 3.

For example, if the DVM Readout from [Table 2-84](#) is -15 dBm, and the DVM Offset is $+16.0$ dB, the corrected readout would be $+1$ dBm.

$$(\text{DVM}) + (\text{DVM Offset}) = \text{Corrected Readout}$$

20. Locate the most positive Level Flatness readings in [Table 2-83](#) and [Table 2-84](#) and record these values as TR Entry 1 and TR Entry 2 of the performance verification test record.

21. Locate the most negative Level Flatness readings in [Table 2-83](#) and [Table 2-84](#) and record this value as TR Entry 3 and TR Entry 4 of the performance verification test record.

Table 2-83

Tracking Generator Level Flatness Worksheet

Center Frequency	Level Flatness (dB)	Cal Factor (MHz)
100 kHz	_____	0.1
300 kHz	_____	0.3
500 kHz	_____	0.3
1 MHz	_____	1
2 MHz	_____	3
5 MHz	_____	3
10 MHz	_____	10
20 MHz	_____	30
40 MHz	_____	50
50 MHz	_____	10
80 MHz	_____	100
100 MHz	_____	100
200 MHz	_____	300
300 MHz	_____	300
400 MHz	_____	300
500 MHz	_____	100
600 MHz	_____	300
700 MHz	_____	1000
800 MHz	_____	1000
900 MHz	_____	1000

Table 2-83

Tracking Generator Level Flatness Worksheet (Continued)

Center Frequency	Level Flatness (dB)	Cal Factor (MHz)
1000 MHz	_____	1000
1100 MHz	_____	1000
1200 MHz	_____	1000
1300 MHz	_____	1000
1400 MHz	_____	1000
1500 MHz	_____	2000
1600 MHz	_____	2000
1700 MHz	_____	2000
1800 MHz	_____	2000
1900 MHz	_____	2000
2000 MHz	_____	2000
2100 MHz	_____	2000
2200 MHz	_____	2000
2300 MHz	_____	2000
2400 MHz	_____	2000
2500 MHz	_____	3000
2600 MHz	_____	3000
2700 MHz	_____	3000
2800 MHz	_____	3000
2900 MHz	_____	3000

Table 2-84

Tracking Generator Level Flatness Worksheet, <100 kHz

Center Frequency	DVM Readout dBm	Corrected Level Flatness dBm
9 kHz	_____	_____
20 kHz	_____	_____
40 kHz	_____	_____
60 kHz	_____	_____
80 kHz	_____	_____
100 kHz	_____	_____

64. Harmonic Spurious Outputs, 8591C and 8591E Option 010 or 011

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is then connected to the input of a microwave spectrum analyzer. The tracking generator is tuned to several different frequencies and the amplitude of the second and third harmonics relative to the fundamental are measured at each frequency.

There are no related adjustment procedures for this performance test.

Equipment Required

Microwave spectrum analyzer

Cable, Type N, 62 cm (24 in)

Cable, BNC, 23 cm (9 in)

Adapter, Type N (m) to BNC (f)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Cable, BNC, 75 Ω

Adapter, Type N (f) to BNC (m), 75 Ω

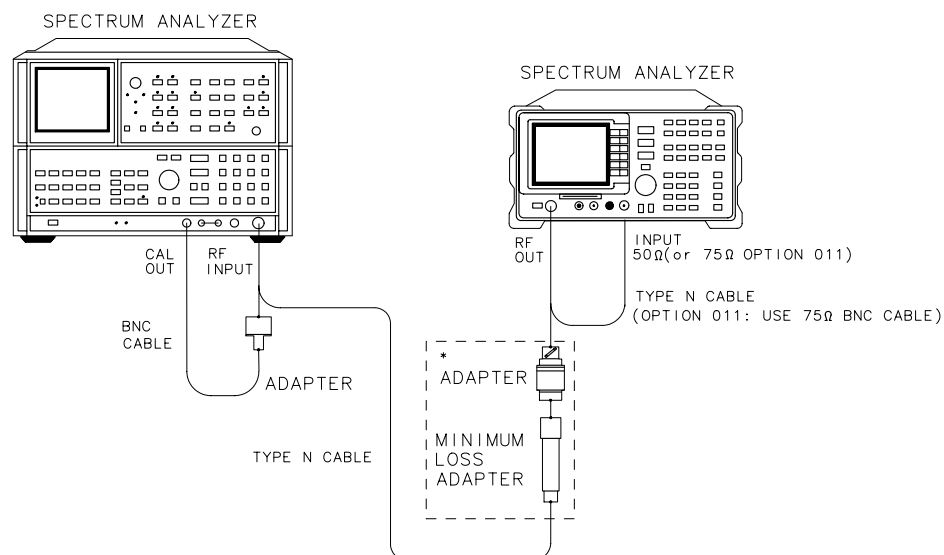
Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See [Figure 2-93](#).

Option 011 only: Connect the 75 Ω BNC cable between the RF OUT 75 Ω and INPUT 75 Ω connectors on the spectrum analyzer.

Figure 2-93

Harmonic Spurious Outputs Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on the 75 Ω input of an Option 011 or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, ZERO SPAN

MKR

AUX CTRL, Track Gen

SRC PWR ON OFF (ON), -5, dBm

75 Ω input only: Press **AUX CTRL, Track Gen, SRC PWR ON OFF**, then enter **42 dBm** (+42 dBmV).

3. On the spectrum analyzer, press **TRACKING PEAK**. Wait for the **PEAKING** message to disappear, then press the following keys:

0, dBm

75 Ω input only: **42.8 dBm** (42.8 dBmV)

FREQUENCY, 10, MHz

SGL SWP

NOTE

It is only necessary to perform the next step if more than two hours have elapsed since a front-panel calibration of the microwave spectrum analyzer was performed.

The microwave spectrum analyzer should be allowed to warm up for at least 30 minutes before proceeding.

4. Perform a front-panel calibration of the microwave spectrum analyzer by performing the following steps:

NOTE

The following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

- a. Connect a BNC cable between the **CAL OUTPUT** and the **RF INPUT**.
- b. Press **2 – 22 GHz** (INSTR PRESET), **RECALL, 8**. Adjust **AMPTD CAL** for a marker amplitude reading of **-10 dBm**.
- c. Press **RECALL, 9**. Adjust **FREQ ZERO** for a maximum amplitude response.

64. Harmonic Spurious Outputs, 8591C and 8591E Option 010 or 011

5. Connect the Type N cable from the tracking generator output to the microwave spectrum analyzer RF INPUT as shown in [Figure 2-93](#).

75 Ω input only: Use the minimum loss adapter and Type N (f) to BNC (m) adapter.

6. Set the microwave spectrum analyzer controls as follows:

CENTER FREQUENCY 10 MHz

SPAN 100 kHz

REFERENCE LEVEL +5 dBm

RES BW 30 kHz

LOG dB/DIV 10 dB

7. Set up the microwave spectrum analyzer by performing the following steps:

NOTE

The following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

- a. Press **PEAK SEARCH** and **SIGNAL TRACK (ON)**. Wait for the signal to be displayed at center screen.
 - b. Press **PEAK SEARCH**, **CF STEP SIZE 10 MHz**, **CENTER FREQUENCY**, then **SIGNAL TRACK (OFF)**.
 - c. Press **CENTER FREQUENCY** and the step-up key to tune to the second harmonic. Press **PEAK SEARCH**. Record the marker amplitude reading in [Table 2-85](#) as the 2nd Harmonic Level for the 10 MHz Tracking Generator Output Frequency.
 - d. Perform this step only if the Tracking Generator Output Frequency is less than 600 MHz. Press **CENTER FREQUENCY** and the step-up key to tune to the third harmonic. Press **PEAK SEARCH**. Record the marker amplitude reading in [Table 2-85](#) as the 3rd Harmonic Level for the 10 MHz Tracking Generator Output Frequency.
 - e. Press **MARKER (OFF)**.
8. Change the microwave spectrum analyzer center frequency to the next frequency listed in [Table 2-85](#), then repeat [step 7](#). Note that the microwave spectrum analyzer frequency is the same as the Tracking Generator Output Frequency (*STEP SIZE = TG FREQ*).

9. Locate the most positive 2nd Harmonic Level in [Table 2-85](#) and record as TR Entry 1 of the performance verification test record.
10. Locate the most positive 3rd Harmonic Level in [Table 2-85](#) and record as TR Entry 2 of the performance verification test record.

Performance verification test “Harmonic Spurious Outputs” is now complete.

Table 2-85**Harmonic Spurious Responses Worksheet**

Tracking Generator Frequency	2nd Harmonic Level (dBc)	3rd Harmonic Level (dBc)
10 MHz	_____	_____
100 MHz	_____	_____
300 MHz	_____	_____
850 MHz	_____	N/A

65. Harmonic Spurious Outputs, 8593E, 8594E, 8595E, and 8596E, Option 010

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is then connected to the input of a microwave spectrum analyzer. The tracking generator is tuned to several different frequencies and the amplitude of the second and third harmonics relative to the fundamental are measured at each frequency.

There are no related adjustment procedures for this performance verification test.

Equipment Required

Microwave spectrum analyzer

Cable, Type N, 62 cm (24 in)

Cable, BNC, 23 cm (9 in)

Adapter, Type N (m) to BNC (f)

Procedure

It is only necessary to perform [step 1](#) if more than two hours have elapsed since a front-panel calibration of the microwave spectrum analyzer was performed.

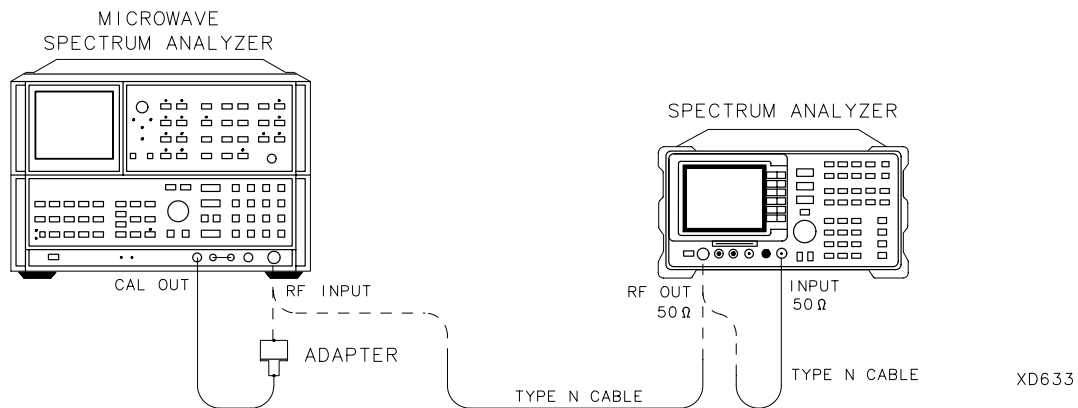
The microwave spectrum analyzer should be allowed to warm up for at least 30 minutes before proceeding.

1. Perform a front-panel calibration of the microwave spectrum analyzer by performing the following steps:

Note that the following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

- a. Connect a BNC cable between the CAL OUTPUT and the RF INPUT.
- b. Press 2 – 22 GHz (INSTR PRESET), RECALL, 8. Adjust AMPTD CAL for a marker amplitude reading of –10 dBm.
- c. Press RECALL, 9. Adjust FREQ ZERO for a maximum amplitude response.

- d. Press **SHIFT, FREQUENCY SPAN** to start the 30 second internal error correction routine.
 - e. When the **CALIBRATING!** message disappears, press **SHIFT, START FREQ** to use the error correction factors just calculated.
2. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See [Figure 2-94](#).

Figure 2-94 Harmonic Spurious Outputs Test Setup

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

The 8594E does not need to be band locked.

FREQUENCY, 300, MHz

SPAN, 0, Hz

BW, 30, kHz

MKR

AUX CTRL, TRACK GEN

SRC PWR ON OFF (ON), -5, dBm

TRACKING PEAK

4. Wait for the **PEAKING** message to disappear, then press the following keys:

SRC PWR ON OFF (ON), -1, dBm

FREQUENCY, 300, kHz

SGL SWP

65. Harmonic Spurious Outputs, 8593E, 8594E, 8595E, and 8596E, Option 010

5. Connect the Type N cable from the tracking generator output to the microwave spectrum analyzer RF INPUT as shown in [Figure 2-94](#).

6. Set the microwave spectrum analyzer controls as follows:

CENTER FREQUENCY300 kHz

SPAN 20 kHz

REFERENCE LEVEL +5 dBm

RES BW1 kHz

LOG dB/DIV 10 dB

7. Set up the microwave spectrum analyzer by performing the following steps:

Note that the following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

- a. Press **PEAK SEARCH** and **SIGNAL TRACK (ON)**. Wait for the signal to be displayed at center screen.
- b. Press **PEAK SEARCH**, **CF STEP SIZE 10 MHz**, **CENTER FREQUENCY**, then **SIGNAL TRACK (OFF)**.
- c. Press **PEAK SEARCH**, **MKR/Δ →STP SIZE, MARKER Δ**.
- d. Press **CENTER FREQUENCY** and $\uparrow$ (step-up key) to tune to the second harmonic, then press **PEAK SEARCH**. (If the center frequency is greater than 2.5 GHz, press **PRESEL PEAK**, then wait for the **PEAKING!** message to disappear.)

Record the marker amplitude reading in [Table 2-86](#) as the 2nd Harmonic Level for the 300 kHz Tracking Generator Output Frequency.

- e. Press $\uparrow$ (step-up key). If the Tracking Generator Output Frequency is less than 1 GHz. Press **PEAK SEARCH**. (If the center frequency is greater than 2.5 GHz, press **PRESEL PEAK** and wait for the **PEAKING** message to disappear.)

Record the marker amplitude reading in [Table 2-86](#) as the 3rd Harmonic Level for the 300 kHz Tracking Generator Output Frequency.

- f. Press **MARKER (OFF)**.

8. Change the tracking generator and microwave spectrum analyzer frequency to the next frequency listed in [Table 2-86](#), then repeat [step 7](#). Note that the microwave spectrum analyzer frequency is the same as the Tracking Generator Output Frequency.

9. Locate the 2nd Harmonic Level for 9 kHz in [Table 2-86](#) and record as TR Entry 1 of the performance verification record.

10. Locate the most positive 2nd Harmonic Level in [Table 2-86](#) and record as TR Entry 2 of the performance verification test record.
11. Locate the 2nd Harmonic Level for 1.4 GHz in [Table 2-86](#) and record as TR Entry 3 of the performance verification test record.
12. Locate the 3rd Harmonic Level for 9 kHz in [Table 2-86](#) and record as TR Entry 4 of the performance verification record.
13. Locate the most positive 3rd Harmonic Level in [Table 2-86](#) and record as TR Entry 5 of the performance verification test record.

Table 2-86**Harmonic Spurious Responses Worksheet**

Tracking Generator Frequency	2nd Harmonic Level (dBc)	3rd Harmonic Level (dBc)
9 kHz	_____	_____
25 kHz	_____	_____
300 kHz	_____	_____
100 MHz	_____	_____
300 MHz	_____	_____
900 MHz	_____	_____
1.4 GHz	_____	N/A

66. Non-Harmonic Spurious Outputs, 8591C and 8591E Option 010 or 011

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is then connected to the input of a microwave spectrum analyzer. The tracking generator is set to several different output frequencies.

For each output frequency, several sweeps are taken on the microwave spectrum analyzer over different frequency spans and the highest displayed spurious response is measured in each span. Responses at the fundamental frequency of the tracking generator output or their harmonics are ignored. The amplitude of the highest spurious response is recorded.

There are no related adjustments for this performance test.

Equipment Required

Microwave spectrum analyzer

Cable, Type N, 62 cm (24 in)

Cable, BNC, 23 cm (9 in)

Adapter, Type N (m) to BNC (f)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Cable, BNC, 75 Ω

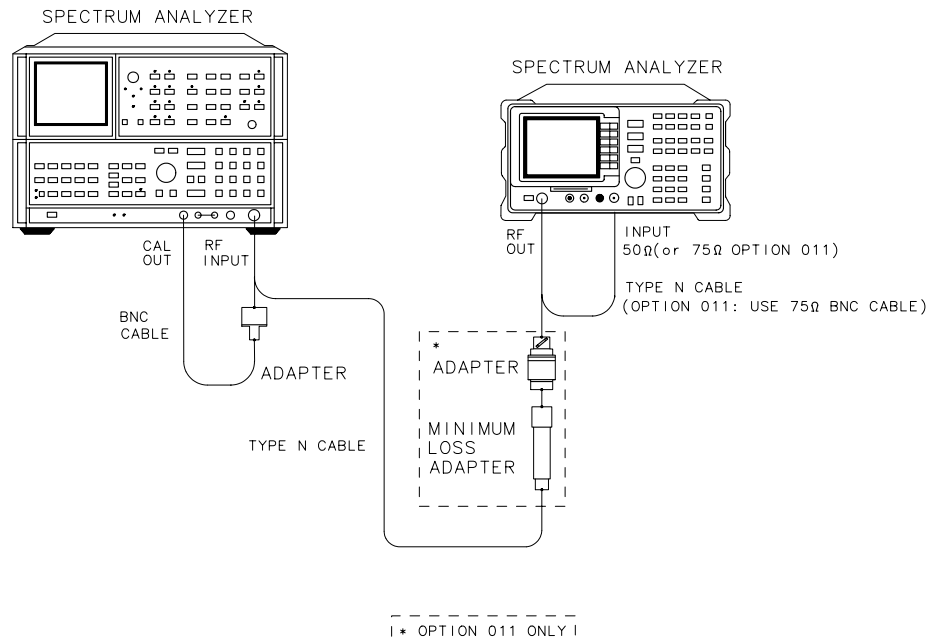
Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See Figure 2-95.

75 Ω input only: Connect the 75 Ω BNC cable between the RF OUT 75 Ω and INPUT 75 Ω on the spectrum analyzer.

Figure 2-95 Non-Harmonic Spurious Outputs Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on the 75 Ω input of an Option 011 or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, ZERO SPAN

BW, RES BW AUTO MAN, 30, kHz

MKR

AUX CTRL, Track Gen

SRC PWR ON OFF (ON), -5, dBm

75 Ω input only: **AUX CTRL, Track Gen,**
SRC PWR ON OFF (ON), 42, dBm (+42 dBmV).

66. Non-Harmonic Spurious Outputs, 8591C and 8591E Option 010 or 011

3. On the spectrum analyzer, press **TRACKING PEAK**, then wait for the **PEAKING** message to disappear.
4. On the spectrum analyzer, press 0, **dBm**, **SGL SWP**.

75 Ω input only: Press 42.8, **dBm** (+42.8 dBmV) then **SGL SWP**.

NOTE

It is only necessary to perform the next step if more than 2 hours have elapsed since a front-panel calibration of the microwave spectrum analyzer has been performed.

The microwave spectrum analyzer should be allowed to warm up for at least 30 minutes before proceeding.

5. *The following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.*

Perform a front-panel calibration of the microwave spectrum analyzer by performing the following steps:

- a. Connect a BNC cable between CAL OUTPUT and RF INPUT.
 - b. Press **2 – 22 GHz** (INSTR PRESET), **RECALL**, 8. Adjust AMPTD CAL for a marker amplitude reading of –10 dBm.
 - c. Press **RECALL**, 9. Adjust **FREQ ZERO** for a maximum amplitude response.
 - d. Press **SHIFT**, **FREQUENCY SPAN** to start the 30 second internal error correction routine.
 - e. Press **SHIFT**, **START FREQ** to use the error correction factors just calculated.
6. Connect the Type N cable from the tracking generator output to the microwave spectrum analyzer RF INPUT as shown in [Figure 2-95](#).
- 75 Ω input only:* Use the minimum loss adapter and Type N (f) to BNC (m) adapter.

Measuring Fundamental Amplitudes

7. Set the spectrum analyzer center frequency to the Fundamental Frequency listed in [Table 2-87](#).
8. Set the microwave spectrum analyzer controls as follows:

SPAN	100 kHz
REFERENCE LEVEL	+5 dBm
ATTEN	20 dB
9. Set the microwave spectrum analyzer CENTER FREQUENCY to the Fundamental Frequency listed in [Table 2-87](#).
10. On the microwave spectrum analyzer, press **PEAK SEARCH**. Press **MARKER** → **REF LVL**. Wait for another sweep to finish.
11. Record the microwave spectrum analyzer marker amplitude reading in [Table 2-87](#) as the Fundamental Amplitude.
12. Repeat [step 9](#) through [step 11](#) for all Fundamental Frequency settings in [Table 2-87](#).

Measuring Non-Harmonic Responses

13. On the spectrum analyzer, set the center frequency to 10 MHz.
14. Set the microwave spectrum analyzer START FREQ, STOP FREQ, and RES BW as indicated in the first row of [Table 2-88](#).
15. Press **SINGLE** on the microwave spectrum analyzer and wait for the sweep to finish. Press **PEAK SEARCH**.
16. *The following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.*

Verify that the marked signal is not the fundamental or a harmonic of the fundamental by performing the following steps:

- a. Divide the marker frequency by the fundamental frequency (the spectrum analyzer center frequency setting). For example, if the marker frequency is 30.3 MHz and the fundamental frequency is 10 MHz, dividing 30.3 MHz by 10 MHz yields 3.03.
- b. Round the number calculated in step a to the nearest whole number. In the example above, 3.03 should be rounded to 3.
- c. Multiply the fundamental frequency by the number calculated in step b. Following the example, multiplying 10 MHz by 3 yields 30 MHz.

66. Non-Harmonic Spurious Outputs, 8591C and 8591E Option 010 or 011

- d. Calculate the difference between the marker frequency and the frequency calculated in step c above. Continuing the example, the difference would be 300 kHz.
 - e. Due to span accuracy uncertainties in the microwave spectrum analyzer, the marker frequency might not equal the actual frequency. Given the marker frequency, check if the difference calculated in step d is within the appropriate tolerance:
 - For marker frequencies <5 MHz, tolerance = ± 200 kHz
 - For marker frequencies <55 MHz, tolerance = ± 750 kHz
 - For marker frequencies >55 MHz, tolerance = ± 10 MHz
 - f. If the difference in step d is within the indicated tolerance, the signal in question is the fundamental signal (if the number in step b = 1) or a harmonic of the fundamental (if the number in step b > 1). This response should be ignored.
17. Verify that the marked signal is a true response and not a random noise peak by pressing **SINGLE** to trigger a new sweep and press **PEAK SEARCH**. A true response will remain at the same frequency and amplitude on successive sweeps but a noise peak will not.
18. If the marked signal is *not* the fundamental or a harmonic of the fundamental (see [step 16](#)) and is a true response (see [step 17](#)), proceed with [step 20](#).
- If the marked signal is either the fundamental or a harmonic of the fundamental (see [step 16](#)) or a noise peak (see [step 17](#)), move the marker to the next highest signal by pressing **SHIFT, PEAK SEARCH**. Repeat [step 16](#).
- The following step is only performed if the marker signal is not the fundamental or harmonic of the fundamental and is a true response.*
19. Calculate the difference between the amplitude of marked signal and the Fundamental Amplitude as listed in [Table 2-87](#).
- $$\text{Non-Harmonic AMP} = \text{Marker AMP} - \text{Fundamental AMP}$$
- For example, if the Fundamental Amplitude for a fundamental frequency of 10 MHz is +1.2 dBm and the marker amplitude is -40.8 dBm, the difference is -42 dBc.
20. Record this difference as the Non-Harmonic Response Amplitude for the appropriate spectrum analyzer center frequency and microwave spectrum analyzer start and stop frequency settings in [Table 2-88](#).

21. If a true non-harmonic spurious response is not found, record “NOISE” as the Non-Harmonic Response Amplitude in [Table 2-88](#) for the appropriate spectrum analyzer center frequency and microwave spectrum analyzer start and stop frequency settings.
22. Repeat [step 15](#) through [step 20](#) for the remaining microwave spectrum analyzer settings for start frequency, stop frequency, and resolution bandwidth; and for the spectrum analyzer center frequency setting of 10 MHz.
23. Repeat [step 14](#) through [step 21](#) with the spectrum analyzer center frequency set to 900 MHz.
24. Repeat [step 14](#) through [step 21](#) with the spectrum analyzer center frequency set to 1.8 GHz.
25. Locate in [Table 2-88](#) the most-positive Non-Harmonic Response Amplitude. Record this amplitude as the Highest Non-Harmonic Response Amplitude in TR Entry 1 of the performance verification test record.

Performance verification test “Non-Harmonic Spurious Outputs” is now complete.

Table 2-87

Fundamental Response Amplitudes Worksheet

Fundamental Frequency	Fundamental Amplitude (dBm)
10 MHz	_____
900 MHz	_____
1.8 GHz	_____

66. Non-Harmonic Spurious Outputs, 8591C and 8591E Option 010 or 011

Table 2-88 Non-Harmonic Responses Worksheet

Microwave Spectrum Analyzer Settings			Non-Harmonic Response Amplitude (dBc)		
Start Frequency (MHz)	Stop Frequency (MHz)	Resolution Bandwidth	at 10 MHz Center Frequency	at 900 MHz Center Frequency	at 1.8 GHz Center Frequency
0.1*	5.0	10 kHz	_____	_____	_____
5.0	55	100 kHz	_____	_____	_____
55	1240	1 MHz	_____	_____	_____
1240	1800	1 MHz	_____	_____	_____
* Option 011: Set the START FREQ to 1 MHz.					

67. Non-Harmonic Spurious Outputs, 8593E, 8594E, 8595E, and 8596E Option 010

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is then connected to the input of a microwave spectrum analyzer. The tracking generator is tuned to several different frequencies, then the amplitude of the second and third harmonics relative to the fundamental are measured at each frequency.

For each output frequency, several sweeps are taken on the microwave spectrum analyzer over different frequency spans and the highest displayed spurious response is measured in each span. Responses at the fundamental frequency of the tracking generator output or its harmonics are ignored; they are tested in the “Harmonic Spurious Responses” performance verification test. The amplitude of the highest spurious response is recorded.

There are no related adjustments for this performance verification test.

Equipment Required

Microwave spectrum analyzer

Cable, Type N, 62 cm (24 in)

Cable, BNC, 23 cm (9 in)

Adapter, Type N (m) to BNC (f)

67. Non-Harmonic Spurious Outputs, 8593E, 8594E, 8595E, and 8596E Option 010

Procedure

It is only necessary to perform **step 1** if more than 2 hours have elapsed since a front-panel calibration of the microwave spectrum analyzer has been performed.

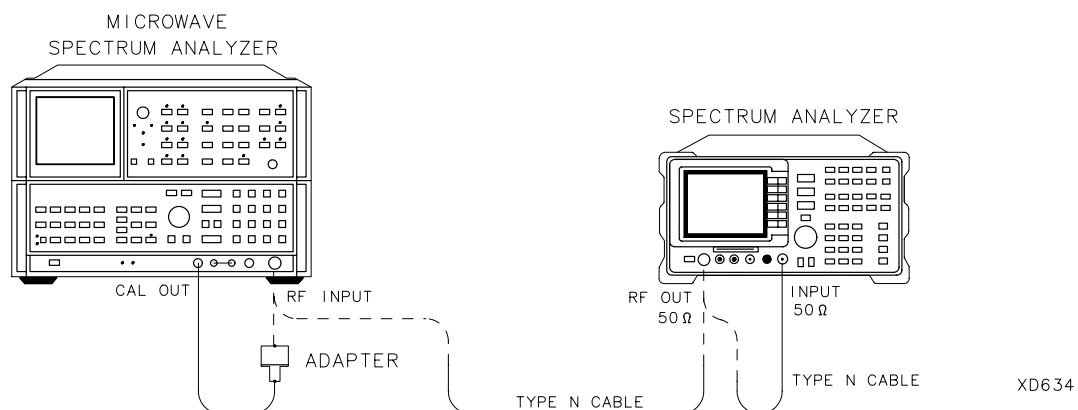
The microwave spectrum analyzer should be allowed to warm up for at least 30 minutes before proceeding.

1. The following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

Perform a front-panel calibration of the microwave spectrum analyzer by performing the following steps:

- a. Connect a BNC cable between CAL OUTPUT and RF INPUT.
 - b. Select the 2 – 22 GHz band, then press INSTR PRESET, RECALL, 8. Adjust AMPTD CAL for a marker amplitude reading of -10 dBm.
 - c. Press RECALL, 9. Adjust FREQ ZERO for a maximum amplitude response.
 - d. Press SHIFT, FREQUENCY SPAN to start the 30 second internal error correction routine.
 - e. When the CALIBRATING! message disappears, press SHIFT, START FREQ to use the error correction factors just calculated.
2. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See [Figure 2-96](#).

Figure 2-96 Non-Harmonic Spurious Outputs Test Setup



3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

The 8594E does not need to be band locked.

FREQUENCY, 300, MHz

SPAN, 0, Hz

BW, RES BW AUTO MAN, 30, kHz

MKR

AUX CTRL, TRACK GEN SRC PWR ON OFF (ON), -5, dBm

TRACKING PEAK

4. Wait for the PEAKING message to disappear, then press the following keys:

SRC PWR ON OFF (ON), -1, dBm

SGL SWP

5. Connect the Type N cable from the tracking generator output to the microwave spectrum analyzer RF INPUT as shown in [Figure 2-96](#).

Measuring Fundamental Amplitudes

6. Set the spectrum analyzer center frequency to the Fundamental Frequency listed in [Table 2-89](#).

7. Set the microwave spectrum analyzer controls as follows:

SPAN 100 kHz

REFERENCE LEVEL +5 dBm

ATTEN 20 dB

LOG dB/DIV 10 dB

8. Set the microwave spectrum analyzer CENTER FREQUENCY to the Fundamental Frequency listed in [Table 2-89](#).
9. On the microwave spectrum analyzer, press **PEAK SEARCH**. If the marker frequency is greater than 2.5 GHz, press **PRESEL PEAK** and wait for the PEAKING! message to disappear. Press **MARKER → REF LVL**. Wait for another sweep to finish.
10. Record the microwave spectrum analyzer marker amplitude reading in [Table 2-89](#) as the Fundamental Amplitude.
11. Repeat [step 6](#) through [step 10](#) for all Fundamental Frequency settings in [Table 2-89](#).

Measuring Non-Harmonic Responses

12. On the spectrum analyzer, set the center frequency to 9 kHz.
13. Set the microwave spectrum analyzer START FREQ, STOP FREQ, and RES BW as indicated in the first row of [Table 2-90](#).
14. Press **SINGLE** on the microwave spectrum analyzer and wait for the sweep to finish. Press **PEAK SEARCH**. If the marker frequency is greater than 2.5 GHz, press **PRESEL PEAK** and wait for the **PEAKING!** message to disappear.
15. The following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

Verify that the marked signal is not the fundamental or a harmonic of the fundamental by performing the following steps:

- a. Divide the marker frequency by the fundamental frequency (the spectrum analyzer center frequency setting). For example, if the marker frequency is 26.5 kHz and the fundamental frequency is 9 kHz, dividing 26.5 kHz by 9 kHz yields 2.944.
- b. Round the number calculated in step a to the nearest whole number. In the example above, 2.944 should be rounded to 3.
- c. Multiply the fundamental frequency by the number calculated in step b. Following the example, multiplying 9 kHz by 3 yields 27 kHz.
- d. Calculate the difference between the marker frequency and the frequency calculated in step c above. Continuing the example, the difference would be 500 Hz.
- e. Due to span accuracy uncertainties in the microwave spectrum analyzer, the marker frequency might not equal the actual frequency. Given the marker frequency, check if the difference calculated in step d is within the appropriate tolerance:

For marker frequencies <5 MHz, tolerance = ± 200 kHz
For marker frequencies <55 MHz, tolerance = ± 750 kHz
For marker frequencies >55 MHz, tolerance = ± 10 MHz
- f. If the difference in step d is within the indicated tolerance, the signal in question is the fundamental signal (if the number in step b = 1) or a harmonic of the fundamental (if the number in step b > 1). This response should be ignored.

16. Verify that the marked signal is a true response and not a random noise peak by pressing **SINGLE** to trigger a new sweep and press **PEAK SEARCH**. A true response will remain at the same frequency and amplitude on successive sweeps but a noise peak will not.

If the marked signal is *not* the fundamental or a harmonic of the fundamental (see [step 15](#)) and is a true response (see [step 16](#)), proceed with [step 18](#).

17. If the marked signal is either the fundamental or a harmonic of the fundamental (see [step 14](#)) or a noise peak (see [step 15](#)), move the marker to the next highest signal by pressing **SHIFT, PEAK SEARCH**. Repeat [step 15](#).

The following step is only performed if the marker signal is not the fundamental or harmonic of the fundamental and is a true response.

18. Calculate the difference between the amplitude of marked signal and the Fundamental Amplitude as listed in [Table 2-89](#).

For example, if the Fundamental Amplitude for a fundamental frequency of 9 kHz is +1.2 dBm and the marker amplitude is -30.8 dBm, the difference is -32 dBc.

19. Record this difference as the Non-Harmonic Response Amplitude for the appropriate spectrum analyzer center frequency and microwave spectrum analyzer start and stop frequency settings in [Table 2-90](#).

$$\text{Non-Harmonic Amp} = \text{Mkr Amp} - \text{Fund Amp}$$

20. If a true non-harmonic spurious response is not found, record "NOISE" as the Non-Harmonic Response Amplitude in [Table 2-90](#) for the appropriate spectrum analyzer center frequency and microwave spectrum analyzer start and stop frequency settings.

21. Repeat [step 15](#) through [step 20](#) for the remaining microwave spectrum analyzer settings for start frequency, stop frequency, and resolution bandwidth; and for the spectrum analyzer center frequency setting of 9 kHz.

22. Repeat [step 13](#) through [step 21](#) with the spectrum analyzer center frequency set to 1.5 GHz.

23. Repeat [step 13](#) through [step 21](#) with the spectrum analyzer center frequency set to 2.9 GHz.

24. Locate in [Table 2-90](#) the most-positive Non-Harmonic Response Amplitude for the microwave spectrum analyzer STOP frequency settings of less than or equal to 2000 MHz. Record this amplitude as the Highest Non-Harmonic Response Amplitude ≤2000 MHz as TR Entry 1 of the performance verification test record.

67. Non-Harmonic Spurious Outputs, 8593E, 8594E, 8595E, and 8596E Option 010

25. Locate in [Table 2-90](#) the most-positive Non-Harmonic Response Amplitude for the microwave spectrum analyzer START frequency settings of greater than or equal to 2000 MHz. Record this amplitude as the Highest Non-Harmonic Response Amplitude ≥ 2000 MHz as TR Entry 2 of the performance verification test record.

Performance verification test “Non-Harmonic Spurious Outputs” is now complete.

Table 2-89**Fundamental Response Amplitudes Worksheet**

Fundamental Frequency	Fundamental Amplitude (dBm)
9 kHz	_____
1.5 GHz	_____
2.9 GHz	_____

Table 2-90**Non-Harmonic Responses Worksheet**

Microwave Spectrum Analyzer Settings			Non-Harmonic Response Amplitude (dBc)		
Start Frequency (MHz)	Stop Frequency (MHz)	Resolution Bandwidth	at 9 kHz Center Frequency	at 1.5 GHz Center Frequency	at 2.9 GHz Center Frequency
0.003*	0.2	3 kHz	_____	_____	_____
0.2	5.0	30 kHz	_____	_____	_____
5.0	55	100 kHz	_____	_____	_____
55	1240	1 MHz	_____	_____	_____
1240	2000	1 MHz	_____	_____	_____
2000	2900	1 MHz	_____	_____	_____
*Adjust start frequency until the LO is just off the left side of the screen.					

68. Tracking Generator Feedthrough, 8591C and 8591E Option 010 or 011

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is terminated and set for 0 dBm output power (maximum output power). The spectrum analyzer input is also terminated. The noise level of the spectrum analyzer is then measured at several frequencies.

There are no related adjustments for this performance test.

Equipment Required

50 Ω Termination (*2 required*)

Cable, Type N, 62 cm (24 in)

Cable, BNC, 23 cm (9 in)

Cable, Type N (m) to BNC (f)

Additional Equipment for 75 Ω Input

Termination, 75 Ω , Type N (m) (*2 required*)

Cable, BNC, 75 Ω

Adapter, Type N (f) to BNC (m), 75 Ω (*2 required*)

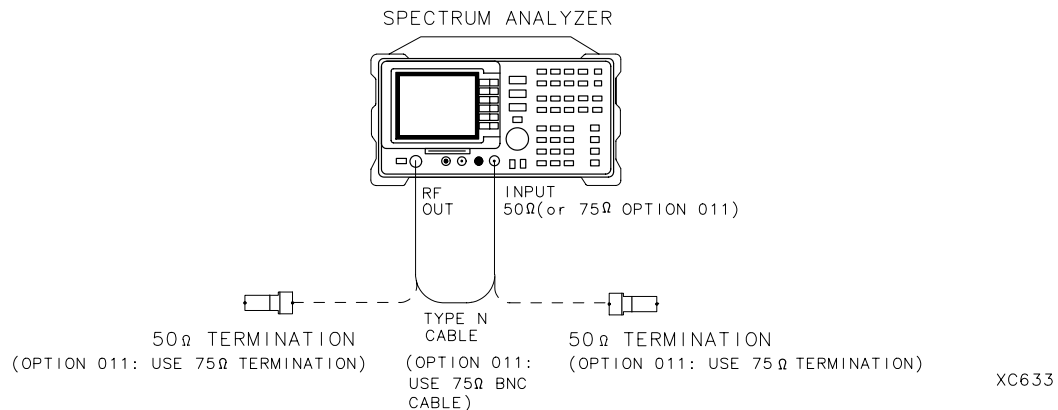
68. Tracking Generator Feedthrough, 8591C and 8591E Option 010 or 011

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See [Figure 2-97](#).

75 Ω input only: Connect the 75 Ω BNC cable between the RF OUT 75 Ω and INPUT 75 Ω connectors on the spectrum analyzer.

Figure 2-97 Tracking Generator Feedthrough Test Setup

**CAUTION**

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 1, MHz

MKR

AUX CTRL, Track Gen

SRC PWR ON OFF (ON), -5, dBm

75 Ω input only: Press **AUX CTRL, Track Gen, SRC PWR ON OFF**, then enter **42 dBm (+42 dBmV)**.

3. On the spectrum analyzer, press **TRACKING PEAK**. Wait for the **PEAKING** message to disappear.

4. Connect the CAL OUTPUT to the INPUT 50 Ω

75 Ω input only: Connect the CAL OUTPUT to the INPUT 75 Ω

5. Set the spectrum analyzer by pressing the following keys:

AMPLITUDE, -20, dBm

75 Ω input only: Press **AMPLITUDE, +28.75, dBmV**.

ATTEN AUTO MAN, 0, dB

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 100, kHz

6. Wait for the AUTO ZOOM message to disappear, then set the spectrum analyzer as follows:

BW VID BW AUTO MAN 30 Hz

MKR FCTN MK TRACK ON OFF (OFF)

7. Press **SGL SWP**, wait for the completion of a new sweep, then press **PEAK SEARCH**.

8. Subtract the MKR amplitude reading from -20 dBm, then enter the result in the spectrum analyzer as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB.

$$-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$$

Example for 75 Ω input:

If the marker reads 26.4 dBmV, enter +2.35 dB

$$28.75 \text{ dBmV} - 26.4 \text{ dBmV} = 2.35 \text{ dB}$$

9. On the spectrum analyzer, press the following keys:

AMPLITUDE, More 1 of 3, REF LVL OFFSET (enter calculated value)

10. Connect one 50 Ω termination to the spectrum analyzer INPUT 50 Ω and another to the tracking generator's RF OUT 50 Ω

75 Ω input only: Connect one 75 Ω termination to the spectrum analyzer INPUT 75 Ω and another to the tracking generator's RF OUT 75 Ω

11. Press **AUX CTRL, Track Gen**, then **SRC PWR ON OFF (OFF)**.

68. Tracking Generator Feedthrough, 8591C and 8591E Option 010 or 011

12. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, -10, dBm

75 Ω input only: **AMPLITUDE, +38.75, dBmV**

AUTO COUPLE, VID BW AUTO MAN (AUTO)

MKR, More 1 of 2, MARKER ALL OFF

TRIG, SWEEP CONT SGL (CONT)

13. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

MKR →, MARKER →REF LVL

SPAN, 2, MHz

14. Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN, MK TRACK ON OFF (OFF)**.

15. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then set the spectrum analyzer as follows:

SPAN, 50, kHz

AMPLITUDE, -50, dBm

75 Ω input only: Press **AMPLITUDE, -1.25, dBmV**.

BW, VID BW AUTO MAN, 30, Hz

16. Press **AUX CTRL, Track Gen, SRC PWR ON OFF (ON)**, and enter 0, **dBm**.

75 Ω input only: Press **AUX CTRL, Track Gen, SRC PWR ON OFF (ON)**, and enter 42.8 **dBm** (+42.8 dBmV).

17. Press **SGL SWP**, then wait for completion of a new sweep. Press **DISPLAY, DSP LINE ON OFF (ON)**.

18. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses. Record the display line amplitude setting in [Table 2-91](#) as the noise level at 1 MHz.

19. Repeat [step 17](#) through [step 18](#) for the remaining Tracking Generator Output Frequencies (spectrum analyzer center frequency) listed in [Table 2-91](#).

20. In Table 2-91, locate the most positive Noise Level Amplitude.

Record this amplitude as TR Entry 1 of the performance verification test record.

Performance verification test “Tracking Generator Feedthrough” is now complete.

Table 2-91

TG Feedthrough Worksheet

Tracking Generator Output Frequency	Noise Level Amplitude (dbm or dBmV)
1 MHz	_____
20 MHz	_____
50 MHz	_____
100 MHz	_____
250 MHz	_____
400 MHz	_____
550 MHz	_____
700 MHz	_____
850 MHz	_____
1000 MHz	_____
1150 MHz	_____
1300 MHz	_____
1450 MHz	_____
1600 MHz	_____
1750 MHz	_____

69. Tracking Generator Feedthrough, 8594E Option 010

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is terminated and set for 1 dBm output power (maximum output power). The spectrum analyzer input is also terminated. The noise level of the spectrum analyzer is then measured at several frequencies.

There are no related adjustments for this performance verification test.

Equipment Required

Termination, 50 Ω (2 required)

Cable, Type N, 62 cm (24 in)

Cable, BNC, 23 cm (9 in)

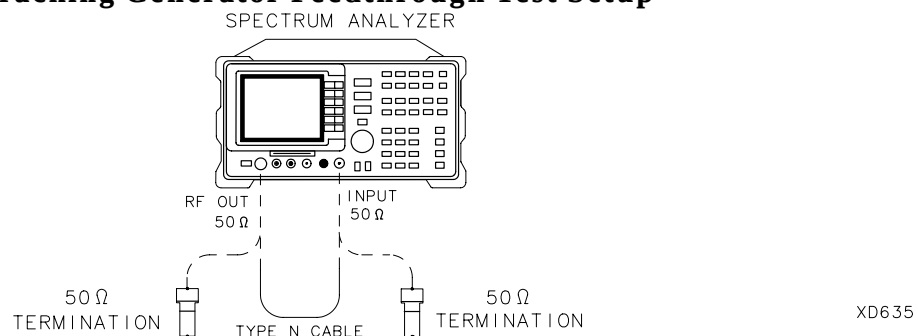
Cable, Type N (m) to BNC (f)

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See [Figure 2-98](#).

Figure 2-98

Tracking Generator Feedthrough Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

SPAN, 0, Hz

BW, RES BW AUTO MAN, 30, kHz

MKR

AUX CTRL, TRACK GEN

SRC PWR ON OFF (ON), -5, dBm

3. On the spectrum analyzer, press **TRACKING PEAK**. Wait for the **PEAKING** message to disappear.
4. Connect the **CAL OUTPUT** to the **INPUT 50 Ω**
5. Set the spectrum analyzer by pressing the following keys:
 - SPAN, 10, MHz**
 - AMPLITUDE, REF LVL, -20, dBm**
 - ATTEN AUTO MAN, 0, dB**
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 100, kHz**
6. Wait for the **AUTO ZOOM** message to disappear, then set the spectrum analyzer as follows:

- BW, VID BW AUTO MAN, 30, Hz**
- MKR FCTN, MK TRACK ON OFF (OFF)**

7. Press **SGL SWP**, wait for the completion of a new sweep, then press **PEAK SEARCH**.

Subtract the MKR amplitude reading from -20 dBm, then enter the result in the spectrum analyzer as the **REF LVL OFFSET**. For example, if the marker reads -20.21 dBm, enter +0.21 dB.

$$-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$$

8. On the spectrum analyzer, press the following keys:
 - AMPLITUDE, More 1 of 3, REF LVL OFFSET** (enter calculated value)
9. Connect one 50 Ω termination to the spectrum analyzer **INPUT 50 Ω** and another to the tracking generator **RF OUT 50 Ω**
10. Press **AUX CTRL, Track Gen**, then **SRC PWR ON OFF (OFF)**.
11. Set the spectrum analyzer by pressing the following keys:

- FREQUENCY, 0, Hz**
- SPAN, 10, MHz**
- AMPLITUDE, REF LVL, -10, dBm**
- MKR, MARKER 1 ON OFF (OFF)**
- AUTO COUPLE, VID BW AUTO MAN (AUTO)**
- TRIG, SWEEP CONT SGL (CONT)**

12. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

MKR →, MARKER →REF LVL

SPAN, 800, kHz

13. Wait for the AUTO ZOOM message to disappear, then press **MKR FCTN, MK TRACK ON OFF (OFF)**.

14. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then set the spectrum analyzer as follows:

SPAN, 50, kHz

AMPLITUDE, REF LVL, -50, dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

TRACE, More 1 of 3, DETECTOR SMP PK (SMP)

15. Press **AUX CTRL, TRACK GEN, SRC PWR ON OFF (ON)**, then enter **-1 dBm**.

16. Press **SGL SWP**, then wait for completion of a new sweep.
Press **DISPLAY, DSP LINE ON OFF (ON)**.

17. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses. Record the display line amplitude setting in [Table 2-92](#) as the noise level at 400 kHz.

18. Repeat [step 16](#) through [step 17](#) for the remaining Tracking Generator Output Frequencies (spectrum analyzer center frequency) listed in [Table 2-92](#).

19. In [Table 2-92](#), locate the most positive Noise Level Amplitude from 400 kHz to 5 MHz. Record this amplitude as TR Entry 1 of the performance verification test record.

20. In [Table 2-92](#), locate the most positive Noise Level Amplitude from 5 MHz to 2900 MHz. Record this amplitude as TR Entry 2 of the performance verification test record.

Performance verification test "Tracking Generator Feedthrough" is now complete.

Table 2-92

TG Feedthrough Worksheet

Tracking Generator Output Frequency	Noise Level Amplitude (dB)
400 kHz	_____
500 kHz	_____
1 MHz	_____
20 MHz	_____
50 MHz	_____
100 MHz	_____
250 MHz	_____
400 MHz	_____
550 MHz	_____
700 MHz	_____
850 MHz	_____
1000 MHz	_____
1150 MHz	_____
1300 MHz	_____
1450 MHz	_____
1600 MHz	_____
1750 MHz	_____
2000 MHz	_____
2300 MHz	_____
2600 MHz	_____
2900 MHz	_____

70. Tracking Generator Feedthrough, 8593E, 8595E, and 8596E Option 010

The tracking generator output is connected to the spectrum analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is terminated and set for -1 dBm output power (maximum output power). The spectrum analyzer input is also terminated. The noise level of the spectrum analyzer is then measured at several frequencies.

There are no related adjustments for this performance verification test.

Equipment Required

Termination, $50\ \Omega$ (two required)

Cable, Type N, 62 cm (24 in)

Cable, BNC, 23 cm (9 in)

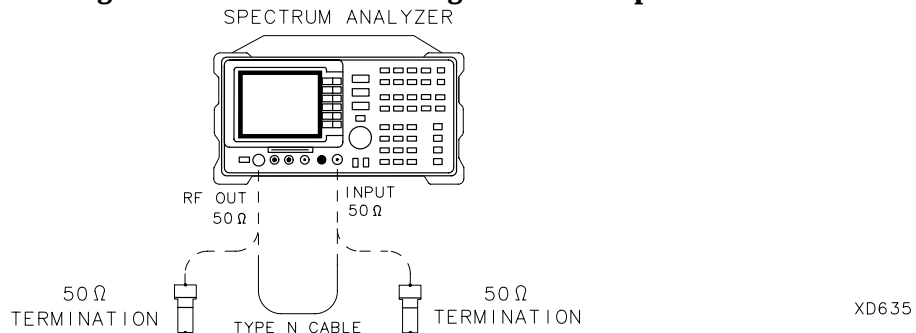
Cable, Type N (m) to BNC (f)

Procedure

1. Connect the Type N cable between the RF OUT $50\ \Omega$ and INPUT $50\ \Omega$ connectors on the spectrum analyzer. See [Figure 2-99](#).

Figure 2-99

Tracking Generator Feedthrough Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, 300, MHz

SPAN, 0, Hz

BW, RES BW AUTO MAN, 30, kHz

MKR

AUX CTRL, TRACK GEN

SRC PWR ON OFF (ON), -5 , dBm

3. On the spectrum analyzer, press **TRACKING PEAK**. Wait for the **PEAKING** message to disappear.
4. Connect the CAL OUTPUT to the INPUT 50 Ω
5. Set the spectrum analyzer by pressing the following keys:
 - SPAN, 10, MHz**
 - AMPLITUDE, REF LVL, -20, dBm**
 - ATTEN AUTO MAN, 0, dB**
 - PEAK SEARCH**
 - MKR FCTN, MK TRACK ON OFF (ON)**
 - SPAN, 100, kHz**
6. Wait for the AUTO ZOOM message to disappear, then set the spectrum analyzer as follows:

BW, VID BW AUTO MAN, 30, Hz

MKR FCTN, MK TRACK ON OFF (OFF)

7. Press **SGL SWP**, wait for the completion of a new sweep, then press **PEAK SEARCH**.
8. Subtract the MKR amplitude reading from -20 dBm, then enter the result in the spectrum analyzer as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB.

$$-20 \text{ dBm} - (-20.21 \text{ dBm}) = +0.21 \text{ dB}$$

Press the following spectrum analyzer keys:

AMPLITUDE, More 1 of 3, REF LVL OFFSET (enter calculated value)

9. Connect one 50 Ω termination to the spectrum analyzer INPUT 50 Ω and another to the tracking generator RF OUT 50 Ω
10. Press **AUX CTRL, Track Gen**, then **SRC PWR ON OFF (OFF)**.
11. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 0, Hz

SPAN, 10, MHz

AMPLITUDE, REF LVL, -10, dBm

MKR, MARKER 1 ON OFF (OFF)

AUTO COUPLE, VID BW AUTO MAN (AUTO)

TRIG, SWEEP CONT SGL (CONT)

70. Tracking Generator Feedthrough, 8593E, 8595E, and 8596E Option 010

12. Press the following spectrum analyzer keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

MKR →, MARKER →REF LVL

SPAN, 80,0 kHz

13. Wait for the **AUTO ZOOM** message to disappear, then press **MKR FCTN, MK TRACK ON OFF (OFF)**.

14. Press **FREQUENCY** and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then set the spectrum analyzer as follows:

SPAN, 50, kHz

AMPLITUDE, REF LVL, -50, dBm

BW, RES BW AUTO MAN, 1, kHz

VID BW AUTO MAN, 30, Hz

TRACE, More 1 of 3, DETECTOR SMPL PK

15. Press **AUX CTRL, TRACK GEN, SRC PWR ON OFF (ON)**, then enter **-1 dBm**.

16. Press **SGL SWP**, then wait for completion of a new sweep. Press **DISPLAY, DSP LINE ON OFF (ON)**.

17. Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses. Record the display line amplitude setting in [Table 2-93](#) as the noise level at 400 kHz.

18. Repeat [step 16](#) through [step 17](#) for the remaining Tracking Generator Output Frequencies (spectrum analyzer center frequency) listed in [Table 2-93](#).

19. In [Table 2-93](#), locate the most positive Noise Level Amplitude. Record this amplitude as TR Entry 1 of the performance verification test record.

Performance verification test "Tracking Generator Feedthrough" is now complete.

Table 2-93

TG Feedthrough Worksheet

Tracking Generator Output Frequency	Noise Level Amplitude (dB)
400 kHz	_____
500 kHz	_____
1 MHz	_____
20 MHz	_____
50 MHz	_____
100 MHz	_____
250 MHz	_____
400 MHz	_____
550 MHz	_____
700 MHz	_____
850 MHz	_____
1000 MHz	_____
1150 MHz	_____
1300 MHz	_____
1450 MHz	_____
1600 MHz	_____
1750 MHz	_____
2000 MHz	_____
2300 MHz	_____
2600 MHz	_____
2900 MHz	_____

71. Tracking Generator LO Feedthrough Amplitude, 8593E, 8594E, 8595E, and 8596E Option 010

The tracking generator output is connected to the spectrum analyzer INPUT 50 Ω and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is then connected to the input of a microwave spectrum analyzer. The tracking generator is tuned to several different frequencies and the LO Feedthrough is measured at the frequency extremes of the LO.

There are no related adjustment procedures for this performance verification test.

Equipment Required

- Microwave spectrum analyzer
- Cable, Type N, 62 cm (24 in)
- Cable, BNC, 23 cm (9 in)
- Adapter, Type N (m) to BNC (f)

Procedure

It is only necessary to perform step 1 if more than 2 hours have elapsed since a front-panel calibration of the microwave spectrum analyzer has been performed.

The microwave spectrum analyzer should be allowed to warm up for at least 30 minutes before proceeding.

1. The following steps are for an 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

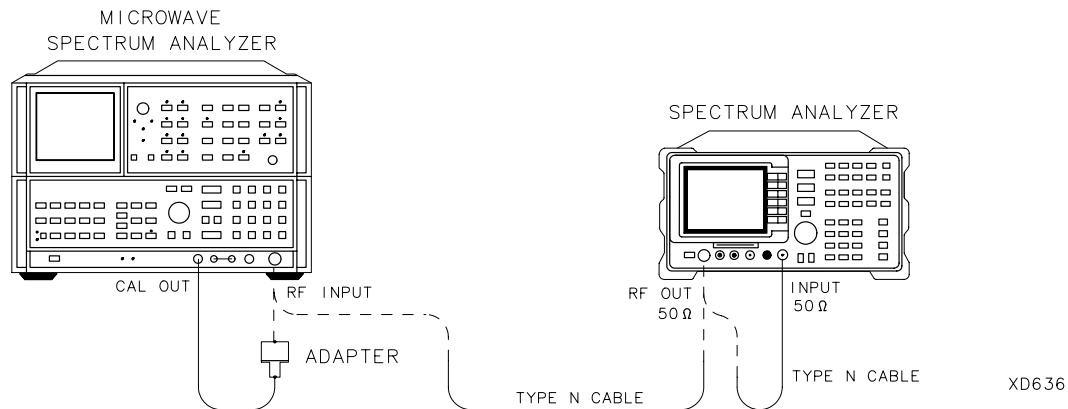
Perform a front-panel calibration of the microwave spectrum analyzer by performing the following steps:

- a. Connect a BNC cable between CAL OUTPUT and RF INPUT.
- b. Press 2 - 22 GHz (INSTR PRESET), RECALL, 8. Adjust AMPTD CAL for a marker-amplitude reading of -10 dBm.
- c. Press RECALL, 9. Adjust FREQ ZERO for a maximum amplitude response.

71. Tracking Generator LO Feedthrough Amplitude, 8593E, 8594E, 8595E, and 8596E Option 010

- d. Press **SHIFT**, **FREQUENCY SPAN** to start the 30 second internal error correction routine.
- e. After the **CALIBRATING!** message disappears, press **SHIFT**, **START FREQ** to use the error correction factors just calculated.
2. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the spectrum analyzer. See [Figure 2-100](#).

Figure 2-100 LO Feedthrough Amplitude Test Setup



3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

The 8594E does not need to be band locked.

FREQUENCY, 300, MHz

SPAN, 0, Hz

BW, RES BW AUTO MAN, 30, kHz

MKR

AUX CTRL, TRACK GEN, SRC PWR ON OFF (ON), -5, dBm

4. Press **TRACKING PEAK**, then wait for the **PEAKING!** message to disappear.

5. Press the following spectrum analyzer keys:

SRC PWR ON OFF (ON), -1, dBm

FREQUENCY, 9, kHz

SGL SWP

6. Connect the Type N cable from the tracking generator output to the microwave spectrum analyzer RF INPUT. See [Figure 2-100](#).

71. Tracking Generator LO Feedthrough Amplitude, 8593E, 8594E, 8595E, and 8596E Option 010

7. Set the microwave spectrum analyzer controls as follows:
 - CENTER FREQUENCY 3.9217 GHz
 - SPAN 100 kHz
 - REFERENCE LEVEL 0 dBm
 - RES BW 1 kHz
 - LOG dB/DIV 10 dB
8. On the microwave spectrum analyzer, press PEAK SEARCH and SIGNAL TRACK (ON), then wait for the signal to be displayed at center screen. Press SIGNAL TRACK (OFF).
9. On the microwave spectrum analyzer, press PEAK SEARCH, PRESEL PEAK, then wait for the PEAKING! message to disappear.
10. Record the microwave spectrum analyzer marker amplitude in [Table 2-94](#) as the LO Feedthrough Amplitude for 3.9217 GHz.
11. Repeat [step 8](#) through [step 10](#) for the remaining Spectrum Analyzer CENTER FREQ and Microwave Spectrum Analyzer CENTER FREQUENCY settings listed in [Table 2-94](#).
12. Locate in [Table 2-94](#) the LO Feedthrough Amplitude with the greatest amplitude 9 kHz to 1.5 GHz, then record the amplitude as TR Entry 1 of the performance verification test record.
13. Locate in [Table 2-94](#) the LO Feedthrough Amplitude for 2.9 GHz, then record the amplitude as TR Entry 2 of the performance verification test record.

Performance verification test “Tracking Generator LO Feedthrough Amplitude” is now complete.

Table 2-94

LO Feedthrough Amplitude

Spectrum Analyzer CENTER FREQUENCY	Microwave Spectrum Analyzer CENTER FREQUENCY	LO Feedthrough Amplitude (dBm)
9 kHz	3.9214 GHz	_____
70 MHz	3.9914 GHz	_____
150 MHz	4.0714 GHz	_____
1.5 GHz	5.4214 GHz	_____
2.9 GHz	6.8214 GHz	_____

72. CISPR Pulse Response, 8590 E-Series Option 103

This CISPR Pulse Response measurement is made using a pulsed RF input signal rather than a pulse signal because the equipment is readily available, easily calibrated, and flexible in use. Pulsed RF setup considerations as well as the relationship between the two techniques are explained in Application Note 150-2.

The CISPR Pulse Response test measures the spectrum analyzer quasi-peak detector receiver system's response to a pulsed RF input signal relative to that of a CW input signal and as a function of pulse repetition frequency. The output of the synthesizer/level generator is modulated by the pulse generator using the pulse modulator to yield the pulsed RF signal. The output of the pulse modulator is connected to the input of the device under test (DUT) with a BNC cable through a 3 dB attenuator. The 3 dB attenuator provides a controlled source match. Amplitude accuracy is ensured by measuring the output signal of the 3 dB attenuator using the power meter with the pulse modulator dc biased to provide a CW signal. This measured CW amplitude also corresponds to the burst amplitude of the pulsed RF input signal when the pulse modulator is appropriately driven.

The system is tested, through the 9 kHz and 120 kHz EMI bandwidth filters with a pulse repetition frequency (PRF) corresponding to CISPR specifications. (Additional steps are included to test the 200 Hz EMI bandwidth filter for spectrum analyzers equipped with Option 130.) The required CW amplitude for the tests are calculated based on the device under test's impulse bandwidth, the pulse width of the pulsed RF, and the CISPR specified spectral intensity.

There are no related adjustment procedures for this performance test.

Equipment

- Pulse generator
- Synthesizer/level generator
- Power meter
- Power sensor, 100 kHz to 1800 MHz
- Attenuator, 3 dB
- Modulator, TeleTech
- Quasi-peak detector driver
- Cable, BNC, 122 cm (48 in) (*3 required*)
- Adapter, Type N (m) to BNC (f)
- Adapter, Type N (f) to Type N (f)

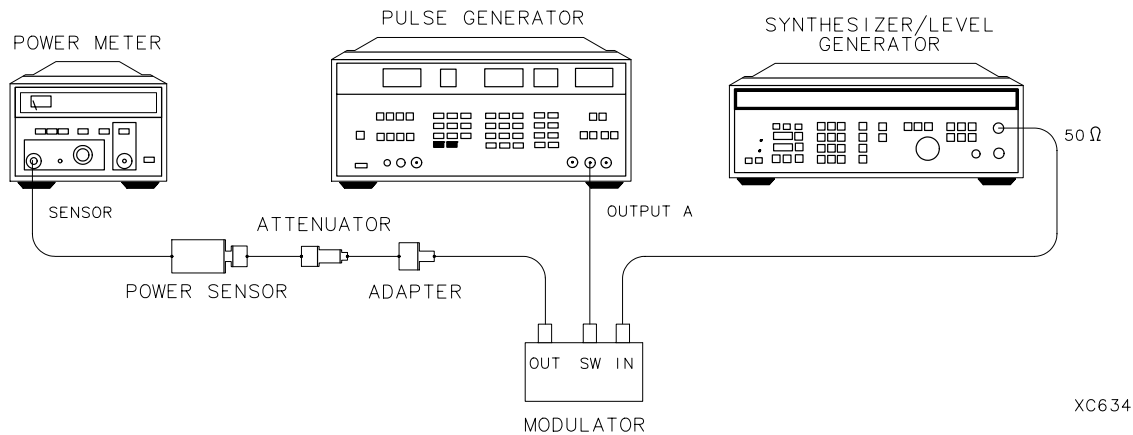
Procedure

Be sure the quasi-peak detector driver (DLP) is installed before performing this procedure.

Input Amplitude Calibration

1. Zero and Calibrate the power meter and 100 kHz to 1800 MHz power sensor, as described in the power meter operation manual.
2. Connect the equipment as shown in [Figure 2-101](#).

Figure 2-101 Input Amplitude Calibration Test Setup



3. Press RECALL 0 on the pulse generator to preset the pulse generator. To bias the modulator on, set the pulse generator to the following settings:

Parameters:

LEE3 ns
 TRE3 ns
 HIL+2 V
 LOL+1.8 V
 DEL0 ns

Output Mode: Enabled

Channel A50 Ω
 Channel ANORM

4. Press STORE 1 on the pulse generator to store the settings in storage register 1.
5. Set the synthesizer/level generator to the following settings:
 FREQUENCY 50 MHz
 AMPLITUDE-3 dBm

6. Set the power meter to the following settings:

MODEdBm

CAL FACTOR..power sensor Ref Cal Factor for 50 MHz

7. Adjust synthesizer/level generator power level for a -6.99 dBm (± 0.03) reading on the power meter.
8. Record the synthesizer/level generator amplitude setting in [Table 2-95](#) under Reference Amplitude at 50 MHz for the 200 Hz, 9 kHz and 120 kHz EMI bandwidths. Calculate the Required Amplitude for the 200 Hz, 9 kHz and 120 kHz resolution bandwidths using the following formula:

$$\text{Required Amplitude} = \text{Ref Amp at 50 MHz} + \text{Amp Offset}$$

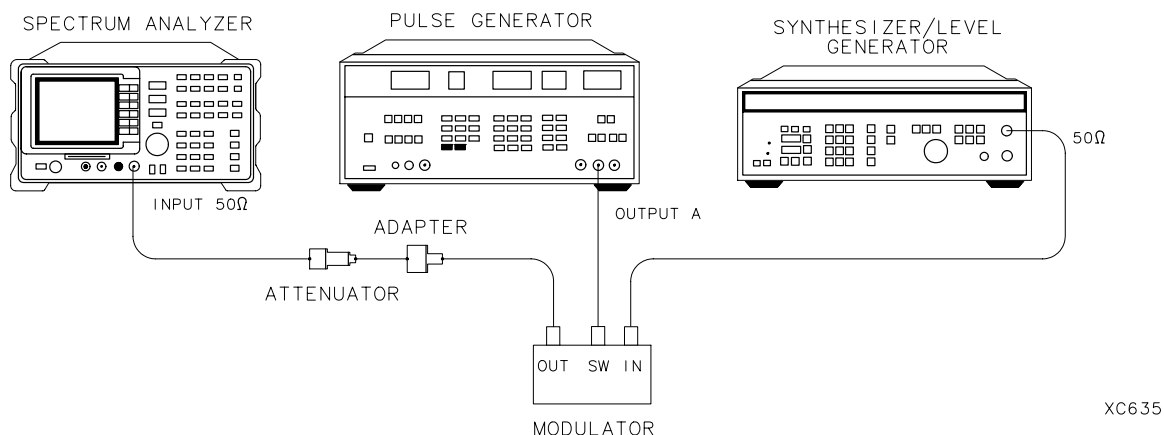
Note that the reference amplitude is the same for the 9 kHz, 120 kHz, and 200 Hz filters.

9. Enter the calculated 200 Hz, 9 kHz and 120 kHz Required Amplitude values in [Table 2-95](#).
10. On the synthesizer/level generator, press STORE 1 to store the previous setting of the synthesizer/level generator in storage register 1.

Isolation Check

11. Connect the equipment as shown in [Figure 2-102](#).

Figure 2-102 Isolation Check Test Setup



12. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 1, MHz

PEAK SEARCH

SAVE, STATE → INTRNL, 1

MKR →, MARKER → REF LVL

MKR, MARKER Δ

13. Press **RECALL 1** on the pulse generator. Set the pulse generator to the following settings to bias the modulator off:

HIL -1.5 V

LOL -1.7 V

Use the **CHS** key to change signs of the entered value on the pulse generator.

14. Verify that the isolation of the modulator (the marker-delta reading) exceeds 70 dBc.

CW Measurement for 9 kHz EMI Bandwidth

15. Press **RECALL 1** on the pulse generator.
16. Subtract 40 dB from the Reference Amplitude at 50 MHz in [Table 2-95](#). Set the synthesizer/level generator amplitude to the calculated value by pressing **AMPLITUDE**, (enter the calculated value), **-dBm**.
17. Press **STORE 2** on the synthesizer/level generator.
18. Press the following keys on the spectrum analyzer:

MKR, MARKER NORMAL

BW, EMI BW Menu, 9 kHz EMI BW

AUX CTRL, Quasi Peak, AUTO QP AT MKR

A message will be displayed warning that an improper bandwidth is selected. Disregard the message and press **CONTINUE**.

19. Record the quasi-peak reading displayed below the signal on the spectrum analyzer screen in [Table 2-96](#), under the Measured CW Amplitude for 9 kHz.

9 kHz Pulse RF Signal Setup

20. Press **RECALL 1** on the pulse generator. Set the pulse generator to the following conditions:

PER 10 ms

WID 2.2 μ s

LOL -1.7 V

Use the **CHS** key to change the sign of the value entered on the pulse generator.

21. Press **RECALL 1** on the synthesizer/level generator. Set the synthesizer/level generator amplitude to the required amplitude value for the 9 kHz filter recorded in [Table 2-95](#) by pressing **AMPLITUDE**, (enter the Required Amplitude for 9 kHz), **-dBm**.

22. Press **MAN QP AT MKR** on the spectrum analyzer.

A message will be displayed warning that an improper bandwidth is selected. Disregard the message and press **CONTINUE**.

23. Record the marker amplitude reading in [Table 2-96](#) and the performance verification record as the Measured 100 Hz Amplitude for 9 kHz. Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band B, 100 Hz Repetition Frequency.

24. Set the **PERIOD** to 1 ms on the pulse generator. On the spectrum analyzer, press **MARKER NORM PK** (so that **PK** is underlined), then press **SGL SWP**.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band B, 1000 Hz Repetition Frequency.

25. Set the **PERIOD** to 50 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band B, 20 Hz Repetition Frequency.

26. Set the **PERIOD** to 100 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band B, 10 Hz Repetition Frequency.

27. Set the **PERIOD** to 500 ms on the pulse generator. On the spectrum analyzer, press **QP X10 ON OFF** so that **ON** is underlined, then press **SGL SWP**.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band B, 2 Hz Repetition Frequency.

28. Set the PERIOD to 980 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band B, 1 Hz Repetition Frequency.

29. Press TRIG on the pulse generator. Press **SGL SWP** on the spectrum analyzer. Let the spectrum analyzer sweep 3 divisions then press **MAN** on the pulse generator. Record the Marker reading for Isolated Pulse Measurement for Band B in [Table 2-97](#).

Continue with “CW Measurement for 120 kHz EMI Bandwidth.”

CW Measurement for 120 kHz EMI Bandwidth

30. Press RECALL 1 on the pulse generator.
31. Press RECALL 2 on the synthesizer/level generator.
32. Press **RECALL, INTRNL → STATE, 1** on the spectrum analyzer.
33. On the spectrum analyzer, press the following keys:

MKR, MARKER NORMAL

AUX CTRL, Quasi Peak, RETURN, AUTO QP AT MKR, 120 kHz EMI BW, CONTINUE

34. Record the reading displayed below signal on the spectrum analyzer screen in [Table 2-96](#) under the Measured CW Amplitude for 120 kHz.

120 kHz Pulse RF Signal Setup

35. Set the pulse generator to the following conditions:

PER10 ms

WID167 ns

LOL-1.7 V

36. Press RECALL, 1 on the synthesizer/level generator. Set the synthesizer/level generator amplitude to the required amplitude value for the 120 kHz filter recorded in [Table 2-95](#) by pressing **AMPLITUDE**, (enter the Required Amplitude value for the 120 kHz EMI bandwidth), **dBm**.
37. Press **Quasi Peak, MAN QP AT MKR** on the spectrum analyzer.

38. Record the marker reading in [Table 2-96](#) and in the performance verification test record as the Measured 100 Hz Amplitude for the 120 kHz EMI bandwidth. Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 100 Hz Repetition Frequency.

39. Set PERIOD to 1 ms on the pulse generator. Press **MARKER NORM PK** (so that PK is underlined), **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 1000 Hz Repetition Frequency.

Set the PERIOD to 50 ms on the pulse generator. Press **QP X10 ON OFF** so that ON is underlined on the spectrum analyzer. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 20 Hz Repetition Frequency.

40. Set PERIOD to 100 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 10 Hz Repetition Frequency.

41. Set the PERIOD to 500 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 2 Hz Repetition Frequency.

42. Set PERIOD to 980 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 1 Hz Repetition Frequency.

43. Press **TRIG** on the pulse generator. Press **SGL SWP** on the spectrum analyzer. Let the spectrum analyzer sweep three divisions then press **MAN** on the pulse generator. Record the marker reading as the Isolated Pulse for Bands C and D in [Table 2-97](#).

44. Enter the Measured value for the Band B 100 Hz Repetition Frequency as the Reference value for all the Repetition Frequencies listed for Band B.
45. Enter the Measured value for the Bands C and D 100 Hz Repetition Frequency as the Reference value for all the Repetition Frequencies listed for Bands C and D.
46. Calculate the Amplitude Error for each of the frequencies listed in [Table 2-97](#) using the following formula: Measured – Reference = Error.
47. Record these calculated values in the performance verification test record as indicated in [Table 2-97](#).

If you are testing a spectrum analyzer equipped with Option 130 continue with “Additional Steps for Option 130.”

Performance verification test “CISPR Pulse Response” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

CW Measurement for 200 Hz EMI Bandwidth

48. Press RECALL 1 on the pulse generator.
49. Press RECALL 2 on the synthesizer/level generator.
50. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

RECALL, INTRNL → STATE 1

MKR, MARKER NORMAL

BW, EMI BW Menu, 200 Hz EMI BW

AUX CTRL, Quasi Peak, AUTO QP AT MKR

A message will be displayed warning that an improper bandwidth is selected. Disregard the message and press **CONTINUE**.

Note that this routine will take 1 to 2 minutes to execute.

51. Record the quasi-peak reading displayed below the signal on the spectrum analyzer screen in [Table 2-96](#), under the Measured CW Amplitude for 200 Hz.

200 Hz Pulse RF Signal Setup

52. Press **RECALL 1** on the pulse generator. Set the pulse generator to the following conditions:

PER40 ms

WID0.1 ms

LOL-1.7 V

Use the **CHS** key to change the sign of the value entered on the pulse generator.

53. Press **RECALL 1** on the synthesizer/level generator. Set the synthesizer/level generator amplitude to the required amplitude value for the 200 Hz filter recorded in [Table 2-95](#) by pressing **AMPLITUDE**, (enter the Required Amplitude for 200 Hz), **-dBm**.

54. Press **MAN QP AT MKR** on the spectrum analyzer.

A message will be displayed warning that an improper bandwidth is selected. Disregard the message and press **CONTINUE**.

Note that this routine will take 1 to 2 minutes to execute.

55. Record the marker amplitude reading in [Table 2-96](#) and the performance verification test record as the Measured 25 Hz Amplitude for 200 Hz. Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band A, 25 Hz Repetition Frequency.

56. Set the **PERIOD** to 10 ms on the pulse generator. On the spectrum analyzer, press **MARKER NORM PK** (so that PK is underlined), then **SGL SWP**.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band A, 100 Hz Repetition Frequency.

57. Set the **PERIOD** to 16.7 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band A, 60 Hz Repetition Frequency.

58. Set the **PERIOD** to 100 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band A, 10 Hz Repetition Frequency.

59. Set the PERIOD to 200 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band A, 5 Hz Repetition Frequency.

60. Set the PERIOD to 500 ms on the pulse generator. On the spectrum analyzer, press **QP X10 ON OFF** so that ON is underlined, then press **SGL SWP**.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band A, 2 Hz Repetition Frequency.

61. Set the PERIOD to 980 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.

Record the marker amplitude reading in [Table 2-97](#) as the Measured Relative Equivalent Level of Pulse for Band A, 1 Hz Repetition Frequency.

62. Press **TRIG** on the pulse generator. Press **SGL SWP** on the spectrum analyzer. Let the spectrum analyzer sweep 3 divisions then press **MAN** on the pulse generator. Record the Marker reading for Isolated Pulse Measurement for Band A in [Table 2-97](#).

Performance verification test “CISPR Pulse Response” is now complete.

Table 2-95

Input Amplitude Calibration Worksheet

EMI Bandwidth	Reference Amplitude at 50 MHz	Amplitude Offset	Required Amplitude
9 kHz	_____	0.05	_____
120 kHz	_____	5.42	_____
200 Hz	_____	-0.40	_____

Table 2-96

Quasi-Peak Detector Reference Accuracy Worksheet

EMI Bandwidth	Measured CW Amplitude	Measured Amplitude for 25 Hz or 100 Hz	Error (TR Entry)
9 kHz	_____	_____	(1) _____
120 kHz	_____	_____	(2) _____
200 Hz	_____	_____	(3) _____

Table 2-97

Quasi-Peak Detector Accuracy

Repetition Frequency	Relative Equivalent Level of Pulse Band B (9 kHz EMI BW)		
(Hz)	Measured (dB μ V)	Reference (dB μ V)	TR Entry (Error)
1000	_____	_____	(4) _____
100	_____	_____	(5) _____
20	_____	_____	(6) _____
10	_____	_____	(7) _____
2	_____	_____	(8) _____
1	_____	_____	(9) _____
Isolated pulse	_____	_____	(10) _____
Repetition Frequency	Relative Equivalent Level of Pulse Bands C and D (120 kHz EMI BW)		
(Hz)	Measured (dB μ V)	Reference (dB μ V)	TR Entry (Error)
1000	_____	_____	(11) _____
100	_____	_____	(12) _____
20	_____	_____	(13) _____
10	_____	_____	(14) _____
2	_____	_____	(15) _____
1	_____	_____	(16) _____
Isolated pulse	_____	_____	(17) _____

Table 2-97 Quasi-Peak Detector Accuracy (Continued)

Repetition Frequency	Relative Equivalent Level of Pulse Band B (9 kHz EMI BW)		
(Hz)	Measured (dBμV)	Reference (dBμV)	TR Entry (Error)
100	_____	_____	(18) _____
60	_____	_____	(19) _____
25	_____	_____	(20) _____
10	_____	_____	(21) _____
5	_____	_____	(22) _____
2	_____	_____	(23) _____
1	_____	_____	(24) _____
Isolated pulse	_____	_____	(25) _____

73. Gate Delay Accuracy/Gate Length Accuracy, 8590 E-Series Option 105 or 107 and 8591C Option 107

The method used for measuring the gate length times is determined by the length of the gate. Shorter gate-length times are measured with an oscilloscope, and longer gate-length times are measured with a counter.

For shorter gate-length times, the output signal of a pulse generator is used to trigger the gate circuitry. To measure the gate delay, Δt markers are used. There is often up to 1 μ s of jitter due to the 1 μ s resolution of the gate delay clock. The “define measure” feature of the oscilloscope is used to measure and calculate the average length of the gate output automatically.

For longer gate-length times, a counter is used to measure the time period from the rising edge of the gate output to its falling edge. Because the gate-length time is equivalent to the clock accuracy of the spectrum analyzer, the gate-length time is compared to the specification for clock accuracy.

There are no related adjustments for this procedure.

Equipment Required

Universal counter

Pulse/function generator

Digitizing oscilloscope

Cable, BNC, 120 cm (48 in) (*4 required*)

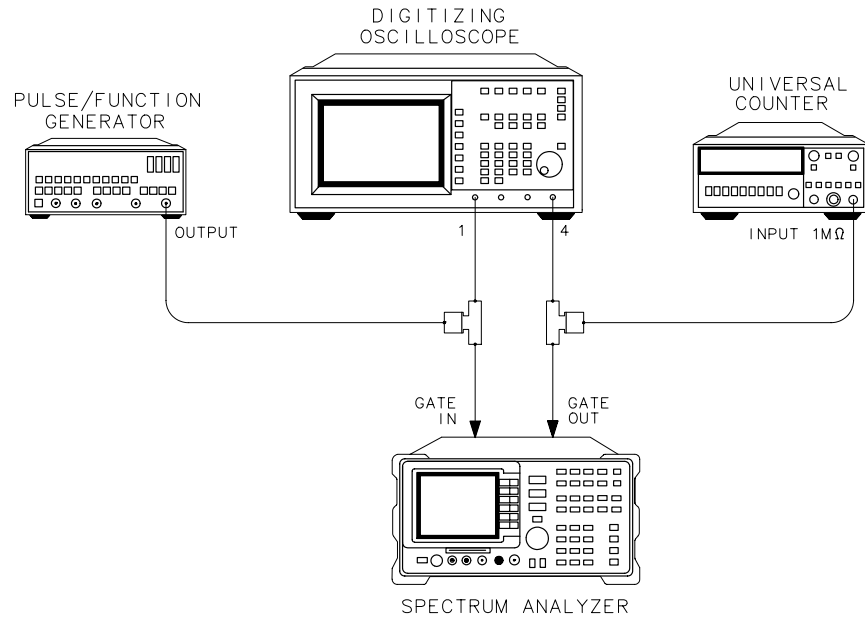
Adapter, BNC tee (m) (f) (f) (*2 required*)

Procedure

To determine small gate delay and gate length (jitter-term)

1. Connect the equipment as shown in Figure 2-103.

Figure 2-103 Gate Delay and Gate Length Test Setup



XC638

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

SPAN, ZERO SPAN

**SWEEP, 20, ms, GATE ON OFF (underline ON) GATE CONTROL,
GATE DELAY, 1, μ s, GATE LENGTH, 1, μ s**

3. Activate the square wave output on the function generator.
4. Set the pulse/function generator controls as follows:

MODE NORM
FRQ 100 Hz
DTY 50%
HIL 2.5 V
LOL 0.0 V

5. Press the following keys on the oscilloscope:

RECALL

CLEAR

DISPLAY

off frame axes grid highlight **grid**

connect dots off on highlight **on**

TRIG

source 1 2 3 4 highlight **4**

level **2 V**

TIMEBASE **500 ns/div**

CHAN

CHANNEL 1 2 3 4 off on

highlight **CHANNEL 1 on**

set V/div to 1 V and offset to 2 V

highlight **CHANNEL 4 on**

set V/div to 1 V and offset to 3 V

DISPLAY

DISPLAY norm avg env highlight **env**

6. Press **CLEAR DISPLAY** on the oscilloscope. Wait for the trace to fill in, then press the following keys:

$\Delta t \Delta V$

Δt markers off on highlight **on**

stop marker 0 μs

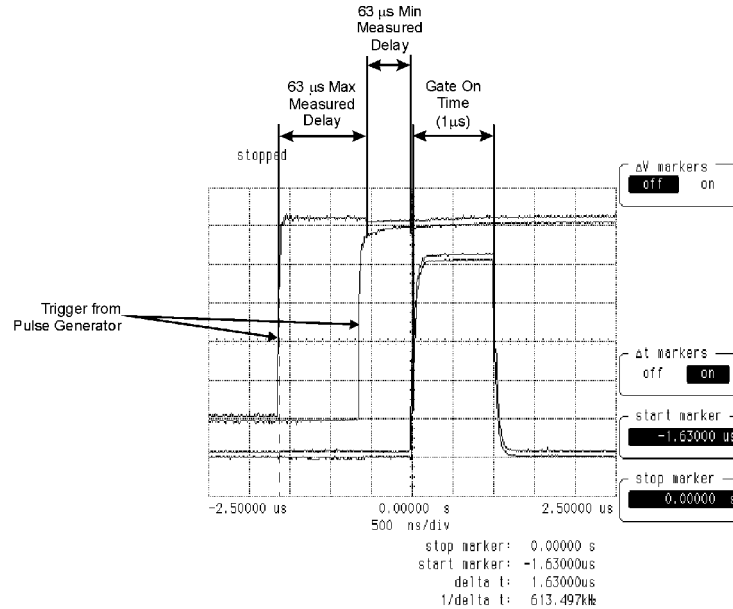
73. Gate Delay Accuracy/Gate Length Accuracy, 8590 E-Series Option 105 or 107 and 8591C Option 107

To record the minimum and maximum gate delay values

7. On the oscilloscope, press **start marker**. Use the knob to position the start marker on the right edge of the upper trace on the oscilloscope display. [Figure 2-104](#) shows position for maximum gate delay.

Figure 2-104

Oscilloscope Display of Minimum and Maximum Gate Delay Values



8. Record the Δt value of the start marker reading as the MIN Gate Delay in TR Entry 1 of the performance verification test record. The expected value is greater than 0.0 µs, but less than 2.0 µs.
9. Use the oscilloscope knob to position the start marker on the left edge of the upper trace.
10. Record the Δt value of the start marker reading as the MAX Gate Delay in TR Entry 2 of the performance verification test record. The expected value is greater than 0.0 µs, but less than 2.0 µs.

To determine small gate length

11. Press the following keys on the oscilloscope:

BLUE +WIDTH, 4

DEFINE MEAS

statistics off on **highlight ON**

12. Read the average +width (4) displayed on the oscilloscope in the bottom right-hand annotation area.

13. Record this value as the 1 μ s Gate Length value in TR Entry 3 of the performance verification test record. The 1 μ s gate length minimum width should be greater than 800 ns and maximum width should be less than 1200 ns.

To determine large gate length (clock accuracy term)

14. Press the following spectrum analyzer keys:

SWEE,P 150, ms, GATE CONTROL, GATE DELAY, 10, ms, GATE LENGTH, 65, ms

15. Set the universal counter controls as follows:

TI **A $\rightarrow$ B**

GATE TIME delay..... **mid-range**

CHANNEL A **rising edge, dc couple, SENSITIVITY mode**

CHANNEL B **falling edge, dc couple, SENSITIVITY mode**

COM A

16. Adjust LEVEL/SENS on the universal counter for best triggering.

17. Record the universal counter readout value as the 65 ms Gate Length in TR Entry 4 of the performance verification test record. The minimum gate length width should be greater than 64.99 ms and maximum width should be less than 65.01 ms.

Performance verification test "Gate Delay Accuracy/Gate Length Accuracy" is now complete.

74. Gate Card Insertion Loss, 8590 E-Series Option 105 or 107 and 8591C Option 107

Use this procedure to verify that the insertion loss for the Option 105 card is within the specifications. See the specifications for the log and linear scale additional amplitude error due to Gate-On enabled. The insertion loss is measured as follows:

1. HIGH SWEEP output on the spectrum analyzer is connected to GATE INPUT to provide a trigger signal for the gate circuitry.
2. The gate is turned off and a marker reading is taken.
3. The gate is then turned on and the synthesizer/level generator amplitude is adjusted to match the marker reading taken while the gate was off.

The difference between the two synthesizer/level generator readings is the measured insertion loss of the gate card.

Equipment Required

Synthesizer/level generator

Cable, BNC, 122 cm (48 in) (*2 required*)

Additional Equipment for 75 Ω input

Cable, BNC, 75 Ω , 120 cm (48 in)

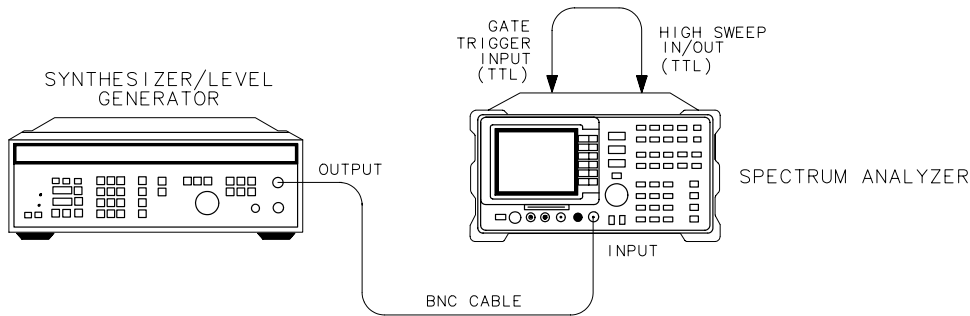
Procedure

To determine the card insertion loss

1. Connect the equipment as shown in [Figure 2-105](#).

75 Ω input only: Attach the 75 Ω cable to the spectrum analyzer RF input connector rather than the 50 Ω cable.

Figure 2-105 Gate Delay and Gate Length Test Setup



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2. Set the synthesizer/level generator controls as follows:

FREQUENCY 50 MHz

AMPTD INCR.....0.01 dB

AMPLITUDE -5 dBm

3. On the spectrum analyzer, press **PRESET**. Wait for preset to complete.

4. Press the following spectrum analyzer keys:

FREQUENCY, 50, MHz

SPAN, 1, MHz

BW, 100, kHz

SWEEP, 100, ms, GATE ON OFF (underline OFF), GATE CONTROL, GATE DELAY, 20, ms, GATE LENGTH, 65, ms

PEAK SEARCH, MARKER Δ

SWEEP, GATE ON OFF (underline ON)

PEAK SEARCH

5. Use the step INCR $\uparrow$ or $\downarrow$ key on the synthesizer/level generator to adjust the output amplitude for a spectrum analyzer MKR Δ reading of 0.0 ± 0.05 dB.

74. Gate Card Insertion Loss, 8590 E-Series Option 105 or 107 and 8591C Option 107

6. Record the amplitude displayed on the synthesizer/level generator as the Synthesizer/Level Generator Reading.

Synthesizer/Level Generator Reading_____

7. Subtract the synthesizer/level generator from the previous step from -5.0 dBm. Record the result as the Gate Card Insertion Loss (GCIL) in TR Entry 1 of the performance verification test record. The insertion loss should be between -0.5 dB and $+0.5$ dB for the 65 ms gate length.

Gate Card Insertion Loss = -5.0 dB – Synthesizer Reading

For example, if the synthesizer/level generator reading is -4.96 dBm, then the result is -0.04 dBm as shown below:

Gate Card Insertion Loss = -5.0 dB – $(-4.96$ dBm) = -0.04 dBm

8. Press the following spectrum analyzer keys:

SWEEP, 100, ms, GATE ON OFF (underline OFF)

GATE CONTROL, GATE DELAY, 20, ms

GATE LENGTH, 1.8, μ s

PEAK SEARCH, MARKER Δ

SWEEP, GATE ON OFF (underline ON)

PEAK SEARCH

9. Use the step INCR $\uparrow$ or $\downarrow$ key on the synthesizer/level generator to adjust the output amplitude for a spectrum analyzer MKR Δ reading of 0.0 ± 0.05 dB.

10. Record the amplitude displayed on the synthesizer/level generator as the Synthesizer/Level Generator Reading.

Synthesizer/Level Generator Reading_____

11. Subtract the synthesizer/level generator from the previous step from -5.0 dBm. Record the result as the Gate Card Insertion loss in TR Entry 2 of the performance verification test record. The insertion loss should be between -0.8 dB and $+0.8$ dB for the 1.8μ s gate length.

75. TV Receiver, Video Tester, 8590 E-Series Option 107 and 8591C Option 107

Equipment Required

Base band signal source
Video modulator
Cable, 75 Ω BNC, (4 required)
10 dB coupler
85721A cable TV measurements personality

Differential Gain and Differential Phase Procedure

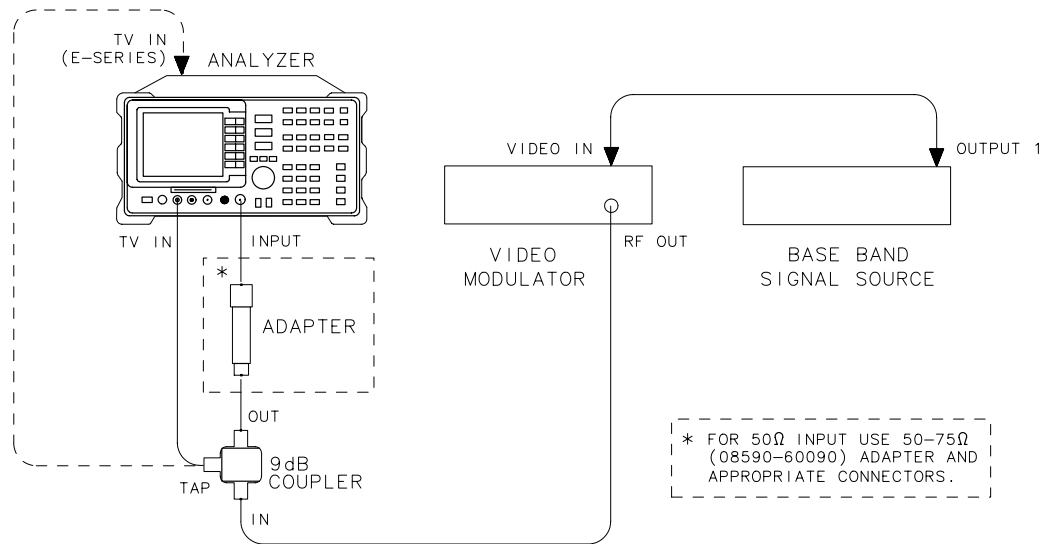
If the analyzer has not been self calibrated today, perform the self calibration procedure in Chapter 1.

1. Load the 85721A cable TV measurements personality (if necessary).
 - a. Insert the card with the card's arrow matching the raised arrow on the bezel around the card-insertion slot.
 - b. Press **CONFIG, MORE 1 of 3, Dispose User Mem, Erase DLP MEM, Erase DLP MEM**. When completed, press **PRESET**.
 - c. Load the file "LOADME_1."
 - d. Press **RECALL**. Press the **INTERNAL CARD** softkey so that **CARD** is underlined.
 - e. Press the following keys to load the 85721A: **Catalog Card, CATALOG ALL**.
 - f. "LOADME_1" is highlighted in inverse video.
 - g. Press **LOAD FILE**.
2. Next, execute the function "CODE LOADER" by pressing **MODE, CODE LOADER**.

The new program requires 8 to 10 minutes to load.

3. Connect equipment as shown in Figure 2-106.

Figure 2-106 Differential Gain/Phase Setup



ws11q

4. Set up the cable TV analyzer by pressing:

MODE

CABLE TV ANALYZER

CHANNEL MEAS

5. Perform [step 6](#) through [step 8](#) for channels 2, 7, 14, 23, 38, and 77.

6. Select the channel on the video modulator: 2, 7, 14, 23, 38, or 77.

7. Select the same channel on the cable TV analyzer by pressing:

CHANNEL SELECT

2, 7, 14, 23, 38, or 77, **ENTER**

Main 1 of 3

Main 2 of 3

DIF GAIN DIF PHAZ

28

ENTER, This selects the first vertical line.

8. Press **Select Test Sig**, then select the appropriate test signal, by pressing one of the following softkeys:

NTC 7 COMPOSIT, to select the NTC 7 composite test signal.

FCC COMPOSIT, to select the FCC composite test signal.

CCIR 17, to select the PAL test signal.

See [Figure 2-107](#) and [Figure 2-108](#).

NOTE

The ability to select from these three test signals will depend on the revision of your software.

Figure 2-107 NTC7 Composite

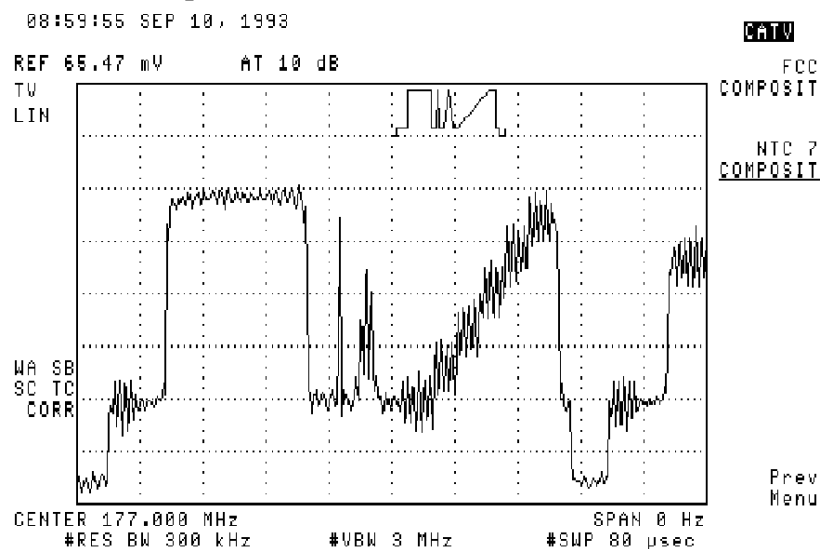
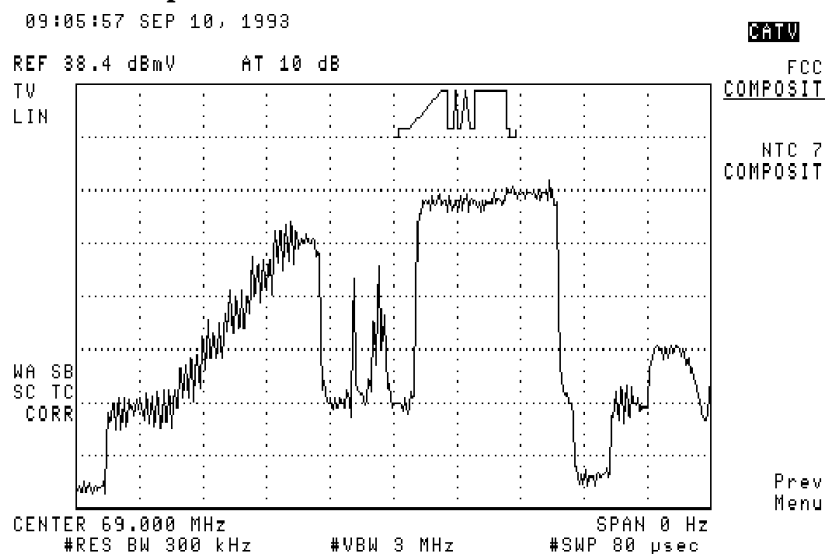
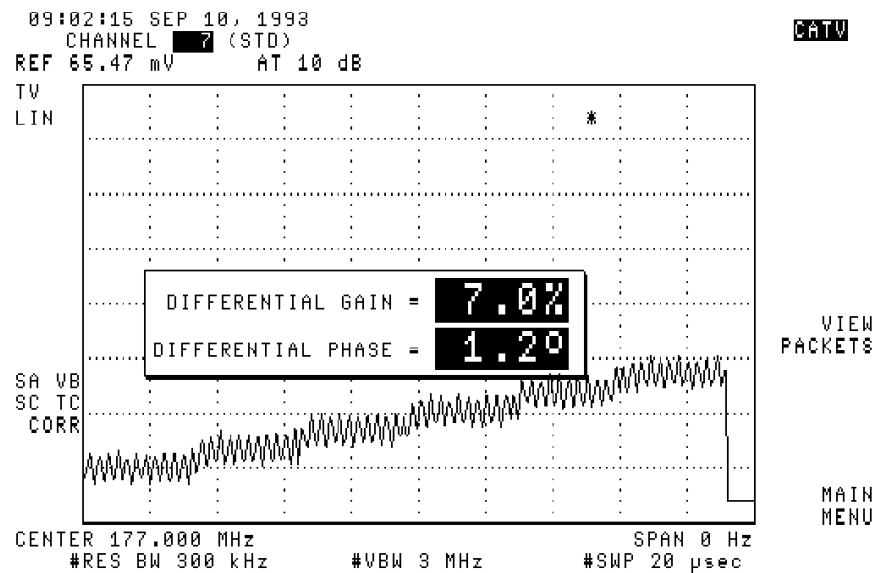


Figure 2-108 FCC Composite



9. Press **Prev Menu**, then **CONTINUE**.
10. Record the DIFFERENTIAL GAIN value as TR Entry 1 through 6 of the performance test record.
11. Record the DIFFERENTIAL PHASE value as TR Entry 7 through 12 of the performance test record. See [Figure 2-109](#).

Figure 2-109 Differential Gain/Phase



12. Press: **MAIN MENU** then **Main 3 of 3** to select another channel.

Chroma-Luminance Delay Procedure

If the cable TV analyzer has not been self calibrated today, perform the self calibration procedure in Chapter 1.

1. Connect equipment as shown in [Figure 2-106](#).
2. Set up the cable TV analyzer by pressing:

MODE

CABLE TV ANALYZER

CHANNEL MEAS

3. Perform [step 4](#) through [step 6](#) for channels 2, 7, 14, 23, 38, and 77.
4. Select the channel on the video modulator: 2, 7, 14, 23, 38, or 77.

5. Select the same channel on the cable TV analyzer by pressing:

CHANNEL SELECT

2, 7, 14, 23, 38, or 77, **ENTER**

Main 1 of 3

Main 2 of 3

C/L DELAY

28

ENTER, This selects the first vertical line.

6. Press **Select Test Sig**, then select the appropriate test signal, by pressing one of the following softkeys:

NTC 7 COMPOSIT, to select the NTC 7 composite test signal.

FCC COMPOSIT, to select the FCC composite test signal.

CCIR 330, to select the PAL test signal.

See [Figure 2-107](#) and [Figure 2-108](#).

NOTE

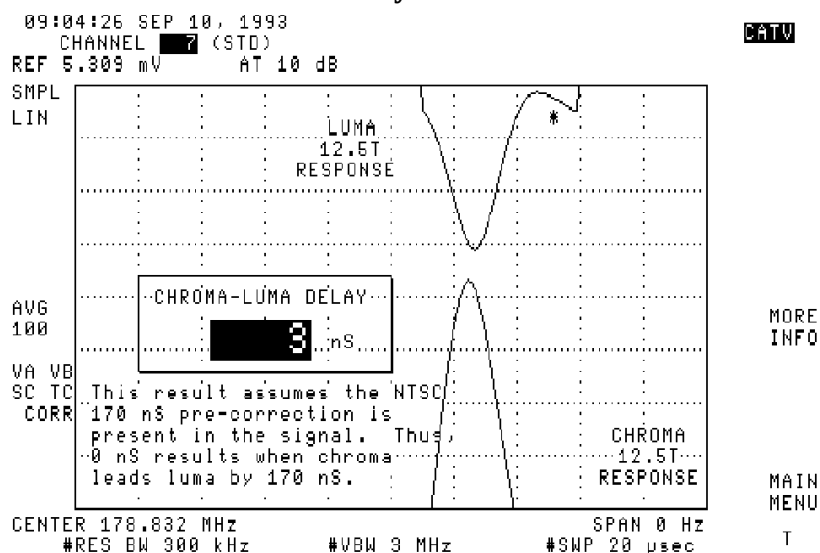
The ability to select from these three test signals will depend on the revision of your software.

7. Press **Prev Menu**, then **CONTINUE**.

8. Record the CHROMA-LUMA DELAY value as TR Entry 13 through 18 of the performance test record.

See [Figure 2-110](#).

Figure 2-110 Chroma-Luminance Delay



75. TV Receiver, Video Tester, 8590 E-Series Option 107 and 8591C Option 107

9. Press **MAIN MENU** then **Main 3 of 3** to select another channel.

Performance verification test “TV Receiver, Video Tester” is now complete.

2a**Performance Verification Tests: If 3335A Source Not Available**

This chapter provides alternative performance verification tests for the spectrum analyzer which do not require the use of the 3335A Synthesizer Level Generator. Substitute the tests in this chapter for those of the same number found in [Chapter 2 , “Performance Verification Tests,”](#) when the 3335A Synthesizer Level Generator is not available.

8a. Frequency Span Readout Accuracy, 8591E and 8591C

For testing each frequency span, two synthesized sources are used to provide two precisely-spaced signals. The spectrum analyzer marker functions are used to measure this frequency difference and the marker reading is compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

- Synthesized sweeper
- Synthesized signal generator
- Signal generator
- Power splitter
- Adapter, Type N (f) to APC 3.5 (f)
- Adapter, Type N (m) to Type N (m)
- Cable, BNC, 122 cm (48 in)
- Cable, Type N, 152 cm (60 in) (*2 required*)

Additional Equipment for 75 Ω Input

- Pad, minimum loss
- Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

This performance test consists of two parts:

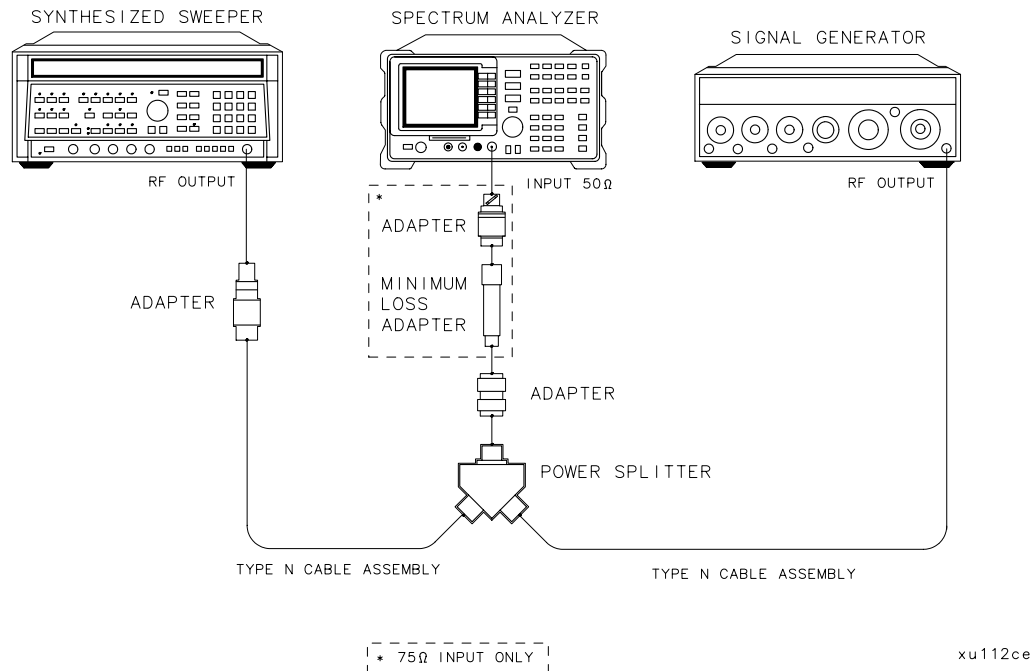
- Part 1: 1800 MHz Frequency Span Readout Accuracy
- Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform “Part 1: 1800 MHz Frequency Span Readout Accuracy” before “Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy.”

Part 1: 1800 MHz Frequency Span Readout Accuracy

1. Connect the equipment as shown in Figure 2a-1. Note that the power splitter is used as a combiner.

Figure 2a-1 1800 MHz Frequency Span Readout Accuracy Test Setup



CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish.
3. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:
 - CW 1800 MHz
 - POWER LEVEL -5 dBm
4. On the synthesized signal generator, set the controls as follows:
 - FREQUENCY (LOCKED MODE) 200 MHz
 - CW OUTPUT 0 dBm
5. Adjust the spectrum analyzer center frequency, if necessary, to place the lower frequency on the second vertical graticule line (one division from the left-most graticule line).

8a. Frequency Span Readout Accuracy, 8591E and 8591C

- On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

- Press **MARKER Δ** , then continue pressing **NEXT PK RIGHT** until the marker Δ is on the right-most signal (1700 MHz).
- Record the MKR Δ frequency reading as TR Entry 1 in the appropriate performance verification test record in [Chapter 3](#).

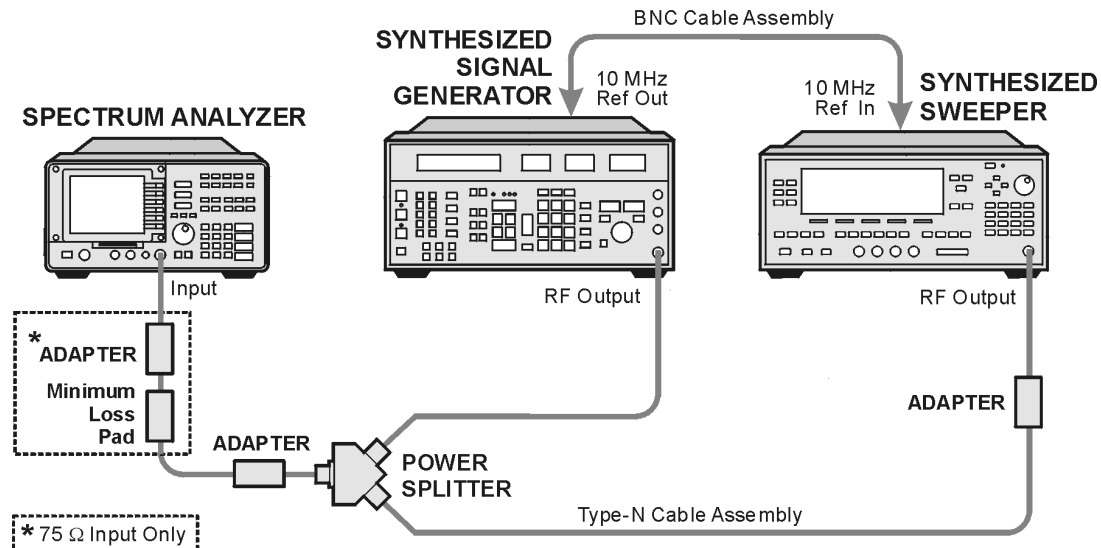
The MKR reading should be within the 1446 MHz and 1554 MHz.

Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform “Part 1: 1800 MHz Frequency Span Readout Accuracy” before performing this procedure. Additional steps are included for spectrum analyzers equipped with Option 130 to measure frequency span accuracies at 1 kHz and 300 Hz.

- Connect the equipment as shown in [Figure 2a-2](#). Note that the power splitter is used as a combiner.

Figure 2a-2 10.1 MHz to 10 kHz Frequency Span Readout Accuracy Test Setup



ws12e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 70, MHz

SPAN, 10.1, MHz

3. Press **INSTRUMENT PRESET** on the synthesized sweeper, then set the controls as follows:

CW 74 MHz

POWER LEVEL -5 dBm

4. Set the synthesized signal generator controls as follows:

FREQUENCY 66 MHz

AMPLITUDE 0 dBm

5. Adjust the spectrum analyzer center frequency to center the two signals on the display.

6. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

7. Record the MKR- Δ frequency reading in [Table 2a-1](#). The MKR- Δ frequency reading corresponds to TR Entry 2 in [Table 2a-1](#) and should be within the limits shown.

8. Press **MKR, More 1 of 2**, then **MARKER ALL OFF** on the spectrum analyzer.

9. Adjust the spectrum analyzer span setting to the next frequency listed in [Table 2a-1](#). Likewise, adjust the synthesizer sweeper CW and the synthesized signal generator to the corresponding frequencies in [Table 2a-1](#).

10. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

11. Record the MKR- Δ frequency reading in [Table 2a-1](#). The MKR- Δ frequency reading corresponds to the next TR Entry in [Table 2a-1](#) and should be within the limits shown.

12. Repeat [step 9](#) through [step 11](#) for spectrum analyzer span settings 100 kHz, 99 kHz, and 10 kHz.

13. Record TR Entry 2 through TR Entry 6 in the appropriate performance verification test record in [Chapter 3](#).

If you are testing a spectrum analyzer equipped with Option 130 continue with [step 14](#).

Performance test “Frequency Span Readout Accuracy” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

14. Set the spectrum analyzer to measure the frequency span accuracy at 1 kHz by pressing the following keys:

MKR, More 1 of 2, MARKER ALL OFF

BW, 1, kHz

15. Adjust the spectrum analyzer span setting to the next frequency listed in [Table 2a-1](#). Likewise, adjust the synthesizer sweeper CW and the synthesized signal generator to the corresponding settings in [Table 2a-1](#).

16. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

17. Record the MKR- Δ frequency reading in the performance test record as in [Table 2a-1](#). The MKR- Δ frequency reading corresponds to the next TR Entry in [Table 2a-1](#) and should be within the limits shown.

18. Repeat [step 15](#) through [step 17](#) when the spectrum analyzer span is set at 300 Hz.

19. Record TR Entry 7 and TR Entry 8 in the appropriate performance verification test record in [Chapter 3](#).

Performance test “Frequency Span Readout Accuracy” is now complete for spectrum analyzers equipped with Option 130.

Table 2a-1 Frequency Span Readout Accuracy

Spectrum Analyzer Span Setting	Synthesized Signal Generator Frequency	Synthesized Sweeper Frequency	MKR-Δ Reading		
			Min.	TR Entry MKR Δ Reading	Max.
10.10 MHz	66.000 MHz	74.000 MHz	7.70 MHz	(2)_____	8.30 MHz
10.00 MHz	66.000 MHz	74.000 MHz	7.80 MHz	(3)_____	8.20 MHz
100.00 kHz	69.960 MHz	70.040 MHz	78.00 kHz	(4)_____	82.00 kHz
99.00 kHz	69.960 MHz	70.040 MHz	78.00 kHz	(5)_____	82.06 kHz
10.00 kHz	69.996 MHz	70.004 MHz	7.80 kHz	(6)_____	8.20 kHz
Option 130 Only:					
1.00 kHz	69.9996 MHz	70.0004 MHz	0.78 kHz	(7)_____	0.82 kHz
300.00 Hz ^a	69.99988 MHz	70.00012 MHz	225.00 Hz	(8)_____	255.00 Hz

a. This is not a spectrum analyzer specification. However, the 300 Hz span is tested to $\pm 5\%$ to keep the narrow bandwidth accuracy and residual FM measurement uncertainty at a minimum. If the 300 Hz span accuracy is $>5\%$ the additional measurement uncertainty may need to be included for the bandwidth accuracy and residual FM measurement uncertainties.

9a. Frequency Span Readout Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

For testing each frequency span, two synthesized sources are used to provide two precisely-spaced signals. The spectrum analyzer marker functions are used to measure this frequency difference and the marker reading is compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

- Synthesized sweeper
- Synthesized signal generator
- Signal generator
- Power splitter
- Adapter, Type N (m) to Type N (m)
- Adapter, Type N (f) to APC 3.5 (f) (*2 required*)
- Cable, BNC, 122 cm (48 in)
- Cable, Type N, 183 cm (72 in)
- Cable, Type N, 152 cm (60 in)

Additional Equipment for Option 026

- Adapter, Type N (f) to APC 3.5 (f)

Procedure

This performance verification test consists of two parts:

- Part 1: 1800 MHz Frequency Span Readout Accuracy

- Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform “Part 1: 1800 MHz Frequency Span Readout Accuracy” before “Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy.”

Part 1: 1800 MHz Frequency Span Readout Accuracy

1. Connect the equipment as shown in [Figure 2a-3](#) (8593E, 8595E, 8596E) or as shown in [Figure 2a-4](#) (8594E, 8594Q). Note that the power splitter is used as a combiner.

Figure 2a-3 1800 MHz Frequency Span Readout Accuracy Test Setup

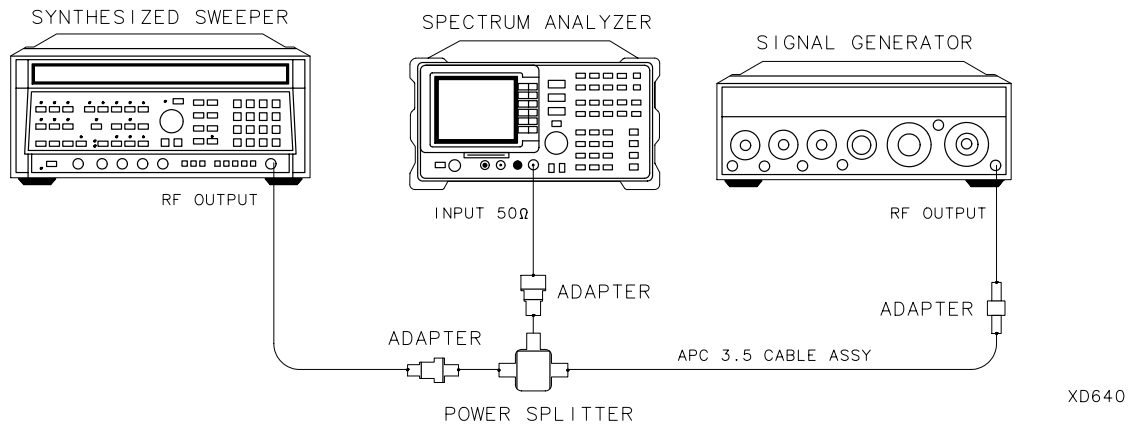
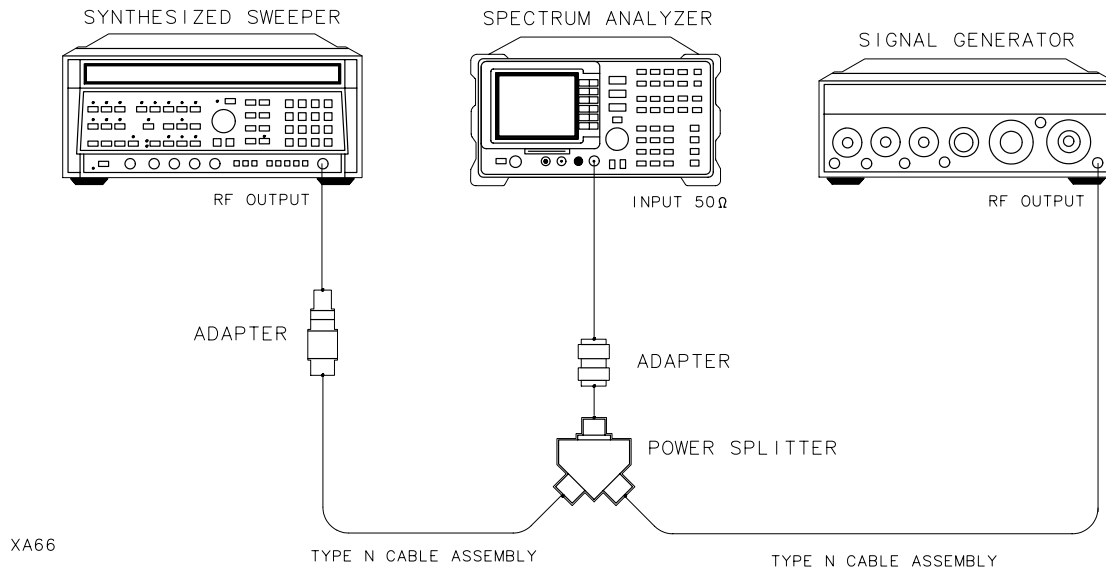


Figure 2a-4 For 8594E and 8594Q Only - Frequency Span Readout Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 900, MHz

SPAN, 1800, MHz

9a. Frequency Span Readout Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

3. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:

CW 1800 MHz

POWER LEVEL -5 dBm

4. On the signal generator, set the controls as follows:

FREQUENCY (LOCKED MODE) 200 MHz

CW OUTPUT 0 dBm

5. Adjust the spectrum analyzer center frequency, if necessary, to place the lower frequency on the second vertical graticule line (one division from the left-most graticule line).

6. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ, NEXT PEAK

The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

7. Press **MARKER Δ**, then continue pressing **NEXT PK RIGHT** until the marker Δ is on the right-most signal (1700 MHz).

8. Record the MKR Δ frequency reading as TR Entry 1 of the performance verification test record in [Chapter 3](#).

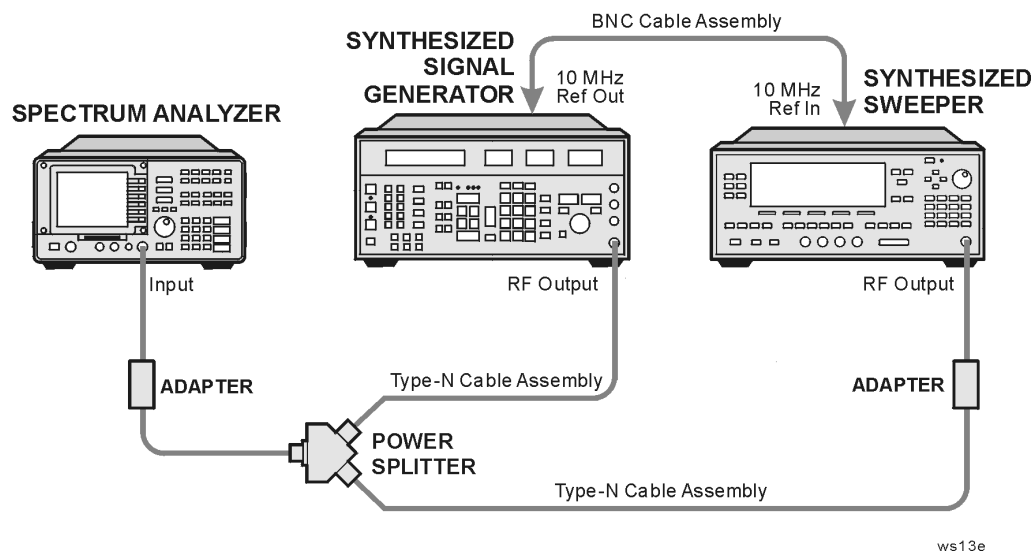
The MKR reading should be within the 1446 MHz and 1554 MHz.

Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform “Part 1: 1800 MHz Frequency Span Readout Accuracy” before performing this procedure. Additional steps are included for spectrum analyzers equipped with Option 130 to measure frequency span accuracies at 1 kHz and 300 Hz.

1. Connect the equipment as shown in Figure 2a-5. Note that the power splitter is used as a combiner.

Figure 2a-5 10.1 MHz to 10 kHz Frequency Span Readout Accuracy Test Setup



2. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:
FREQUENCY, 70, MHz
SPAN, 10.1, MHz
3. Press **INSTRUMENT PRESET** on the synthesized sweeper, then set the controls as follows:
 CW 74 MHz
 POWER LEVEL -5 dBm
4. Set the synthesized signal generator controls as follows:
 FREQUENCY 66 MHz
 AMPLITUDE 0 dBm

9a. Frequency Span Readout Accuracy, 8593E, 8594E, 8595E, 8596E, and 8594Q

5. Adjust the spectrum analyzer center frequency to center the two signals on the display.
6. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

7. Record the MKR- Δ frequency reading in [Table 2a-2](#). The MKR- Δ frequency reading corresponds to TR Entry 2 in [Table 2a-2](#) and should be within the limits shown.
8. Press **MKR, MARKER 1 ON OFF (OFF)** on the spectrum analyzer.
9. Adjust the spectrum analyzer span setting to the next frequency listed in [Table 2a-2](#). Likewise, adjust the synthesizer sweeper CW and the synthesized signal generator to the corresponding frequencies in [Table 2a-2](#).
10. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:

PEAK SEARCH, MARKER Δ , NEXT PEAK

11. Record the MKR- Δ frequency reading in [Table 2a-2](#). The MKR- Δ frequency reading corresponds to TR Entry 2 in [Table 2a-2](#) and should be within the limits shown.
12. Repeat [step 8](#) through [step 11](#) for spectrum analyzer span settings 100 kHz, 99 kHz, and 10 kHz.
13. Record TR Entry 2 through TR Entry 6 in the appropriate performance verification test record in [Chapter 3](#).

If you are testing a spectrum analyzer equipped with Option 130 continue with [step 14](#).

Performance verification test “Frequency Span Readout Accuracy” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

14. Set the spectrum analyzer to measure the frequency span accuracy at 1 kHz by pressing the following keys:

MKR, More 1 of 2, MARKER ALL OFF

BW, 1, kHz

15. Adjust the spectrum analyzer span setting to the next frequency listed in [Table 2a-2](#). Likewise, adjust the synthesizer sweeper CW and the synthesized signal generator to the corresponding settings in [Table 2a-2](#).
16. On the spectrum analyzer, press **SGL SWP**. Wait for the completion of a new sweep, then press the following keys:
- PEAK SEARCH, MARKER Δ , NEXT PEAK**
17. Record the MKR- Δ frequency reading in the performance test record and in [Table 2a-2](#). The MKR- Δ frequency reading corresponds to the next TR Entry in [Table 2a-2](#) and should be within the limits shown.
18. Repeat [step 14](#) through [step 17](#) when the spectrum analyzer span is set at 300 Hz.
19. Record TR Entry 7 and TR Entry 8 in the appropriate performance verification test record in [Chapter 3](#).
- Performance verification test "Frequency Span Readout Accuracy" is now complete for spectrum analyzers equipped with Option 130.

Table 2a-2 Frequency Span Readout Accuracy

Spectrum Analyzer Span Setting	Synthesized Signal Generator Frequency	Synthesized Sweeper Frequency	MKR- Δ Reading		
			Min.	TR Entry MKR Δ Reading	Max.
10.10 MHz	66.000 MHz	74.000 MHz	7.70 MHz	(2)_____	8.30 MHz
10.00 MHz	66.000 MHz	74.000 MHz	7.80 MHz	(3)_____	8.20 MHz
100.00 kHz	69.960 MHz	70.040 MHz	78.00 kHz	(4)_____	82.00 kHz
99.00 kHz	69.960 MHz	70.040 MHz	78.00 kHz	(5)_____	82.06 kHz
10.00 kHz	69.996 MHz	70.004 MHz	7.80 kHz	(6)_____	8.20 kHz
<i>Option 130 Only:</i>					
1.00 kHz	69.9996 MHz	70.0004 MHz	0.78 kHz	(7)_____	0.82 kHz
300.00 Hz ^a	69.99988 MHz	70.00012 MHz	225.00 Hz	(8)_____	255.00 Hz

a. This is not a spectrum analyzer specification. However, the 300 Hz span is tested to $\pm 5\%$ to keep the narrow bandwidth accuracy and residual FM measurement uncertainty at a minimum. If the 300 Hz span accuracy is $>5\%$ the additional measurement uncertainty may need to be included for the bandwidth accuracy and residual FM measurement uncertainties.

13a. Scale Fidelity

A 50 MHz CW signal is applied to the input of the analyzer through two calibrated step attenuators. The attenuators are the amplitude reference standard. The source is adjusted for a response at the reference level. The attenuators are then set to achieve a nominal amplitude below the reference level. The analyzer's amplitude marker is compared to the actual total attenuation to determine the scale fidelity error.

The test is performed in both log and linear amplitude scales.

The related adjustment for this performance test is "Log and Linear Amplifier."

Equipment Required

Synthesized signal generator

Attenuator, 1 dB step

Attenuator, 10 dB step

Attenuator/switch driver (if programmable step attenuators are used)

Cable, Type N, 152cm (60 in)

Cable, BNC, 122 cm (48 in) (*2 required*)

Attenuator interconnect kit

Adapter, Type N (m) to BNC (f) (*2 required*)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Adapter, BNC (f) to SMA (m)

Additional Equipment for 75 Ω Input

Pad, minimum loss

Adapter, Type N (f) to BNC (m), 75 Ω

13a. Scale Fidelity**Procedure****Calculate Actual Attenuation Values**

20. From the calibration data supplied with the 1 dB step attenuator, enter the actual attenuation for the corresponding nominal attenuation settings in [Table 2a-3](#) and [Table 2a-4](#). If the calibration data does not indicate an actual attenuation value for the 0 dB setting, enter 0 dB. If using a programmable attenuator, enter the data for the section three 4 dB step.
21. From the calibration data supplied with the 10 dB step attenuator, enter the actual attenuation for the corresponding nominal attenuation settings in [Table 2a-3](#) and [Table 2a-4](#). If the calibration data does not indicate an actual attenuation value for the 0 dB setting, enter 0 dB. If using a programmable attenuator, enter the data for the section three 40 dB step.
22. Calculate the total actual attenuation for each dB from REF LVL setting (including 0 dB) in [Table 2a-3](#) and [Table 2a-4](#) by adding the 1 dB step attenuator actual attenuation to the 10 dB step attenuator actual attenuation.

For example, if the 1 dB step attenuator actual attenuation for the 6 dB from REF LVL setting is 5.998 dB and the 10 dB step attenuator actual attenuation for the 30 dB from REF LVL setting is 30.012 dB, the total attenuation for the -36 dB from REF LVL setting would be:

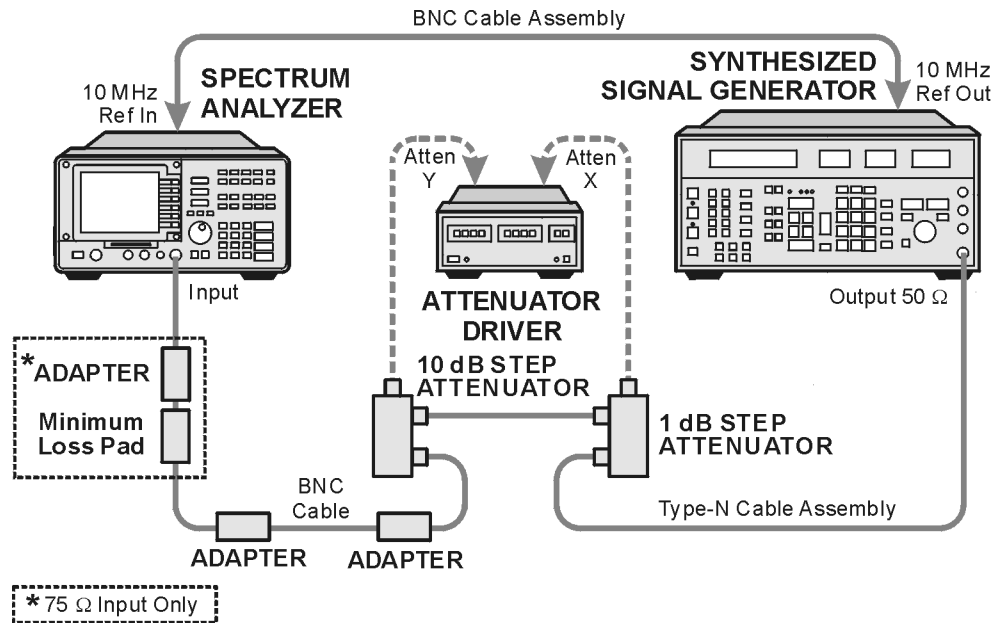
$$\text{Total Actual Attenuation} = 5.998 \text{ dB} + 30.012 \text{ dB} = 36.01 \text{ dB}$$

Log Scale

Setup for Log Scale Measurement

23. Connect the equipment as indicated in Figure 2a-6. The synthesized signal generator provides the frequency reference for the analyzer.

Figure 2a-6 Scale Fidelity Test Setup



ws14e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

24. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 50, kHz

13a. Scale Fidelity

25. Wait for the auto zoom routine to finish, then set the resolution bandwidth and the video bandwidth by pressing the following keys:

BW

RES BW AUTO MAN, 3, kHz

VID BW AUTO MAN, 30, Hz

26. Preset the synthesized signal generator and set the controls as follows:

FREQUENCY, 50, MHz

AMPLITUDE, -3, dBm (50 Ω Input only)

AMPLITUDE, +4, dBm (75 Ω Input only)

AM OFF

FM OFF

27. Set the step attenuators to 0 dB attenuation. Refer to [Table 2-1](#) for information on manually controlling a programmable step attenuator with an 11713A attenuator/switch driver.
28. Adjust the synthesized signal generator's amplitude until the analyzer's marker amplitude reads 0 dBm 0.1 dBm.
- 75 Ω input only:* Adjust the synthesized signal generator's amplitude until the analyzer's marker reads 0 dBm.
29. On the analyzer, press **Marker, Marker Δ** .
30. Do not adjust the synthesized signal generator's amplitude after the reference is established.

Measure Cumulative Log Fidelity

31. Set the 1 dB and 10 dB step attenuators as indicated in [Table 2a-3](#) for the –4 dB from REF LVL setting.
32. Press **PEAK SEARCH** on the spectrum analyzer and record the Mkr D reading in [Table 2a-3](#).
33. Calculate the Cumulative Log Fidelity Error (CLFE) for each dB from REF LVL setting in [Table 2a-3](#), beginning with the –4 dB from REF LVL setting, using the current Total Actual Attenuation (TAA) and the previous Total Actual Attenuation (TAA) as follows:
$$\text{CLFE} = \text{TAA (current)} + \text{Mkr } \Delta \text{ Reading} - \text{TAA (previous)}$$
Record each Cumulative Log Fidelity Error in [Table 2a-3](#).
34. Record TR Entry 1 through TR Entry 17 in the appropriate performance verification test record in [Chapter 3](#).

Calculate Incremental Log Fidelity

35. Calculate the Incremental Log Fidelity Error (ILFE) for each dB from REF LVL setting in [Table 2a-3](#) using the current Cumulative Log Fidelity Error (CLFE) and the previous Cumulative Log Fidelity Error (CLFE) as follows:
$$\text{ILFE} = \text{CLFE (current)} - \text{CLFE (previous)}$$
For example, if the CLFE for the -16 dB from REF LVL setting is –0.07 dB and the CLFE for the –20 dB from REF LVL setting is +0.02 dB, the ILFE for the –20 dB from REF LVL setting is:
$$\text{ILFE (–20 dB)} = (0.02 \text{ dB}) - (-0.07 \text{ dB}) = 0.09 \text{ dB}$$
Record each Incremental Log Fidelity Error in [Table 2a-3](#).
36. Record TR Entry 18 through TR Entry 32 in the appropriate performance verification test record in [Chapter 3](#).

If you are testing a spectrum analyzer equipped with Option 130, continue with [step 37](#).

The “Log Scale” portion of the performance verification test “Scale Fidelity” is now complete for all other spectrum analyzers. Proceed to step 1 of “Linear Scale.”

13a. Scale Fidelity**Additional Steps for Option 130**

37. Press the following spectrum analyzer keys:

BW, RES BW AUTO MAN, 300, Hz

SPAN, 10, kHz

38. Repeat [step 24](#) through [step 30](#) for the narrow bandwidths. Record the results in [Table 2a-4](#).

39. Repeat [step 31](#) through [step 33](#) for the narrow bandwidths. Record the results in [Table 2a-4](#).

40. Record TR Entry 33 through TR Entry 49 in the appropriate performance verification test record in [Chapter 3](#).

41. Repeat [step 35](#) for the narrow bandwidths. Record the results in [Table 2a-4](#).

42. Record TR Entry 50 through TR Entry 64 in the appropriate performance verification test record in [Chapter 3](#).

The “Log Scale” portion of the performance verification test “Scale Fidelity” is now complete for spectrum analyzers equipped with Option 130. Proceed with step 1 of “Linear Scale”.

Linear Scale

Setup for Linear Scale Measurement

1. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

AMPLITUDE, SCALE LOG LIN (LIN)

75 Ω input only: More 1 of 2, INPUT Z 50 Ω 75 Ω (50 Ω)

FREQUENCY, 50, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 50, kHz

Wait for the auto zoom routine to finish, then set the resolution bandwidth and the video bandwidth by pressing the following keys:

BW

RES BW AUTO MAN, 3, kHz

VID BW AUTO MAN, 30, Hz

2. Preset the synthesized signal generator and set the controls as follows:

FREQUENCY, 50, MHz

AMPLITUDE, -3, dBm (50 W Input only)

AMPLITUDE, +4, dBm (75 W Input only)

AM OFF

FM OFF

3. Set the step attenuators to 0 dB attenuation. Refer to [Table 2-1](#) for information on manually controlling a programmable step attenuator with an 11713A attenuator/switch driver.
4. Press **PEAK SEARCH** on the analyzer.
5. Adjust the synthesized signal generator's amplitude until the analyzer's marker amplitude reads 223.6 mV $\pm$ 4 mV.
6. Do not adjust the synthesized signal generator's amplitude after the 223.6 mV reference is established.

13a. Scale Fidelity**Calculate Ideal Marker Amplitude**

Consider the Total Actual Attenuation at the 0 dB from REF LVL setting to be AT_{ref}, and the Total Actual Attenuation at any other dB from Ref Level setting to be AT_{meas}.

7. Calculate the Ideal Mkr Reading (IMR) for each dB from REF LVL in [Table 2a-5](#) as follows:

$$\text{IMR} = 1000 \times \text{SQRT}[0.05 \times 10((-AT_{\text{meas}} + AT_{\text{ref}})/10)] \text{ mV}$$

For example, if the Total Actual Attenuation at the 0 dB from REF LVL is 0.012 dB and the Total Actual Attenuation at the -8 dB from REF LVL is 7.982, the Ideal Mkr Reading (IMR) for the -8 dB from REF LVL would be:

$$\begin{aligned} \text{IMR} &= 1000 \times \text{SQRT}[0.05 \times 10((-AT_{\text{meas}} + AT_{\text{ref}})/10)] \\ &= 1000 \times \text{SQRT}[0.05 \times 10((-7.982 + 0.012)/10)] \\ &= 89.3 \text{ mV} \end{aligned}$$

Record each Ideal Mkr Reading in [Table 2a-5](#).

Measure Linear Fidelity

1. Set the 1 dB and 10 dB step attenuators as indicated in [Table 2a-5](#) for the -4 dB from REF LVL setting.
2. Press **Peak Search** on the analyzer and record the Mkr amplitude reading in [Table 2a-5](#).
3. Calculate the Linear Fidelity Error (LFE) as a percentage of Reference Level (REF LVL) as follows:

$$\text{LFE} = 100 \times (\text{Actual Mkr Reading} - \text{Ideal Mkr Reading}) / 223.6\%$$

For example, if the Ideal Mkr Reading is 89.3 mV and the Actual Mkr Reading is 85 mV, the Linear Fidelity Error would be:

$$\text{LFE} = 100 \times (85 - 89.3) / 223.6 = 1.92\% \text{ of REF LVL}$$

4. Repeat [step 1](#) through [step 3](#) above for the remaining dB from REF LVL settings in [Table 2a-5](#).

5. Record TR Entry 65 through TR Entry 68 in the appropriate performance verification test record in [Chapter 3](#).
6. Press **Amplitude, More, Input Z, 75, Preset**, on the spectrum analyzer.

If you are testing a spectrum analyzer equipped with Option 130, continue with [step 1](#).

The “Linear Scale” portion of the performance verification test “Scale Fidelity” is now complete for all other spectrum analyzers. Proceed to step 1 of “Log to Linear Switching.”

Additional Steps for Option 130

1. Press the following spectrum analyzer keys:

BW, RES BW AUTO MAN, 300, Hz

SPAN, 10, kHz

2. Repeat [step 1](#) through [step 3](#) for the narrow bandwidths. Record the results as indicated in [Table 2a-5](#).
3. Record TR Entry 69 through TR Entry 72 in the appropriate performance verification test record in [Chapter 3](#).

The “Linear Scale” portion of the performance verification test “Scale Fidelity” is now complete for spectrum analyzers equipped with Option 130. Proceed to step 1 of “Log to Linear Switching.”

13a. Scale Fidelity

Log to Linear Switching

1. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

2. Set the synthesizer controls as follows:

FREQUENCY 50 MHz

AMPLITUDE+6 dBm

3. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

BW, 300, kHz

4. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR →, MARKER →REF LVL

PEAK SEARCH

5. Record the peak marker reading in Log mode below.

Log Mode Amplitude Reading: _____dBm

6. Press **AMPLITUDE, SCALE LOG LIN (LIN)** to change the scale to linear, then press **More 1 of 2, Amptd Units**, and **dBm** to set the amplitude units to dBm.

7. Press **PEAK SEARCH**, then record the peak marker amplitude reading in linear mode.

Linear Mode Amplitude Reading: _____dBm

8. Subtract the Linear Mode Amplitude Reading from the Log Mode Amplitude Reading, then record this value as the Log/Linear Error.

Log/Linear Error: _____dBm

9. If the Log/Linear Error is less than 0 dB, record this value as TR Entry 73 in the performance verification test record. The absolute value of the reading should be less than 0.25 dB. If the Log/Linear Error is greater than 0 dB, continue with the next step.

10. On the spectrum analyzer, press the following keys:

MKR →, MARKER →REF LVL

PEAK SEARCH

11. Record the peak marker amplitude reading in linear mode.

Linear Mode Amplitude Reading: _____ dBm

12. On the spectrum analyzer, press the following keys:

AMPLITUDE, SCALE LOG LIN (LOG)

PEAK SEARCH

13. Record the peak marker reading in Log mode below.

Log Mode Amplitude Reading: _____ dBm

14. Subtract the Log Mode Amplitude Reading from the Linear Mode Amplitude Reading, then record this value as the Linear/Log Error.

Linear/Log Error: _____ dBm

15. Record the Linear/Log Error as TR Entry 73 in the appropriate performance verification test record in [Chapter 3](#). The absolute value of the reading should be less than 0.25 dB.

If you are testing a spectrum analyzer equipped with Option 130, continue with [step 16](#).

The performance verification test “Scale Fidelity” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

16. Press the following spectrum analyzer keys:

AMPLITUDE, SCALE LOG LIN (LOG)

BW, RES BW AUTO MAN, 300, Hz

SPAN, 10, kHz

17. Repeat [step 5](#) through [step 14](#) for the narrow bandwidths.

18. Record the Linear/Log Error as TR Entry 74 in the appropriate performance verification test record in [Chapter 3](#). The absolute value of the reading should be less than 0.25 dB.

Performance verification test “Scale Fidelity” is now complete for spectrum analyzers equipped with Option 130.

13a. Scale Fidelity

Table 2a-3 Scale Fidelity, Log Mode

dB from REF LVL	1 dB step Atten. Nominal Atten.	1 dB step Atten. Nominal Atten.	10 dB step Atten. Nominal Atten.	10 dB step Atten. Nominal Atten.	Total Actual Atten.	Mkr Δ Reading	TREntry Cumulative Log Fidelity Error	TREntry Incremental Log Fidelity Error
(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
0(Ref)	0	_____	0	_____	_____	0(Ref)	0(Ref)	0(Ref)
-4	4	_____	0	_____	_____	_____	(1)_____	(18)_____
-8	8	_____	0	_____	_____	_____	(2)_____	(19)_____
-12	2	_____	10	_____	_____	_____	(3)_____	(20)_____
-16	6	_____	10	_____	_____	_____	(4)_____	(21)_____
-20	0	_____	20	_____	_____	_____	(5)_____	(22)_____
-24	4	_____	20	_____	_____	_____	(6)_____	(23)_____
-28	8	_____	20	_____	_____	_____	(7)_____	(24)_____
-32	2	_____	30	_____	_____	_____	(8)_____	(25)_____
-36	6	_____	30	_____	_____	_____	(9)_____	(26)_____
-40	0	_____	40	_____	_____	_____	(10)_____	(27)_____
-44	4	_____	40	_____	_____	_____	(11)_____	(28)_____
-48	8	_____	40	_____	_____	_____	(12)_____	(29)_____
-52	2	_____	50	_____	_____	_____	(13)_____	(30)_____
-56	6	_____	50	_____	_____	_____	(14)_____	(31)_____
-60	0	_____	60	_____	_____	_____	(15)_____	(32)_____
-64	4	_____	60	_____	_____	_____	(16)_____	N/A
-68	8	_____	60	_____	_____	_____	(17)_____	N/A

Table 2a-4 Scale Fidelity, Log Mode for Option 130

dB from REF LVL	1 dB step Atten. Nom- inal Atten.	1 dB step Atten. Nom- inal Atten.	10 dB step Atten. Nom- inal Atten.	10 dB step Atten. Nom- inal Atten.	Total Actual Atten.	Mkr D Reading	TREntry Cum- ulative Log Fidelity Error	TREntry Incre- mental Log Fidelity Error
(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
0(Ref)	0	_____	0	_____	_____	0(Ref)	0(Ref)	0(Ref)
-4	4	_____	0	_____	_____	_____	(33) _____	(50) _____
-8	8	_____	0	_____	_____	_____	(34) _____	(51) _____
-12	2	_____	10	_____	_____	_____	(35) _____	(52) _____
-16	6	_____	10	_____	_____	_____	(36) _____	(53) _____
-20	0	_____	20	_____	_____	_____	(37) _____	(54) _____
-24	4	_____	20	_____	_____	_____	(38) _____	(55) _____
-28	8	_____	20	_____	_____	_____	(39) _____	(56) _____
-32	2	_____	30	_____	_____	_____	(40) _____	(57) _____
-36	6	_____	30	_____	_____	_____	(41) _____	(58) _____
-40	0	_____	40	_____	_____	_____	(42) _____	(59) _____
-44	4	_____	40	_____	_____	_____	(43) _____	(60) _____
-48	8	_____	40	_____	_____	_____	(44) _____	(61) _____
-52	2	_____	50	_____	_____	_____	(45) _____	(62) _____
-56	6	_____	50	_____	_____	_____	(46) _____	(63) _____
-60	0	_____	60	_____	_____	_____	(47) _____	(64) _____
-64	4	_____	60	_____	_____	_____	(48) _____	N/A
-68	8	_____	60	_____	_____	_____	(49) _____	N/A

13a. Scale Fidelity

Table 2a-5 Scale Fidelity, Linear Mode

dB from REF LVL	1 dB step Atten. Nominal Atten.	1 dB step atten. Nominal Atten.	10 dB step atten. Nominal Atten.	10 dB step atten. Nominal Atten.	Total Actual Atten.	Ideal Mkr Reading	Actual Mkr Reading	TR Entry Linear Fidelity Error
(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(mV)	(mV)	% of RL
0(Ref)	0	_____	0	_____	_____	0(Ref)	0(Ref)	0(Ref)
-4	4	_____	0	_____	_____	_____	_____	(65) _____
-8	8	_____	0	_____	_____	_____	_____	(66) _____
-12	2	_____	10	_____	_____	_____	_____	(67) _____
-16	6	_____	10	_____	_____	_____	_____	(68) _____
-20	0	_____	20	_____	_____	_____	_____	N/A

Table 2a-6 Scale Fidelity, Linear Mode for Option 130

dB from REF LVL	1 dB step Atten. Nominal Atten.	1 dB step atten. Nominal Atten.	10 dB step atten. Nominal Atten.	10 dB step atten. Nominal Atten.	Total Actual Atten.	Ideal Mkr Reading	Actual Mkr Reading	TR Entry Linear Fidelity Error
(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(mV)	(mV)	% of RL
0(Ref)	0	_____	0	_____	_____	0(Ref)	0(Ref)	0(Ref)
-4	4	_____	0	_____	_____	_____	_____	(69) _____
-8	8	_____	0	_____	_____	_____	_____	(70) _____
-12	2	_____	10	_____	_____	_____	_____	(71) _____
-16	6	_____	10	_____	_____	_____	_____	(72) _____
-20	0	_____	20	_____	_____	_____	_____	N/A

14a. Reference Level Accuracy 8591E and 8591C

A 50 MHz CW signal is applied to the INPUT 50 Ω of the spectrum analyzer through two step attenuators. The amplitude of the source is decreased in 10 dB steps and the spectrum analyzer marker functions are used to measure the amplitude difference between steps. The source's internal attenuator is used as the reference standard. The test is performed in both log and linear amplitude scales.

It is only necessary to test reference levels as low as -90 dBm (with 10 dB attenuation) since lower reference levels are a function of the spectrum analyzer microprocessor manipulating the trace data. There is no error associated with the trace data manipulation.

The related adjustment for this procedure is "A12 Cal Attenuator Error Correction."

Equipment Required

Synthesized signal generator

1 dB step Attenuator

10 dB step Attenuator

Attenuator/switch driver (if programmable step attenuators are used)

Cable, Type N, 152 cm (60 in)

Cable, BNC, 122 cm (48 in) (*2 required*)

Attenuator interconnect kit

Adapter, Type N (m) to BNC (f) (*2 required*)

Additional Equipment for 75 Ω Input

Adapter, minimum loss

Adapter, Type N (f) to BNC (m) 75 Ω

Procedure

Calculate Actual Attenuation Errors

1. From the calibration data supplied with the 10 dB step attenuator, enter the 10 dB actual attenuation for the corresponding nominal attenuation settings in [Table 2a-7](#), [Table 2a-8](#), [Table 2a-9](#), and [Table 2a-10](#). If using a programmable attenuator, enter the data for the section three 40 dB step.

2. Calculate the reference attenuation error by subtracting 40 dB from the actual attenuation for the 40 dB nominal attenuator setting as follows:

$$\text{Ref Atten Error} = \text{Actual Atten (40 dB)} - 40 \text{ dB}$$

Record this value as the reference attenuation error below:

Reference Attenuation Error: _____ dB

3. To calculate the attenuation error at other nominal attenuator settings, subtract the reference attenuation error from the attenuation error at the other settings as follows:

$$\text{Atten Error} = (\text{Actual Atten} - \text{Nominal Atten}) - \text{Ref Atten Error}$$

For example, if the Actual Attenuation for the 40 dB Nominal Attenuation setting is 40.15 dB and the Actual Attenuation for 50 dB Nominal Attenuation setting is 50.08 dB, then the Reference Attenuation Error is 0.15 dB and the Attenuation Error for the 50 dB Nominal Attenuation setting is:

$$\text{Atten Error} = (50.08 \text{ dB} - 50 \text{ dB}) - 0.15 \text{ dB} = -0.07 \text{ dB}$$

Record the results in [Table 2a-7](#), [Table 2a-8](#), [Table 2a-9](#), and [Table 2a-10](#).

Log Scale

1. Set the synthesized signal generator controls as follows:

FREQUENCY 50 MHz

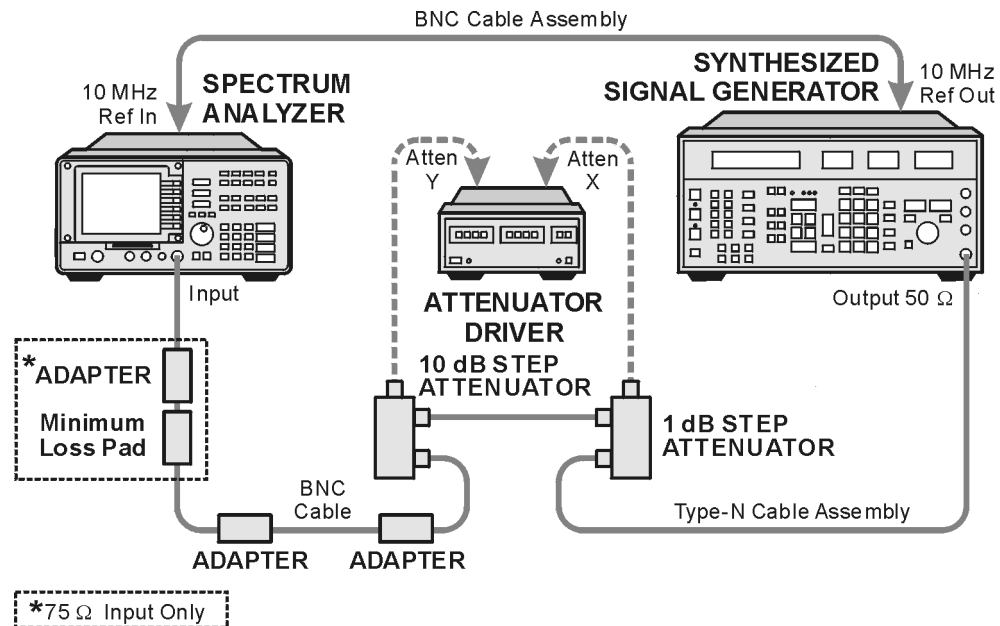
AMPLITUDE -10 dBm

AMPTD INCR 10 dB

2. Connect the equipment as shown in [Figure 2a-7](#). Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

75 Ω input only: Connect the minimum loss adapter to the RF input 75 Ω using adapters, and set the 10 dB step attenuator to 0 dB attenuation.

Figure 2a-7 Reference Level Accuracy Test Setup



ws15e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

14a. Reference Level Accuracy 8591E and 8591C

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 50, kHz

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

AMPLITUDE, -20, dBm, SCALE LOG LIN (LOG), 1, dB

BW, 3, kHz, VID BW AUTO MAN, 30, Hz

4. Set the 1 dB step attenuator signal peak between 1 dB and 2 dB (one to two divisions) below the reference level. Refer to [Table 2-1](#) for information on manually controlling a programmable step attenuator with an 11713A attenuator/switch driver.
5. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

6. Set the 10 dB step attenuator and spectrum analyzer reference level according to [Table 2a-7](#).
7. At each 10 dB Nominal Attenuation setting in [Table 2a-7](#):
 - a. Press **SGL SWP, PEAK SEARCH** on the spectrum analyzer.
 - b. Record the MKR Δ amplitude reading as indicated in [Table 2a-7](#).
 - c. Add the Actual Attenuation error to the analyzer MKR Δ amplitude reading for each Nominal Attenuation setting in [Table 2a-7](#).

For example, if the Attenuation Error at the 50 dB Nominal Attenuation setting is -0.07 dB and the MKR Δ amplitude reading is +0.17 dB, the result corresponding to the 50 dB Nominal Attenuation setting is:

$$\text{MKR } \Delta \text{ Read} + \text{Atten Error} = +0.17 \text{ dB} + (-0.07 \text{ dB}) = +0.10 \text{ dB}$$

Record the result corresponding to each Nominal Attenuation setting in [Table 2a-7](#).

8. Record TR Entry 1 through TR Entry 9 in the appropriate performance verification test record in [Chapter 3](#).

Linear Scale

9. Set the 10 dB attenuator to 10 dB attenuation.

10. Set the 1 dB step attenuator to 10 dB attenuation.

75 Ω input only: Set the 1 dB step attenuator to 0 dB.

11. Set the spectrum analyzer controls as follows:

AMPLITUDE, -20, dBm

SCALE LOG LIN (LIN)

AMPLITUDE, More 1 of 2, Amptd Units, dBm

SWEEP, SWEEP CONT SGL (CONT)

MKR, More 1 of 2, MARKER ALL OFF

12. Set the 1 dB step attenuator to place the signal peak between 1 dB and 2 dB (one to two divisions) below the reference level.

13. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

MKR FCTN, MK TRACK ON OFF (OFF)

14. Set the 10 dB step attenuator and spectrum analyzer reference level according to [Table 2a-8](#).

15. At each 10 dB Nominal Attenuation setting in [Table 2a-8](#):

- Press **SGL SWP, PEAK SEARCH** on the spectrum analyzer.
- Record the MKR Δ amplitude reading as indicated in [Table 2a-8](#).
- Add the Actual Attenuation error to the analyzer MKR Δ amplitude reading for each Nominal Attenuation setting in [Table 2a-8](#) (see example in step 7c).

Record the result corresponding to each Nominal Attenuation setting in [Table 2a-8](#).

16. Record TR Entry 10 through TR Entry 18 in the appropriate performance verification test record in [Chapter 3](#).

If you are testing a spectrum analyzer equipped with Option 130, continue with [step 17](#).

Performance test "Reference Level Accuracy" is now complete for all other spectrum analyzers.

Additional Steps for Option 130

17. Press the following spectrum analyzer keys:

AMPLITUDE, -20 dBm, **SCALE LOG LIN** (LOG), 1, dB

BW, **RES BW AUTO MAN**, 300, Hz

SPAN, 10, kHz

SWEEP, **SWEEP CONT SGL** (CONT)

18. Set the 10 dB step attenuator to 10 dB attenuation.

19. Repeat [step 4](#) through [step 7](#), using [Table 2a-9](#) for the narrow resolution bandwidths.

20. Record TR Entry 19 through TR Entry 27 in the appropriate performance verification test record in [Chapter 3](#).

21. Set the 10 dB step attenuator and spectrum analyzer reference level according to [Table 2a-10](#).

22. Repeat [step 12](#) through [step 15](#), using [Table 2a-10](#) for the narrow resolution bandwidths.

23. Record TR Entry 28 through TR Entry 36 in the appropriate performance verification test record in [Chapter 3](#).

Performance verification test “Reference Level Accuracy” is now complete for spectrum analyzers equipped with Option 130.

Table 2a-7 Reference Level Accuracy, Log Mode

10 dB Att Nominal Atten (dB)	10 dB Att Actual Atten (dB)	Atten Error (dB)	Spect- rum Analyzer Refer- ence Level (dBm)	MKR Δ Reading (dB)			TR Entry MKR Δ Reading + Atten Error
				Min.	MKR Δ Reading	Max.	
20	_____	_____	-20	0 (Ref)	_____	0 (Ref)	0 (Ref)
10	_____	_____	-10	-0.4	_____	+0.4	(1) _____
0	_____	_____	0	-0.5	_____	+0.5	(2) _____
30	_____	_____	-30	-0.4	_____	+0.4	(3) _____
40	_____	_____	-40	-0.5	_____	+0.5	(4) _____
50	_____	_____	-50	-0.8	_____	+0.8	(5) _____
60	_____	_____	-60	-1.0	_____	+1.0	(6) _____
70	_____	_____	-70	-1.1	_____	+1.1	(7) _____
80	_____	_____	-80	-1.2	_____	+1.2	(8) _____
90	_____	_____	-90	-1.3	_____	+1.3	(9) _____

Table 2a-8 Reference Level Accuracy, Linear Mode

10 dB Att Nominal Atten (dB)	10 dB Att Actual Atten (dB)	Atten Error (dB)	Spect- rum Analyzer Refer- ence Level (dBm)	MKR Δ Reading (dB)			TR Entry MKR Δ Reading + Atten Error
				Min.	MKR Δ Reading	Max.	
20	_____	_____	-20	0 (Ref)	_____	0 (Ref)	0 (Ref)
10	_____	_____	-10	-0.4	_____	+0.4	(10)_____
0	_____	_____	0	-0.5	_____	+0.5	(11)_____
30	_____	_____	-30	-0.4	_____	+0.4	(12)_____
40	_____	_____	-40	-0.5	_____	+0.5	(13)_____
50	_____	_____	-50	-0.8	_____	+0.8	(14)_____
60	_____	_____	-60	-1.0	_____	+1.0	(15)_____
70	_____	_____	-70	-1.1	_____	+1.1	(16)_____
80	_____	_____	-80	-1.2	_____	+1.2	(17)_____
90	_____	_____	-90	-1.3	_____	+1.3	(18)_____

Table 2a-9 Reference Level Accuracy, Log Mode for Option 130

10 dB Att Nominal Atten (dB)	10 dB Att Actual Atten (dB)	Atten Error (dB)	Spect- rum Analyzer Refer- ence Level (dBm)	MKR Δ Reading (dB)			TR Entry MKR Δ Reading + Atten Error
				Min.	MKR Δ Reading	Max.	
20	_____	_____	-20	0 (Ref)	_____	0 (Ref)	0 (Ref)
10	_____	_____	-10	-0.4	_____	+0.4	(19) _____
0	_____	_____	0	-0.5	_____	+0.5	(20) _____
30	_____	_____	-30	-0.4	_____	+0.4	(21) _____
40	_____	_____	-40	-0.5	_____	+0.5	(22) _____
50	_____	_____	-50	-0.8	_____	+0.8	(23) _____
60	_____	_____	-60	-1.0	_____	+1.0	(24) _____
70	_____	_____	-70	-1.1	_____	+1.1	(25) _____
80	_____	_____	-80	-1.2	_____	+1.2	(26) _____
90	_____	_____	-90	-1.3	_____	+1.3	(27) _____

Table 2a-10 Reference Level Accuracy, Linear Mode for Option 130

10 dB Att Nominal Atten (dB)	10 dB Att Actual Atten (dB)	Atten Error (dB)	Spect- rum Analyzer Refer- ence Level (dBm)	MKR Δ Reading (dB)			TR Entry MKR Δ Reading + Atten Error
				Min.	MKR Δ Reading	Max.	
20	_____	_____	-20	0 (Ref)	_____	0 (Ref)	0 (Ref)
10	_____	_____	-10	-0.4	_____	+0.4	(28)_____
0	_____	_____	0	-0.5	_____	+0.5	(29)_____
30	_____	_____	-30	-0.4	_____	+0.4	(30)_____
40	_____	_____	-40	-0.5	_____	+0.5	(31)_____
50	_____	_____	-50	-0.8	_____	+0.8	(32)_____
60	_____	_____	-60	-1.0	_____	+1.0	(33)_____
70	_____	_____	-70	-1.1	_____	+1.1	(34)_____
80	_____	_____	-80	-1.2	_____	+1.2	(35)_____
90	_____	_____	-90	-1.3	_____	+1.3	(36)_____

15a. Reference Level Accuracy 8593E, 8594E, 8595E, 8596E, and 8594Q

A 50 MHz CW signal is applied to the INPUT 50 Ω of the spectrum analyzer through two step attenuators. The amplitude of the source is decreased in 10 dB steps and the spectrum analyzer marker functions are used to measure the amplitude difference between steps. The source's internal attenuator is used as the reference standard. The test is performed in both log and linear amplitude scales.

It is only necessary to test reference levels as low as -90 dBm (with 10 dB attenuation) since lower reference levels are a function of the spectrum analyzer microprocessor manipulating the trace data. There is no error associated with the trace data manipulation.

The related adjustment for this procedure is "A12 Cal Attenuator Error Correction."

Equipment Required

Synthesized signal generator

1 dB step Attenuator

10 dB step Attenuator

Attenuator/switch driver (if programmable step attenuators are used)

Cable, Type N, 152 cm (60 in)

Cable, BNC, 122 cm (48 in) (*2 required*)

Attenuator interconnect kit

Adapter, Type N (m) to BNC (f) (*2 required*)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

Adapter, BNC (f) to SMA (m)

Procedure

Calculate Actual Attenuation Errors

1. From the calibration data supplied with the 10 dB step attenuator, enter the 10 dB actual attenuation for the corresponding nominal attenuation settings in [Table 2a-11](#), [Table 2a-12](#), [Table 2a-13](#), and [Table 2a-14](#). If using a programmable attenuator, enter the data for the section three 40 dB step.

2. Calculate the reference attenuation error by subtracting 40 dB from the actual attenuation for the 40 dB nominal attenuator setting as follows:

$$\text{Ref Atten Error} = \text{Actual Atten (40 dB)} - 40 \text{ dB}$$

Record this value as the reference attenuation error below:

Reference Attenuation Error: _____ dB

3. To calculate the attenuation error at other nominal attenuator settings, subtract the reference attenuation error from the attenuation error at the other settings as follows:

$$\text{Atten Error} = (\text{Actual Atten} - \text{Nominal Atten}) - \text{Ref Atten Error}$$

For example, if the Actual Attenuation for the 40 dB Nominal Attenuation setting is 40.15 dB and the Actual Attenuation for 50 dB Nominal Attenuation setting is 50.08 dB, then the Reference Attenuation Error is 0.15 dB and the Attenuation Error for the 50 dB Nominal Attenuation setting is:

$$\text{Atten Error} = (50.08 \text{ dB} - 50 \text{ dB}) - 0.15 \text{ dB} = -0.07 \text{ dB}$$

Record the results in [Table 2a-11](#), [Table 2a-12](#), [Table 2a-13](#), and [Table 2a-14](#).

Log Scale

1. Set the synthesized signal generator controls as follows:

FREQUENCY 50 MHz

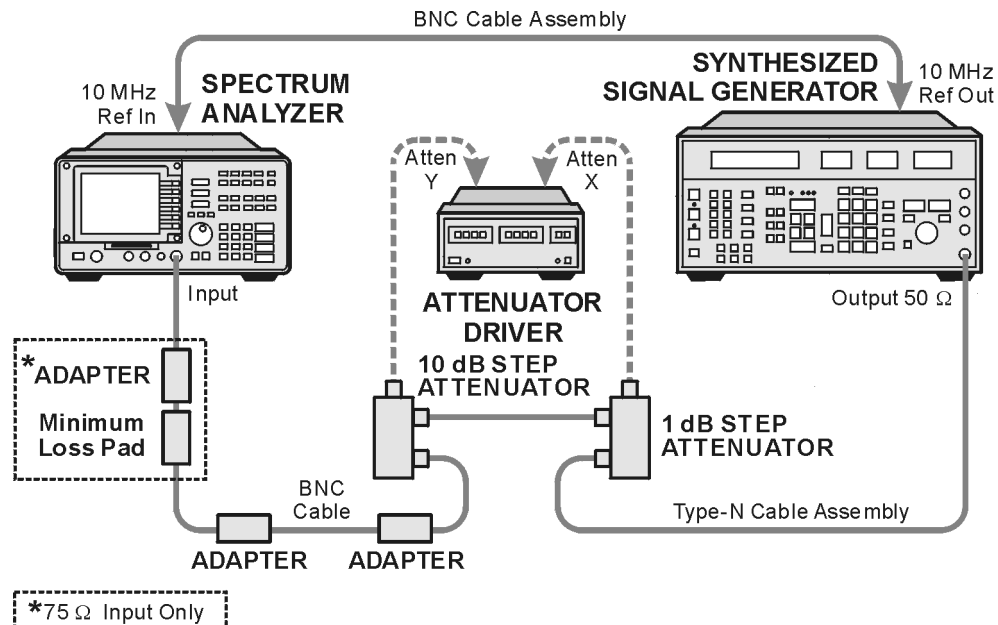
AMPLITUDE -10 dBm

AMPTD INCR 10 dB

2. Connect the equipment as shown in [Figure 2a-8](#). Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

75 Ω input only: Connect the minimum loss adapter to the RF input 75 Ω , using adapters, and set the 10 dB step attenuator to 0 dB attenuation.

Figure 2a-8 Reference Level Accuracy Test Setup



ws15e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 50, kHz

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

AMPLITUDE, -20, dBm, SCALE LOG LIN (LOG), 1, dB

BW, 3, kHz, VID BW AUTO MAN, 30, Hz

4. Set the 1 dB step attenuator signal peak between 1 dB and 2 dB (one to two divisions) below the reference level. Refer to [Table 2-1](#) for information on manually controlling a programmable step attenuator with an 11713A attenuator/switch driver.
5. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

6. Set the 10 dB step attenuator and spectrum analyzer reference level according to [Table 2a-11](#).
7. At each 10 dB Nominal Attenuation setting in [Table 2a-11](#):
 - a. Press **SGL SWP, PEAK SEARCH** on the spectrum analyzer.
 - b. Record the MKR Δ amplitude reading as indicated in [Table 2a-11](#).
 - c. Add the Actual Attenuation error to the analyzer MKR Δ amplitude reading for each Nominal Attenuation setting in [Table 2a-11](#).

For example, if the Attenuation Error at the 50 dB Nominal Attenuation setting is -0.07 dB and the MKR Δ amplitude reading is +0.17 dB, the result corresponding to the 50 dB Nominal Attenuation setting is:

$$\text{MKR } \Delta \text{ Read} + \text{Atten Error} = +0.17 \text{ dB} + (-0.07 \text{ dB}) = +0.10 \text{ dB}$$

Record the result corresponding to each Nominal Attenuation setting in [Table 2a-11](#).

8. Record TR Entry 1 through TR Entry 9 in the appropriate performance verification test record in [Chapter 3](#).

Linear Scale

9. Set the 10 dB attenuator to 10 dB attenuation.

10. Set the 1 dB step attenuator to 10 dB attenuation.

75 Ω input only: Set the 1 dB step attenuator to 0 dB.

11. Set the spectrum analyzer controls as follows:

AMPLITUDE, -20, dBm

SCALE LOG LIN (LIN)

AMPLITUDE, More 1 of 2, Amptd Units, dBm

SWEEP, SWEEP CONT SGL (CONT)

MKR, More 1 of 2, MARKER ALL OFF

12. Set the 1 dB step attenuator to place the signal peak between 1 dB and 2 dB (one to two divisions) below the reference level.

13. On the spectrum analyzer, press the following keys:

SGL SWP

PEAK SEARCH, MARKER Δ

MKR FCTN, MK TRACK ON OFF (OFF)

14. Set the 10 dB step attenuator and spectrum analyzer reference level according to [Table 2a-12](#).

15. At each 10 dB Nominal Attenuation setting in [Table 2a-12](#):

- Press **SGL SWP, PEAK SEARCH** on the spectrum analyzer.
- Record the MKR Δ amplitude reading as indicated in [Table 2a-12](#).
- Add the Actual Attenuation error to the analyzer MKR Δ amplitude reading for each Nominal Attenuation setting in [Table 2a-12](#) (see example in step 7c).

Record the result corresponding to each Nominal Attenuation setting in [Table 2a-12](#).

16. Record TR Entry 10 through TR Entry 18 in the appropriate performance verification test record in [Chapter 3](#).

If you are testing a spectrum analyzer equipped with Option 130, continue with [step 17](#).

Performance test "Reference Level Accuracy" is now complete for all other spectrum analyzers.

Additional Steps for Option 130

17. Press the following spectrum analyzer keys:

AMPLITUDE, -20 dBm, **SCALE LOG LIN** (LOG), 1, dB

BW, **RES BW AUTO MAN**, 300, Hz

SPAN, 10, kHz

SWEEP, **SWEEP CONT SGL** (CONT)

18. Set the 10 dB step attenuator to 10 dB attenuation.

19. Repeat [step 4](#) through [step 7](#), using [Table 2a-13](#) for the narrow resolution bandwidths.

20. Record TR Entry 19 through TR Entry 27 in the appropriate performance verification test record in [Chapter 3](#).

21. Set the 10 dB step attenuator and spectrum analyzer reference level according to [Table 2a-10](#).

22. Repeat [step 12](#) through [step 15](#), using [Table 2a-14](#) for the narrow resolution bandwidths.

23. Record TR Entry 28 through TR Entry 36 in the appropriate performance verification test record in [Chapter 3](#).

Performance verification test “Reference Level Accuracy” is now complete for spectrum analyzers equipped with Option 130.

Table 2a-11 Reference Level Accuracy, Log Mode

10 dB Att Nominal Atten (dB)	10 dB Att Actual Atten (dB)	Atten Error (dB)	Spect- rum Analyzer Refer- ence Level (dBm)	MKR Δ Reading (dB)			TR Entry MKR Δ Reading + Atten Error
				Min.	MKR Δ Reading	Max.	
20	_____	_____	-20	0 (Ref)	_____	0 (Ref)	0 (Ref)
10	_____	_____	-10	-0.4	_____	+0.4	(1) _____
0	_____	_____	0	-0.5	_____	+0.5	(2) _____
30	_____	_____	-30	-0.4	_____	+0.4	(3) _____
40	_____	_____	-40	-0.5	_____	+0.5	(4) _____
50	_____	_____	-50	-0.8	_____	+0.8	(5) _____
60	_____	_____	-60	-1.0	_____	+1.0	(6) _____
70	_____	_____	-70	-1.1	_____	+1.1	(7) _____
80	_____	_____	-80	-1.2	_____	+1.2	(8) _____
90	_____	_____	-90	-1.3	_____	+1.3	(9) _____

Table 2a-12 Reference Level Accuracy, Linear Mode

10 dB Att Nominal Atten (dB)	10 dB Att Actual Atten (dB)	Atten Error (dB)	Spect- rum Analyzer Refer- ence Level (dBm)	MKR Δ Reading (dB)			TR Entry MKR Δ Reading + Atten Error
				Min.	MKR Δ Reading	Max.	
20	_____	_____	-20	0 (Ref)	_____	0 (Ref)	0 (Ref)
10	_____	_____	-10	-0.4	_____	+0.4	(10)_____
0	_____	_____	0	-0.5	_____	+0.5	(11)_____
30	_____	_____	-30	-0.4	_____	+0.4	(12)_____
40	_____	_____	-40	-0.5	_____	+0.5	(13)_____
50	_____	_____	-50	-0.8	_____	+0.8	(14)_____
60	_____	_____	-60	-1.0	_____	+1.0	(15)_____
70	_____	_____	-70	-1.1	_____	+1.1	(16)_____
80	_____	_____	-80	-1.2	_____	+1.2	(17)_____
90	_____	_____	-90	-1.3	_____	+1.3	(18)_____

Table 2a-13 Reference Level Accuracy, Log Mode for Option 130

10 dB Att Nominal Atten (dB)	10 dB Att Actual Atten (dB)	Atten Error (dB)	Spect- rum Analyzer Refer- ence Level (dBm)	MKR Δ Reading (dB)			TR Entry MKR Δ Reading + Atten Error
				Min.	MKR Δ Reading	Max.	
20	_____	_____	-20	0 (Ref)	_____	0 (Ref)	0 (Ref)
10	_____	_____	-10	-0.4	_____	+0.4	(19) _____
0	_____	_____	0	-0.5	_____	+0.5	(20) _____
30	_____	_____	-30	-0.4	_____	+0.4	(21) _____
40	_____	_____	-40	-0.5	_____	+0.5	(22) _____
50	_____	_____	-50	-0.8	_____	+0.8	(23) _____
60	_____	_____	-60	-1.0	_____	+1.0	(24) _____
70	_____	_____	-70	-1.1	_____	+1.1	(25) _____
80	_____	_____	-80	-1.2	_____	+1.2	(26) _____
90	_____	_____	-90	-1.3	_____	+1.3	(27) _____

Table 2a-14 Reference Level Accuracy, Linear Mode for Option 130

10 dB Att Nominal Atten (dB)	10 dB Att Actual Atten (dB)	Atten Error (dB)	Spect- rum Analyzer Refer- ence Level (dBm)	MKR Δ Reading (dB)			TR Entry MKR Δ Reading + Atten Error
				Min.	MKR Δ Reading	Max.	
20	_____	_____	-20	0 (Ref)	_____	0 (Ref)	0 (Ref)
10	_____	_____	-10	-0.4	_____	+0.4	(28)_____
0	_____	_____	0	-0.5	_____	+0.5	(29)_____
30	_____	_____	-30	-0.4	_____	+0.4	(30)_____
40	_____	_____	-40	-0.5	_____	+0.5	(31)_____
50	_____	_____	-50	-0.8	_____	+0.8	(32)_____
60	_____	_____	-60	-1.0	_____	+1.0	(33)_____
70	_____	_____	-70	-1.1	_____	+1.1	(34)_____
80	_____	_____	-80	-1.2	_____	+1.2	(35)_____
90	_____	_____	-90	-1.3	_____	+1.3	(36)_____

17a. Resolution Bandwidth Accuracy, 8590 E-Series, 8591C, and 8594Q

The output of a synthesized signal generator is connected to the input of the spectrum analyzer, characterized through a 1 dB step attenuator set to 3 dB.

The amplitude of the synthesized signal generator is set to a reference amplitude 5 dB below the top of the screen. A marker reference is set and the attenuator is set to 0 dB.

The markers of the analyzer are then used to measure the 3 dB bandwidth. The first marker is set on the left filter skirt so that the marker delta amplitude is 1 dB plus the attenuator error for the 3 dB setting. The second marker is similarly set on the right filter skirt. The frequency difference between the two markers is the 3 dB bandwidth.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized Signal Generator

Cable, BNC, 122 cm (48 in)

Cable, Type N, 152 cm (60 in) (*2 required*)

1 dB step attenuator

Attenuator/switch driver (*if programmable step attenuators are used*)

Additional Equipment for 75 Ω Input

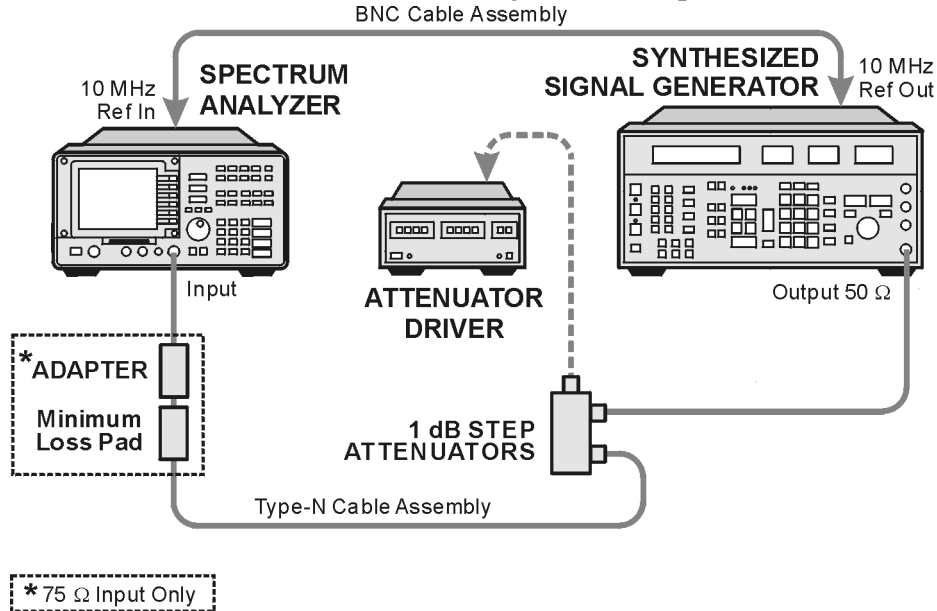
Pad, minimum loss

Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

1. Connect the equipment as shown in Figure 2a-9.

Figure 2a-9 Resolution Bandwidth Accuracy Test Setup



ws16e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. Set the synthesized signal generator, press **Blue Key, Special, 0, 0** and set the controls as follows:

FREQUENCY, 50, MHz

AMPLITUDE, 0, dBm (50 Ω input only)

AMPLITUDE, 6, dBm (75 Ω input only)

3. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50, MHz

SPAN, 7.5, MHz

AMPLITUDE, SCALE, 1, dB

AMPLITUDE, More 1 of 2, Amptd Units, dBm

BW, 3, MHz

BW, Video BW, 30, Hz

4. Set the 1 dB step attenuator to 3 dB.

5. Note the error of the external 1 dB step attenuator at 3 dB and 6 dB below using its calibration records.

Attenuator Error (3 dB)_____dB

Attenuator Error (6 dB)_____dB

3 dB Resolution Bandwidth Accuracy

6. Press **Peak Search, Mkr** → **CF** on the analyzer.
7. Adjust the amplitude of the synthesized signal generator for a marker amplitude reading of $-5 \text{ dBm} \pm 0.2 \text{ dB}$.
8. Press **Peak Search, Mkr** Δ on the analyzer.
9. Set the attenuator to 0 dB.
10. On the analyzer, press **Marker**. Lower the marker frequency by adjusting the knob until the marker delta amplitude is 0 dB plus the attenuator error (3 dB) noted in step 5 to a tolerance of $\pm 0.05 \text{ dB}$.
11. Record the marker frequency readout as the Lower Marker Frequency in [Table 2a-15](#).
12. Using the analyzer knob, raise the marker frequency so that the marker delta amplitude is maximum. Continue increasing the marker frequency until the marker reads 0.0 dB plus the attenuator error (3 dB) noted in step 5 to a tolerance of $\pm 0.05 \text{ dB}$.
13. Record the marker frequency readout as the Upper Marker Frequency in [Table 2a-15](#).
14. Set the attenuator to 3 dB.
15. Press **Marker, Normal** on the analyzer.
16. Repeat [step 6](#) through [step 15](#) for each of the Analyzer Res BW and Analyzer Span settings listed in [Table 2a-15](#).
17. Subtract the Lower Marker Frequency from the Upper Marker Frequency. Record the difference as the 3 dB Bandwidth in [Table 2a-15](#).

$$3 \text{ dB Bandwidth} = \text{Upper Marker Freq.} - \text{Lower Marker Freq.}$$

18. Record TR Entry 1 through TR Entry 8 in the appropriate performance verification test record in Chapter 3a.

If you are testing an analyzer equipped with Option 130, continue with [step 25](#).

The “3 dB Resolution Bandwidth Accuracy” portion of the performance verification test “Resolution Bandwidth Accuracy” is now complete for all other spectrum analyzers. Proceed to [step 25](#), “6 dB Resolution Bandwidth Accuracy.”

Additional Step For Option 130

19. Press PRESET on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 50 MHz

SPAN, 1, MHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 1, kHz

20. Wait for the auto zoom routine to finish, then press the following keys:

MKR, MARKER 1 ON OFF (OFF)

MEAS/USER, N dB PTS ON OFF, 3, dB

AMPLITUDE, SCALE LOG LIN (LOG), 1, dB

BW, 300, Hz

21. Set the spectrum analyzer resolution bandwidth and span according to [Table 2a-16](#).

22. Press **SGL SWP**. Record the -3 dB POINTS: readout in [Table 2a-16](#).

23. Repeat [step 21](#) through [step 22](#) for each of the Resolution Bandwidth settings listed in [Table 2a-16](#).

24. Record TR Entry 9 through TR Entry 11 in the appropriate performance verification test record in Chapter 3a.

The “3 dB Resolution Bandwidth Accuracy” portion of the performance verification test “Resolution Bandwidth Accuracy” is now complete for spectrum analyzers equipped with Option 130. Proceed to [step 25](#), “6 dB Resolution Bandwidth Accuracy.”

6 dB EMI Bandwidths

25. Set the Analyzer Res BW to 120 kHz and the Analyzer Span to 180 kHz as shown in [Table 2a-17](#).

26. On the analyzer, press **Peak Search, Mkr → CF**.

27. Set the attenuator to 0 dB.

28. On the analyzer, press **Marker**. Lower the marker frequency by adjusting the knob until the marker delta amplitude is 0 dB plus the attenuator error (6 dB) noted in step 5 to a tolerance of ± 0.05 dB.

29. Record the marker frequency readout as the Lower Marker Frequency in [Table 2a-17](#).

30. Using the analyzer knob, raise the marker frequency so that the marker delta amplitude is maximum. Continue increasing the marker frequency until the marker reads 0.0 dB plus the attenuator error (6 dB) noted in step 5 to a tolerance of ± 0.05 dB.
31. Record the marker frequency readout as the Upper Marker Frequency in [Table 2a-17](#).
32. Set the attenuator to 6dB.
33. Press **Marker, Normal** on the analyzer.
34. Repeat [step 26](#) through [step 33](#) for each of the Analyzer Res BW and Analyzer Span settings listed in [Table 2a-17](#).
35. Subtract the Lower Marker Frequency from the Upper Marker Frequency. Record the difference as the 6dB Bandwidth in [Table 2a-17](#).

$$6 \text{ dB Bandwidth} = \text{Upper Marker Freq.} - \text{Lower Marker Freq.}$$

36. Record TR Entry 12 through TR Entry 13 in the appropriate performance verification test record in Chapter 3a.

If you are testing an analyzer equipped with Option 130, continue with [step 37](#).

The performance verification test “Resolution Bandwidth Accuracy” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

37. Pressing the following spectrum analyzer keys:

MEAS/USER, N dB PTS ON OFF, 6, dB

BW, 200, Hz

38. Press **SGL SWP**. Record the **-6 dB POINTS:** readout as TR Entry 14 in the appropriate performance verification test record in Chapter 3a.

The performance verification test “Resolution Bandwidth Accuracy” is now complete for spectrum analyzers equipped with Option 130.

Table 2a-15 3 dB Resolution Bandwidth Accuracy

Analyzer RES BW	Analyzer Span	Lower Marker Frequency	Upper Marker Frequency	TR Entry 3 dB Bandwidth
3 MHz	4.5 MHz	_____	_____	(1)_____
1 MHz	1.5 MHz	_____	_____	(2)_____
300 kHz	450 kHz	_____	_____	(3)_____
100 kHz	150 kHz	_____	_____	(4)_____
30 kHz	45 kHz	_____	_____	(5)_____
10 kHz	15 kHz	_____	_____	(6)_____
3 kHz	4.5 kHz	_____	_____	(7)_____
1 kHz	1.5 kHz	_____	_____	(8)_____

Table 2a-16 3 dB Resolution Bandwidth Accuracy for Option 130

Resolution Bandwidth	Frequency Span	TR Entry –3 dB Readout
300 Hz	1 kHz	(9)_____
100 Hz	1 kHz	(10)_____
30 Hz	300 Hz	(11)_____

Table 2a-17 6 dB Resolution Bandwidth Accuracy

Analyzer RES BW	Analyzer Span	Lower Marker Frequency	Upper Marker Frequency	TR Entry 6 dB Bandwidth
9 kHz	180 kHz	_____	_____	(12)_____
120 kHz	13.5 kHz	_____	_____	(13)_____

19a. Frequency Response, 8591E and 8591C

The output of the synthesized signal generator is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized signal generator's power level is adjusted at 300 MHz to place the displayed signal at the spectrum analyzer's center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new sweeper frequency and spectrum analyzer center frequency setting, the sweeper's power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency). A low frequency function generator is used for frequencies below 100 kHz in addition to using a Digital Voltmeter (DVM) as a power sensor.

The related adjustment for this performance test is "Frequency Response Error Correction."

A system characterization is performed before testing the flatness of 8591C spectrum analyzers and spectrum analyzers equipped with 75 Ω INPUT.

Equipment Required

Measuring receiver (*used as a power meter*)

Synthesizer/level generator

Power sensor, 100 kHz to 1800 MHz

Power splitter

Adapter, Type N (f) to APC 3.5 (f)

Adapter, Type N (m) to BNC (f) (*2 required*)

Adapter, Type N (m) to Type N (m)

Cable, BNC, 122 cm (48 in)

Cable, Type N, 183 cm (72 in)

Synthesizer/function generator

Dual banana plug to BNC (f)

BNC tee (BNC f, m, f)

Termination, 50 Ω

DVM (3458 or 34401A *only*)

Additional Equipment for 75 Ω Input

Power meter

Power sensor, 75 Ω , 1 MHz to 2 GHz

Adapter, Type N (f) 75 Ω to Type N (m) 50 Ω

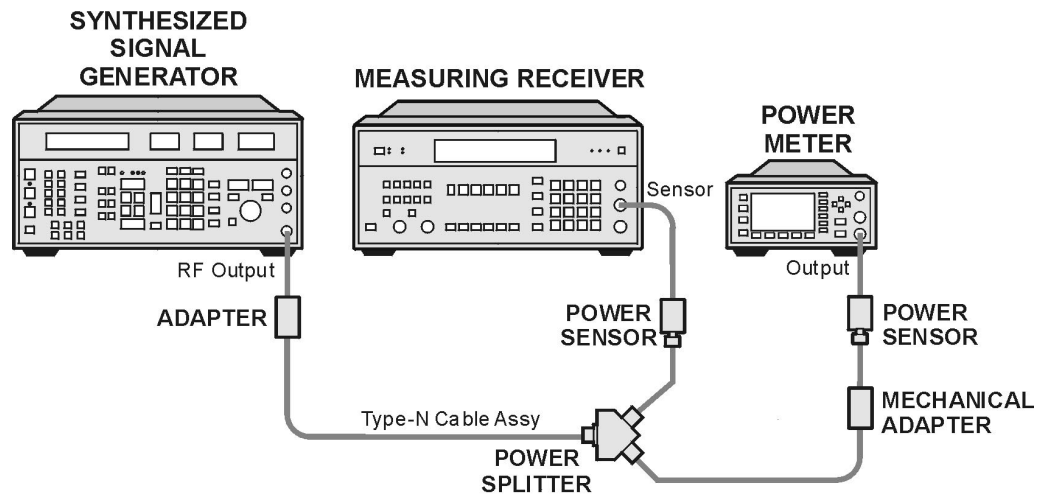
Adapter, Type N (m) to BNC (m), 75 Ω

Cable, BNC, 120 cm (48 in) 75 Ω

System Characterization Procedure for 75 Ω Input

The following procedure is for 8591C spectrum analyzers and spectrum analyzers equipped with 75 Ω input *only*. If your spectrum analyzer is *not* an 8591C spectrum analyzer or if your spectrum analyzer is *not* equipped with 75 Ω input, proceed to step 1 of “Frequency Response, ≥ 100 MHz.”

1. Zero and calibrate the 100 kHz to 1800 MHz power sensor and the measuring receiver as described in the measuring receiver operation manual.
2. Zero and calibrate the power meter and the 1 MHz to 2 GHz, 75 W power sensor as described in the power meter operation manual.
3. Press INSTRUMENT PRESET on the synthesized signal generator, then set the controls as follows:
CW 50 MHz
FREQ STEP 50 MHz
POWER LEVEL 5 dBm
4. Connect the equipment as shown in [Figure 2-10](#).

Figure 2-10 System Characterization Test Setup for 75 Ω Input

ws17e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

5. Adjust the synthesized signal generator power level for a 0 dBm reading on the measuring receiver.
6. Record the power meter system error reading corresponding to 50 MHz in [Table 2a-18](#).
7. Enter each power sensor's Cal Factor into the respective power meter.
8. On the synthesized signal generator, press **CW**.
9. For the frequencies 20 MHz, 10 MHz, 5 MHz, and 1 MHz, repeat [step 5](#) through [step 8](#). Do not test below 1 MHz.
10. On the synthesized signal generator, press **CW**, 50, MHz. The **Freq INCR set** should still be 50 MHz. If not, readjust the **Freq INCR set** to 50 MHz.
11. On the synthesized signal generator, press **FREQUENCY** and $\uparrow$ (step-up key). Repeat [step 5](#) through [step 8](#) for the remaining frequencies listed in Table, entering each power sensor's Cal Factor into the respective power meter.
12. At each new frequency repeat [step 5](#) through [step 8](#), entering each power sensor's Cal Factor into the respective power meter.

System characterization is now complete for 8591C spectrum analyzers and spectrum analyzers equipped with 75 Ω Input. Proceed to step 1 of "Frequency Response, ≥ 100 kHz."

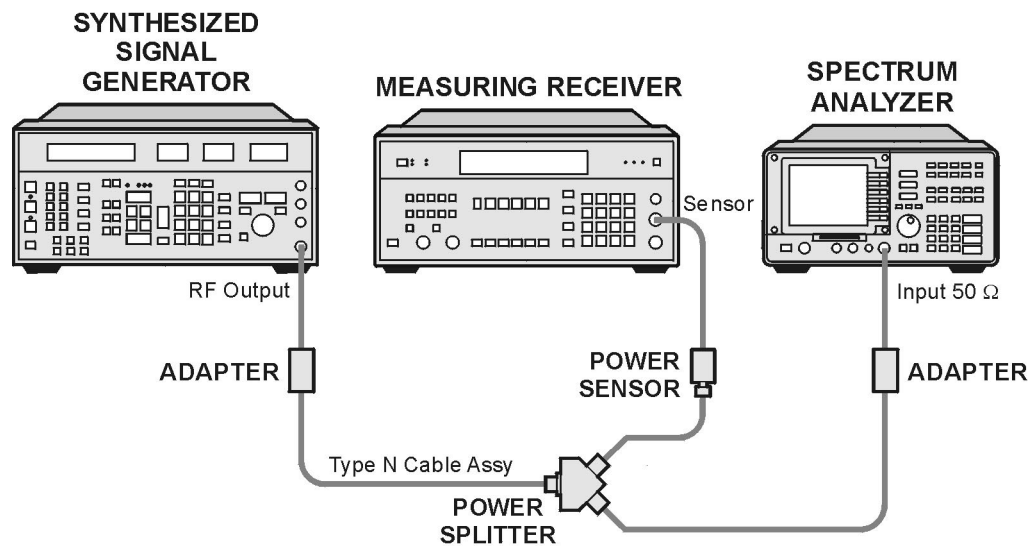
19a. Frequency Response, 8591E and 8591C

Frequency Response, ≥ 100 kHz

If you have an 8591C spectrum analyzer or if your spectrum analyzer is equipped with $75\ \Omega$ input, perform “System Characterization Procedure” before proceeding.

1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode as described in the measuring receiver operation manual.
2. If your spectrum analyzer is *not* an 8591C spectrum analyzer and is *not* equipped with $75\ \Omega$ input, connect the equipment as shown in [Figure 2a-11](#). Otherwise, connect the equipment as shown in [Figure 2-12](#).

Figure 2a-11 Frequency Response Test Setup, ≥ 100 kHz

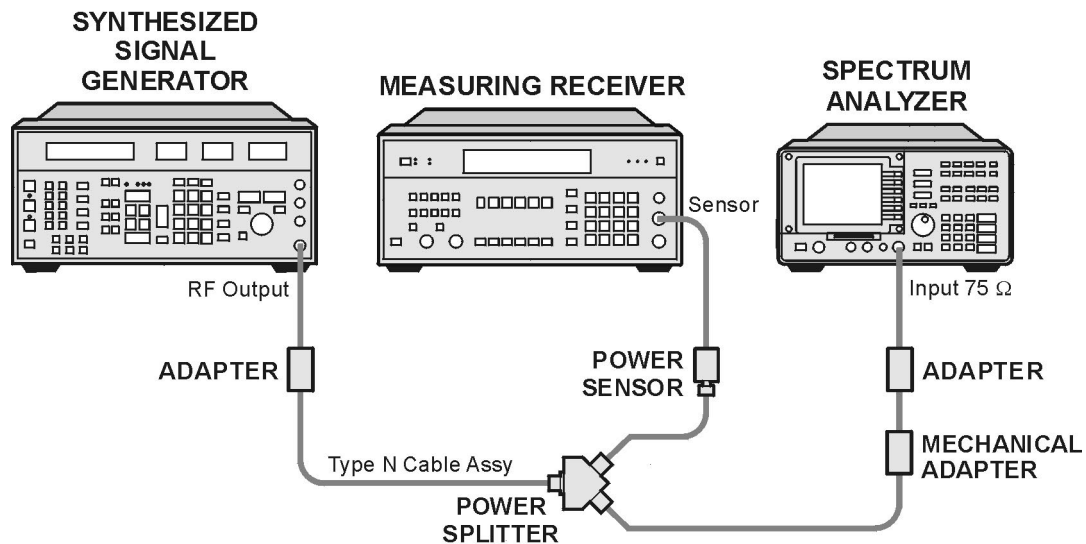


ws18e

CAUTION

Use only $75\ \Omega$ cables, connectors, or adapters on instruments with $75\ \Omega$ inputs, or damage to the input connector will occur.

Figure 2-12 Frequency Response Test Setup, ≥ 100 kHz, 8591C and 75 Ω Input



ws19e

3. Press INSTRUMENT PRESET on the synthesized signal generator. Set the synthesized signal generator controls as follows:

CW 300 MHz

FREQ STEP 50 MHz

POWER LEVEL -8 dBm

4. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 50, MHz

SPAN, 5, MHz

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

AMPLITUDE, -10, dBm

SCALE LOG LIN (LOG), 1, dB

BW, 1, MHz

VID BW AUTO MAN, 3, kHz

PEAK SEARCH

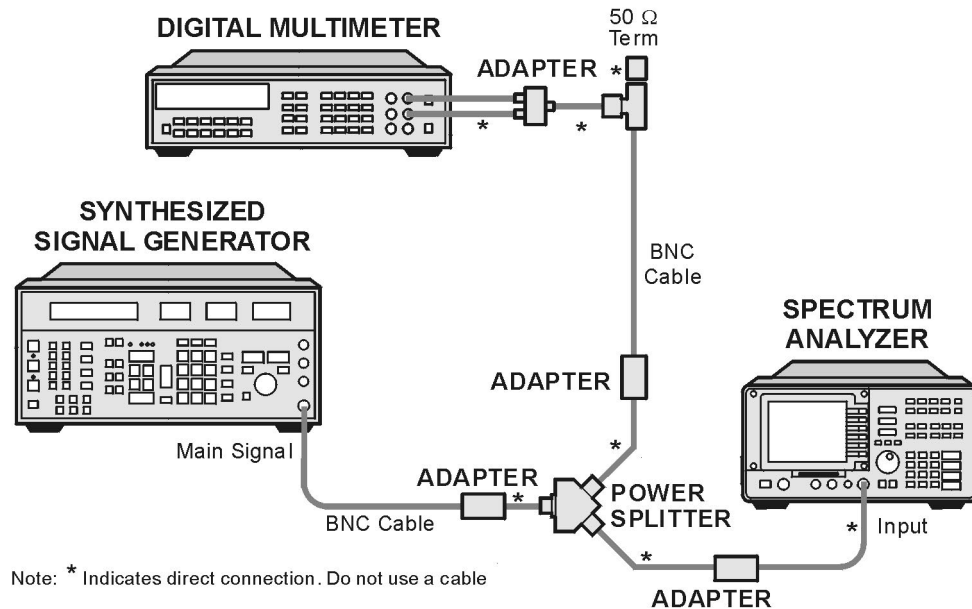
MKR FCTN, MK TRACK ON OFF (ON)

19a. Frequency Response, 8591E and 8591C

5. Adjust the synthesized signal generator power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.05 \text{ dB}$.
6. Set the sensor Cal Factor on the measuring receiver as indicated in [Table 2a-18](#), then press **RATIO**.
7. Set the synthesized signal generator CW to 50 MHz.
8. Press **FREQUENCY**, 50, **MHz** on the spectrum analyzer.
9. Adjust the synthesized signal generator power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.05 \text{ dB}$.
10. Set the sensor Cal Factor on the measuring receiver as indicated in [Table 2a-18](#), then record the negative of the power ratio displayed on the measuring receiver in [Table 2a-18](#) as the Error Relative to 300 MHz at 50 MHz.
11. Repeat [step 7](#) through [step 10](#) for each frequency below 50 MHz.
12. Press **FREQUENCY**, 50, **MHz** and then **Freq INCR set**, 50, **MHz** on the synthesized signal generator.
13. On the synthesized signal generator, press **CW**, $\uparrow$ (step-up key). Then, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step-up key).
14. Set the sensor Cal Factor on the measuring receiver as indicated in [Table 2a-18](#), then record the negative of the power ratio displayed on the measuring receiver in [Table 2a-18](#) as the Error Relative to 300 MHz at 100 MHz.
15. Repeat [step 13](#) through [step 14](#) for the remaining frequencies listed in [Table 2a-18](#).

If your spectrum analyzer is equipped with 75 W input, continue with [step 16](#). If your spectrum analyzer is *not* equipped with 75 W input, skip [step 16](#) through [step 17](#) and proceed to [step 18](#).

16. Starting with the error at 1 MHz, calculate the Corrected Error by subtracting the System Error from the Error Relative to 300 MHz. Record the result in [Table 2a-18](#).
17. Skip [step 18](#) through [step 29](#) and proceed to "Test Results."
18. Connect the equipment as shown in [Figure 2a-14](#).

Figure 2a-13 Frequency Response Test Setup, <100 kHz

ws110e

19. Set the synthesizer/function generator controls as follows:

FREQUENCY, 100, kHz

AMPLITUDE, -8, dBm

AMPTD INCR, 0.05, dB

20. Set the DVM as follows:

Function Sync AC Volts

Math dBm

Res Register 50 Ω

Front/Rear Terminals Front

Resolution 7.5 digits

21. On spectrum analyzer, press the following keys:

Frequency, 100, kHz

SPAN, 100, kHz

22. Adjust the synthesizer/function generator amplitude until the spectrum analyzer marker reads -14 dBm. This corresponds to the amplitude at 100 kHz recorded in [step 17](#). Record the DVM amplitude in [Table 2a-19](#).

23. On the spectrum analyzer, press **Peak Search, Marker, Marker Δ** .

19a. Frequency Response, 8591E and 8591C

24. Set the spectrum analyzer and the synthesizer/function generator to the next frequency setting listed in [Table 2a-19](#).
25. Adjust the frequency synthesizer/function generator amplitude for a Sig-Δ-Trk amplitude reading of 0.00 ± 0.05 dB.
26. Record the DVM amplitude setting in [Table 2a-19](#).
27. Calculate the Response Relative to 100 kHz by subtracting the DVM Amplitude from the DVM Amplitude at 100 kHz. Record the result as the Response Relative to 100 kHz in [Table 2a-19](#).
28. Calculate the Response Relative to 300 kHz by adding the 100 kHz Error Relative to 300 MHz, recorded in [Table 2a-18](#), to the Response Relative to 100 kHz, recorded in [Table 2a-19](#). Record the result as the Response Relative to 300 kHz in [Table 2a-19](#).
29. Repeat [step 23](#) through [step 26](#) for each frequency setting listed in [Table 2a-19](#).

Test Results

Perform the following steps to verify the frequency response of the spectrum analyzer.

1. Enter the most positive Response Relative to 300 MHz from [Table 2a-19](#).
_____ dB
2. If your spectrum analyzer is equipped with 75 W input, enter the most positive Corrected Error from [Table 2a-18](#). If your spectrum analyzer is not equipped with 75 W input, enter the most positive Error Relative to 300 MHz from [Table 2a-18](#).
_____ dB
3. Record the most positive number from step 1 and step 2 above as TR Entry 1 in the appropriate performance verification test record in Chapter 3.

The absolute value should be less than 1.5 dB.
4. Enter the most negative Response Relative to 300 MHz from [Table 2a-19](#).
_____ dB
5. If your spectrum analyzer is equipped with 75 W input, enter the most negative Corrected Error from [Table 2a-18](#). If your spectrum analyzer is not equipped with 75 W input, enter the most negative Error Relative to 300 MHz from [Table 2a-18](#).
_____ dB

6. Record the most negative number from [step 4](#) and [step 5](#) above as TR Entry 2 in the appropriate performance verification test record in Chapter 3.

The absolute value should be less than 1.5 dB.

7. Subtract the most negative number of [step 6](#) from the most positive number of [step 3](#). Record the result as TR Entry 3 in the appropriate performance verification test record in Chapter 3.

The result should be less than 2.0 dB.

Performance verification test “Frequency Response” is now complete.

Table 2a-18 Frequency Response Errors Worksheet

Spectrum Analyzer Frequency (MHz)	Error Relative to 300 MHz (dB)	CAL FACTOR Frequency (GHz)	System Error (75 Ω input only) (dB)	Corrected Error (75 Ω input only) (dB)
100 kHz	_____	0.0001	N/A	N/A
200 kHz	_____	0.0001	N/A	N/A
1	_____	0.001	_____	_____
5	_____	0.003	_____	_____
10	_____	0.01	_____	_____
20	_____	0.01	_____	_____
50	_____	0.03	_____	_____
100	_____	0.1	_____	_____
150	_____	0.1	_____	_____
200	_____	0.3	_____	_____
250	_____	0.3	_____	_____
300 (Ref)	_____	0.3	_____	_____
350	_____	0.3	_____	_____
400	_____	0.3	_____	_____
450	_____	0.3	_____	_____
500	_____	0.3	_____	_____
550	_____	1.0	_____	_____
600	_____	1.0	_____	_____
650	_____	1.0	_____	_____

Table 2a-18 Frequency Response Errors Worksheet (Continued)

Spectrum Analyzer Frequency (MHz)	Error Relative to 300 MHz (dB)	CAL FACTOR Frequency (GHz)	System Error (75 Ω input only) (dB)	Corrected Error (75 Ω input only) (dB)
700	_____	1.0	_____	_____
750	_____	1.0	_____	_____
800	_____	1.0	_____	_____
850	_____	1.0	_____	_____
900	_____	1.0	_____	_____
950	_____	1.0	_____	_____
1000	_____	1.0	_____	_____
1050	_____	1.0	_____	_____
1100	_____	1.0	_____	_____
1150	_____	1.0	_____	_____
1200	_____	1.0	_____	_____
1250	_____	1.0	_____	_____
1300	_____	1.0	_____	_____
1350	_____	1.0	_____	_____
1400	_____	1.0	_____	_____
1450	_____	1.0	_____	_____
1500	_____	1.0	_____	_____
1550	_____	2.0	_____	_____
1600	_____	2.0	_____	_____
1650	_____	2.0	_____	_____
1700	_____	2.0	_____	_____
1750	_____	2.0	_____	_____
1800	_____	2.0	_____	_____

Table 2a-19 Frequency Response, ≤100 kHz Worksheet

Spectrum Analyzer Frequency (kHz)	Frequency Synthesizer Amplitude (dBm)	Response Relative to 100 MHz	Response Relative to 300 MHz
100	_____	0 (Ref)	_____
75	_____	_____	_____
50	_____	_____	_____
20	_____	_____	_____
9	_____	_____	_____

20a. Frequency Response, 8593E

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper power level is adjusted at 300 MHz to place the displayed signal at the analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new synthesized sweeper frequency and analyzer center frequency setting, the synthesized sweeper power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency). A low frequency function generator is used for frequencies below 10 MHz in addition to using a DVM as a power sensor.

The related adjustments for this performance verification test are “YTF Adjustment,” “Dual Mixer Bias Adjustment,” and “Frequency Response Adjustment.”

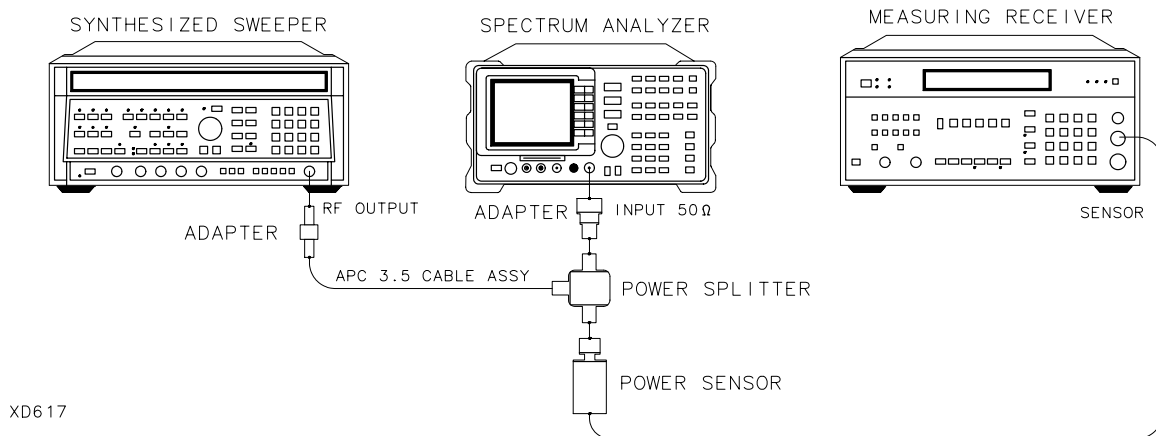
Equipment Required

- Synthesized sweeper
- Measuring receiver (*used as a power meter*)
- Synthesizer/function generator
- Power sensor, 50 MHz to 26.5 GHz
- Power Sensor, 100 kHz to 4.2 GHz
- Power splitter
- Termination, 50 Ω
- Adapter, Type N (m) to APC 3.5 (m)
- Adapter, Type N (f) to BNC (f)
- Adapter, Type N (m) to BNC (f) (*2 required*)
- Adapter, 3.5 mm (f) to 3.5mm (f)
- Adapter, BNC (f) to SMA (m)
- Cable, BNC, 122 cm (48 in)
- Cable, APC 3.5, 91 cm (36 in) (*2 required*)
- BNC tee (BNC f, m, f)
- Dual banana plug to BNC (f)
- Digital Voltmeter

Procedure

1. Zero and calibrate the measuring receiver and 100 kHz to 4.2 GHz power sensor in LOG mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in [Figure 2a-14](#).

Figure 2a-14 Frequency Response Test Setup, ≥ 10 MHz



XD617

3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:
 - CW 300 MHz
 - FREQ STEP 100 MHz
 - POWER LEVEL -8 dBm
4. Press **PRESET** on the spectrum analyzer, and wait for the preset routine to finish. Then press the following analyzer keys:
 - FREQUENCY, Band Lock, 0–2.9 GHz BAND 0**
 - FREQUENCY, 300, MHz**
 - CF STEP AUTO MAN, 100, MHz**
 - SPAN, 10, MHz**
 - AMPLITUDE, REF LVL, 10, -dBm**
 - SCALE LOG LIN (LOG), 1, dB**
 - BW, RES BW AUTO MAN, 1, MHz**
 - VID BW AUTO MAN, 10, kHz**
 - PEAK SEARCH, MKR FCTN, MK TRACK ON OFF (ON)**
5. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
6. Press RATIO on the measuring receiver.

20a. Frequency Response, 8593E**Frequency Response, Band 0, ≥ 10 MHz**

7. Set the synthesized sweeper CW FREQUENCY to 10 MHz.
8. Set the spectrum analyzer CENTER FREQUENCY to 10 MHz.
9. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of -14 dBm ± 0.1 dB.
10. Record the negative of the power ratio displayed on the measuring receiver as the Measuring Receiver Reading at 10 MHz in [Table 2a-20](#).
11. On the synthesized sweeper, press **CW**, $\uparrow$ (step up) and, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-20](#).
12. At each new frequency repeat [step 9](#) through [step 10](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-20](#).

Frequency Response, Band 1

1. Zero and calibrate the measuring receiver and 50 kHz to 26.5 GHz power sensor in LOG mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in [Figure 2a-14](#).
3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:

CW 300 MHz

FREQ STEP 100 MHz

POWER LEVEL -8 dBm

4. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Then press the following analyzer keys:

FREQUENCY, Band Lock, 0–2.9 GHz BAND 0

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 100, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, 10, $-$ dBm

SCALE LOG LIN (LOG), 1, dB

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH, MKR FCTN, MK TRACK ON OFF (ON)

5. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
6. Press **RATIO** on the measuring receiver.
7. Press the following spectrum analyzer keys:
FREQUENCY, Band Lock, 2.75 - 6.5 BAND 1
FREQUENCY, 2.75, GHz
SPAN, 10, MHz
BW, RES BW AUTO MAN, 1, MHz
VID BW AUTO MAN, 10, kHz
PEAK SEARCH
MKR FCTN, MK TRACK ON OFF (ON)
8. Set the synthesized sweeper CW to 2.75 GHz.
9. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.
10. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
11. Record the negative of the power ratio displayed on the measuring receiver as the Measuring Receiver Reading at 2.75 GHz in [Table 2a-21](#).
12. On the synthesized sweeper, press **CW**, $\uparrow$ (step up) and, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-21](#).
13. At each new frequency repeat [step 10](#) through [step 11](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-21](#).

Frequency Response, Band 2

14. Press the following spectrum analyzer keys:
FREQUENCY, Band Lock 6.0 -12.8 BAND 2
FREQUENCY, 6.0, GHz
CF STEP AUTO MAN, 200, MHz
SPAN, 10, MHz
BW, RES BW AUTO MAN, 1, MHz
VID BW AUTO MAN, 10, kHz
PEAK SEARCH
MKR FCTN, MK TRACK ON OFF (ON)

20a. Frequency Response, 8593E

15. Set the synthesized sweeper CW to 6.0 GHz.
16. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.
17. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
18. Record the negative of the power ratio displayed on the measuring receiver as the Measuring Receiver Reading at 6.0 GHz in [Table 2a-22](#).
19. On the synthesized sweeper, press **CW**, $\uparrow$ (step up) and, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-22](#).
20. At each new frequency repeat [step 17](#) through [step 18](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-22](#).

Frequency Response, Band 3

21. On the spectrum analyzer, press the following keys:

FREQUENCY, Band Lock, 12.4-19.4 BAND 3

FREQUENCY, 12.0, GHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

22. Set the synthesized sweeper CW to 12.4 GHz.
23. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.
24. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
25. Record the negative of the power ratio displayed on the measuring receiver as the Measuring Receiver Reading at 12.4 GHz in [Table 2a-23](#).
26. On the synthesized sweeper, press **CW**, $\uparrow$ (step up) and, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-23](#).
27. At each new frequency repeat [step 24](#) through [step 25](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-23](#).

Frequency Response, Band 4

28. On the spectrum analyzer, press the following keys:

FREQUENCY, Band Lock, 19.1-22.0 BAND 4

FREQUENCY, 19.1, GHz

CF STEP AUTO MAN, 100, MHz

SPAN, 5, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

29. Set the synthesized sweeper CW to 19.1 GHz.

30. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.

31. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.

32. Record the negative of the power ratio displayed on the measuring receiver as the Measuring Receiver Reading at 19.1 GHz in [Table 2a-24](#).

33. On the synthesized sweeper, press **CW**, $\uparrow$ (step up) and, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-24](#).

34. At each new frequency repeat [step 31](#) through [step 32](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-24](#).

Frequency Response, Band 4 for Option 026 or 027

35. On the spectrum analyzer, press the following keys:

FREQUENCY, Band Lock, 19.1-26.5 BAND 4

FREQUENCY, 19.1, GHz

CF STEP AUTO MAN, 100, MHz

CF STEP AUTO MAN, (Option 026), 200, MHz

SPAN, 5, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

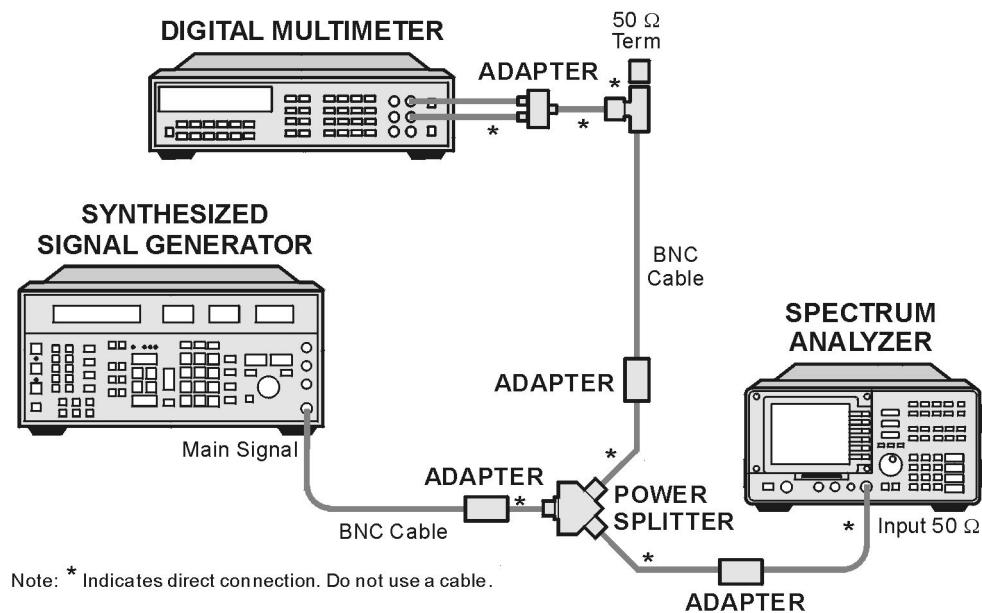
MKR FCTN, MK TRACK ON OFF (ON)

20a. Frequency Response, 8593E

36. Set the synthesized sweeper CW to 19.1 GHz.
37. On the spectrum analyzer, press **AMPLITUDE**, **PRESEL PEAK**.
38. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
39. Record the negative of the power ratio displayed on the measuring receiver as the Measuring Receiver Reading at 19.1 GHz in [Table 2a-25](#).
40. On the synthesized sweeper, press **CW**, $\uparrow$ (step up) and, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-25](#).
41. At each new frequency repeat [step 38](#) through [step 39](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-25](#).

Frequency Response, Band 0, < 10 MHz

42. Connect the equipment as shown in [Figure 2a-15](#).

Figure 2a-15 Frequency Response Test Setup, < 10 MHz

ws111e

43. Set the synthesizer/function generator controls as follows:

FREQUENCY, 10, MHz**AMPLITUDE, -8, dBm****AMPTD INCR, 0.05, dB**

44. Set the DVM as follows:

Function Sync AC Volts
Math dBm
Res Register 50 Ω
Front/Rear Terminals Front
Resolution 7.5 digits

45. On the analyzer, press the following keys:

Frequency, 10, MHz

SPAN, 100, kHz

46. Adjust the synthesizer/function generator amplitude until the spectrum analyzer marker reads -14 dBm. This corresponds to the amplitude at 10 MHz recorded in [step 11](#). Record the DVM Amplitude at 10 MHz in [Table 2a-26](#).

47. On the spectrum analyzer, press **Peak Search, Marker, Marker D**.

48. Set the spectrum analyzer and the synthesizer/function generator to the next frequency listed in [Table 2a-26](#).

49. Adjust the synthesizer/function generator amplitude for a Sig Δ -Trk amplitude reading of $0.00 \text{ dBm} \pm 0.05 \text{ dB}$.

50. Record the DVM amplitude setting in [Table 2a-26](#) as the DVM Amplitude.

51. Repeat [step 48](#) through [step 50](#) for the remaining frequency settings listed in [Table 2a-26](#).

52. For each of the frequencies in [Table 2a-26](#), subtract the DVM Amplitude from the DVM Amplitude at 10 MHz recorded in [step 46](#). Record each result as the Response Relative to 100 MHz in [Table 2a-26](#).

53. Add the 100 kHz Error Relative to 50 MHz from [Table 2a-20](#) to each Response Relative to 100 MHz in [Table 2-31](#) and record each result as the Response Relative to 300 MHz in [Table 2a-20](#).

20a. Frequency Response, 8593E**Test Results****Frequency Response, Band 0**

1. Enter the most positive Response Relative to 300 MHz from
[Table 2a-26](#):
_____ dB
2. Enter the most positive Measuring Receiver Reading from
[Table 2a-20](#):
_____ dB
3. Record the most positive number from step 1 and step 2 above as
TR Entry 1 in the appropriate performance verification test record in
Chapter 3.
4. Enter the most negative Response Relative to 300 MHz from
[Table 2a-26](#):
_____ dB
5. Enter the most negative Measuring Receiver Reading from
[Table 2a-20](#):
_____ dB
6. Record the most positive number from step 1 and step 2 above as
TR Entry 2 in the appropriate performance verification test record in
Chapter 3.
7. Subtract the most negative number of step 6 from the most positive
number of step 3. Record the result as TR Entry 3 in the appropriate
performance verification test record in Chapter 3 (relative flatness).

Frequency Response, Band 1

8. Enter the most positive Measuring Receiver Reading from
[Table 2a-21](#) as TR Entry 4 in the appropriate performance
verification test record in Chapter 3.
9. Enter the most negative Measuring Receiver Reading from
[Table 2a-21](#) as TR Entry 5 in the appropriate performance
verification test record in Chapter 3
10. Subtract the most negative number of step 9 from the most positive
number of step 8. Record the result as TR Entry 6 in the appropriate
performance verification test record in Chapter 3.

Frequency Response, Band 2

11. Enter the most positive Measuring Receiver Reading from [Table 2a-22](#) as TR Entry 7 in the appropriate performance verification test record in Chapter 3.
12. Enter the most negative Measuring Receiver Reading from [Table 2a-22](#) as TR Entry 8 in the appropriate performance verification test record in Chapter 3.
13. Subtract the most negative number of step 12 from the most positive number of step 11. Record the result as TR Entry 9 in the appropriate performance verification test record in Chapter 3.

Frequency Response, Band 3

14. Enter the most positive Measuring Receiver Reading from [Table 2a-23](#) as TR Entry 10 in the appropriate performance verification test record in Chapter 3.
15. Enter the most negative Measuring Receiver Reading from [Table 2a-23](#) as TR Entry 11 in the appropriate performance verification test record in Chapter 3.
16. Subtract the most negative number of step 15 from the most positive number of step 14. Record the result as TR Entry 12 in the appropriate performance verification test record in Chapter 3.

Frequency Response, Band 4

If you are testing a spectrum analyzer equipped with Option 026 or 027, continue with [step 20](#). Otherwise, continue with [step 17](#).

17. Enter the most positive Measuring Receiver Reading from [Table 2a-24](#) as TR Entry 13 in the appropriate performance verification test record in Chapter 3.
18. Enter the most negative Measuring Receiver Reading from [Table 2a-24](#) as TR Entry 14 in the appropriate performance verification test record in Chapter 3.
19. Subtract the most negative number of step 18 from the most positive number of step 17. Record the result as TR Entry 15 in the appropriate performance verification test record in Chapter 3.

Performance verification test “Frequency Response” is now complete for spectrum analyzers which are not equipped with Option 026 or 027.

20a. Frequency Response, 8593E**Frequency Response, Band 4 for Option 026 or 027**

20. Enter the most positive Measuring Receiver Reading from [Table 2a-25](#) as TR Entry 13 in the appropriate performance verification test record in Chapter 3.
21. Enter the most negative Measuring Receiver Reading from [Table 2a-25](#) as TR Entry 14 in the appropriate performance verification test record in Chapter 3
22. Subtract the most negative number of step 21 from the most positive number of step 20. Record the result as TR Entry 6 in the appropriate performance verification test record in Chapter 3.

Performance verification test “Frequency Response” is now complete for spectrum analyzers equipped with Option 026 or 027.

Table 2a-20 Frequency Response Band 0, ≥ 10 MHz

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
10	_____	0.05
20	_____	0.05
50	_____	0.05
100	_____	0.05
200	_____	0.05
300(Ref)	_____	0.05
400	_____	0.05
500	_____	0.05
600	_____	0.05
700	_____	0.05
800	_____	0.05
900	_____	0.05
1000	_____	0.05
1100	_____	2.0
1200	_____	2.0
1300	_____	2.0
1400	_____	2.0
1500	_____	2.0
1600	_____	2.0

Table 2a-20 Frequency Response Band 0, ≥ 10 MHz (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
1700	_____	2.0
1800	_____	2.0
1900	_____	2.0
2000	_____	2.0
2100	_____	2.0
2200	_____	2.0
2300	_____	2.0
2400	_____	2.0
2500	_____	3.0
2600	_____	3.0
2700	_____	3.0
2800	_____	3.0
2900	_____	3.0

Table 2a-21 Frequency Response Band 1

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
2.75	_____	3.0
2.8	_____	3.0
2.9	_____	3.0
3.0	_____	3.0
3.1	_____	3.0
3.2	_____	3.0
3.3	_____	3.0
3.4	_____	3.0
3.5	_____	4.0
3.6	_____	4.0
3.7	_____	4.0
3.8	_____	4.0

Table 2a-21 Frequency Response Band 1 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
3.9	_____	4.0
4.0	_____	4.0
4.1	_____	4.0
4.2	_____	4.0
4.3	_____	4.0
4.4	_____	4.0
4.5	_____	5.0
4.6	_____	5.0
4.7	_____	5.0
4.8	_____	5.0
4.9	_____	5.0
5.0	_____	5.0
5.1	_____	5.0
5.2	_____	5.0
5.3	_____	5.0
5.4	_____	5.0
5.5	_____	6.0
5.6	_____	6.0
5.7	_____	6.0
5.8	_____	6.0
5.9	_____	6.0
6.0	_____	6.0
6.1	_____	6.0
6.2	_____	6.0
6.3	_____	6.0
6.4	_____	6.0
6.5	_____	6.0

Table 2a-22 Frequency Response Band 2

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
6.0	_____	6.0
6.2	_____	6.0
6.4	_____	6.0
6.6	_____	7.0
6.8	_____	7.0
7.0	_____	7.0
7.2	_____	7.0
7.4	_____	7.0
7.6	_____	8.0
7.8	_____	8.0
8.0	_____	8.0
8.2	_____	8.0
8.4	_____	8.0
8.6	_____	9.0
8.8	_____	9.0
9.0	_____	9.0
9.2	_____	9.0
9.4	_____	9.0
9.6	_____	10.0
9.8	_____	10.0
10.0	_____	10.0
10.2	_____	10.0
10.4	_____	10.0
10.6	_____	11.0
10.8	_____	11.0
11.0	_____	11.0
11.2	_____	11.0
11.4	_____	11.0

Table 2a-22 Frequency Response Band 2 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
11.6	_____	12.0
11.8	_____	12.0
12.0	_____	12.0
12.2	_____	12.0
12.4	_____	12.0
12.6	_____	13.0
12.8	_____	13.0

Table 2a-23 Frequency Response Band 3

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
12.4	_____	12.0
12.6	_____	13.0
12.8	_____	13.0
13.0	_____	13.0
13.2	_____	13.0
13.4	_____	13.0
13.6	_____	14.0
13.8	_____	14.0
14.0	_____	14.0
14.2	_____	14.0
14.4	_____	14.0
14.6	_____	15.0
14.8	_____	15.0
15.0	_____	15.0
15.2	_____	15.0
15.4	_____	15.0
15.6	_____	16.0

Table 2a-23 Frequency Response Band 3 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
15.8	_____	16.0
16.0	_____	16.0
16.2	_____	16.0
16.4	_____	16.0
16.6	_____	17.0
16.8	_____	17.0
17.0	_____	17.0
17.2	_____	17.0
17.4	_____	17.0
17.6	_____	18.0
17.8	_____	18.0
18.0	_____	18.0
18.2	_____	18.0
18.4	_____	18.0
18.6	_____	19.0
18.8	_____	19.0
19.0	_____	19.0
19.2	_____	19.0
19.4	_____	19.0

Table 2a-24 Frequency Response Band 4

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
19.1	_____	19.0
19.2	_____	19.0
19.3	_____	19.0
19.4	_____	19.0
19.5	_____	20.0

Table 2a-24 Frequency Response Band 4 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
19.6	_____	20.0
19.7	_____	20.0
19.8	_____	20.0
19.9	_____	20.0
20.0	_____	20.0
20.1	_____	20.0
20.2	_____	20.0
20.3	_____	20.0
20.4	_____	20.0
20.5	_____	21.0
20.6	_____	21.0
20.7	_____	21.0
20.8	_____	21.0
20.9	_____	21.0
21.0	_____	21.0
21.1	_____	21.0
21.2	_____	21.0
21.3	_____	21.0
21.4	_____	21.0
21.5	_____	22.0
21.6	_____	22.0
21.7	_____	22.0
21.8	_____	22.0
21.9	_____	22.0
22.0	_____	22.0

Table 2a-25 Frequency Response Band 4, Option 026 or 027

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
19.1	_____	19.0
19.3	_____	19.0
19.5	_____	20.0
19.7	_____	20.0
19.9	_____	20.0
20.1	_____	20.0
20.3	_____	20.0
20.5	_____	21.0
20.7	_____	21.0
20.9	_____	21.0
21.1	_____	21.0
21.3	_____	21.0
21.5	_____	22.0
21.7	_____	22.0
21.9	_____	22.0
22.1	_____	22.0
22.3	_____	22.0
22.5	_____	23.0
22.7	_____	23.0
22.9	_____	23.0
23.1	_____	23.0
23.3	_____	23.0
23.5	_____	24.0
23.7	_____	24.0
23.9	_____	24.0
24.1	_____	24.0
24.3	_____	24.0
24.5	_____	25.0

Table 2a-25 Frequency Response Band 4, Option 026 or 027 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
24.7	_____	25.0
24.9	_____	25.0
25.1	_____	25.0
25.3	_____	25.5
25.5	_____	25.5
25.7	_____	25.5
25.9	_____	26.0
26.1	_____	26.0
26.3	_____	26.5
26.5	_____	26.5

Table 2a-26 Frequency Response Band 0, <10 MHz

Spectrum Analyzer Frequency Synthesizer Frequency	DVM Amplitude (dBm)	Response Relative to 50 MHz	Response Relative to 300 MHz
10 MHz	_____	0 (Ref)	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____

21a. Frequency Response, 8594E and 8594Q

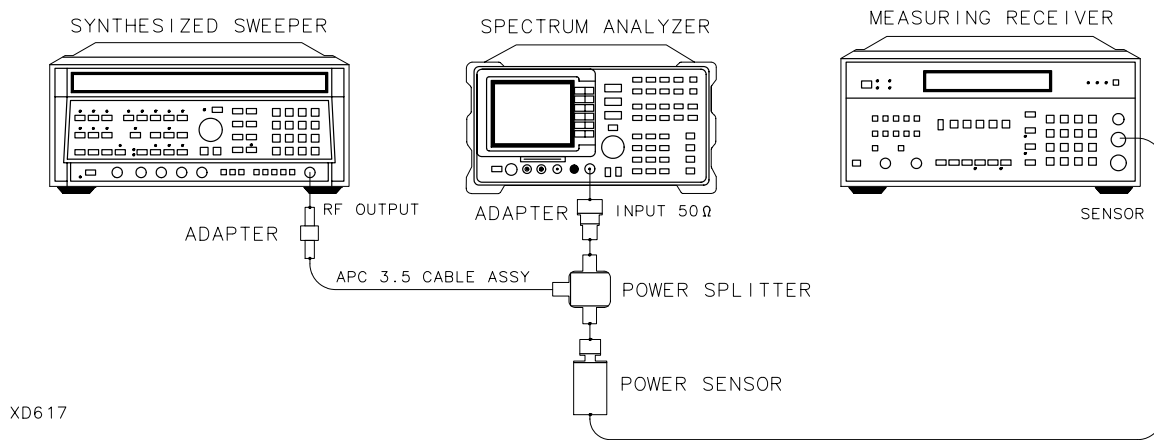
The RF INPUT coupling is first set to the dc coupled mode. The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper's power level is adjusted at 300 MHz to place the displayed signal at the analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new sweeper frequency and analyzer center frequency setting, the sweeper's power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency). A low frequency function generator is used for frequencies below 10 MHz in addition to using a DVM as a power sensor.

The related adjustments for this performance verification test are “Dual Mixer Bias Adjustment” and “Frequency Response Adjustment.”

Equipment Required

- Synthesized sweeper
- Measuring receiver (*used as a power meter*)
- Synthesizer/function generator
- Power sensor, 100 MHz to 4.2 GHz
- Power splitter
- Termination, 50 Ω
- Adapter, Type N (m) to APC 3.5 (m)
- Adapter, Type N (f) to BNC (f)
- Adapter, Type N (m) to BNC (f) (*2 required*)
- Adapter, 3.5 mm (f) to 3.5mm (f)
- Adapter, BNC (f) to SMA (m)
- Cable, BNC, 122 cm (48 in)
- Cable, APC 3.5, 91 cm (36 in) (*2 required*)
- BNC tee (BNC f, m, f)
- Dual banana plug to BNC (f)
- Digital Voltmeter

Figure 2a-16 Frequency Response Test Setup, ≥ 10 MHz



Procedure

1. Zero and calibrate the measuring receiver and 100 kHz to 4.2 GHz power sensor in log mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in [Figure 2a-16](#).
3. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 300 MHz

FREQ STEP 100 MHz

POWER LEVEL -8 dBm

4. On the spectrum analyzer, press **PRESET**. Wait for the preset to finish, then set the spectrum analyzer controls by pressing the following keys:

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 100, MHz

SPAN, 5, MHz

AMPLITUDE, -10, dBm

SCALE LOG LIN (LOG), 1, dB

AMPLITUDE, More 1 of 3, More 2 of 3, COUPLE AC DC (DC)

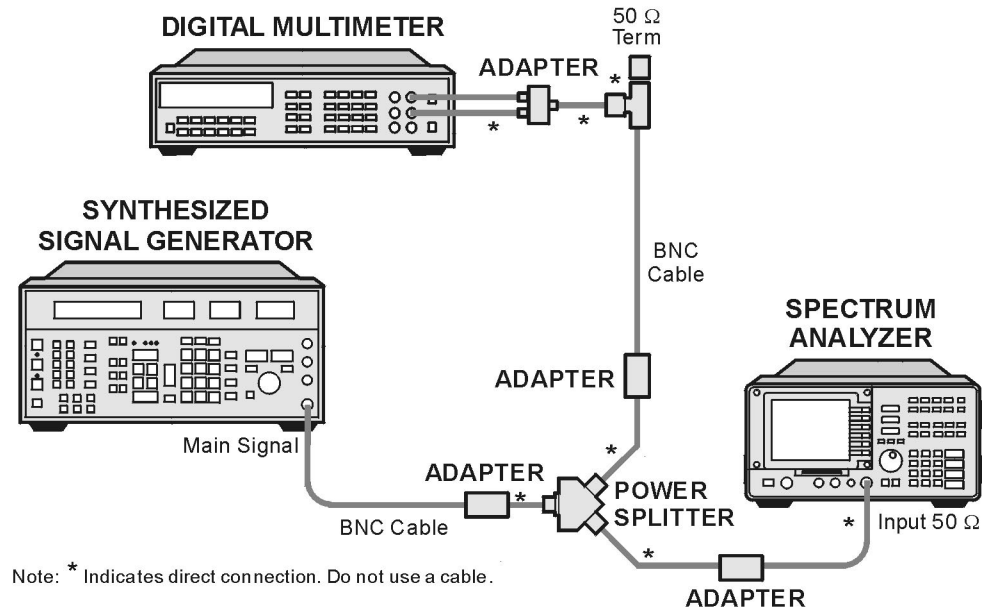
BW, 1, MHz

VID BW AUTO MAN, 10, kHz

5. On the spectrum analyzer, press **PEAK SEARCH**, **SIGNAL TRACK (ON)**.
6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
7. Set the power sensor cal factor for the measuring receiver, then press **RATIO**.
8. Set the synthesized sweeper CW to 10 MHz.
9. Press **FREQUENCY**, 10, **MHz** on the spectrum analyzer.
10. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
11. Set the power sensor cal factor for the measuring receiver, then record the power ratio displayed on the measuring receiver below.
Measuring Receiver Power Ratio dB
12. Record the negative of the power ratio as the Measuring Receiver Reading at 10 MHz in [Table 2a-27](#).
13. Set the synthesized sweeper CW to 20 MHz.
14. Press **FREQUENCY**, 20 **MHz** on the spectrum analyzer.
15. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
16. Set the power sensor cal factor for the measuring receiver, then record the negative of the power ratio displayed on the measuring receiver in [Table 2a-27](#) as the Measuring Receiver Reading at 20 MHz.
17. On the synthesized sweeper, press **CW**, and $\uparrow$ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-27](#).
18. At each new frequency repeat [step 15](#) through [step 17](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-27](#).

19. Connect the equipment as shown in [Figure 2a-17](#).

Figure 2a-17 Frequency Response Test Setup, < 10 MHz



ws111e

20. Set the synthesizer/function generator controls as follows:

FREQUENCY, 10, MHz

AMPLITUDE, -8, dBm

AMPTD INCR, 0.05, dB

21. Set the DVM as follows:

Function Sync AC Volts

Math dBm

Res Register 50 Ω

Front/Rear Terminals Front

Resolution 7.5 digits

22. On the analyzer, press **Frequency, 10, MHz**.

23. Adjust the synthesizer/function generator amplitude until the spectrum analyzer marker reads -14 dBm. This corresponds to the Amplitude at 10 MHz recorded in [step 11](#). Record the DVM Amplitude at 10 MHz in [Table 2a-28](#).

24. On the spectrum analyzer, press **Peak Search, Marker, Marker Δ**.

25. Set the spectrum analyzer and the synthesizer/function generator to the next frequency listed in [Table 2a-28](#).
26. Adjust the synthesizer/function generator amplitude for a Sig Δ-Trk amplitude reading of $0.00 \text{ dBm} \pm 0.05 \text{ dB}$.
27. Record the DVM Amplitude in [Table 2a-28](#).
28. Repeat [step 25](#) through [step 27](#) for each frequency setting listed in [Table 2a-28](#).
29. For each frequency in [Table 2a-28](#), subtract the DVM Amplitude from the DVM Amplitude at 10 MHz recorded in [step 23](#). Record the result as the Response Relative to 300 kHz in [Table 2a-28](#).
30. Add the 10 MHz Measuring Receiver Reading recorded in [step 11](#), to each Response Relative to 10 MHz in [Table 2a-28](#). Record the results as the Response Relative to 300 MHz in [Table 2a-28](#).

Test Results

Perform the following steps to verify the frequency response of the spectrum analyzer.

1. Enter the most positive Response Relative to 300 MHz from [Table 2a-28](#):
_____dB
2. Enter the most positive Measuring Receiver Reading from [Table 2a-27](#):
_____dB
3. Record the most positive number from step 1 and step 2 above as TR Entry 1 in the appropriate performance verification test record in Chapter 3 (absolute referenced to 300 MHz).
The absolute value should be less than 1.5 dB.
4. Enter the most negative Response Relative to 300 MHz from [Table 2a-28](#):
_____dB
5. Enter the most negative Measuring Receiver Reading from [Table 2a-27](#):
_____dB
6. Record the most negative number from step 4 and step 5 above as TR Entry 2 in the appropriate performance verification test record in Chapter 3 (absolute referenced to 300 MHz).
The absolute value should be less than 1.5 dB.

21a. Frequency Response, 8594E and 8594Q

7. Subtract the most negative number of step 6 from the most positive number of step 3. Enter this value as TR Entry 3 in the appropriate performance verification test record in Chapter 3 (relative flatness).

The result should be less than 2.0 dB.

Performance verification test “Frequency Response” is now complete.

Table 2a-27 Frequency Response, ≥ 10 MHz

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
10	_____	0.05
20	_____	0.05
50	_____	0.05
100	_____	0.05
200	_____	0.05
300 (Ref)	_____	0.05
400	_____	0.05
500	_____	0.05
600	_____	0.05
700	_____	0.05
800	_____	0.05
900	_____	0.05
1000	_____	0.05
1100	_____	2.0
1200	_____	2.0
1300	_____	2.0
1400	_____	2.0
1500	_____	2.0
1600	_____	2.0
1700	_____	2.0
1800	_____	2.0
1900	_____	2.0
2000	_____	2.0

Table 2a-27 Frequency Response, ≥ 10 MHz (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2100	_____	2.0
2200	_____	2.0
2300	_____	2.0
2400	_____	2.0
2500	_____	3.0
2600	_____	3.0
2700	_____	3.0
2800	_____	3.0
2900	_____	3.0

Table 2a-28 Frequency Response, < 10 MHz

Spectrum Analyzer Synthesizer/Level Generator Frequency	Synthesizer Level Generator Amplitude (dBm)	Response Relative to 10 MHz	Response Relative to 300 MHz
10 MHz	_____	0 (Ref)	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____

22a. Frequency Response, 8595E

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper power level is adjusted at 300 MHz to place the displayed signal at the analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new synthesized sweeper frequency and analyzer center frequency setting, the synthesized sweeper power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency). A low frequency function generator is used for frequencies below 10 MHz in addition to using a DVM as a power sensor.

The related adjustments for this performance verification test are “YTF Adjustment,” “Dual Mixer Bias Adjustment,” and “Frequency Response Adjustment.”

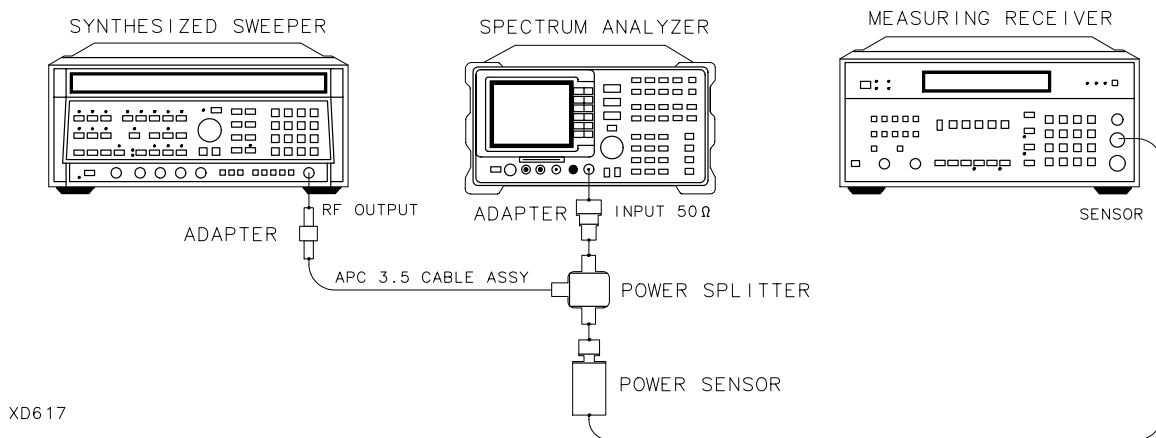
Equipment Required

- Synthesized sweeper
- Measuring receiver (*used as a power meter*)
- Synthesizer/function generator
- Power sensor, 100 kHz to 4.2 GHz
- Power sensor, 50 MHz to 6.5 GHz
- Power splitter
- Termination, 50 Ω
- Adapter, Type N (m) to APC 3.5 (m)
- Adapter, Type N (f) to BNC (f)
- Adapter, Type N (m) to BNC (f) (*2 required*)
- Adapter, 3.5 mm (f) to 3.5mm (f)
- Adapter, BNC (f) to SMA (m)
- Cable, BNC, 122 cm (48 in)
- Cable, APC 3.5, 91 cm (36 in) (*2 required*)
- BNC tee (BNC f, m, f)
- Dual banana plug to BNC (f)
- Digital Voltmeter

Procedure

1. Zero and calibrate the measuring receiver and 100 kHz to 4.2 GHz power sensor in LOG mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in Figure 2a-18.

Figure 2a-18 Frequency Response Test Setup, ≥ 10 MHz



3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:

CW 300 MHz

FREQ STEP 100 MHz

POWER LEVEL -8 dBm

4. On the spectrum analyzer, press **PRESET**, then wait for the preset routine to finish. Press the following analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 100, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, 10, -dBm

AMPLITUDE, More 1 of 3, More 2 of 3, COUPLE AC DC (DC)

SCALE LOG LIN (LOG), 1, dB

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

22a. Frequency Response, 8595E

5. On the spectrum analyzer, press **PEAK SEARCH, MKR FCTN, MK TRACK ON OFF (ON)**.
6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
7. Press **RATIO** on the measuring receiver.

Frequency Response, Band 0, $\geq 10 \text{ MHz}$

8. Set the synthesized sweeper CW to 10 MHz.
9. Press **FREQUENCY, 10, MHz** on spectrum analyzer.
10. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
11. Set the power sensor cal factor for the measuring receiver, then record the power ratio displayed on the measuring receiver below.

Measuring Receiver Power Ratio dB
12. Record the negative of the power ratio as the Measuring Receiver Reading at 10 MHz in [Table 2a-29](#).
13. Set the synthesized sweeper CW FREQUENCY to 20 MHz.
14. Press **FREQUENCY, 20, MHz** on spectrum analyzer.
15. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
16. Set the power sensor cal factor for the measuring receiver, then record the negative of the power ratio displayed on the measuring receiver in [Table 2a-29](#) as the Measuring Receiver Reading at 20 MHz.
17. On the synthesized sweeper, press **CW, ↑** (step up). Then, on the spectrum analyzer, press **FREQUENCY, ↑** (step up) to step through the remaining frequencies listed in [Table 2a-29](#).
18. At each new frequency repeat [step 15](#) through [step 17](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-29](#).

Procedure

19. Zero and calibrate the measuring receiver and 50 MHz to 6.5 GHz power sensor in log mode as described in the measuring receiver operation manual.
20. Connect the equipment as shown in [Figure 2a-18](#).

21. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:

CW 300 MHz

FREQ STEP 100 MHz

POWER LEVEL -8 dBm

22. Press **PRESET** on the spectrum analyzer, and wait for the preset routine to finish. Then press the following analyzer keys:

FREQUENCY, Band Lock, 0–2.9 GHz BAND 0

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 100, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, 10, -dBm

SCALE LOG LIN (LOG), 1, dB

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

23. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.

24. Press **RATIO** on the measuring receiver.

Frequency Response, Band 1

25. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75–6.5 GHz BAND 1

FREQUENCY, 2.75, GHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

26. Set the synthesized sweeper CW to 2.75 GHz.

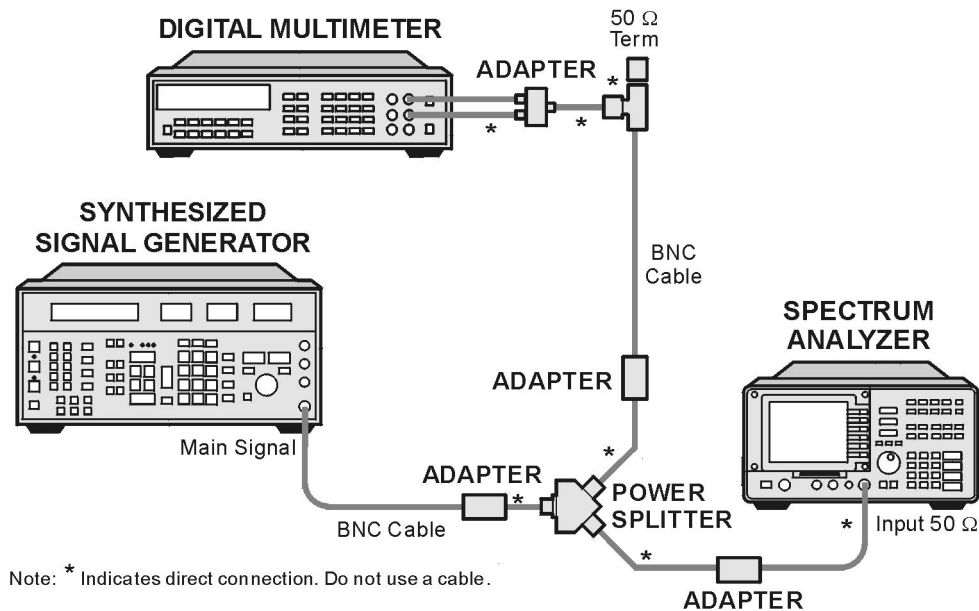
27. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.

22a. Frequency Response, 8595E

28. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
29. Record the negative of the power ratio displayed on the measuring receiver in [Table 2a-30](#) as the Measuring Receiver Reading.
30. On the synthesized sweeper, press CW, $\uparrow$ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-30](#).
31. At each new frequency repeat [step 27](#) through [step 29](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-30](#).

Frequency Response, Band 0, < 10 MHz

32. Connect the equipment as shown in [Figure 2a-28](#).

Figure 2a-19 Frequency Response Test Setup, < 10 MHz

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33. Set the synthesizer/function generator controls as follows:

FREQUENCY, 10, MHz**AMPLITUDE, -8, dBm****AMPTD INCR, 0.05, dB**

34. Set the DVM as follows:

Function Sync AC Volts
Math dBm
Res Register 50 Ω
Front/Rear Terminals Front
Resolution 7.5 digits

35. On the analyzer, press the following keys:

Frequency, 10, MHz

SPAN, 100, kHz

36. Adjust the synthesizer/function generator amplitude until the spectrum analyzer reads -14 dBm. This corresponds to the Measuring Receiver Reading at 10 MHz recorded in [step 11](#).

37. Record the DVM Amplitude at 10 MHz in [Table 2a-31](#).

38. On the spectrum analyzer, press **Peak Search, Marker, Marker Δ** .

39. Set the spectrum analyzer and the synthesizer/function generator to the next frequency listed in [Table 2a-31](#).

40. At each frequency, adjust the synthesizer/function generator amplitude for a Sig Δ -Trk amplitude reading of $0.00 \text{ dB} \pm 0.05 \text{ dB}$.

41. Record the DVM Amplitude in [Table 2a-31](#).

42. Repeat [step 39](#) through [step 41](#) for each frequency setting listed in [Table 2a-31](#).

43. For each frequency in [Table 2a-31](#), subtract the DVM Amplitude Reading from the Measuring Receiver Reading at 10 MHz recorded in [step 11](#). Record the result as the Response Relative to 10 MHz in [Table 2a-31](#).

44. Add the Measuring Receiver Reading at 10 MHz, recorded in [step 11](#), to each Response Relative to 10 MHz in [Table 2a-31](#). Record the results as the Response Relative to 300 MHz in [Table 2a-31](#).

22a. Frequency Response, 8595E**Test Results****Frequency Response, Band 0**

1. Enter the most positive Response Relative to 300 MHz from
[Table 2a-31](#):
_____dB
2. Enter the most positive Measuring Receiver Reading from
[Table 2a-29](#):
_____dB
3. Record the most positive of number from step 1 and step 2 above as TR Entry 1 in the appropriate performance verification test record in Chapter 3 (absolute referenced to 300 MHz).
4. Enter the most negative Response Relative to 300 MHz from
[Table 2a-31](#):
_____dB
5. Enter the most negative Measuring Receiver Reading from
[Table 2a-29](#):
_____dB
6. Record the most positive of number from step 4 and step 5 above as TR Entry 2 in the appropriate performance verification test record in Chapter 3.
7. Subtract the most negative number of step 6 from the most positive number of step 3. Enter this value as TR Entry 3 in the appropriate performance verification test record in Chapter 3 (relative flatness).

Frequency Response, Band 1

8. Enter the most positive Measuring Receiver Reading from [Table 2a-30](#) as TR Entry 4 in the appropriate performance verification test record in Chapter 3.
9. Enter the most negative Measuring Receiver Reading from [Table 2a-30](#), column 2, as TR Entry 5 in the appropriate performance verification test record in Chapter 3.
10. Subtract the most negative number of step 9 from the most positive number of step 8. Enter this value as TR Entry 6 in the appropriate performance verification test record in Chapter 3.

Performance verification test “Frequency Response” is now complete.

Table 2a-29 Frequency Response, Band 0, ≥ 10 MHz

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
10	_____	0.05
20	_____	0.05
50	_____	0.05
100	_____	0.05
200	_____	0.05
300 (Ref)	_____	0.05
400	_____	0.05
500	_____	0.05
600	_____	0.05
700	_____	0.05
800	_____	0.05
900	_____	0.05
1000	_____	0.05
1100	_____	2.0
1200	_____	2.0
1300	_____	2.0
1400	_____	2.0
1500	_____	2.0
1600	_____	2.0
1700	_____	2.0
1800	_____	2.0
1900	_____	2.0
2000	_____	2.0
2100	_____	2.0
2200	_____	2.0
2300	_____	2.0
2400	_____	2.0
2500	_____	3.0
2600	_____	3.0

Table 2a-29 Frequency Response, Band 0, ≥ 10 MHz (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2700	_____	3.0
2800	_____	3.0
2900	_____	3.0

Table 2a-30 Frequency Response Band 1

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
2.75	_____	3.0
2.8	_____	3.0
2.9	_____	3.0
3.0	_____	3.0
3.1	_____	3.0
3.2	_____	3.0
3.3	_____	3.0
3.4	_____	3.0
3.5	_____	4.0
3.6	_____	4.0
3.7	_____	4.0
3.8	_____	4.0
3.9	_____	4.0
4.0	_____	4.0
4.1	_____	4.0
4.2	_____	4.0
4.3	_____	4.0
4.4	_____	4.0
4.5	_____	5.0
4.6	_____	5.0
4.7	_____	5.0
4.8	_____	5.0

Table 2a-30 Frequency Response Band 1 (Continued)

Frequency (GHz)	Measuring Receiver Reading (dB) Preselector Peaked	CAL FACTOR Frequency (GHz)
4.9	_____	5.0
5.0	_____	5.0
5.1	_____	5.0
5.2	_____	5.0
5.3	_____	5.0
5.4	_____	5.0
5.5	_____	6.0
5.6	_____	6.0
5.7	_____	6.0
5.8	_____	6.0
5.9	_____	6.0
6.0	_____	6.0
6.1	_____	6.0
6.2	_____	6.0
6.3	_____	6.0
6.4	_____	6.0
6.5	_____	6.0

Table 2a-31 Frequency Response Band 0, < 10 MHz

Spectrum Analyzer Frequency Synthesizer Frequency	DVM Amplitude (dBm)	Response Relative to 10 MHz	Response Relative to 300 MHz
10 MHz	_____	0 (Ref)	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____

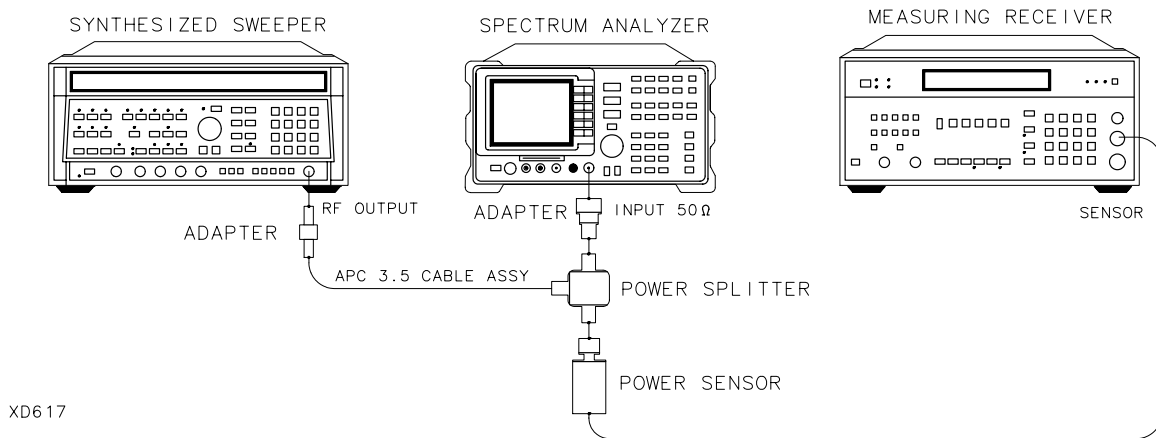
23a. Frequency Response, 8596E

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper power level is adjusted at 300 MHz to place the displayed signal at the analyzer center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new synthesized sweeper frequency and analyzer center frequency setting, the synthesized sweeper power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency). A low frequency function generator is used for frequencies below 10 MHz in addition to using a DVM as a power sensor.

The related adjustments for this performance verification test are “YTF Adjustment,” “Dual Mixer Bias Adjustment,” and “Frequency Response Adjustment.”

Equipment Required

- Synthesized sweeper
- Measuring receiver (*used as a power meter*)
- Synthesizer/function generator
- Power sensor, 100 kHz to 4.2 GHz
- Power sensor, 50 MHz to 12.8 GHz
- Power splitter
- Termination, 50 Ω
- Adapter, Type N (m) to APC 3.5 (m)
- Adapter, Type N (f) to BNC (f)
- Adapter, Type N (m) to BNC (f) (*2 required*)
- Adapter, 3.5 mm (f) to 3.5mm (f)
- Adapter, BNC (f) to SMA (m)
- Cable, BNC, 122 cm (48 in)
- Cable, APC 3.5, 91 cm (36 in) (*2 required*)
- BNC tee (BNC f, m, f)
- Dual banana plug to BNC (f)
- Digital Voltmeter

Figure 2a-20 Frequency Response Test Setup, ≥ 10 MHz

Procedure

1. Zero and calibrate the measuring receiver and 100 kHz to 4.2 GHz power sensor in LOG mode as described in the measuring receiver operation manual.

2. Connect the equipment as shown in [Figure 2a-20](#).

Option 026 only: Connect the output of the power splitter to the spectrum analyzer input directly.

Option 027 only: Connect the output of the power splitter to the SMA adapter included with spectrum analyzer. Note that the SMA adapter is required to meet specifications.

3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:

CW 300 MHz

FREQ STEP 100 MHz

POWER LEVEL -8 dBm

23a. Frequency Response, 8596E

4. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Then, press the following analyzer keys:

FREQUENCY, Band Lock, 0-2.9 GHz BAND 0

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 100, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, 10, -dBm

SCALE LOG LIN (LOG), 1, dB

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

5. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
6. Press **RATIO** on the measuring receiver.

Frequency Response, Band 0, $\geq 10 \text{ MHz}$

7. Set the synthesized sweeper CW to 10 MHz.
8. Press **FREQUENCY, 10, MHz** on spectrum analyzer.
9. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
10. Set the power sensor cal factor for the measuring receiver, then record the power ratio displayed on the measuring receiver below.
Measuring Receiver Power Ratio dB
11. Record the negative of the power ratio as the Measuring Receiver Reading at 10 MHz in [Table 2a-32](#).
12. Set the synthesized sweeper CW **FREQUENCY** to 20 MHz.
13. Press **FREQUENCY, 20, MHz** on spectrum analyzer.
14. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
15. Set the power sensor cal factor for the measuring receiver, then record the negative of the power ratio displayed on the measuring receiver in [Table 2a-32](#) as the Measuring Receiver Reading at 20 MHz.

16. On the synthesized sweeper, press **CW**, $\uparrow$ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-32](#).
17. At each new frequency repeat [step 13](#) through [step 15](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-32](#).

Procedure

18. Zero and calibrate the measuring receiver and 100 kHz to 4.2 GHz power sensor in LOG mode as described in the measuring receiver operation manual.

19. Connect the equipment as shown in [Figure 2a-20](#).

20. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:

CW 300 MHz

FREQ STEP 100 MHz

POWER LEVEL -8 dBm

21. Press **PRESET** on the spectrum analyzer, and wait for the preset routine to finish. Then press the following analyzer keys:

FREQUENCY, Band Lock, 0–2.9 GHz BAND 0

FREQUENCY, 300, MHz

CF STEP AUTO MAN, 100, MHz

SPAN, 10, MHz

AMPLITUDE, REF LVL, 10, -dBm

SCALE LOG LIN (LOG), 1, dB

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

22. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.

23. Press **RATIO** on the measuring receiver.

Frequency Response, Band 1

24. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 2.75 - 6.5 BAND 1

FREQUENCY, 2.75, GHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

25. Set the synthesized sweeper CW to 2.75 GHz.

26. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.

27. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.

28. Record the negative of the power ratio displayed on the measuring receiver in [Table 2a-33](#) as the Measuring Receiver Reading.

29. On the synthesized sweeper, press CW, $\uparrow$ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in [Table 2a-33](#).

30. At each new frequency repeat [step 26](#) through [step 28](#), entering the power sensor Cal Factor into the measuring receiver as indicated in [Table 2a-33](#).

Frequency Response, Band 2

31. Press the following spectrum analyzer keys:

FREQUENCY, Band Lock, 6.0 -12.8 BAND 2

FREQUENCY, 6.0, GHz

CF STEP AUTO MAN, 200, MHz

SPAN, 10, MHz

BW, RES BW AUTO MAN, 1, MHz

VID BW AUTO MAN, 10, kHz

PEAK SEARCH

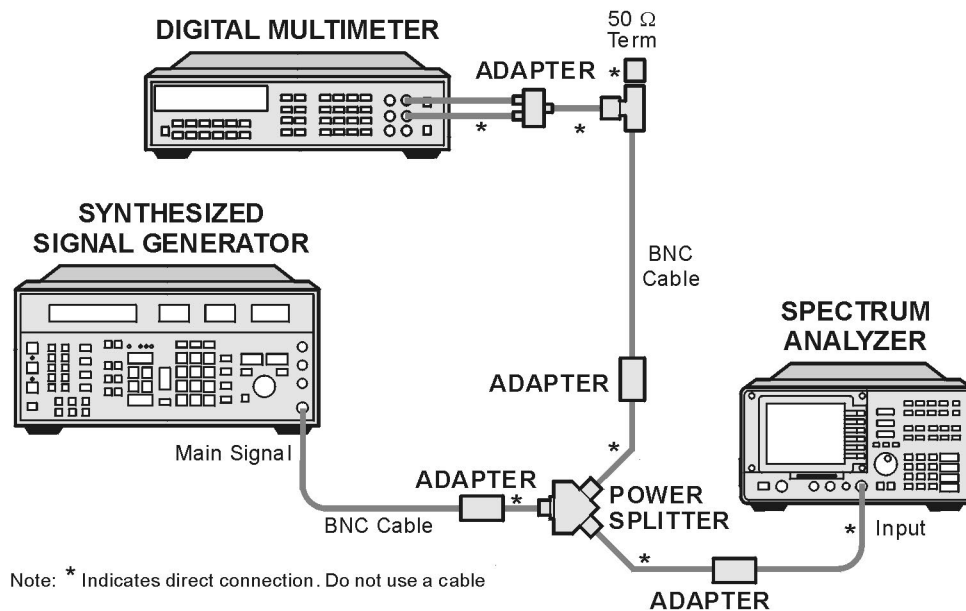
MKR FCTN, MK TRACK ON OFF (ON)

32. Set the synthesized sweeper CW to 6.0 GHz.

33. On the spectrum analyzer, press **AMPLITUDE, PRESEL PEAK**.

34. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of $-14 \text{ dBm} \pm 0.1 \text{ dB}$.
35. Record the negative of the power ratio displayed on the measuring receiver in Table 2a-34 as the Measuring Receiver Reading.
36. On the synthesized sweeper, press CW, $\uparrow$ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, $\uparrow$ (step up) to step through the remaining frequencies listed in Table 2a-34.
37. At each new frequency repeat step 33 through step 35, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2a-34.

Figure 2a-21 Frequency Response Test Setup, < 10 MHz



ws110e

Frequency Response, Band 0, < 10 MHz

38. Connect the equipment as shown in Figure 2a-21.
39. Set the frequency synthesizer controls as follows:

FREQUENCY 10 MHz
 AMPLITUDE -8 dBm
 AMPTD INCR 0.05 dB

23a. Frequency Response, 8596E

40. Set the DVM as follows:

Function Sync AC Volts
 Math dBm
 RES Register 50 W
 Front/Rear Terminals Front
 Resolution 7.5 digits

41. On the spectrum analyzer, press the following keys:

FREQUENCY, 100, kHz

SPAN, 100, kHz

42. Adjust the frequency synthesizer/function generator amplitude until the spectrum analyzer display reads -14 dBm. This corresponds to the Measuring Receiver Reading at 10 MHz recorded in [step 12](#). Record the DVM Amplitude in [Table 2a-35](#).

43. On the spectrum analyzer, press **Peak Search, Marker, Marker Δ**.

44. Set the spectrum analyzer and the synthesizer/function generator to the next frequency settings listed in [Table 2a-35](#).

45. At each frequency, adjust the synthesizer/function generator amplitude for a SIG Δ-TRK amplitude reading of 0.00 ± 0.05 dB.

46. Record the DVM Amplitude setting in [Table 2a-35](#).

47. Repeat [step 44](#) through [step 46](#) for each frequency setting listed in [Table 2a-35](#).

48. For each frequency in [Table 2a-35](#), subtract the DVM Amplitude Reading from the Measuring Receiver Reading at 10 MHz recorded in [step 12](#). Record the result as the Response Relative to 10 MHz in [Table 2a-35](#).

49. Add the Measuring Receiver Reading at 10 MHz, recorded in [step 12](#), to each Response Relative to 10 MHz in [Table 2a-35](#). Record the results as the Response Relative to 300 MHz in [Table 2a-35](#).

Test Results

Frequency Response, Band 0

1. Enter the most positive Response Relative to 300 MHz from
[Table 2a-35](#):
_____dB
2. Enter the most positive Measuring Receiver Reading from
[Table 2a-32](#):
_____dB
3. Record the most positive of number from step 1 and step 2 above as TR Entry 1 in the appropriate performance verification test record in Chapter 3 (absolute referenced to 300 MHz).
4. Enter the most negative Response Relative to 300 MHz from
[Table 2a-35](#):
_____dB
5. Enter the most negative Measuring Receiver Reading from
[Table 2a-32](#):
_____dB
6. Record the most positive of number from step 4 and step 5 above as TR Entry 2 in the appropriate performance verification test record in Chapter 3.
7. Subtract the most negative number of step 6 from the most positive number of step 3. Enter this value as TR Entry 3 in the appropriate performance verification test record in Chapter 3 (relative flatness).

Frequency Response, Band 1

8. Enter the most positive Measuring Receiver Reading from [Table 2a-33](#) as TR Entry 4 in the appropriate performance verification test record in Chapter 3.
9. Enter the most negative Measuring Receiver Reading from [Table 2a-33](#), column 2, as TR Entry 5 in the appropriate performance verification test record in Chapter 3.
10. Subtract the most negative number of step 9 from the most positive number of step 8. Enter this value as TR Entry 6 in the appropriate performance verification test record in Chapter 3.

23a. Frequency Response, 8596E**Frequency Response, Band 2**

11. Enter the most positive Measuring Receiver Reading from [Table 2a-34](#) as TR Entry 7 in the appropriate performance verification test record in Chapter 3.
12. Enter the most negative Measuring Receiver Reading from [Table 2a-34](#), column 2, as TR Entry 8 in the appropriate performance verification test record in Chapter 3.
13. Subtract the most negative number of step 12 from the most positive number of step 11. Enter this value as TR Entry 9 in the appropriate performance verification test record in Chapter 3.

Performance verification test “Frequency Response” is now complete.

Table 2a-32 Frequency Response Band 0, ≥ 10 MHz

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
10	_____	0.05
20	_____	0.05
50	_____	0.05
100	_____	0.05
200	_____	0.05
300 (Ref)	_____	0.05
400	_____	0.05
500	_____	0.05
600	_____	0.05
700	_____	0.05
800	_____	0.05
900	_____	0.05
1000	_____	0.05
1100	_____	2.0
1200	_____	2.0
1300	_____	2.0
1400	_____	2.0
1500	_____	2.0
1600	_____	2.0
1700	_____	2.0
1800	_____	2.0
1900	_____	2.0
2000	_____	2.0
2100	_____	2.0
2200	_____	2.0
2300	_____	2.0
2400	_____	2.0
2500	_____	3.0
2600	_____	3.0

Table 2a-32 Frequency Response Band 0, ≥ 10 MHz (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2700	_____	3.0
2800	_____	3.0
2900	_____	3.0

Table 2a-33 Frequency Response Band 1

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
2.75	_____	3.0
2.8	_____	3.0
2.9	_____	3.0
3.0	_____	3.0
3.1	_____	3.0
3.2	_____	3.0
3.3	_____	3.0
3.4	_____	3.0
3.5	_____	4.0
3.6	_____	4.0
3.7	_____	4.0
3.8	_____	4.0
3.9	_____	4.0
4.0	_____	4.0
4.1	_____	4.0
4.2	_____	4.0
4.3	_____	4.0
4.4	_____	4.0
4.5	_____	5.0
4.6	_____	5.0
4.7	_____	5.0
4.8	_____	5.0
4.9	_____	5.0

Table 2a-33 Frequency Response Band 1 (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
5.0	_____	5.0
5.1	_____	5.0
5.2	_____	5.0
5.3	_____	5.0
5.4	_____	5.0
5.5	_____	6.0
5.6	_____	6.0
5.7	_____	6.0
5.8	_____	6.0
5.9	_____	6.0
6.0	_____	6.0
6.1	_____	6.0
6.2	_____	6.0
6.3	_____	6.0
6.4	_____	6.0
6.5	_____	6.0

Table 2a-34 Frequency Response Band 2

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
6.0	_____	6.0
6.2	_____	6.0
6.4	_____	6.0
6.6	_____	7.0
6.8	_____	7.0
7.0	_____	7.0
7.2	_____	7.0
7.4	_____	7.0
7.6	_____	8.0
7.8	_____	8.0

Table 2a-34 Frequency Response Band 2 (Continued)

Frequency (MHz)	Measuring Receiver Reading (dB)	CAL FACTOR Frequency (GHz)
8.0	_____	8.0
8.2	_____	8.0
8.4	_____	8.0
8.6	_____	9.0
8.8	_____	9.0
9.0	_____	9.0
9.2	_____	9.0
9.4	_____	9.0
9.6	_____	10.0
9.8	_____	10.0
10.0	_____	10.0
10.2	_____	10.0
10.4	_____	10.0
10.6	_____	11.0
10.8	_____	11.0
11.0	_____	11.0
11.2	_____	11.0
11.4	_____	11.0
11.6	_____	12.0
11.8	_____	12.0
12.0	_____	12.0
12.2	_____	12.0
12.4	_____	12.0
12.6	_____	13.0
12.8	_____	13.0

Table 2a-35 Frequency Response Band 0, < 10 MHz

Spectrum Analyzer Frequency Synthesizer Frequency	DVM Amplitude (dBm)	Response Relative to 10 MHz	Response Relative to 300 MHz
10 MHz	_____	0 (Ref)	_____
5 MHz	_____	_____	_____
1 MHz	_____	_____	_____
200 kHz	_____	_____	_____
50 kHz	_____	_____	_____

29a. Spurious Response, 8591C and 8591E

This test is performed in two parts. Part 1 measures second harmonic distortion and part 2 measures third order intermodulation distortion.

To test second harmonic distortion, a 50 MHz low pass filter is used to filter the source output, ensuring that harmonics read by the spectrum analyzer are internally generated and not coming from the source. To measure the distortion products, the power at the mixer is set 25 dB higher than specified. New test limits have been developed based on this higher power.

With -45 dBm at the input mixer and the distortion products suppressed by 70 dBc, the equivalent Second Order Intercept (SOI) is $+25$ dBm (-45 dBm + 70 dBc). Therefore, with -20 dBm at the mixer, and the distortion products suppressed by 45 dBc, the equivalent SOI is also $+25$ dBm (-20 dBm + 45 dBc).

For third order intermodulation distortion, two signals are combined in a directional bridge (for isolation) and are applied to the spectrum analyzer input. The power level of the two signals is 8 dB higher than specified, so the distortion products should be suppressed by 16 dB less than specified. In this manner, the equivalent third order intercept (TOI) is measured.

With two -30 dBm signals at the input mixer and the distortion products suppressed by 70 dBc, the equivalent TOI is $+5$ dBm (-30 dBm + 70 dBc/2). However, if two -22 dBm signals are present at the input mixer and the distortion products are suppressed by 54 dBc, the equivalent TOI is also $+5$ dBm (-22 dBm + 54 dBc/2).

Performing the test with a higher power level maintains the measurement integrity while reducing both test time and the dependency upon the source's noise sideband performance.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized signal generator
Synthesized sweeper
Measuring receiver (*used as a power meter*)
Power sensor, 100 kHz to 1800 MHz
50 MHz low pass filter
Directional bridge
Cable, BNC, 120 cm (48 in) (*2 required*)
Adapter, Type N (f) to APC 3.5 (f)
Adapter, Type N (f) to BNC (m)
Adapter, Type N (m) to BNC (f)
Adapter, Type N (m) to BNC (m)

Additional Equipment for 75 Ω Input

Power sensor, 75 Ω
Adapter, mechanical, 75 Ω to 50 Ω
Adapter, minimum loss
Adapter, Type N (f) to BNC (m), 75 Ω
Adapter, BNC (m) to BNC (m)

Procedure

This performance test consists of two parts:

Part 1: Second Harmonic Distortion, 30 MHz

Part 2: Third Order Intermodulation Distortion, 50 MHz

Perform “Part 1: Second Harmonic Distortion, 30 MHz” before “Part 2: Third Order Intermodulation Distortion, 50 MHz.”

Part 1: Second Harmonic Distortion, 30 MHz

1. Set the synthesized signal generator controls as follows:

FREQUENCY 30 MHz

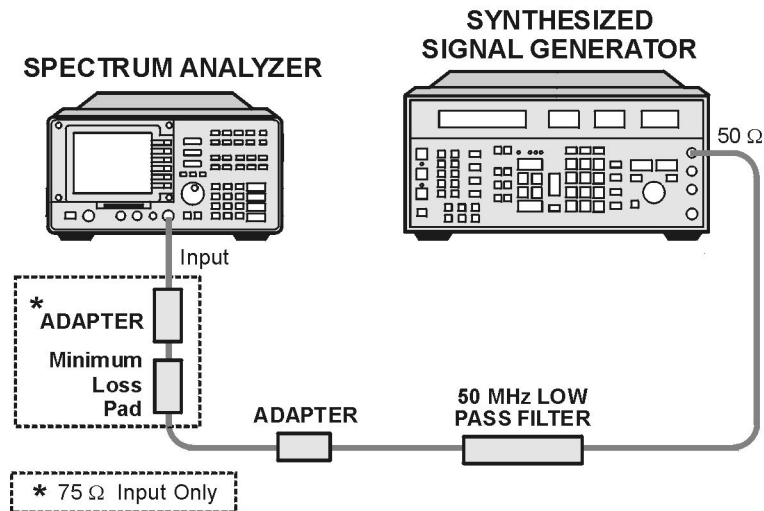
AMPLITUDE -10 dBm

AMPLITUDE (75 Ω input only:) -4.3 dBm

2. Connect the equipment as shown in [Figure 2a-22](#).

75 Ω input only: Connect the minimum loss adapter between the LPF and INPUT 75 Ω

Figure 2a-22 Second Harmonic Distortion Test Setup, 30 MHz



ws112e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press **PRESET** on the spectrum analyzer and wait for the preset routine to finish. Then press the following spectrum analyzer keys:

FREQUENCY, 30, MHz

SPAN 10 MHz

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

AMPLITUDE, -10, dBm

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 1, MHz

4. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

BW, 30, kHz

5. Adjust the synthesized signal generator amplitude to place the peak of the signal at the reference level by pressing **AMPLITUDE, INCR SET, 1, dBm**. Press the $\uparrow$ (step-up key) or the $\downarrow$ (step-down key) until the spectrum analyzer marker read $-10.0 \text{ dBm} \pm 0.1 \text{ dBm}$.
6. Set the spectrum analyzer control as follows:

BW, 1, kHz

VID BW AUTO MAN, 100, Hz

7. Wait for two sweeps to finish, then press the following spectrum analyzer keys:

PEAK SEARCH

MKR $\rightarrow$, MKR $\rightarrow$ CF STEP

MKR, MARKER Δ

FREQUENCY.

8. Press the $\uparrow$ (step-up key) on the spectrum analyzer to step to the second harmonic (at 60 MHz). Press **PEAK SEARCH**. Record the MKR Δ Amplitude reading as TR Entry 1 in the appropriate performance verification test record in Chapter 3.

Part 2: Third Order Intermodulation Distortion, 50 MHz

1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.

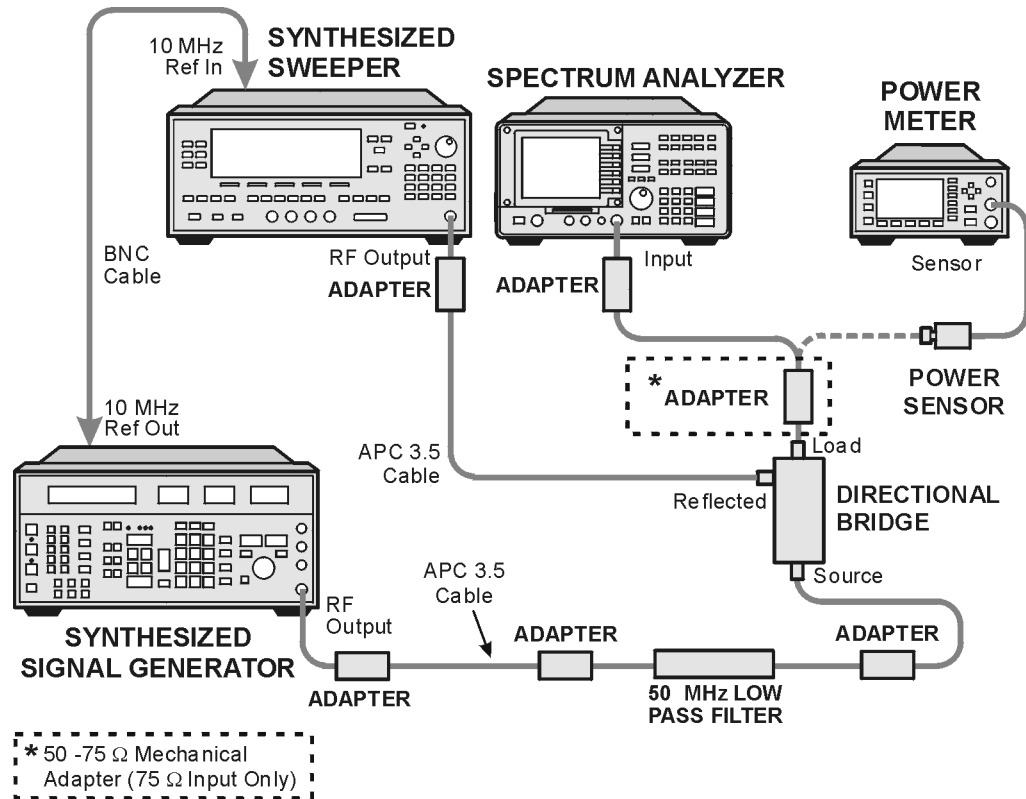
75 Ω input only: Use a 75 Ω power sensor.

2. Connect the equipment as shown in [Figure 2a-23](#) with the output of the directional bridge connected to the 100 kHz to 1.8 GHz power sensor.

75 Ω input only: Use the 75 Ω power sensor with a Type N (f) to BNC (m) 75 Ω adapter and use a BNC (m) to BNC (m) 75 Ω adapter in place of the 50 Ω adapter.

The power measured at the output of the 50 Ω directional bridge by the 75 Ω power sensor, is the equivalent power “seen” by the 75 Ω spectrum analyzer.

Figure 2a-23 Third Order Intermodulation Distortion Test Setup



ws113e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

3. Press INSTRUMENT PRESET on the synthesized sweeper. Set the synthesized sweeper controls as follows:

POWER LEVEL -6 dBm
 CW 50 MHz
 RF OFF

4. Set the synthesized signal generator controls as follows:

FREQUENCY 50.050 MHz
 AMPLITUDE -100 dBm

5. On the spectrum analyzer, press **PRESET** and wait until the preset routine is finished. Then press the following spectrum analyzer keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

75 Ω input only: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

AMPLITUDE, -10, dBm

PEAK SEARCH, More 1 of 2, PEAK EXCURSN, 3, dB

DISPLAY, More 1 of 2, THRESHLD ON OFF (ON), 90, -dBm

6. On the synthesized sweeper, set RF on. Adjust the power level until the measuring receiver reads $-12 \text{ dBm} \pm 0.05 \text{ dB}$.

7. Disconnect the 100 kHz to 1.8 GHz power sensor from the directional bridge. Connect the directional bridge directly to the spectrum analyzer RF INPUT using an adapter (do not use a cable).

75 Ω input only: Use a 75 Ω adapter, BNC (m) to BNC (m).

8. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 200, kHz

9. Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

MKR FCTN, MK TRACK ON OFF (OFF)

PEAK SEARCH

MKR $\rightarrow$, MARKER $\rightarrow$ REF LVL

10. On the synthesized signal generator, adjust the amplitude until the two signals are displayed at -6 dBm .

11. If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display, then set the spectrum analyzer by pressing the following keys:

BW, 3, kHz

VID BW AUTO MAN, 300, Hz

12. Press **PEAK SEARCH, DISPLAY, DSP LINE ON OFF (ON)**. Set the display line to a value 54 dB below the current reference level setting.

The third order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line.

13. If the distortion products can be seen, proceed as follows:

- a. On the spectrum analyzer, press **PEAK SEARCH, MARKER Δ**.
- b. Repeatedly press **NEXT PEAK** until the active marker is on the highest distortion product.
- c. Record the MKR Δ amplitude reading below. The MKR Δ reading should be less than -54 dBc.

MKR Δ amplitude reading _____ dBc

14. If the distortion products cannot be seen, proceed as follows:

- a. On both the synthesized sweeper and the synthesized signal generator, increase the POWER LEVEL by 5 dB. Distortion products should now be visible at this higher power level.
- b. On the spectrum analyzer, press **PEAK SEARCH, MARKER Δ**.
- c. Repeatedly press **NEXT PEAK** until the active marker is on the highest distortion product.
- d. On both the synthesized sweeper and the synthesizer signal generator, reduce the power level by 5 dB and wait for the completion of a new sweep.
- e. Record the MKR Δ amplitude reading below. The MKR Δ reading should be less than -54 dBc.

MKR Δ amplitude reading dBc

- f. Record the MKR D amplitude reading as TR Entry 2 in the appropriate performance verification test record in Chapter 3.

Performance verification test "Spurious Response" is now complete.

34a. Gain Compression, 8591C and 8591E

Gain compression is measured by applying two signals, separated by 3 MHz. First, the test places a -20 dBm signal at the input of the spectrum analyzer (the spectrum analyzer reference level is also set to -20 dBm). Then, a 0 dBm signal is applied to the spectrum analyzer, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.

For spectrum analyzers equipped with Option 130 the signals are separated by 10 kHz, then the first signal is kept 10 dB below the reference level.

There are no related adjustment procedures for this performance test.

Equipment Required

- Synthesized sweeper
- Synthesized signal generator
- Measuring receiver (*used as a power meter*)
- Power sensor, 100 kHz to 1800 MHz
- Directional bridge
- Adapter, Type N (f) to APC 3.5 (f)
- Adapter, Type N (f) to BNC (m)
- Adapter, Type N (m) to BNC (f)
- Adapter, Type N (m) to BNC (m)
- Cable, BNC, 120 cm (48 in) (*2 required*)

Additional Equipment for 75 Ω Input

- Power sensor, 75 Ω
- Adapter, BNC (m) to BNC (m), 75 Ω
- Adapter, Type N (f) to BNC (m), 75 Ω

Procedure

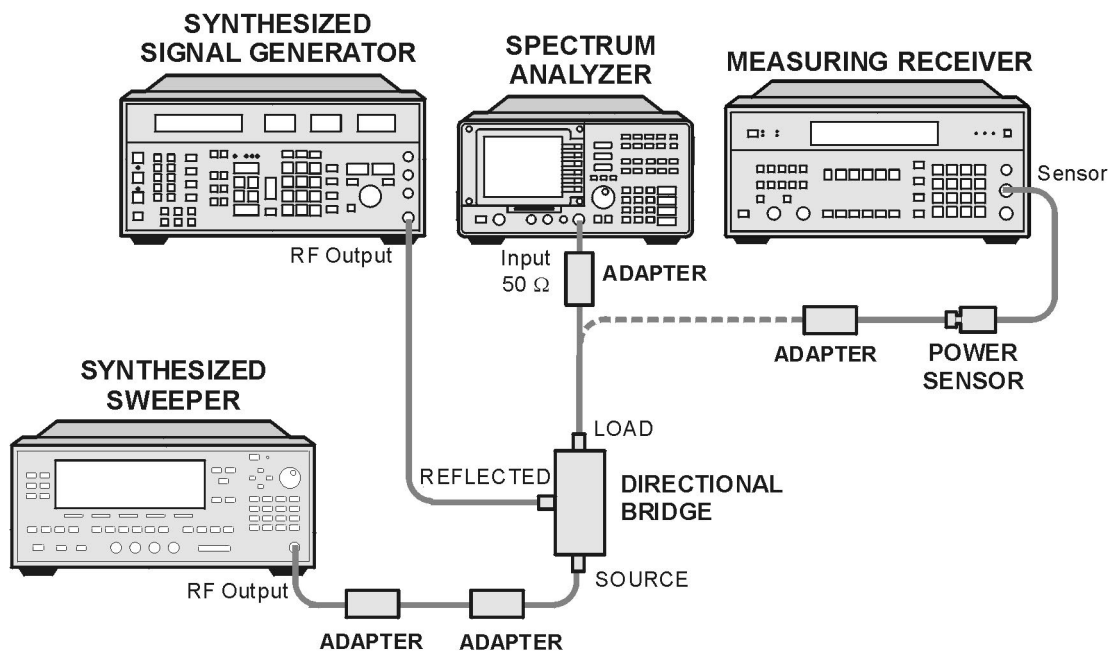
1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.

75 Ω input only: Calibrate the 75 Ω power sensor.

2. Connect the equipment as shown in Figure 2a-24, with the load of the directional bridge connected to the power sensor.

75 Ω input only: Use the 75 Ω power sensor with a Type N (f) to BNC (m) 75 Ω adapter and a BNC (m) to BNC (m) adapter. The power measured at the output of the 50 Ω directional bridge by the 75 Ω power sensor, is the equivalent power “seen” by the 75 Ω spectrum analyzer.

Figure 2a-24 Gain Compression Test Setup



ws114e

CAUTION

Use only 75 Ω cables, connectors, or adapters on the 75 Ω input of an 75 Ω input, or damage to the input connector will occur.

3. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 53 MHz

POWER LEVEL 6 dBm

4. Set the synthesized signal generator controls as follows:

CW 50 MHz

AMPLITUDE -100 dBm

5. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Then press the following spectrum analyzer keys:

FREQUENCY, 50, MHz

SPAN, 20, MHz

75 Ω input: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

AMPLITUDE, -20, dBm

SCALE LOG LIN (LOG), 1, dB

BW, 300, kHz

6. On the synthesized sweeper, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.
7. On the synthesized signal generator, set the RF OUTPUT POWER to -14 dBm.

NOTE

The power level applied to the spectrum analyzer input is 10 dB greater than the specification to account for the 10 dB attenuation setting. A power level of 0 dBm at the spectrum analyzer input yields -10 dBm at the input mixer.

8. Disconnect the power sensor from the directional bridge and connect the directional bridge to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

75 Ω input only: Use a 75 Ω adapter, BNC (m) to BNC (m).

9. On the spectrum analyzer, press the following keys:

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 10, MHz

10. Wait for the AUTO ZOOM routine to finish. Then adjust the amplitude on the synthesized signal generator to place the signal 1 dB below the spectrum analyzer reference level.

11. On the spectrum analyzer, press **PEAK SEARCH**, then **MARKER Δ** .

12. On the synthesized sweeper, set RF to ON.

13. On the spectrum analyzer, press **PEAK SEARCH**, then **NEXT PEAK**.

The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

14. Record the MKR Δ amplitude reading as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The absolute value of this amplitude should be less than 0.5 dB.

If you are testing a spectrum analyzer equipped with Option 130 continue with step 15.

Performance verification test “Gain Compression” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

15. Connect the equipment as shown in [Figure 2a-24](#).

16. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW 50.010 MHz

POWER LEVEL 6 dBm

17. Set the synthesized signal generator controls as follows:

FREQUENCY 50 MHz

AMPLITUDE -100 dBm

18. On the synthesized sweeper, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.

19. On the synthesized signal generator, set the RF OUTPUT POWER to -14 dBm.

20. Disconnect the power sensor from the directional bridge and connect the directional bridge to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

75 Ω input only: Use a 75 Ω adapter, BNC (m) to BNC (m).

21. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Then press the following spectrum analyzer keys:

FREQUENCY, 50, MHz

SPAN, 10, MHz

75 Ω input: **AMPLITUDE, More 1 of 2, Amptd Units, dBm**

AMPLITUDE, -10, dBm

PEAK SEARCH

MKR FCTN, MK TRACK ON OFF (ON)

SPAN, 2, kHz

22. Wait for the **AUTO ZOOM** routine to finish. Then adjust the amplitude on the synthesized signal generator to place the signal 10 dB below the spectrum analyzer reference level.

23. On the spectrum analyzer, press **SGL SWP** and wait for the completion of a new sweep. Then, press **PEAK SEARCH, MARKER Δ** .

24. On the synthesized sweeper, set RF to ON.

25. On the spectrum analyzer, press **SGL SWP** and wait for the completion of a new sweep. Then, press **PEAK SEARCH, MARKER Δ**

26. Record the MKR Δ amplitude reading as TR Entry 2 in the appropriate performance verification test record in Chapter 3.

Performance verification test "Gain Compression" is now complete for spectrum analyzers equipped with Option 130.

57a. Fast Time Domain Sweeps, 8591E Option 101 and 8591C

The CAL OUT signal is used to compare the amplitude level of a normal sweep time (20 ms) to a fast sweep time (18 ms) using the marker delta function.

A synthesizer/function generator is used to amplitude modulate a 500 MHz, CW signal from another signal generator. The spectrum analyzer demodulates this signal in zero span to display the response in the time domain. The marker delta frequency function on the spectrum analyzer is used to read out the sweep time.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesizer/function generator

Signal generator

Cable, BNC, 23 cm (9 in)

Cable, BNC, 122 cm (48 in)

Cable, Type N, 152 cm (60 in)

Adapter, Type N (m) to BNC (f)

Additional Equipment for 75 Ω input

Adapter, minimum loss

Adapter, Type N (f) to BNC (m), 75 Ω

Cable, BNC, 75 Ω , 30 cm (12 in)

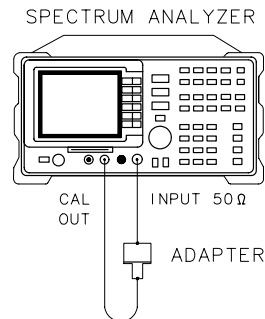
Procedure

Fast Sweep Time Amplitude Accuracy

1. Connect the equipment as shown in [Figure 2a-25](#).

75 Ω input only: Use minimum loss adapter.

Figure 2a-25 Fast Sweep Time Amplitude Test Setup



XC626

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

2. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Then press the following spectrum analyzer keys:

FREQUENCY, 300, MHz

SPAN, 0, Hz

SWEEP, 20, ms

AMPLITUDE, SCALE LOG/LIN (LIN)

REF LVL, 25, mV

75 Ω input only: **REF LVL, 30, mV**

MKR FCTN, MK NOISE ON OFF (ON)

SGL SWP

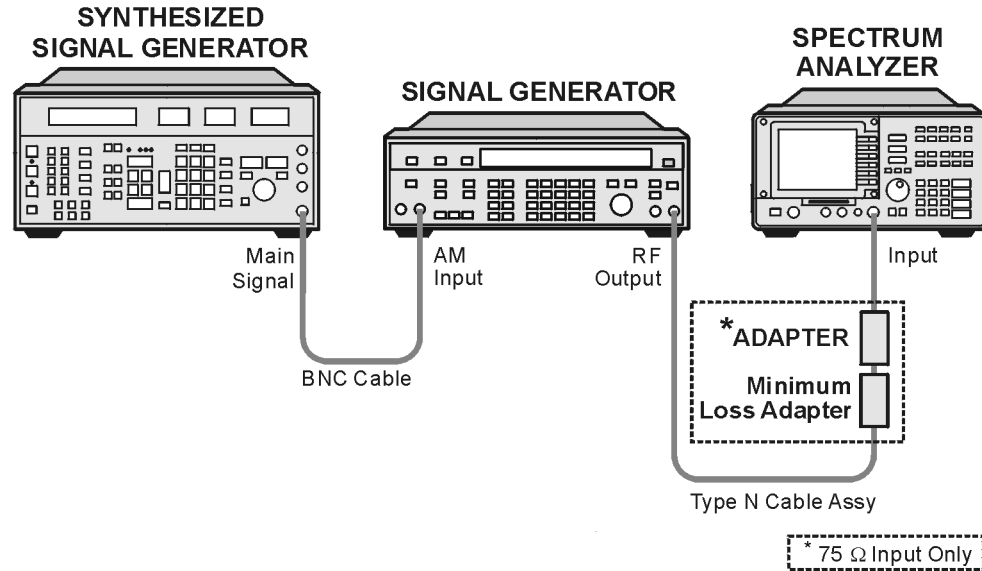
MKR, MARKER Δ

3. Set the sweep time to 18 ms. Press **SGL SWP** and read the MKR Δ amplitude. Record the marker- Δ reading as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The amplitude should be within 1.007X and 0.993X.

Fast Sweep Time Accuracy

4. Connect the equipment as shown in Figure 2a-26.

Figure 2a-26 Fast Sweep Time Test Setup, 75 Ω input



ws115e

CAUTION

Use only 75 Ω cables, connectors, or adapters on instruments with 75 Ω inputs, or damage to the input connector will occur.

5. Set the signal generator to output a 300 MHz, -4 dBm, CW signal. Set the AM and FM controls to OFF.
75 Ω input only: Set the output to +2 dBm.
6. Set the synthesizer/function generator to output a 556 Hz, +5 dBm, signal.
7. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:
FREQUENCY, 300, MHz
SPAN, ZERO SPAN
AMPLITUDE, SCALE LOG LIN (LIN)
8. Set the signal generator AM switch to the AC position. If necessary, adjust the output amplitude of the signal generator to position the top of the modulated waveform approximately one division below top screen.

9. Set the spectrum analyzer controls by pressing the following keys:

TRIG VIDEO

SWEEP, 18, ms

10. On the spectrum analyzer, press **SGL SWP, PEAK SEARCH**.

If necessary, press **NEXT PEAK** or **NEXT PK LEFT** until the marker is on the left-most complete signal peak. This is the “marked signal.”

11. Press **MARKER Δ, MARKER Δ, NEXT PK RIGHT** until the marker Δ is on the eighth signal.

12. Record the result as MKR Δ frequency reading at 18 ms in [Table 2a-36](#). The MKR Δ reading should be within the limits shown.

13. Repeat [step 10](#) through [step 12](#) for the remaining sweep time settings listed in [Table 2a-36](#).

14. Record TR Entry 2 through TR Entry 6 in the appropriate performance verification test record in Chapter 3.

Performance verification test record “Fast Time Domain Sweeps” is now complete.

Table 2a-36 Fast Sweep Time Accuracy

Spectrum Analyzer Sweep Time	Synthesizer Function Generator Frequency	Minimum Reading	TR Entry MKR Δ Frequency
18 ms	556 Hz	14.04 ms	(2) _____
10 ms	1 kHz	7.8 ms	(3) _____
1.0 ms	10 kHz	780 μs	(4) _____
100 μs	100 kHz	78 μs	(5) _____
20 μs	500 kHz	15.6 μs	(6) _____

58a. Fast Time Domain Sweeps, 8593E, 8594E, 8595E, and 8596E Option 101

The CAL OUT signal is used to compare the amplitude level of a normal sweep time (20 ms) to a fast sweep time (18 ms) using the marker delta function.

A synthesizer/function generator is used to amplitude modulate a 500 MHz, CW signal from another signal generator. The spectrum analyzer demodulates this signal in zero span to display the response in the time domain. The marker delta frequency function on the spectrum analyzer is used to read out the sweep time.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesizer/function generator

Signal generator

Adapter, Type N (m) to BNC (f)

Cable, BNC, 23 cm (9 in)

Cable, BNC, 122 cm (48 in)

Cable, Type N, 152 cm (60 in)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

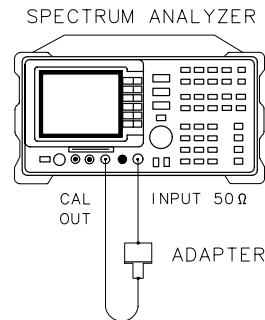
Procedure

Fast Sweep Time Amplitude Accuracy

1. Connect the equipment as shown in [Figure 2a-27](#).

Option 026 only: Use the APC to Type N adapter.

Figure 2a-27 Fast Sweep Time Amplitude Test Setup



XD628

2. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Then press the following spectrum analyzer keys:

FREQUENCY, 300, MHz

SPAN, 0, Hz

SWEEP, 20, ms

AMPLITUDE, SCALE LOG/LIN (LIN)

REF LVL, 25, mV

MKR FCTN, MK NOISE ON OFF (ON)

SGL SWP

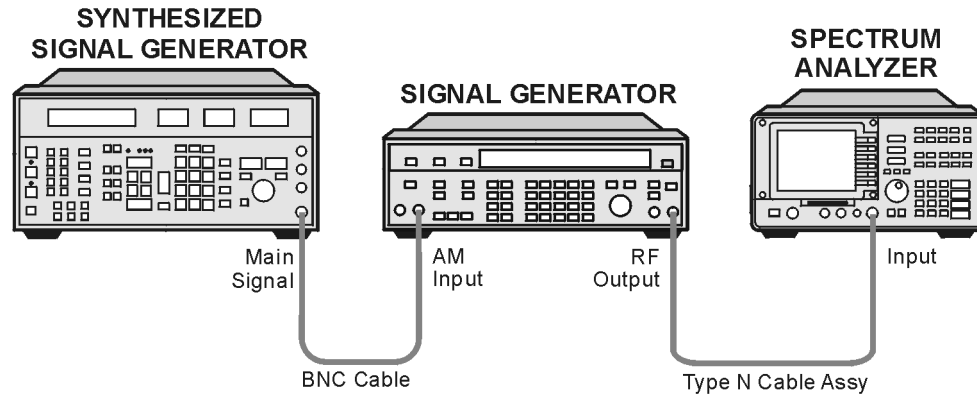
MKR, MARKER Δ

3. Set the sweep time to 18 ms. Press **SGL SWP** and read the MKR Δ amplitude. Record the marker-Δ reading as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The amplitude should be within 1.007X and 0.993X.

Fast Sweep Time Accuracy

4. Connect the equipment as shown in Figure 2a-28.

Option 026 only: Use the APC to Type N adapter.

Figure 2a-28 Fast Sweep Time Accuracy Test Setup

ws116e

5. Set the signal generator to output a 300 MHz, -4 dBm, CW signal. Set the AM and FM controls to OFF.
6. Set the synthesizer/function generator to output a 556 Hz, +5 dBm, signal.
7. On the spectrum analyzer, press **PRESET** and wait for the preset routine to finish. Then press the following spectrum analyzer keys:
 - FREQUENCY, 300, MHz**
 - SPAN, 0, Hz**
 - AMPLITUDE, SCALE LOG LIN (LIN)**
8. Set the signal generator AM switch to the AC position. If necessary, adjust the output amplitude of the signal generator to position the top of the modulated waveform approximately one division below top screen.
9. Set the spectrum analyzer controls by pressing the following keys:
 - TRIG, VIDEO**
 - SWEEP, 18, ms**
10. On the spectrum analyzer, press **SGL SWP, PEAK SEARCH**.
 - If necessary, press **NEXT PEAK** or **NEXT PK LEFT** until the marker is on the left-most complete signal peak. This is the "marked signal."
11. Press **MARKER Δ, MARKER Δ, NEXT PK RIGHT** until the marker Δ is on the eighth signal.

12. Record the MKR Δ frequency reading at 18 ms [Table 2a-37](#). The MKR Δ reading should be within the limits shown.

13. Repeat [step 10](#) through [step 12](#) for the remaining sweep time settings listed in [Table 2a-37](#).

14. Record TR Entry 1 through TR Entry 5 in the appropriate performance verification test record in Chapter 3.

Performance verification test record “Fast Time Domain Sweeps” is now complete.

Table 2a-37 Fast Sweep Time Accuracy

Spectrum Analyzer Sweep Time	Synthesizer Function Generator Frequency	Minimum Reading	TR Entry MKR Δ Frequency
18 ms	556 Hz	14.04 ms	(2)_____
10 ms	1 kHz	7.8 ms	(3)_____
1.0 ms	10 kHz	780 μ s	(4)_____
100 μ s	100 kHz	78 μ s	(5)_____
20 μ s	500 kHz	15.6 μ s	(6)_____

72a. CISPR Pulse Response, 8590 E-Series Option 103

This CISPR Pulse Response measurement is made using a pulsed RF input signal rather than a pulse signal because the equipment is readily available, easily calibrated, and flexible in use. Pulsed RF setup considerations as well as the relationship between the two techniques are explained in Application Note 150-2.

The CISPR Pulse Response test measures the spectrum analyzer quasi-peak detector receiver system's response to a pulsed RF input signal relative to that of a CW input signal and as a function of pulse repetition frequency. The output of the synthesized signal generator is modulated by the pulse generator using the pulse modulator to yield the pulsed RF signal. The output of the pulse modulator is connected to the input of the device under test (DUT) with a BNC cable through a 3 dB attenuator. The 3 dB attenuator provides a controlled source match. Amplitude accuracy is ensured by measuring the output signal of the 3 dB attenuator using the power meter with the pulse modulator dc biased to provide a CW signal. This measured CW amplitude also corresponds to the burst amplitude of the pulsed RF input signal when the pulse modulator is appropriately driven.

The system is tested, through the 9 kHz and 120 kHz EMI bandwidth filters with a pulse repetition frequency (PRF) corresponding to CISPR specifications. (Additional steps are included to test the 200 Hz EMI bandwidth filter for spectrum analyzers equipped with Option 130.) The required CW amplitude for the tests are calculated based on the device under test's impulse bandwidth, the pulse width of the pulsed RF, and the CISPR specified spectral intensity.

NOTE

There are no related adjustment procedures for this performance test.

Equipment

Pulse generator
Synthesized signal generator
Power meter
Power sensor, 100 kHz to 1800 MHz
Attenuator, 3 dB
Modulator, TeleTech
Quasi-peak detector driver
Adapter, Type N (f) to Type N (f)
Adapter, Type N (m) to BNC (f)
Cable, BNC, 122 cm (48 in) (3 required)

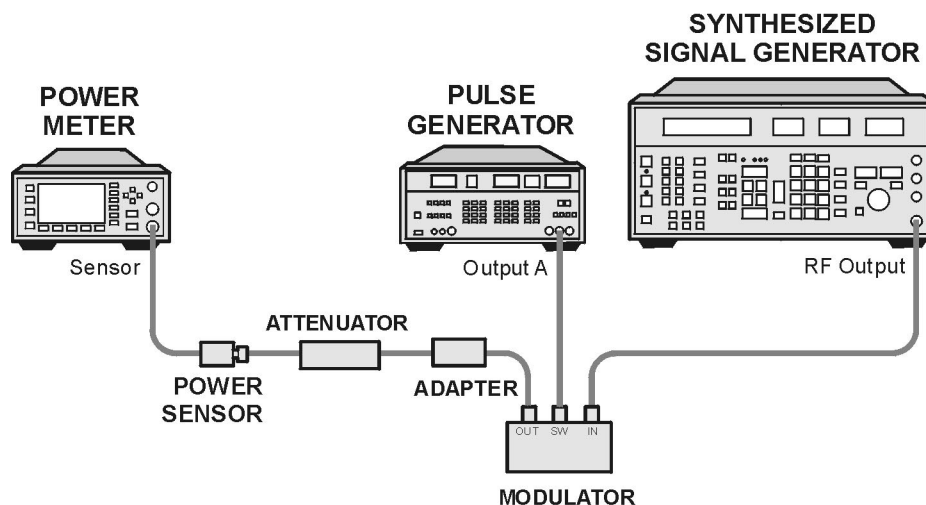
Procedure

Be sure the quasi-peak detector driver (DLP) is installed before performing this procedure.

Input Amplitude Calibration

1. Zero and Calibrate the power meter and 100 kHz to 1800 MHz power sensor, as described in the power meter operation manual.
2. Connect the equipment as shown in [Figure 2a-29](#).

Figure 2a-29 Input Amplitude Calibration Test Setup



ws117e

3. Press RECALL 0 on the pulse generator to preset the pulse generator. To bias the modulator on, set the pulse generator to the following settings:

Parameters:

LEE3 ns
 TRE3 ns
 HIL+2 V
 LOL+1.8 V
 DEL0 ns

Output Mode: Enabled

Channel A50 Ω
 Channel ANORM

4. Press STORE 1 on the pulse generator to store the settings in storage register 1.
5. Set the synthesizer/function generator to the following settings:

FREQUENCY 50 MHz
 AMPLITUDE -3 dBm
6. Set the power meter to the following settings:

MODEdBm
 CAL FACTOR.. power sensor Ref Cal Factor, 50 MHz
7. Adjust synthesizer/function generator power level for a -6.99 dBm (± 0.03) reading on the power meter.
8. Record the synthesizer/function generator amplitude setting in [Table 2a-38](#) as the Reference Amplitude at 50 MHz, for the 200 Hz EMI Bandwidth setting.
9. Repeat [step 6](#) through [step 8](#) for the 9 kHz and the 120 kHz EMI Bandwidth settings.
10. Calculate and record the Required Amplitude for the 200 Hz, 9 kHz, and 120 kHz EMI Bandwidths in [Table 2a-38](#) as follows:

Required Amplitude = Ref Amp at 50 MHz + Amp Offset

NOTE

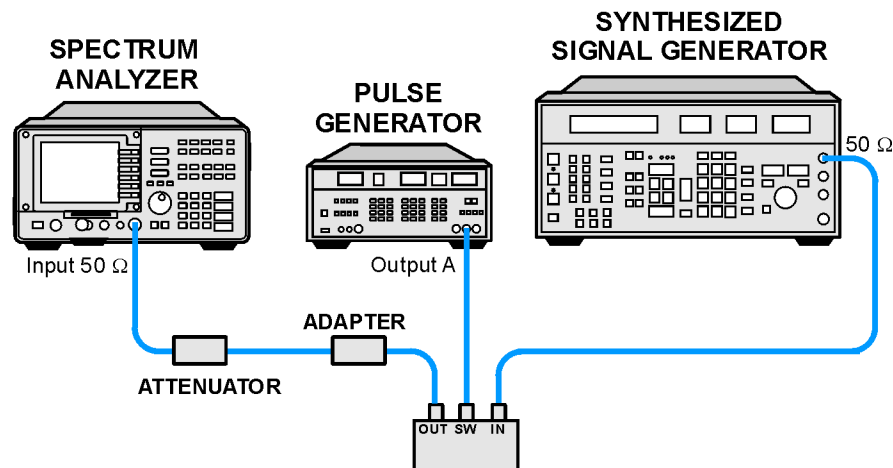
The reference amplitude is the same for the 200 Hz, 9 kHz, and 120 kHz filters.

11. On the synthesizer/function generator, press STORE 1 to store the previous setting of the synthesizer/function generator in storage register 1.

Isolation Check

12. Connect the equipment as shown in Figure 2-30.

Figure 2-30 Isolation Check Test Setup



ws118e

13. Press **PRESET** on the spectrum analyzer and wait for the preset routine to finish. Then, press the following spectrum analyzer keys:

FREQUENCY, 50, MHz

SPAN, 1, MHz

PEAK SEARCH

SAVE, STATE → INTRNL, 1

MKR →, MARKER →REF LVL

MKR, MARKER Δ

14. Press **RECALL 1** on the pulse generator. Set the pulse generator to the following settings to bias the modulator off:

HIL -1.5 V

LOL -1.7 V

Use the **CHS** key to change signs of the entered value on the pulse generator.

15. Verify that the isolation of the modulator (the marker-delta reading) exceeds 70 dBc.

CW Measurement for 9 kHz EMI Bandwidth

16. Press **RECALL 1** on the pulse generator.

17. Subtract 40 dB from the Reference Amplitude at 50 MHz in [Table 2a-38](#). Then, set the synthesizer/function generator amplitude to the calculated value by pressing **AMPLITUDE**, (enter the calculated value), **-dBm**.

18. Press STORE 2 on the synthesizer/function generator.

19. Press the following keys on the spectrum analyzer:

MKR, MARKER NORMAL

BW, EMI BW Menu, 9 kHz EMI BW

AUX CTRL, Quasi Peak, AUTO QP AT MKR

A message will be displayed warning that an improper bandwidth is selected. Disregard the message and press **CONTINUE**.

20. Record the quasi-peak reading, displayed below the signal on the spectrum analyzer screen, as the Measured CW Amplitude for 9 kHz in [Table 2a-39](#).

9 kHz Pulse RF Signal Setup

21. Press RECALL 1 on the pulse generator. Set the pulse generator to the following conditions:

PER 10 ms

WID 2.2 μ s

LOL -1.7 V

Use the CHS key to change the sign of the value entered on the pulse generator.

22. Press RECALL 1 on the synthesizer/function generator. Set the synthesizer/function generator amplitude to the required amplitude value for the 9 kHz filter recorded in [Table 2a-38](#) by pressing **AMPLITUDE**, (enter the Required Amplitude for 9 kHz), **-dBm**.

23. Press **MAN QP AT MKR** on the spectrum analyzer.

A message will be displayed warning that an improper bandwidth is selected. Disregard the message and press **CONTINUE**.

24. Record the marker amplitude reading in [Table 2a-39](#) as the Measured 100 Hz Amplitude for the 9 kHz EMI Bandwidth and in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Band B, 100 Hz Repetition Frequency.

25. Set the PERIOD to 1 ms on the pulse generator. On the spectrum analyzer, press **MARKER NORM PK** (so that PK is underlined), then press **SGL SWP**.

26. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Band B, 1000 Hz

Repetition Frequency.

27. Set the PERIOD to 50 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
28. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Band B, 20 Hz Repetition Frequency.
29. Set the PERIOD to 100 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
30. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Band B, 10 Hz Repetition Frequency.
31. Set the PERIOD to 500 ms on the pulse generator. On the spectrum analyzer, press **QP X10 ON OFF** so that ON is underlined, then press **SGL SWP**.
32. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Band B, 2 Hz Repetition Frequency.
33. Set the PERIOD to 980 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Band B, 1 Hz Repetition Frequency.
34. Press TRIG on the pulse generator. Press **SGL SWP** on the spectrum analyzer. Let the spectrum analyzer sweep 3 divisions then press **MAN** on the pulse generator. Record the Marker reading for Isolated Pulse Measurement for Band B in [Table 2a-40](#).
35. Enter the Measured value for the Band B 100 Hz Repetition Frequency as the Reference value for all the Repetition Frequencies listed for Band B.
36. Calculate and record the Amplitude Error for the 9 MHz EMI Bandwidth in [Table 2a-39](#) as follows:
$$\text{Amp Error} = \text{Meas CW Amp} - \text{Meas 100 Hz Amp}$$
37. Record TR Entry 1 in the appropriate performance verification test record in Chapter 3.
38. Calculate and record the Amplitude Error for each of the Band B, 9 kHz EMI Bandwidth Repetition Frequencies listed in [Table 2a-40](#) as follows:
$$\text{Amp Error} = \text{Meas Pulse Level} - \text{Ref Pulse Level}$$
39. Record TR Entry 4 through TR Entry 10 in the appropriate performance verification test record in Chapter 3.

CW Measurement for 120 kHz EMI Bandwidth

40. Press RECALL 1 on the pulse generator.
41. Press RECALL 2 on the synthesizer/function generator.
42. On the spectrum analyzer, press the following keys:
 RECALL, INTRNL → STATE, 1, MKR, MARKER NORMAL
 AUX CTRL, Quasi Peak, RETURN
 AUTO QP AT MKR, 120 kHz EMI BW, CONTINUE
43. Record the reading displayed below the signal on the spectrum analyzer screen in [Table 2a-39](#) as the Measured CW Amplitude for 120 kHz.

120 kHz Pulse RF Signal Setup

44. Set the pulse generator to the following conditions:
 PER 10 ms
 WID 167 ns
 LOL -1.7 V
45. Press RECALL, 1 on the synthesizer/function generator. Set the synthesizer/function generator amplitude to the required amplitude value for the 120 kHz filter recorded in [Table 2a-38](#) by pressing **AMPLITUDE**, (enter the Required Amplitude value for the 120 kHz EMI bandwidth), **dBm**.
46. Press **Quasi Peak, MAN QP AT MKR** on the spectrum analyzer.
47. Record the marker amplitude reading in [Table 2a-39](#) as the Measured 100 Hz Amplitude for the 120 kHz EMI Bandwidth and in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Band B, 100 Hz Repetition Frequency.
48. Set PERIOD to 1 ms on the pulse generator. Press **MARKER NORM PK** (so that PK is underlined), **SGL SWP** on the spectrum analyzer.
49. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 1000 Hz Repetition Frequency.
50. Set the PERIOD to 50 ms on the pulse generator. Press **QP X10 ON OFF** so that ON is underlined on the spectrum analyzer. Press **SGL SWP** on the spectrum analyzer.
51. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 20 Hz Repetition Frequency.

52. Set PERIOD to 100 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
53. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 10 Hz Repetition Frequency.
54. Set the PERIOD to 500 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
55. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 2 Hz Repetition Frequency.
56. Set PERIOD to 980 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
57. Record the marker amplitude reading in [Table 2a-40](#) as the Measured Relative Equivalent Level of Pulse for Bands C and D, 1 Hz Repetition Frequency.
58. Press **TRIG** on the pulse generator. Press **SGL SWP** on the spectrum analyzer. Let the spectrum analyzer sweep three divisions then press **MAN** on the pulse generator. Record the marker reading as the Isolated Pulse for Bands C and D in [Table 2a-40](#).
59. Enter the Measured value for the Band B 100 Hz Repetition Frequency as the Reference value for all the Repetition Frequencies listed for Band B.
60. Calculate and record the Amplitude Error for the 120 MHz EMI Bandwidth in [Table 2a-39](#) as follows:
$$\text{Amp Error} = \text{Meas CW Amp} - \text{Meas 100 Hz Amp}$$
61. Record TR Entry 2 in the appropriate performance verification test record in Chapter 3.
62. Calculate and record the Amplitude Error for each of the Band C and D, 120 kHz EMI Bandwidth Repetition Frequencies listed in [Table 2a-40](#) as follows:
$$\text{Amp Error} = \text{Meas Pulse Level} - \text{Ref Pulse Level}$$
63. Record TR Entry 11 through TR Entry 17 in the appropriate performance verification test record in Chapter 3.

If you are testing a spectrum analyzer equipped with Option 130 continue with [step 64](#).

Performance verification test “CISPR Pulse Response” is now complete for all other spectrum analyzers.

Additional Steps for Option 130

CW Measurement for 200 Hz EMI Bandwidth

64. Press **RECALL 1** on the pulse generator.
65. Press **RECALL 2** on the synthesizer/function generator.
66. Press **PRESET** on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

RECALL, INTRNL → STATE 1

MKR, MARKER NORMAL

BW, EMI BW Menu, 200 Hz EMI BW

AUX CTRL, Quasi Peak, AUTO QP AT MKR

A message will be displayed warning that an improper bandwidth is selected. Disregard the message and press **CONTINUE**.

Note that this routine will take 1 to 2 minutes to execute.

67. Record the quasi-peak reading displayed below the signal on the spectrum analyzer screen in [Table 2a-39](#), under the Measured CW Amplitude for 200 Hz.

200 Hz Pulse RF Signal Setup

68. Press **RECALL 1** on the pulse generator. Set the pulse generator to the following conditions:

PER40 ms

WID0.1 ms

LOL-1.7 V

Use the **CHS** key to change the sign of the value entered on the pulse generator.

69. Press **RECALL 1** on the synthesizer/function generator. Set the synthesizer/function generator amplitude to the required amplitude value for the 200 Hz filter recorded in [Table 2a-38](#) by pressing **AMPLITUDE**, (enter the Required Amplitude for 200 Hz), **-dBm**.

70. Press **MAN QP AT MKR** on the spectrum analyzer.

A message will be displayed warning that an improper bandwidth is selected. Disregard the message and press **CONTINUE**.

Note that this routine will take 1 to 2 minutes to execute.

71. Record the marker amplitude reading in [Table 2a-39](#) and the performance verification test record as the Measured 25 Hz Amplitude for 200 Hz. Record the marker amplitude reading in [Table 2a-41](#) as the Measured Relative Equivalent Level of Pulse for Band A, 25 Hz Repetition Frequency.
72. Set the PERIOD to 10 ms on the pulse generator. On the spectrum analyzer, press **MARKER NORM PK** (so that PK is underlined), then **SGL SWP**.
73. Record the marker amplitude reading in [Table 2a-41](#) as the Measured Relative Equivalent Level of Pulse for Band A, 100 Hz Repetition Frequency.
74. Set the PERIOD to 16.7 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
75. Record the marker amplitude reading in [Table 2a-41](#) as the Measured Relative Equivalent Level of Pulse for Band A, 60 Hz Repetition Frequency.
76. Set the PERIOD to 100 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
77. Record the marker amplitude reading in [Table 2a-41](#) as the Measured Relative Equivalent Level of Pulse for Band A, 10 Hz Repetition Frequency.
78. Set the PERIOD to 200 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
79. Record the marker amplitude reading in [Table 2a-41](#) as the Measured Relative Equivalent Level of Pulse for Band A, 5 Hz Repetition Frequency.
80. Set the PERIOD to 500 ms on the pulse generator. On the spectrum analyzer, press **QP X10 ON OFF** so that ON is underlined, then press **SGL SWP**.
81. Record the marker amplitude reading in [Table 2a-41](#) as the Measured Relative Equivalent Level of Pulse for Band A, 2 Hz Repetition Frequency.
82. Set the PERIOD to 980 ms on the pulse generator. Press **SGL SWP** on the spectrum analyzer.
83. Record the marker amplitude reading in [Table 2a-41](#) as the Measured Relative Equivalent Level of Pulse for Band A, 1 Hz Repetition Frequency.
84. Press **TRIG** on the pulse generator. Press **SGL SWP** on the spectrum analyzer. Let the spectrum analyzer sweep 3 divisions then press **MAN** on the pulse generator. Record the Marker reading for Isolated Pulse Measurement for Band A in [Table 2a-41](#).

72a. CISPR Pulse Response, 8590 E-Series Option 103

85. Enter the Measured value for the Band A 100 Hz Repetition Frequency as the Reference value for all the Repetition Frequencies listed for Band A.

86. Calculate and record the Amplitude Error for the 200 Hz EMI Bandwidth in Table 2a-39 as follows:

$$\text{Amp Error} = \text{Meas CW Amp} - \text{Meas 25 Hz Amp}$$

87. Record TR Entry 3 in the appropriate performance verification test record in Chapter 3.

88. Calculate and record the Amplitude Error for each of the Band C and D, 200 Hz EMI Bandwidth Repetition Frequencies listed in Table 2a-41 as follows:

$$\text{Amp Error} = \text{Meas Pulse Level} - \text{Ref Pulse Level}$$

89. Record TR Entry 18 through TR Entry 25 in the appropriate performance verification test record in Chapter 3.

Performance verification test “CISPR Pulse Response” is now complete.

Table 2a-38

Input Amplitude Calibration Worksheet

EMI Bandwidth	Reference Amplitude at 50 MHz	Amplitude Offset	Required Amplitude
9 kHz	_____	0.05	_____
120 kHz	_____	5.42	_____
200 Hz	_____	-0.40	_____

Table 2a-39

Quasi-Peak Detector Reference Accuracy Worksheet

EMI Bandwidth	Measured CW Amplitude	Measured Amplitude for 25 Hz or 100 Hz	Error (TR Entry)
9 kHz	_____	_____	(1) _____
120 kHz	_____	_____	(2) _____
Option 130:			
200 Hz	_____	_____	(3) _____

Table 2a-40 Quasi-Peak Detector Accuracy

Repetition Frequency	Relative Equivalent Level of Pulse		
(Hz)	Measured (dBμV)	Reference (dBμV)	TR Entry (Error)
Band B (9 kHz EMI Bandwidth)			
1000	_____	_____	(4) _____
100	_____	_____	(5) _____
20	_____	_____	(6) _____
10	_____	_____	(7) _____
2	_____	_____	(8) _____
1	_____	_____	(9) _____
Isolated pulse	_____	_____	(10) _____
Bands C and D (120 kHz EMI Bandwidth)			
1000	_____	_____	(11) _____
100	_____	_____	(12) _____
20	_____	_____	(13) _____
10	_____	_____	(14) _____
2	_____	_____	(15) _____
1	_____	_____	(16) _____
Isolated pulse	_____	_____	(17) _____

Table 2a-41 Quasi-Peak Detector Accuracy, Option 130

Repetition Frequency	Relative Equivalent Level of Pulse		
(Hz)	Measured (dBμV)	Reference (dBμV)	TR Entry (Error)
Band A (200 Hz EMI Bandwidth)			
100	_____	_____	(18) _____
60	_____	_____	(19) _____
25	_____	_____	(20) _____
10	_____	_____	(21) _____
5	_____	_____	(22) _____
2	_____	_____	(23) _____
1	_____	_____	(24) _____
Isolated pulse	_____	_____	(25) _____

74a. Gate Card Insertion Loss, 8590 E-Series Option 105 or 107 and 8591C Option 107

Use this procedure to verify that the insertion loss for the Option 105 card is within the specifications. See the specifications for the log and linear scale additional amplitude error due to Gate-On enabled. The Gate Card Insertion Loss is measured by first connecting the HIGH SWEEP output to the GATE INPUT on the spectrum analyzer, providing a trigger signal for the gate circuitry. The gate is turned off and a marker reading is taken. Then the gate is turned on and the synthesizer/function generator amplitude is adjusted to match the marker reading while the gate was off. The difference between the two synthesizer/function generator readings is the measured gate card insertion loss.

Equipment Required

synthesizer/function generator

Cable, BNC, 122 cm (48 in) (*2 required*)

Additional Equipment for 75 Ω input

Cable, BNC, 75 Ω , 120 cm (48 in)

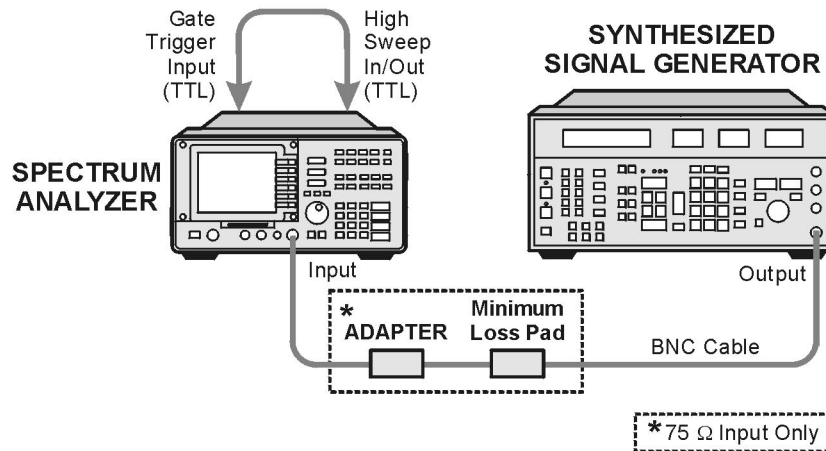
Procedure

To determine the card insertion loss

1. Connect the equipment as shown in [Figure 2a-31](#).

75 Ω input only: Attach the minimum loss pad and adapter to the spectrum analyzer RF input connector.

Figure 2a-31 Gate Delay and Gate Length Test Setup



ws119e

2. Set the synthesizer/function generator controls as follows:

FREQUENCY 50 MHz

AMPTD INCR..... 0.1 dB

AMPLITUDE (50 Ω input only)..... -5 dBm

AMPLITUDE (75 Ω input only)..... 0 dBm

3. On the spectrum analyzer, press **PRESET**. Wait for preset to complete.

4. Press the following spectrum analyzer keys:

FREQUENCY, 50, MHz

SPAN, 1, MHz

BW, 100, kHz

SWEEP, 100, ms, GATE ON OFF (underline OFF)

GATE CONTROL, GATE DELAY, 20, ms, GATE LENGTH, 65, ms

PEAK SEARCH, MARKER Δ

SWEEP, GATE ON OFF (underline ON)

PEAK SEARCH

74a. Gate Card Insertion Loss, 8590 E-Series Option 105 or 107 and 8591C Option 107

5. Use the INCR $\uparrow$ (step up) or the INCR $\downarrow$ (step down) key on the synthesizer/function generator to adjust the output amplitude for a spectrum analyzer MKR Δ reading of 0.0 0.1 dB

6. Record the amplitude displayed on the synthesizer/function generator as the Synthesizer/Function Generator Reading below:

Synthesizer/Function Generator Reading _____ dBm

7. Calculate the Gate Card Insertion Loss (GCIL) by subtracting the synthesizer/function generator reading in [step 6](#) from -5.0 dBm. Record the Gate Card Insertion Loss as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The insertion loss should be between -0.5 dB and +0.5 dB for the 65 ms gate length.

For example, if the synthesizer/function generator reading is -4.96 dBm, then the gate card insertion loss is:

$$\text{GCIL} = -5.0 - \text{S/F Gen Reading} = -5.0 - (-4.96) = -0.04 \text{ dBm}$$

8. Press the following spectrum analyzer keys:

SWEEP, 20, ms, RBW, 5, MHz, GATE ON OFF (underline OFF)

GATE CONTROL, GATE DELAY, 10, ms, GATE LENGTH, 1.8, ms

PEAK SEARCH, MARKER D

SWEEP, GATE ON OFF (underline ON)

9. Adjust the **GATE DELAY** to position the signal at the center of the screen. Then press **PEAK SEARCH**.
10. Use the INCR $\uparrow$ (step up) key or the INCR $\downarrow$ (step down) key on the synthesizer/function generator to adjust the output amplitude for a spectrum analyzer MKR Δ reading of 0.0 0.1 dB.

11. Record the amplitude displayed on the synthesizer/function generator as the Synthesizer/Function Generator Reading below:

Synthesizer/Function Generator Reading _____ dBm

12. Calculate the Gate Card Insertion Loss by subtracting the synthesizer/function generator reading in [step 11](#) from -5.0 dBm. Record the Gate Card Insertion Loss as TR Entry 2 in the appropriate performance verification test record in Chapter 3. The insertion loss should be between -0.8 dB and +0.8 dB for the 1.8 ms gate length.

Performance verification test "Gate Card Insertion Loss" is now complete.

3

Performance Test Records

These test records correspond to the verification tests found in Chapter 2.

If a 3335A source is not available, use the alternative test record with the same number found in Chapter 3a, corresponding to the verification test in Chapter 2a.

8591C Performance Test Record¹**Table 3-1****8591C Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8591C			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator	_____	_____	_____
AM/FM Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
(Option 011 only)			
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesizer/Level Generator	_____	_____	_____
Universal Frequency Counter	_____	_____	_____
Base Band Signal Source	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8591C are included in this test record, therefore not all test numbers are included.

Table 3-2 8591C Performance Verification Test Record Part 2

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
1. 10 MHz Frequency Reference Accuracy				
<i>Option 704 only:</i>	Frequency (MHz)			$\pm 4.2 \times 10^{-9}$
Settability	-150 Hz	(1) _____	$+150 \text{ Hz}$	
2. 10 MHz Precision Frequency Reference Accuracy				
5 Minute Warmup Error	Frequency (MHz)			$\pm 2.004 \times 10^{-9}$
	-1×10^{-7}	(1) _____	$+1 \times 10^{-7}$	
30 Minute Warmup Error	-1×10^{-8}	(2) _____	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
4. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (GHz)			
SPAN				
20 MHz	1.49918	(1) _____	1.50082	$\pm 1 \text{ Hz}$
10 MHz	1.49968	(2) _____	1.50032	$\pm 1 \text{ Hz}$
1 MHz	1.4999680	(3) _____	1.500032	$\pm 1 \text{ Hz}$
<i>Option 130 only:</i>				
20 kHz	1.49999924	(4) _____	1.50000076	$\pm 1 \text{ Hz}$
Marker Count Accuracy				
SPAN				
(CNT RES = 100 Hz) 20 MHz	1.4999989	(5) _____	1.5000011	$\pm 1.0 \text{ Hz}$
(CNT RES = 10 Hz) 1 MHz	1.4999989	(6) _____	1.5000011	$\pm 1.0 \text{ Hz}$

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
4. Frequency Readout Accuracy and Marker Count Accuracy				
<i>Option 130 only:</i>				
(CNT RES = 10 Hz) 20 kHz	1.49999989	(7) _____	1.50000011	±1.0 Hz
(CNT RES = 10 Hz) 2 kHz	1.49999989	(8) _____	1.50000011	±1.0 Hz
6. Noise Sidebands				
Suppression at 10 kHz		(1) _____	-60 dBc	±1.0 dB
Suppression at 20 kHz		(2) _____	-70 dBc	±1.0 dB
Suppression at 30 kHz		(3) _____	-75 dBc	±1.0 dB
7. System Related Sidebands				
Sideband Below Signal		(1) _____	-65 dBc	±1.0 dB
Sideband Above Signal		(2) _____	-65 dBc	±1.0 dB
8. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00MHz	(1) _____	1554.00MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±3.54 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.06 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	0.78 kHz	(7) _____	0.82 kHz	±354 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
10. Residual FM				
		(1) _____	250 Hz	±45.8 Hz
<i>Option 130 only:</i>		(2) _____	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRA Reading			
20 ms	15.4 ms	(1) _____	16.6 ms	±0.057 ms
100 ms	77.0 ms	(2) _____	83.0 ms	±0.283 ms
1 s	770.0 ms	(3) _____	830.0 ms	±2.83 ms
10 s	7.7 s	(4) _____	8.3 s	±23.8 ms
13. Scale Fidelity				
Log Mode dB from Ref Level	Cumulative Error			
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
Option 130 only:				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
Option 130 only:				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14. Reference Level Accuracy				
–80 –1.20 dB (17) _____ +1.20 dB ±0.12 dB –90 –1.30 dB (18) _____ +1.30 dB ±0.12 dB Option 130 only: Log Mode Reference Level (dBm) –20 0 (Ref) 0 (Ref) 0 (Ref) –10 –0.40 dB (19) _____ +0.40 dB ±0.06 dB 0 –0.50 dB (20) _____ +0.50 dB ±0.06 dB –30 –0.50 dB (21) _____ +0.50 dB ±0.06 dB –40 –0.50 dB (22) _____ +0.50 dB ±0.08 dB –50 –0.80 dB (23) _____ +0.80 dB ±0.08 dB –60 –1.20 dB (24) _____ +1.10 dB ±0.12 dB –70 –1.20 dB (25) _____ +1.20 dB ±0.12 dB –80 –1.30 dB (26) _____ +1.30 dB ±0.12 dB –90 –1.40 dB (27) _____ +1.40 dB ±0.12 dB Option 130 only: Linear Mode Reference Level (dBm) –20 0 (Ref) 0 (Ref) 0 (Ref) –10 –0.40 dB (28) _____ +0.40 dB ±0.06 dB 0 –0.50 dB (29) _____ +0.50 dB ±0.06 dB –30 –0.50 dB (30) _____ +0.50 dB ±0.06 dB				

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14. Reference Level Accuracy				
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	-20.15 dB	(1) _____	-19.85 dB	N/A
Resolution Bandwidth Switching Uncertainty				
Resolution Bandwidth				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
1 kHz	-0.5 dB	(2) _____	+0.5 dB	+0.07/-0.08 dB
9 kHz	-0.4 dB	(3) _____	+0.4 dB	+0.07/-0.08 dB
10 kHz	-0.4 dB	(4) _____	+0.4 dB	+0.07/-0.08 dB
30 kHz	-0.4 dB	(5) _____	+0.4 dB	+0.07/-0.08 dB
100 kHz	-0.4 dB	(6) _____	+0.4 dB	+0.07/-0.08 dB
120 kHz	-0.4 dB	(7) _____	+0.4 dB	+0.07/-0.08 dB
300 kHz	-0.4 dB	(8) _____	+0.4 dB	+0.07/-0.08 dB
1 MHz	-0.4 dB	(9) _____	+0.4 dB	+0.07/-0.08 dB
3 MHz	-0.4 dB	(10) _____	+0.4 dB	+0.07/-0.08 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
<i>Option 130 only:</i>				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
300 Hz	-0.6 dB	(11) _____	+0.6 dB	+0.07/-0.08 dB
200 Hz	-0.6 dB	(12) _____	+0.6 dB	+0.07/-0.08 dB
100 Hz	-0.6 dB	(13) _____	+0.6 dB	+0.07/-0.08 dB
30 Hz	-0.6 dB	(14) _____	+0.6 dB	+0.07/-0.08 dB
17. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(9) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(10) _____	144 kHz	±4.44 kHz

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17. Resolution Bandwidth Accuracy				
<i>Option 130 only:</i>				
3 dB Resolution Bandwidth				
300 Hz	240 Hz	(11) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(12) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(13) _____	36 Hz	±3.9 Hz
6 dB EMI Bandwidth				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
18. Calibrator Amplitude Accuracy				
<i>75 Ω input only:</i>	−20.4 dBm	(1) _____	−19.6 dBm	±0.2 dB
	+28.35 dBmV	(2) _____	+29.15 dBmV	±0.2 dB
19. Frequency Response				
Max Positive Response		(1) _____	+1.5 dB	+0.32/−0.33 dB
Max Negative Response	−1.5 dB	(2) _____		+0.32/−0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/−0.33 dB
24. Other Input Related Spurious Responses				
542.8 MHz		(1) _____	−55 dBc	±1.0 dB
1142.8 MHz		(2) _____	−55 dBc	±1.0 dB
29. Spurious Responses				
Second Harmonic Distortion		(1) _____	−45 dBc	+1.86/−2.27 dB
Third Order Intermodulation Distortion		(2) _____	−54 dBc	+2.07/−2.42 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
34. Gain Compression				
		(1) _____	0.5 dB	+0.21/–0.22 dB
<i>Option 130 only:</i>		(2) _____	0.5 dB	+0.21/–0.22 dB
39. Displayed Average Noise				
Frequency				
Display Line Amplitude		(1) _____	N/A	N/A
1 MHz		(2) _____	–63 dBmV	+1.15/–1.25 dB
1 MHz to 1.5 GHz		(3) _____	–63 dBmV	+1.15/–1.25 dB
1.5 GHz to 1.8 GHz		(4) _____	–61 dBmV	+1.15/–1.25 dB
44. Displayed Average Noise for Option 130				
Frequency				
Display Line Amplitude		(1) _____	N/A	N/A
1 MHz		(2) _____	–78 dBmV	+1.15/–1.25 dB
1 MHz to 1.5 GHz		(3) _____	–78 dBmV	+1.15/–1.25 dB
1.5 GHz to 1.8 GHz		(4) _____	–76 dBmV	+1.15/–1.25 dB
49. Residual Responses				
1 MHz to 1.8 GHz		(1) _____	–38 dBmV	+1.09/–1.15 dB
54. Residual Responses for Option 130				
1 MHz to 1.8 GHz		(1) _____	–38 dBmV	+1.09/–1.15 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
57. Fast Time Domain Sweeps				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 µs	(4) _____	820 µs	±0.5%
100 µs	78 µs	(5) _____	82 µs	±0.5%
20 µs	15.6 µs	(6) _____	16.4 µs	±0.5%
59. Absolute Amplitude, Vernier, and Power Sweep Accuracy				
<i>Option 011 only:</i>				
Absolute Amplitude Accuracy	-1.0 dB	(1) _____	+1.0 dB	+0.25/-0.26 dB
Positive Vernier Accuracy		(2) _____	+0.75 dB	±0.033 dB
Negative Vernier Accuracy	-0.75 dB	(3) _____		±0.033 dB
Power Sweep Accuracy		(4) _____	1.5 dB	±0.033 dB
62. Tracking Generator Level Flatness				
Maximum Flatness				
<i>Option 011 only:</i>				
1 MHz to 1800 MHz		(4) _____	+1.75 dB	+0.18/-0.39 dB
Minimum Flatness				
<i>Option 011 only:</i>				
1 MHz to 1800 MHz	-1.75 dB	(8) _____		+0.18/-0.39 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
64. Harmonic Spurious Outputs				
<i>Option 011 only:</i>				
2nd Harmonic Level		(1) _____	-25 dBc	+1.55/-1.80 dB
3rd Harmonic Level		(2) _____	-25 dBc	+1.55/-1.80 dB
66. Non-Harmonic Spurious Outputs				
<i>Option 011 only:</i>				
Highest Non-Harmonic Response Amplitude		(1) _____	-30 dBc	+1.55/-1.80 dB
68. Tracking Generator Feedthrough				
<i>Option 011 only:</i>				
		(1) _____	-57.24 dBmV	+1.15/-1.24 dB
73. Gate Delay Accuracy and Gate Length Accuracy				
<i>Option 107 only:</i>				
Minimum Gate Delay	0.0 μ s	(1) _____	2.0 μ s	$\pm$ 0.011 μ s
Maximum Gate Delay	0.0 μ s	(2) _____	2.0 μ s	$\pm$ 0.011 μ s
1 μ s Gate Length	0.8 μ s	(3) _____	1.2 μ s	$\pm$ 0.011 μ s
65 ms Gate Length	64.99 ms	(4) _____	65.01 ms	$\pm$ 0.434 μ s
74. Gate Card Insertion Loss				
<i>Option 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	-0.5	(1) _____	+0.5	$\pm$ 0.092 dB
1.8 μ s Gate Length	-0.8	(2) _____	+0.8	$\pm$ 0.092 dB

Table 3-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
75. TV Receiver, Video Tester				
<i>Option 107 only:</i>				
Differential Gain				
Channel 2		(1) _____	6%	1.5%
7		(2) _____	6%	1.5%
14		(3) _____	6%	1.5%
33		(4) _____	6%	1.5%
38		(5) _____	6%	1.5%
77		(6) _____	6%	1.5%
Differential Phase				
Channel 2		(7) _____	4°	1°
7		(8) _____	4°	1°
14		(9) _____	4°	1°
33		(10) _____	4°	1°
38		(11) _____	4°	1°
77		(12) _____	4°	1°
Chroma-Luminance Delay				
Channel 2	-45 ns	(13) _____	45 ns	±5.1 ns
7	-45 ns	(14) _____	45 ns	±5.1 ns
14	-45 ns	(15) _____	45 ns	±5.1 ns
33	-45 ns	(16) _____	45 ns	±5.1 ns
38	-45 ns	(17) _____	45 ns	±5.1 ns
77	-45 ns	(18) _____	45 ns	±5.1 ns

8591E Performance Test Record¹

Table 3-3

8591E Performance Verification Test Record Part 1

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8591E			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
AM/FM Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
(Option 010 and 011 only)			
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesizer/Level Generator	_____	_____	_____
Universal Frequency Counter	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8591E are included in this test record, therefore not all test numbers are included.

Table 3-4 8591E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
1. 10 MHz Reference Accuracy				
Settability	Frequency (MHz)			$\pm 4.2 \times 10^{-9}$
	-150 Hz	(1) _____	+150 Hz	
2. 10 MHz Reference Accuracy for Option 004				
5 Minute Warmup Error	Frequency (MHz)			$\pm 2.004 \times 10^{-9}$
	-1×10^{-7}	(1) _____	$+1 \times 10^{-7}$	
30 Minute Warmup Error	-1×10^{-8}	(2) _____	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
4. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (GHz)			
	SPAN			
20 MHz	1.49918	(1) _____	1.50082	± 1 Hz
10 MHz	1.49968	(2) _____	1.50032	± 1 Hz
1 MHz	1.4999680	(3) _____	1.500032	± 1 Hz
<i>Option 130 only:</i>				
20 kHz	1.49999924	(4) _____	1.50000076	± 1 Hz
Marker Count Accuracy				
SPAN				
(CNT RES = 100 Hz) 20 MHz	1.4999989	(5) _____	1.5000011	± 1.0 Hz
(CNT RES = 10 Hz) 1 MHz	1.4999989	(6) _____	1.5000011	± 1.0 Hz

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
4. Frequency Readout Accuracy and Marker Count Accuracy				
<i>Option 130 only:</i>				
(CNT RES = 10 Hz) 20 kHz	1.49999989	(7) _____	1.50000011	±1.0 Hz
(CNT RES = 10 Hz) 2 kHz	1.49999989	(8) _____	1.50000011	±1.0 Hz
6. Noise Sidebands				
Suppression at 10 kHz		(1) _____	-60 dBc	±1.0 dB
Suppression at 20 kHz		(2) _____	-70 dBc	±1.0 dB
Suppression at 30 kHz		(3) _____	-75 dBc	±1.0 dB
7. System Related Sidebands				
Sideband Below Signal		(1) _____	-65 dBc	±1.0 dB
Sideband Above Signal		(2) _____	-65 dBc	±1.0 dB
8. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±3.54 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.06 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	0.78 kHz	(7) _____	0.82 kHz	±354 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
10. Residual FM				
<i>Option 130 only:</i>		(1) _____	250 Hz	±45.8 Hz
		(2) _____	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRA Reading			
20 ms	15.4 ms	(1) _____	16.6 ms	±0.057 ms
100 ms	77.0 ms	(2) _____	83.0 ms	±0.283 ms
1 s	770.0 ms	(3) _____	830.0 ms	±2.83 ms
10 s	7.7 s	(4) _____	8.3 s	±23.8 ms
13. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
Option 130 only:				
% of Ref Level				
100.00	151.38 mV	0 (Ref)	164.80 mV	
70.70	105.09 mV	(69) _____	118.51 mV	±1.84 mV
50.00	72.62 mV	(70) _____	86.04 mV	±1.84 mV
35.48	49.19 mV	(71) _____	62.61 mV	±1.84 mV
25.00	151.38 mV	(72) _____	164.80 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
Option 130 only:				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14. Reference Level Accuracy				
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14. Reference Level Accuracy				
<i>Option 130 only:</i>				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	−20.15 dB	(1) _____	−19.85 dB	N/A
Resolution Bandwidth Switching Uncertainty				
Resolution Bandwidth				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
1 kHz	−0.5 dB	(2) _____	+0.5 dB	+0.07/−0.08 dB
9 kHz	−0.4 dB	(3) _____	+0.4 dB	+0.07/−0.08 dB
10 kHz	−0.4 dB	(4) _____	+0.4 dB	+0.07/−0.08 dB
30 kHz	−0.4 dB	(5) _____	+0.4 dB	+0.07/−0.08 dB
100 kHz	−0.4 dB	(6) _____	+0.4 dB	+0.07/−0.08 dB
120 kHz	−0.4 dB	(7) _____	+0.4 dB	+0.07/−0.08 dB
300 kHz	−0.4 dB	(8) _____	+0.4 dB	+0.07/−0.08 dB
1 MHz	−0.4 dB	(9) _____	+0.4 dB	+0.07/−0.08 dB
3 MHz	−0.4 dB	(10) _____	+0.4 dB	+0.07/−0.08 dB
<i>Option 130 only:</i>				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
300 Hz	−0.6 dB	(11) _____	+0.6 dB	+0.07/−0.08 dB
200 Hz	−0.6 dB	(12) _____	+0.6 dB	+0.07/−0.08 dB
100 Hz	−0.6 dB	(13) _____	+0.6 dB	+0.07/−0.08 dB
30 Hz	−0.6 dB	(14) _____	+0.6 dB	+0.07/−0.08 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(9) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(10) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
3 dB Resolution Bandwidth				
300 Hz	240 Hz	(11) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(12) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(13) _____	36 Hz	±3.9 Hz
6 dB EMI Bandwidth				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
18. Calibrator Amplitude Accuracy				
	-20.4 dBm	(1) _____	-19.6 dBm	±0.2 dB
<i>75 Ω input only:</i>	+28.35 dBmV	(2) _____	+29.15 dBmV	±0.2 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
19. Frequency Response				
Max Positive Response		(1) _____	+1.5 dB	+0.32/–0.33 dB
Max Negative Response	–1.5 dB	(2) _____		+0.32/–0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/–0.33 dB
24. Other Input Related Spurious Responses				
542.8 MHz		(1) _____	–55 dBc	±1.0 dB
1142.8 MHz		(2) _____	–55 dBc	±1.0 dB
29. Spurious Responses				
Second Harmonic Distortion		(1) _____	–45 dBc	+1.86/–2.27 dB
Third Order Intermodulation Distortion		(2) _____	–54 dBc	+2.07/–2.42 dB
34. Gain Compression				
		(1) _____	0.5 dB	+0.21/–0.22 dB
<i>Option 130 only:</i>		(2) _____	0.5 dB	+0.21/–0.22 dB
39. Displayed Average Noise				
Frequency				
400 kHz		(1) _____	–115 dBm	+1.15/–1.25 dB
1 MHz		(2) _____	–115 dBm	+1.15/–1.25 dB
1 MHz to 1.5 GHz		(3) _____	–115 dBm	+1.15/–1.25 dB
1.5 GHz to 1.8 GHz		(4) _____	–113 dBm	+1.15/–1.25 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
44. Displayed Average Noise for Option 130				
Frequency				
400 kHz		(1) _____	-130 dBm	+1.15/-1.25 dB
1 MHz		(2) _____	-130 dBm	+1.15/-1.25 dB
1 MHz to 1.5 GHz		(3) _____	-130 dBm	+1.15/-1.25 dB
1.5 GHz to 1.8 GHz		(4) _____	-128 dBm	+1.15/-1.25 dB
49. Residual Responses				
150 kHz to 1.8 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
<i>Option 001 only:</i>				
1 MHz to 1.8 GHz		(1) _____	-38 dBmV	+1.09/-1.15 dB
54. Residual Responses for Option 130				
150 kHz to 1.8 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
<i>Option 001 only:</i>				
1 MHz to 1.8 GHz		(1) _____	-38 dBmV	+1.09/-1.15 dB
57. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X		1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(1) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(2) _____	8.20 ms	±0.5%
1.0 ms	780 µs	(3) _____	820 µs	±0.5%
100 µs	78 µs	(4) _____	82 µs	±0.5%
20 µs	15.6 µs	(5) _____	16.4 µs	±0.5%

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
59. Absolute Amplitude, Vernier, and Power Sweep Accuracy				
<i>Option 010 or 011 only:</i>				
Absolute Amplitude Accuracy	-1.0 dB	(1) _____	+1.0 dB	+0.25/-0.26 dB
Positive Vernier Accuracy		(2) _____	+0.75 dB	±0.033 dB
Negative Vernier Accuracy	-0.75 dB	(3) _____		±0.033 dB
Power Sweep Accuracy		(4) _____	1.5 dB	±0.033 dB
62. Tracking Generator Level Flatness				
<i>Option 010 only:</i>				
Maximum Flatness				
100 kHz		(1) _____	+1.75 dB	+0.42/-0.45 dB
300 kHz to 5 MHz		(2) _____	+1.75 dB	+0.28/-0.28 dB
10 MHz to 1800 MHz		(3) _____	+1.75 dB	+0.24/-0.24 dB
Minimum Flatness				
100 kHz	-1.75 dB	(4) _____		+0.42/-0.45 dB
300 kHz to 5 MHz	-1.75 dB	(5) _____		+0.28/-0.28 dB
10 MHz to 1800 MHz	-1.75 dB	(6) _____		+0.24/-0.24 dB
<i>Option 011 only:</i>				
Maximum Flatness				
1 MHz to 1800 MHz		(1) _____	+1.75 dB	+0.18/-0.39 dB
Minimum Flatness				
1 MHz to 1800 MHz	-1.75 dB	(2) _____		+0.18/-0.39 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
64. Harmonic Spurious Outputs				
<i>Option 010 or 011 only:</i>				
2nd Harmonic Level		(1) _____	-25 dBc	+1.55/-1.80 dB
3rd Harmonic Level		(2) _____	-25 dBc	+1.55/-1.80 dB
66. Non-Harmonic Spurious Outputs				
<i>Option 010 or 011 only:</i>				
Highest Non-Harmonic Response Amplitude		(1) _____	-30 dBc	+1.55/-1.80 dB
68. Tracking Generator Feedthrough				
<i>Option 010 only:</i>		(1) _____	-106 dBm	+1.15/-1.24 dB
<i>Option 011 only:</i>		(1) _____	-57.24 dBmV	+1.15/-1.24 dB
72. CISPR Pulse Response				
<i>Option 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW	N/A	(1) _____	N/A	N/A
120 kHz EMI BW	N/A	(2) _____	N/A	N/A
<i>Option 103 and 130 only:</i>				
200 Hz EMI BW	N/A	(3) _____	N/A	N/A

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
<i>Option 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	-5.5 dB	(6) _____	-7.5 dB	±0.27 dB
10	-8.5 dB	(7) _____	-11.5 dB	±0.25 dB
2	-18.5 dB	(8) _____	-22.5 dB	±0.23 dB
1	-20.5 dB	(9) _____	-24.5 dB	±0.19 dB
Isolated Pulse	-21.5 dB	(10) _____	-25.5 dB	±0.15 dB
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	-8.0 dB	(13) _____	-10.0 dB	±0.18 dB
10	-12.5 dB	(14) _____	-15.5 dB	±0.18 dB
2	-24.0 dB	(15) _____	-28.0 dB	±0.18 dB
1	-26.5 dB	(16) _____	-30.5 dB	±0.18 dB
Isolated Pulse	-29.5 dB	(17) _____	-33.5 dB	±0.17 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8591E Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
<i>Options 103 and 130 only:</i> Relative Level, Band A Repetition Frequency 100 60 25 10 5 2 1 Isolated Pulse	Amplitude Error			
	3.0 dB	(18) _____	+5.0 dB	±0.24 dB
	2.0 dB	(19) _____	4.0 dB	±0.26 dB
	0 (Ref)	(20) _____	0 (Ref)	0 (Ref)
	-3.0 dB	(21) _____	-5.0 dB	±0.29 dB
	-6.0 dB	(22) _____	-9.0 dB	±0.30 dB
	-11.0 dB	(23) _____	-15.0 dB	±0.36 dB
	-15.0 dB	(24) _____	-19.0 dB	±0.28 dB
	-17.0 dB	(25) _____	-21.0 dB	±0.20 dB
73. Gate Delay Accuracy and Gate Length Accuracy				
<i>Option 105 or 107 only:</i> Minimum Gate Delay Maximum Gate Delay 1 µs Gate Length 65 ms Gate Length	0.0 µs 0.0 µs 0.8 µs 64.99 ms	(1) _____ (2) _____ (3) _____ (4) _____	2.0 µs 2.0 µs 1.2 µs 65.01 ms	±0.011 µs ±0.011 µs ±0.011 µs ±0.434 µs
74. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i> Gate Card Insertion Loss 65 ms Gate Length 1.8 µs Gate Length	-0.5 -0.8	(1) _____ (2) _____	+0.5 +0.8	±0.092 dB ±0.092 dB

Table 3-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
75. TV Receiver, Video Tester				
<i>Option 107 only:</i>				
Differential Gain				
Channel 2		(1) _____	6%	1.5%
7		(2) _____	6%	1.5%
14		(3) _____	6%	1.5%
33		(4) _____	6%	1.5%
38		(5) _____	6%	1.5%
77		(6) _____	6%	1.5%
Differential Phase				
Channel 2		(7) _____	4°	1°
7		(8) _____	4°	1°
14		(9) _____	4°	1°
33		(10) _____	4°	1°
38		(11) _____	4°	1°
77		(12) _____	4°	1°
Chroma-Luminance Delay				
Channel 2	-45 ns	(13) _____	45 ns	±5.1 ns
7	-45 ns	(14) _____	45 ns	±5.1 ns
14	-45 ns	(15) _____	45 ns	±5.1 ns
33	-45 ns	(16) _____	45 ns	±5.1 ns
38	-45 ns	(17) _____	45 ns	±5.1 ns
77	-45 ns	(18) _____	45 ns	±5.1 ns

8593E Performance Test Record¹**Table 3-5****8593E Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8593E			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
(Option 010)			
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesizer/Level Generator	_____	_____	_____
Universal Frequency Counter	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8593E are included in this test record, therefore not all test numbers are included.

Table 3-6 8593E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
1. 10 MHz Reference Accuracy				
Settability	Frequency Error			$\pm 4.2 \times 10^{-9}$
	-150 Hz	(1) _____	+150 Hz	
2. 10 MHz Reference Accuracy for Option 004				
5 Minute Warmup Error	Frequency Error			$\pm 2.004 \times 10^{-9}$
	-1×10^{-7}	(1) _____	$+1 \times 10^{-7}$	
30 Minute Warmup Error	-1×10^{-8}	(2) _____	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
3. Comb Generator Frequency Accuracy				
Comb Generator Frequency	Frequency (MHz)			± 25 Hz
	99.993	(1) _____	100.007	
5. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (MHz)			
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	(1) _____	1.50082	± 1.0 Hz
10 MHz	1.49958	(2) _____	1.50042	± 1.0 Hz
1 MHz	1.4999680	(3) _____	1.500032	± 1.0 Hz
Frequency = 4.0 GHz				
SPAN				
20 MHz	3.99918	(4) _____	4.00082	± 1.0 Hz
10 MHz	3.99958	(5) _____	4.00042	± 1.0 Hz
1 MHz	3.9999680	(6) _____	4.000032	± 1.0 Hz

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
5. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency = 9.0 GHz				
SPAN				
20 MHz	8.99918	(7) _____	9.00082	±2.0 Hz
10 MHz	8.99958	(8) _____	9.00042	±2.0 Hz
1 MHz	8.9999680	(9) _____	9.000032	±2.0 Hz
Frequency = 16.0 GHz				
SPAN				
20 MHz	15.99918	(10) _____	16.00082	±3.0 Hz
10 MHz	15.99958	(11) _____	16.00042	±3.0 Hz
1 MHz	15.9999680	(12) _____	16.000032	±3.0 Hz
Frequency = 21.0 GHz				
SPAN				
20 MHz	20.99918	(13) _____	21.00082	±4.0 Hz
10 MHz	20.99958	(14) _____	21.00042	±4.0 Hz
1 MHz	20.9999680	(15) _____	21.000032	±4.0 Hz
<i>Option 130 only:</i>				
20 kHz	1.49999924	(16) _____	1.50000076	±1.0 Hz
Marker Count Accuracy				
Frequency = 1.5 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	1.4999989	(17) _____	1.5000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	1.4999989	(18) _____	1.5000011	±1 Hz

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
5. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency = 4.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	3.9999989	(19) _____	4.0000011	±1 Hz
(CNT RES = 10 Hz) 1MHz	1.9999989	(20) _____	1.0000011	±1 Hz
Frequency = 9.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	8.9999989	(21) _____	9.0000011	±2 Hz
(CNT RES = 10 Hz) 1 MHz	8.9999989	(22) _____	9.0000011	±2 Hz
Frequency =16.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	15.9999989	(23) _____	16.0000011	±3 Hz
(CNT RES = 10 Hz) 1 MHz	15.9999989	(24) _____	16.0000011	±3 Hz
Frequency = 21.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	20.9999989	(25) _____	21.0000011	±4 Hz
(CNT RES = 10 Hz) 1 MHz	20.9999989	(26) _____	21.0000011	±4 Hz

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
5. Frequency Readout Accuracy and Marker Count Accuracy				
<i>Option 130 only:</i>				
(CNT RES = 10 Hz) 20 kHz	1.49999989	(27) _____	1.50000011	±1.0 Hz
(CNT RES = 10 Hz) 2 kHz	1.49999989	(28) _____	1.50000011	±1.0 Hz
6. Noise Sidebands				
Suppression at 10 kHz		(1) _____	-60 dBc	±1.0 dB
Suppression at 20 kHz		(2) _____	-70 dBc	±1.0 dB
Suppression at 30 kHz		(3) _____	-75 dBc	±1.0 dB
7. System Related Sidebands				
Sideband Below Signal		(1) _____	-65 dBc	±1.0 dB
Sideband Above Signal		(2) _____	-65 dBc	±1.0 dB
9. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	0.78 kHz	(7) _____	0.82 kHz	±3.54 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
11. Residual FM				
<i>Option 130 only:</i>		(1) _____	250 Hz	±45.8 Hz
		(2) _____	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRA Reading			
20 ms	15.4 ms	(1) _____	16.6 ms	±0.057 ms
100 ms	77.0 ms	(2) _____	83.0 ms	±0.283 ms
1 s	770.0 ms	(3) _____	830.0 ms	±2.83 ms
10 s	7.7 s	(4) _____	8.3 s	±23.8 ms
13. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies							
Model 8593E			Report No. _____				
Serial No. _____			Date _____				
Test Description	Results Measured			Measurement			
	Min.	TR Entry	Max.	Uncertainty			
13. Scale Fidelity							
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV			
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV			
<i>Option 130 only:</i>							
% of Ref Level							
100.00	0 (Ref)	0 (Ref)	0 (Ref)				
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV			
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV			
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV			
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV			
Log-to-Linear Switching							
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB			
<i>Option 130 only:</i>							
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB			
15. Reference Level Accuracy							
Log Mode							
Reference Level (dBm)							
-20	0 (Ref)	0 (Ref)	0 (Ref)				
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB			
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB			
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB			
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB			
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB			

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15. Reference Level Accuracy				
Linear Mode Reference Level (dBm) -60 -70 -80 -90 -20 -10 0 -30 -40 -50 -60 -70 -80 -90	-1.00 dB -1.10 dB -1.20 dB -1.30 dB 0 (Ref) -0.40 dB -0.50 dB -0.40 dB -0.50 dB -0.80 dB -1.00 dB -1.10 dB -1.20 dB -1.30 dB	(6) _____ (7) _____ (8) _____ (9) _____ 0 (Ref) (10) _____ (11) _____ (12) _____ (13) _____ (14) _____ (15) _____ (16) _____ (17) _____ (18) _____	+1.00 dB +1.10 dB +1.20 dB +1.30 dB 0 (Ref) +0.40 dB +0.50 dB +0.40 dB +0.50 dB +0.80 dB +1.00 dB +1.10 dB +1.20 dB +1.30 dB	±0.12 dB ±0.12 dB ±0.12 dB ±0.12 dB ±0.06 dB ±0.06 dB ±0.06 dB ±0.06 dB ±0.08 dB ±0.08 dB ±0.12 dB ±0.12 dB ±0.12 dB ±0.12 dB
Option 130 only: Log Mode Reference Level (dBm) -20 -10 0	0 (Ref) -0.40 dB -0.50 dB	0 (Ref) (19) _____ (20) _____	0 (Ref) +0.40 dB +0.50 dB	±0.06 dB ±0.06 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies							
Model 8593E			Report No. _____				
Serial No. _____			Date _____				
Test Description	Results Measured			Measurement			
	Min.	TR Entry	Max.	Uncertainty			
15. Reference Level Accuracy							
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB			
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB			
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB			
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB			
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB			
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB			
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB			
<i>Option 130 only:</i>							
Linear Mode							
Reference Level (dBm)							
-20	0 (Ref)	0 (Ref)	0 (Ref)				
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB			
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB			
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB			
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB			
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB			
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB			
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB			
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB			
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB			

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8593E Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	-20.15 dB	(1) _____	-19.85 dB	N/A
Resolution Bandwidth Switching Uncertainty				
Resolution Bandwidth				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
1 kHz	-0.5 dB	(2) _____	+0.5 dB	+0.07/-0.08 dB
9 kHz	-0.4 dB	(3) _____	+0.4 dB	+0.07/-0.08 dB
10 kHz	-0.4 dB	(4) _____	+0.4 dB	+0.07/-0.08 dB
30 kHz	-0.4 dB	(5) _____	+0.4 dB	+0.07/-0.08 dB
100 kHz	-0.4 dB	(6) _____	+0.4 dB	+0.07/-0.08 dB
120 kHz	-0.4 dB	(7) _____	+0.4 dB	+0.07/-0.08 dB
300 kHz	-0.4 dB	(8) _____	+0.4 dB	+0.07/-0.08 dB
1 MHz	-0.4 dB	(9) _____	+0.4 dB	+0.07/-0.08 dB
3 MHz	-0.4 dB	(10) _____	+0.4 dB	+0.07/-0.08 dB
<i>Option 130 only:</i>				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
300 Hz	-0.6 dB	(11) _____	+0.6 dB	+0.07/-0.08 dB
200 Hz	-0.6 dB	(12) _____	+0.6 dB	+0.07/-0.08 dB
100 Hz	-0.6 dB	(13) _____	+0.6 dB	+0.07/-0.08 dB
30 Hz	-0.6 dB	(14) _____	+0.6 dB	+0.07/-0.08 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(9) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(10) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
3 dB Resolution Bandwidth				
300 Hz	240 Hz	(11) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(12) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(13) _____	36 Hz	±3.9 Hz
6 dB EMI Bandwidth				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
18. Calibrator Amplitude Accuracy				
	-20.4 dBm	(1) _____	-19.6 dBm	±0.2 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
20. Frequency Response				
Band 0				
Max Positive Response		(1) _____	+1.5 dB	+0.32/−0.33 dB
Max Negative Response	−1.5 dB	(2) _____		+0.32/−0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/−0.33 dB
Band 1				
Max Positive Response		(4) _____	+2.0 dB	+0.40/−0.42 dB
Max Negative Response	−2.0 dB	(5) _____		+0.40/−0.42 dB
Peak-to-Peak Response		(6) _____	3.0 dB	+0.40/−0.42 dB
Band 2				
Max Positive Response		(7) _____	+2.5 dB	+0.42/−0.43 dB
Max Negative Response	−2.5 dB	(8) _____		+0.42/−0.43 dB
Peak-to-Peak Response		(9) _____	4.0 dB	+0.42/−0.43 dB
Band 3				
Max Positive Response		(10) _____	+3.0 dB	+0.52/−0.55 dB
Max Negative Response	−3.0 dB	(11) _____		+0.52/−0.55 dB
Peak-to-Peak Response		(12) _____	4.0 dB	+0.52/−0.55 dB
Band 4				
Max Positive Response		(13) _____	+3.0 dB	+0.54/−0.57 dB
Max Negative Response	−3.0 dB	(14) _____		+0.54/−0.57 dB
Peak-to-Peak Response		(15) _____	4.0 dB	+0.54/−0.57 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
20. Frequency Response				
Band 4 for Option 026 or 027				
Max Positive Response		(13) _____	+5.0 dB	+0.54/–0.57 dB
Max Negative Response	–5.0 dB	(14) _____		+0.54/–0.57 dB
Peak-to-Peak Response		(15) _____	4.0 dB	+0.54/–0.57 dB
25. Other Input Related Spurious Responses				
50 kHz to 2.9 GHz		(1) _____	–55 dBc	+1.12/–1.21 dB
≤18 GHz		(2) _____	–55 dBc	+1.13/–1.22 dB
≤22 GHz		(3) _____	–50 dBc	+1.15/–1.25 dB
Option 026 or 027 only: ≤26.5 GHz		(4) _____	–50 dBc	+1.15/–1.25 dB
30. Spurious Responses				
Second Harmonic Distortion				
Applied Frequency				
40 MHz		(1) _____	–50 dBc	+1.86/–2.27 dB
2.8 GHz		(3) _____	(2) _____	+2.24/–2.72 dB
Third Order Intermodulation Distortion				
Frequency				
2.8 GHz		(4) _____	–54 dBc	+2.07/–2.42 dB
4.0 GHz		(5) _____	–54 dBc	+2.07/–2.42 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8593E Serial No. _____					Report No. _____ Date _____
Test Description	Results Measured			Measurement	
	Min.	TR Entry	Max.	Uncertainty	
35. Gain Compression					
<2.9 GHz		(1) _____	0.5 dB	+0.21/–0.22 dB	
>2.9 GHz		(2) _____	0.5 dB	+0.21/–0.22 dB	
<i>Option 130 only:</i>		(3) _____	0.5 dB	+0.21/–0.22 dB	
40. Displayed Average Noise					
Frequency					
400 kHz		(1) _____	–112 dBm	+1.15/–1.25 dB	
1 MHz		(2) _____	–112 dBm	+1.15/–1.25 dB	
1 MHz to 2.9 GHz		(3) _____	–112 dBm	+1.15/–1.25 dB	
2.75 to 6.4 GHz		(4) _____	–114 dBm	+1.15/–1.25 dB	
6.0 to 12.8 GHz		(5) _____	–102 dBm	+1.15/–1.25 dB	
12.4 to 19.4 GHz		(6) _____	–98 dBm	+1.15/–1.25 dB	
19.1 to 22 GHz		(7) _____	–92 dBm	+1.15/–1.25 dB	
<i>Option 026 or 027 only:</i>					
19.1 to 26.5 GHz		(8) _____	–87 dBm	+1.15/–1.25 dB	

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
45. Displayed Average Noise for Option 130				
Frequency				
400 kHz		(1) _____	-127 dBm	+1.15/-1.25 dB
1 MHz		(2) _____	-127 dBm	+1.15/-1.25 dB
1 MHz to 2.9 GHz		(3) _____	-127 dBm	+1.15/-1.25 dB
2.75 to 6.4 GHz		(4) _____	-129 dBm	+1.15/-1.25 dB
6.0 to 12.8 GHz		(5) _____	-117 dBm	+1.15/-1.25 dB
12.4 to 19.4 GHz		(6) _____	-113 dBm	+1.15/-1.25 dB
19.1 to 22 GHz		(7) _____	-107 dBm	+1.15/-1.25 dB
<i>Option 026 or 027 only:</i>				
19.1 to 26.5 GHz		(8) _____	-102 dBm	+1.15/-1.25 dB
50. Residual Responses				
150 kHz to 6.5 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
56. Residual Responses for Option 130				
150 kHz to 6.5 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
58. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 μs	(4) _____	820 μs	±0.5%
100 μs	78 μs	(5) _____	82 μs	±0.5%
20 μs	15.6 μs	(6) _____	16.4 μs	±0.5%

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8593E Serial No. _____					Report No. _____ Date _____
Test Description	Results Measured			Measurement	
	Min.	TR Entry	Max.	Uncertainty	
60. Absolute Amplitude Accuracy					
<i>Option 010 only:</i>					
Absolute Amplitude Accuracy	-20.75 dBm	(1) _____	-19.25 dBm	+.155/- .161 dB	
Positive Vernier Accuracy		(2) _____	+0.50 dB	±0.03 dB	
Negative Vernier Accuracy	-0.50 dB	(3) _____		±0.03 dB	
Positive Step-to-Step Accuracy		(4) _____	+1.20 dB	±0.03 dB	
Negative Step-to-Step Accuracy	-0.80 dB	(5) _____		±0.03 dB	
61. Power Sweep Range					
<i>Option 010 only:</i>					
Start Power Level		(1) _____			
Stop Power Level		(2) _____			
Power Sweep Range	9.0 dB	(3) _____		±0.03 dB	
63. Tracking Generator Level Flatness					
<i>Option 010 only:</i>					
Maximum Flatness					
9 kHz to 100 kHz		(1) _____	+2.0 dB	+0.42/-0.45 dB	
100 kHz to 2900 MHz		(2) _____	+2.0 dB	+0.42/-0.45 dB	
Minimum Flatness					
9 kHz to 100 kHz	-2.0 dB	(3) _____		+0.42/-0.45 dB	
100 kHz to 2900 MHz	-2.0 dB	(4) _____		+0.42/-0.45 dB	

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
65. Harmonic Spurious Outputs				
<i>Option 010 only:</i>				
2nd Harmonic Level, 9 kHz		(1) _____	-15 dBc	+1.55/-1.80 dB
2nd Harmonic Level, 25 kHz to 900 MHz		(2) _____	-25 dBc	+1.55/-1.80 dB
2nd Harmonic Level, 1.4 GHz		(3) _____	-25 dBc	+3.45/-4.01 dB
3rd Harmonic Level, 9 kHz		(4) _____	-15 dBc	+1.55/-1.80 dB
3rd Harmonic Level, 25 kHz to 900 MHz		(5) _____	-25 dBc	+1.55/-1.80 dB
67. Non-Harmonic Spurious Outputs				
<i>Option 010 only:</i>				
Highest Non-Harmonic Response Amplitude				
9 kHz to 2000 MHz		(1) _____	-27 dBc	+1.55/-1.80 dB
2000 MHz to 2900 MHz		(2) _____	-23 dBc	+3.45/-4.01 dB
70. Tracking Generator Feedthrough				
<i>Option 010 only:</i>				
400 kHz to 2.9 GHz		(1) _____	-112 dBm	+1.59/-1.70 dB
71. Tracking Generator LO Feedthrough Amplitude				
<i>Option 010 only:</i>				
9 kHz to 1.5 GHz		(1) _____	-16 dBm	±2.02/-2.50 dB
2.9 GHz		(2) _____	-16 dBm	±2.10/-2.67 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8593E Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
<i>Options 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW	-1.5 dB	(1) _____	+1.5 dB	±0.34 dB
120 kHz EMI BW	-1.5 dB	(2) _____	+1.5 dB	±0.50 dB
<i>Options 103 and 130 only:</i>				
200 Hz EMI BW	-1.5 dB	(3) _____	+1.5 dB	±0.34 dB
<i>Options 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	-5.5 dB	(6) _____	-7.5 dB	±0.27 dB
10	-8.5 dB	(7) _____	-11.5 dB	±0.25 dB
2	-18.5 dB	(8) _____	-22.5 dB	±0.23 dB
1	-15.0 dB	(9) _____	-19.0 dB	±0.19 dB
Isolated Pulse	-17.0 dB	(10) _____	-21.0 dB	±0.15 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	−8.0 dB	(13) _____	−10.0 dB	±0.18 dB
10	−12.5 dB	(14) _____	−15.5 dB	±0.18 dB
2	−24.0 dB	(15) _____	−28.0 dB	±0.18 dB
1	−26.5 dB	(16) _____	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	(17) _____	−33.5 dB	±0.17 dB
<i>Options 103 and 130 only:</i>	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	(18) _____	+5.0 dB	±0.24 dB
60	2.0 dB	(19) _____	5.0 dB	±0.26 dB
25	0 (Ref)	(20) _____	0 (Ref)	0 (Ref)
10	−3.0 dB	(21) _____	−5.0 dB	±0.29 dB
5	−6.0 dB	(22) _____	−9.0 dB	±0.30 dB
2	−11.0 dB	(23) _____	−15.0 dB	±0.36 dB
1	−15.0 dB	(24) _____	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	(25) _____	−21.0 dB	±0.20 dB

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
73. Gate Delay Accuracy and Gate Length Accuracy				
<i>Option 105 or 107 only:</i>				
Minimum Gate Delay	0.0 μ s	(1) _____	2.0 μ s	$\pm 0.011 \mu$ s
Maximum Gate Delay	0.0 μ s	(2) _____	2.0 μ s	$\pm 0.011 \mu$ s
1 μ s Gate Length	0.8 μ s	(3) _____	1.2 μ s	$\pm 0.011 \mu$ s
65 ms Gate Length	64.99 ms	(4) _____	65.01 ms	$\pm 0.434 \mu$ s
74. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	-0.5	(1) _____	+0.5	± 0.092 dB
1.8 μ s Gate Length	-0.8	(2) _____	+0.8	± 0.092 dB
75. TV Receiver, Video Tester				
<i>Option 107 only:</i>				
Differential Gain				
Channel 2		(1) _____	6%	1.5%
7		(2) _____	6%	1.5%
14		(3) _____	6%	1.5%
33		(4) _____	6%	1.5%
38		(5) _____	6%	1.5%
77		(6) _____	6%	1.5%

Table 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
75. TV Receiver, Video Tester				
Differential Phase				
Channel 2		(7) _____	4°	1°
7		(8) _____	4°	1°
14		(9) _____	4°	1°
33		(10) _____	4°	1°
38		(11) _____	4°	1°
77		(12) _____	4°	1°
Chroma-Luminance Delay				
Channel 2	-45 ns	(13) _____	45 ns	±5.1 ns
7	-45 ns	(14) _____	45 ns	±5.1 ns
14	-45 ns	(15) _____	45 ns	±5.1 ns
33	-45 ns	(16) _____	45 ns	±5.1 ns
38	-45 ns	(17) _____	45 ns	±5.1 ns
77	-45 ns	(18) _____	45 ns	±5.1 ns

8594E Performance Test Record¹**Table 3-7****8594E Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8594E			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Counter	_____	_____	_____
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer (Option 010)	_____	_____	_____
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesizer/Level Generator	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8594E are included in this test record, therefore not all test numbers are included.

Table 3-8 8594E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
1. 10 MHz Reference Accuracy				
Settability	Frequency Error			$\pm 4.2 \times 10^{-9}$
	-150 Hz	(1) _____	+150 Hz	
2. 10 MHz Reference Accuracy for Option 004				
5 Minute Warmup Error	Frequency Error			$\pm 2.004 \times 10^{-9}$
	-1×10^{-7}	(1) _____	$+1 \times 10^{-7}$	
30 Minute Warmup Error	-1×10^{-8}	(2) _____	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
4. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (GHz)			± 1.0 Hz
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	(1) _____	1.50082	
10 MHz	1.49968	(2) _____	1.50032	
1 MHz	1.4999680	(3) _____	1.500032	
<i>Option 130 only:</i>				
20 kHz	1.49999924	(4) _____	1.50000076	
Frequency = 1.5 GHz				
SPAN				
(CNT RES = 100 Hz)	1.4999989	(5) _____	1.5000011	
20 MHz				
(CNT RES = 10 Hz)	1.49999989	(6) _____	1.50000011	
1 MHz				

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
4. Frequency Readout Accuracy and Marker Count Accuracy				
<i>Option 130 only:</i>				
(CNT RES = 10 Hz) 20 kHz	1.49999989	(7) _____	1.50000011	±1.0 Hz
(CNT RES = 10 Hz) 2 kHz	1.49999989	(8) _____	1.50000011	±1.0 Hz
6. Noise Sidebands				
Suppression at 10 kHz		(1) _____	-60 dBc	±1.0 dB
Suppression at 20 kHz		(2) _____	-70 dBc	±1.0 dB
Suppression at 30 kHz		(3) _____	-75 dBc	±1.0 dB
7. System Related Sidebands				
Sideband Above Signal		(1) _____	-65 dBc	±1.0 dB
Sideband Below Signal		(2) _____	-65 dBc	±1.0 dB
9. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	780 Hz	(7) _____	820 Hz	±3.54 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
11. Residual FM				
<i>Option 130 only:</i>		(1) _____	250 Hz	±45.8 Hz
		(2) _____	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRA Reading			
20 ms	15.4 ms	(1) _____	16.6 ms	±0.057 ms
100 ms	77.0 ms	(2) _____	83.0 ms	±0.283 ms
1 s	770.0 ms	(3) _____	830.0 ms	±2.83 ms
10 s	7.7 s	(4) _____	8.3 s	±23.8 ms
13. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
<i>Option 130 only:</i>				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
<i>Option 130 only:</i>				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
15. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
15. Reference Level Accuracy				
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
15. Reference Level Accuracy				
<i>Option 130 only:</i>				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	-20.15 dB	(1) _____	-19.85 dB	N/A
Resolution Bandwidth Switching Uncertainty				
Resolution Bandwidth				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
1 kHz	-0.5 dB	(2) _____	+0.5 dB	+0.07/-0.08 dB
9 kHz	-0.4 dB	(3) _____	+0.4 dB	+0.07/-0.08 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies					
Model 8594E			Report No. _____		
Serial No. _____			Date _____		
Test Description	Results Measured			Measurement	
	Min. -	TR Entry	Max.	Uncertainty	
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties					
10 kHz	-0.4 dB	(4) _____	+0.4 dB	+0.07/-0.08 dB	
30 kHz	-0.4 dB	(5) _____	+0.4 dB	+0.07/-0.08 dB	
100 kHz	-0.4 dB	(6) _____	+0.4 dB	+0.07/-0.08 dB	
120 kHz	-0.4 dB	(7) _____	+0.4 dB	+0.07/-0.08 dB	
300 kHz	-0.4 dB	(8) _____	+0.4 dB	+0.07/-0.08 dB	
1 MHz	-0.4 dB	(9) _____	+0.4 dB	+0.07/-0.08 dB	
3 MHz	-0.4 dB	(10) _____	+0.4 dB	+0.07/-0.08 dB	
<i>Option 130 only:</i>					
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)		
300 Hz	-0.6 dB	(11) _____	+0.6 dB	+0.07/-0.08 dB	
200 Hz	-0.6 dB	(12) _____	+0.6 dB	+0.07/-0.08 dB	
100 Hz	-0.6 dB	(13) _____	+0.6 dB	+0.07/-0.08 dB	
30 Hz	-0.6 dB	(14) _____	+0.6 dB	+0.07/-0.08 dB	
17. Resolution Bandwidth Accuracy					
3 dB Resolution Bandwidth					
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz	
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz	
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz	
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz	
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz	
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz	
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz	

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
17. Resolution Bandwidth Accuracy				
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(9) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(10) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
3 dB Resolution Bandwidth				
300 Hz	240 Hz	(11) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(12) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(13) _____	36 Hz	±3.9 Hz
6 dB EMI Bandwidth				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
18. Calibrator Amplitude Accuracy				
	-20.4 dBm	(1) _____	-19.6 dBm	±0.2 dB
21. Frequency Response				
Max Positive Response		(1) _____	+1.5 dB	+0.32/-0.33 dB
Max Negative Response	-1.5 dB	(2) _____		+0.32/-0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/-0.33 dB
26. Other Input Related Spurious Responses				
50 kHz to 2.9 GHz		(1) _____	-55 dBc	+1.12/-1.21 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
31. Spurious Responses				
Second Harmonic Distortion		(1) _____	-50 dBc	+1.12/-1.21 dB
Third Order Intermodulation Distortion				
Frequency				
2.8 GHz		(2) _____	-54 dBc	+2.07/-2.42 dB
36. Gain Compression				
<2.9 GHz		(1) _____	0.5 dB	+0.21/-0.22 dB
<i>Option 130 only:</i>		(2) _____	0.5 dB	+0.21/-0.22 dB
41. Displayed Average Noise				
Frequency				
400 kHz		(1) _____	-107 dBm	+1.15/-1.25 dB
4 MHz		(2) _____	-107 dBm	+1.15/-1.25 dB
5 MHz to 2.9 GHz		(3) _____	-112 dBm	+1.15/-1.25 dB
46. Displayed Average Noise for Option 130				
Frequency				
400 kHz		(1) _____	-122 dBm	+1.15/-1.25 dB
4 MHz		(2) _____	-122 dBm	+1.15/-1.25 dB
5 MHz to 2.9 GHz		(3) _____	-127 dBm	+1.15/-1.25 dB
51. Residual Responses				
150 kHz to 2.9 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
55. Residual Responses for Option 130				
150 kHz to 2.9 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
58. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 µs	(4) _____	820 µs	±0.5%
100 µs	78 µs	(5) _____	82 µs	±0.5%
20 µs	15.6 µs	(6) _____	16.4 µs	±0.5%
60. Absolute Amplitude Accuracy				
<i>Option 010 only:</i>				
Absolute Amplitude Accuracy	-20.75 dBm	(1) _____	-19.25 dBm	+.155/- .161 dB
Positive Vernier Accuracy		(2) _____	+0.50 dB	±0.03 dB
Negative Vernier Accuracy	-0.50 dB	(3) _____		±0.03 dB
Positive Step-to-Step Accuracy		(4) _____	+1.20 dB	±0.03 dB
Negative Step-to-Step Accuracy	-0.80 dB	(5) _____		±0.03 dB
61. Power Sweep Range				
<i>Option 010 only:</i>				
Start Power Level		(1) _____		
Stop Power Level		(2) _____		
Power Sweep Range	9.0 dB	(3) _____		±0.03 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
63. Tracking Generator Level Flatness				
<i>Option 010 only:</i>				
Maximum Flatness				
9 kHz to 100 kHz		(1) _____	+2.0 dB	+0.42/–0.45 dB
100 kHz to 2900 MHz		(2) _____	+2.0 dB	+0.42/–0.45 dB
Minimum Flatness				
9 kHz to 100 kHz	–2.0 dB	(3) _____		+0.42/–0.45 dB
100 kHz to 2900 MHz	–2.0 dB	(4) _____		+0.42/–0.45 dB
65. Harmonic Spurious Outputs				
<i>Option 010 only:</i>				
2nd Harmonic Level, 9 kHz		(1) _____	–15 dBc	+1.55/–1.80 dB
2nd Harmonic Level, 25 kHz to 900 MHz		(2) _____	–25 dBc	+1.55/–1.80 dB
2nd Harmonic Level, 1.4 GHz		(3) _____	–25 dBc	+3.45/–4.01 dB
3rd Harmonic Level, 9 kHz		(4) _____	–15 dBc	+1.55/–1.80 dB
3rd Harmonic Level, 25 kHz to 900 MHz		(5) _____	–25 dBc	+1.55/–1.80 dB
67. Non-Harmonic Spurious Outputs				
<i>Option 010 only:</i>				
Highest Non-Harmonic Response Amplitude				
9 kHz to 2000 MHz		(1) _____	–27 dBc	+1.55/–1.80 dB
2000 MHz to 2900 MHz		(2) _____	–23 dBc	+3.45/–4.01 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
69. Tracking Generator Feedthrough				
<i>Option 010 only:</i>				
400 kHz to 5 MHz		(1) _____	-107 dBm	+1.59/-1.70 dB
5 MHz to 2.9 GHz		(2) _____	-112 dBm	+1.59/-1.70 dB
70. Tracking Generator Feedthrough				
<i>Option 010 only:</i>				
400 kHz to 2.9 GHz		(1) _____	-112 dBm	+1.59/-1.70 dB
71. Tracking Generator LO Feedthrough Amplitude				
<i>Option 010 only:</i>				
9 kHz to 1.5 GHz		(1) _____	-16 dBm	±2.02/-2.50 dB
2.9 GHz		(2) _____	-16 dBm	±2.10/-2.67 dB
72. CISPR Pulse Response				
<i>Options 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW	-1.5 dB	(1) _____	+1.5 dB	±0.34 dB
120 kHz EMI BW	-1.5 dB	(2) _____	+1.5 dB	±0.50 dB
<i>Options 103 and 130 only:</i>				
200 Hz EMI BW	-1.5 dB	(3) _____	+1.5 dB	±0.34 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
<i>Options 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	-5.5 dB	(6) _____	-7.5 dB	±0.27 dB
10	-8.5 dB	(7) _____	-11.5 dB	±0.25 dB
2	-18.5 dB	(8) _____	-22.5 dB	±0.23 dB
1	-15.0 dB	(9) _____	-19.0 dB	±0.19 dB
Isolated Pulse	-17.0 dB	(10) _____	-21.0 dB	±0.15 dB
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	-8.0 dB	(13) _____	-10.0 dB	±0.18 dB
10	-12.5 dB	(14) _____	-15.5 dB	±0.18 dB
2	-24.0 dB	(15) _____	-28.0 dB	±0.18 dB
1	-26.5 dB	(16) _____	-30.5 dB	±0.18 dB
Isolated Pulse	-29.5 dB	(17) _____	-33.5 dB	±0.17 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
<i>Options 103 and 130 only:</i> Relative Level, Band A Repetition Frequency 100 60 25 10 5 2 1 Isolated Pulse	Amplitude Error			
	3.0 dB	(18) _____	+5.0 dB	
	2.0 dB	(19) _____	5.0 dB	
	0 (Ref)	(20) _____	0 (Ref)	
	-3.0 dB	(21) _____	-5.0 dB	
	-6.0 dB	(22) _____	-9.0 dB	
	-11.0 dB	(23) _____	-15.0 dB	
	-20.5 dB	(24) _____	-24.5 dB	
	-21.5 dB	(25) _____	-25.5 dB	±0.24 dB
				±0.26 dB
				0 (Ref)
				±0.29 dB
				±0.30 dB
				±0.36 dB
				±0.28 dB
				±0.20 dB
73. Gate Delay Accuracy and Gate Length Accuracy				
<i>Option 105 or 107 only:</i> Minimum Gate Delay Maximum Gate Delay 1 µs Gate Length 65 ms Gate Length	0.0 µs 0.0 µs 0.8 µs 64.99 ms	(1) _____ (2) _____ (3) _____ (4) _____	2.0 µs 2.0 µs 1.2 µs 65.01 ms	±0.011 µs ±0.011 µs ±0.011 µs ±0.434 µs
74. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i> Gate Card Insertion Loss 65 ms Gate Length 1.8 µs Gate Length	-0.5 -0.8	(1) _____ (2) _____	+0.5 +0.8	±0.092 dB ±0.092 dB

Table 3-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
75. TV Receiver, Video Tester				
<i>Option 107 only:</i>				
Differential Gain				
Channel 2		(1) _____	6%	1.5%
7		(2) _____	6%	1.5%
14		(3) _____	6%	1.5%
33		(4) _____	6%	1.5%
38		(5) _____	6%	1.5%
77		(6) _____	6%	1.5%
Differential Phase				
Channel 2		(7) _____	4°	1°
7		(8) _____	4°	1°
14		(9) _____	4°	1°
33		(10) _____	4°	1°
38		(11) _____	4°	1°
77		(12) _____	4°	1°
Chroma-Luminance Delay				
Channel 2	-45 ns	(13) _____	45 ns	±5.1 ns
7	-45 ns	(14) _____	45 ns	±5.1 ns
14	-45 ns	(15) _____	45 ns	±5.1 ns
33	-45 ns	(16) _____	45 ns	±5.1 ns
38	-45 ns	(17) _____	45 ns	±5.1 ns
77	-45 ns	(18) _____	45 ns	±5.1 ns

8594Q Performance Test Record¹

Table 3-9

8594Q Performance Verification Test Record Part 1

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8594Q			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Counter	_____	_____	_____
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
RF Power Sensor	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
Pulse Generator	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
(Option 011 only)			
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesizer/Level Generator	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8594Q are included in this test record, therefore not all test numbers are included.

Table 3-10 8594Q Performance Verification Test Record Part 2

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
1. 10 MHz Reference Accuracy for Option 704				
Settability	Frequency Error			$\pm 4.2 \times 10^{-9}$
	-150 Hz	(1) _____	+150 Hz	
2. 10 MHz Reference Accuracy for Option 190				
5 Minute Warmup Error	Frequency Error			$\pm 2.004 \times 10^{-9}$
	-1×10^{-7}	(1) _____	$+1 \times 10^{-7}$	
30 Minute Warmup Error	-1×10^{-8}	(2) _____	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
4. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (GHz)			± 1.0 Hz
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	(1) _____	1.50082	
10 MHz	1.49968	(2) _____	1.50032	
1 MHz	1.4999680	(3) _____	1.500032	
<i>Option 130 only:</i>				
20 kHz	1.49999924	(4) _____	1.50000076	
Marker Count Accuracy				
SPAN				
(CNT RES = 100 Hz)	1.4999989	(5) _____	1.5000011	± 1.0 Hz
20 MHz				
(CNT RES = 10 Hz)	1.49999989	(6) _____	1.50000011	± 1.0 Hz
1 MHz				

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
6. Noise Sidebands				
Suppression at 10 kHz		(1) _____	-60 dBc	±1.0 dB
Suppression at 20 kHz		(2) _____	-70 dBc	±1.0 dB
Suppression at 30 kHz		(3) _____	-75 dBc	±1.0 dB
7. System Related Sidebands				
Sideband Above Signal		(1) _____	-65 dBc	±1.0 dB
Sideband Below Signal		(2) _____	-65 dBc	±1.0 dB
9. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
11. Residual FM				
		(1) _____	250 Hz	±45.8 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRA Reading			
20 ms	15.4 ms	(1) _____	16.6 ms	±0.057 ms
100 ms	77.0 ms	(2) _____	83.0 ms	±0.283 ms
1 s	770.0 ms	(3) _____	830.0 ms	±2.83 ms
10 s	7.7 s	(4) _____	8.3 s	±23.8 ms

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8594Q Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
Log Mode dB from Ref Level	Incremental Error			
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
15. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8594Q Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15. Reference Level Accuracy				
Linear Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	−20.15 dB	(1) _____	−19.85 dB	N/A
Resolution Bandwidth Switching Uncertainty				
Resolution Bandwidth				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
1 kHz	−0.5 dB	(2) _____	+0.5 dB	+0.07/−0.08 dB
9 kHz	−0.4 dB	(3) _____	+0.4 dB	+0.07/−0.08 dB
10 kHz	−0.4 dB	(4) _____	+0.4 dB	+0.07/−0.08 dB
30 kHz	−0.4 dB	(5) _____	+0.4 dB	+0.07/−0.08 dB
100 kHz	−0.4 dB	(6) _____	+0.4 dB	+0.07/−0.08 dB
120 kHz	−0.4 dB	(7) _____	+0.4 dB	+0.07/−0.08 dB
300 kHz	−0.4 dB	(8) _____	+0.4 dB	+0.07/−0.08 dB
1 MHz	−0.4 dB	(9) _____	+0.4 dB	+0.07/−0.08 dB
3 MHz	−0.4 dB	(10) _____	+0.4 dB	+0.07/−0.08 dB

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(9) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(10) _____	144 kHz	±4.44 kHz
6 dB EMI Bandwidth				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
18. Calibrator Amplitude Accuracy				
	-20.4 dBm	(1) _____	-19.6 dBm	±0.2 dB
21. Frequency Response				
Max Positive Response		(1) _____	+1.5 dB	+0.32/-0.33 dB
Max Negative Response	-1.5 dB	(2) _____		+0.32/-0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/-0.33 dB
26. Other Input Related Spurious Responses				
50 kHz to 2.9 GHz		(1) _____	-55 dBc	+1.12/-1.21 dB

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
31. Spurious Responses				
Second Harmonic Distortion		(1) _____	-55 dBc	+1.12/-1.21 dB
Third Order Intermodulation Distortion				
Frequency				
2.8 GHz		(2) _____	-54 dBc	+2.07/-2.42 dB
36. Gain Compression				
<2.9 GHz		(1) _____	0.5 dB	+0.21/-0.22 dB
41. Displayed Average Noise				
Frequency				
400 kHz		(1) _____	-107 dBm	+1.15/-1.25 dB
4 MHz		(2) _____	-107 dBm	+1.15/-1.25 dB
5 MHz to 2.9 GHz		(3) _____	-112 dBm	+1.15/-1.25 dB
51. Residual Responses				
150 kHz to 2.9 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
52. Channel Power ^a				
<i>Option 190 only</i>				
Bandwidth				
Saw=OFF, Preamp=OFF 8 MHz	2 dB	(1) _____	6 dB	N/A
Saw=ON, Preamp=ON 8 MHz	-61.0 dB	(2) _____	-51.0 dB	N/A

Table 3-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
53. EVM^b				
<i>Option 190 only</i>				
Bandwidth				
Saw=OFF, Preamp=OFF				
8 MHz	.1%	(1) _____	1.37%	N/A
4 MHz	.1%	(2) _____	1.37%	N/A
2 MHz	.1%	(3) _____	1.37%	N/A
Saw=ON, Preamp=OFF				
8 MHz	.1%	(4) _____	1.91%	N/A
4 MHz	.1%	(5) _____	1.91%	N/A
2 MHz	.1%	(6) _____	1.91%	N/A

- a. No manual performance test is available. This test is to be performed *only* by an authorized service center.
- b. This is a measurement of the residual EVM of the analyzer. No manual performance test is available. This test is to be performed *only* by an authorized service center.

8595E Performance Test Record¹**Table 3-11****8595E Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8595E			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Counter	_____	_____	_____
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer (Option 011 only)	_____	_____	_____
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesizer/Level Generator	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8595E are included in this test record, therefore not all test numbers are included.

Table 3-12 8595E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
1. 10 MHz Reference Accuracy				
Settability	Frequency Error			$\pm 4.2 \times 10^{-9}$
	-150 Hz	(1) _____	+150 Hz	
2. 10 MHz Reference Accuracy for Option 004				
5 Minute Warmup Error	Frequency Error			$\pm 2.004 \times 10^{-9}$
	-1×10^{-7}	(1) _____	$+1 \times 10^{-7}$	
30 Minute Warmup Error	-1×10^{-8}	(2) _____	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
5. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (MHz)			± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	(1) _____	1.50082	
10 MHz	1.49968	(2) _____	1.50032	
1 MHz	1.4999680	(3) _____	1.500032	
Frequency = 4.0 GHz				
SPAN				
20 MHz	3.99918	(4) _____	4.00082	
10 MHz	3.99968	(5) _____	4.00032	
1 MHz	3.9999680	(6) _____	4.000032	
<i>Option 130 only:</i>				
20 kHz	1.49999924	(16) _____	1.50000076	

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
5. Frequency Readout Accuracy and Marker Count Accuracy				
Marker Count Accuracy				
Frequency = 1.5 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	1.49999989	(17) _____	1.50000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	1.49999989	(18) _____	1.50000011	±1 Hz
Frequency = 4.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	3.99999989	(19) _____	4.00000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	+4.99999989	(20) _____	4.00000011	±1 Hz
<i>Option 130 only:</i>				
(CNT RES = 10 Hz) 20 kHz	1.49999989	(27) _____	1.50000011	±1.0 Hz
(CNT RES = 10 Hz) 2 kHz	1.49999989	(28) _____	1.50000011	±1.0 Hz
6. Noise Sidebands				
Suppression at 10 kHz		(1) _____	-60 dBc	±1.0 dB
Suppression at 20 kHz		(2) _____	-70 dBc	±1.0 dB
Suppression at 30 kHz		(3) _____	-75 dBc	±1.0 dB
7. System Related Sidebands				
Sideband Above Signal		(1) _____	-65 dBc	±1.0 dB
Sideband Below Signal		(2) _____	-65 dBc	±1.0 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
9. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	780 Hz	(7) _____	820 Hz	±3.54 Hz
300 Hz	N/A	(8) _____	N/A	N/A
11. Residual FM				
		(1) _____	250 Hz	±45.8 Hz
<i>Option 130 only:</i>		(2) _____	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRA Reading			
20 ms	15.4 ms	(1) _____	16.6 ms	±0.057 ms
100 ms	77.0 ms	(2) _____	83.0 ms	±0.283 ms
1 s	770.0 ms	(3) _____	830.0 ms	±2.83 ms
10 s	7.7 s	(4) _____	8.3 s	±23.8 ms

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
Option 130 only:				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
Option 130 only:				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15. Reference Level Accuracy				
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB
<i>Option 130 only:</i>				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8595E Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15. Reference Level Accuracy				
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	-20.15 dB	(1) _____	-19.85 dB	N/A
Resolution Bandwidth Switching Uncertainty				
Resolution Bandwidth				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
1 kHz	-0.5 dB	(2) _____	+0.5 dB	+0.07/-0.08 dB
9 kHz	-0.4 dB	(3) _____	+0.4 dB	+0.07/-0.08 dB
10 kHz	-0.4 dB	(4) _____	+0.4 dB	+0.07/-0.08 dB
30 kHz	-0.4 dB	(5) _____	+0.4 dB	+0.07/-0.08 dB
100 kHz	-0.4 dB	(6) _____	+0.4 dB	+0.07/-0.08 dB
120 kHz	-0.4 dB	(7) _____	+0.4 dB	+0.07/-0.08 dB
300 kHz	-0.4 dB	(8) _____	+0.4 dB	+0.07/-0.08 dB
1 MHz	-0.4 dB	(9) _____	+0.4 dB	+0.07/-0.08 dB
3 MHz	-0.4 dB	(10) _____	+0.4 dB	+0.07/-0.08 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
<i>Option 130 only:</i>				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
300 Hz	-0.6 dB	(11) _____	+0.6 dB	+0.07/-0.08 dB
200 Hz	-0.6 dB	(12) _____	+0.6 dB	+0.07/-0.08 dB
100 Hz	-0.6 dB	(13) _____	+0.6 dB	+0.07/-0.08 dB
30 Hz	-0.6 dB	(14) _____	+0.6 dB	+0.07/-0.08 dB
17. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(9) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(10) _____	144 kHz	±4.44 kHz

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17. Resolution Bandwidth Accuracy				
<i>Option 130 only:</i>				
3 dB Resolution Bandwidth				
300 Hz	240 Hz	(11) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(12) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(13) _____	36 Hz	±3.9 Hz
6 dB EMI Bandwidth				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
18. Calibrator Amplitude Accuracy				
	−20.4 dBm	(1) _____	−19.6 dBm	±0.2 dB
22. Frequency Response				
Band 0				
Max Positive Response		(1) _____	+1.5 dB	+0.32/−0.33 dB
Max Negative Response	−1.5 dB	(2) _____		+0.32/−0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/−0.33 dB
Band 1				
Max Positive Response		(4) _____	+2.0 dB	+0.40/−0.42 dB
Max Negative Response	−2.0 dB	(5) _____		+0.40/−0.42 dB
Peak-to-Peak Response		(6) _____	3.0 dB	+0.40/−0.42 dB
27. Other Input Related Spurious Responses				
Band 0				
Maximum MKR Δ		(1) _____	−55 dBc	+1.12/−1.21 dB
Band 1				
Maximum MKR Δ		(2) _____	−55 dBc	+1.12/−1.21 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
32. Spurious Responses				
Second Harmonic Distortion				
Applied Frequency				
40 MHz		(1) _____	-50 dBc	+1.86/-2.27 dB
2.8 GHz		(3) _____	(2) _____	+2.24/-2.72 dB
Third Order Intermodulation Distortion				
Frequency				
2.8 GHz		(4) _____	-54 dBc	+2.07/-2.42 dB
4.0 GHz		(5) _____	-54 dBc	+2.07/-2.42 dB
37. Gain Compression				
<2.9 GHz		(1) _____	0.5 dB	+0.21/-0.22 dB
>2.9 GHz		(2) _____	0.5 dB	+0.21/-0.22 dB
<i>Option 130 only:</i>		(3) _____	0.5 dB	+0.21/-0.22 dB
42. Displayed Average Noise				
Frequency				
400 kHz		(1) _____	-110 dBm	+1.15/-1.25 dB
1 MHz		(2) _____	-110 dBm	+1.15/-1.25 dB
1 MHz to 2.9 GHz		(3) _____	-110 dBm	+1.15/-1.25 dB
2.75 to 6.5 GHz		(4) _____	-112 dBm	+1.15/-1.25 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
47. Displayed Average Noise for Option 130				
Frequency				
400 kHz		(1) _____	-125 dBm	+1.15/-1.25 dB
1 MHz		(2) _____	-125 dBm	+1.15/-1.25 dB
1 MHz to 2.9 GHz		(3) _____	-125 dBm	+1.15/-1.25 dB
2.75 to 6.5 GHz		(4) _____	-127 dBm	+1.15/-1.25 dB
52. Residual Responses				
150 kHz to 6.5 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
56. Residual Responses for Option 130				
150 kHz to 6.5 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
58. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 μs	(4) _____	820 μs	±0.5%
100 μs	78 μs	(5) _____	82 μs	±0.5%
20 μs	15.6 μs	(6) _____	16.4 μs	±0.5%

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
60. Absolute Amplitude Accuracy				
<i>Option 010 only:</i>				
Absolute Amplitude Accuracy	-20.75 dBm	(1) _____	-19.25 dBm	+0.155/-0.161 dB
Positive Vernier Accuracy		(2) _____	+0.50 dB	±0.03 dB
Negative Vernier Accuracy	-0.50 dB	(3) _____		±0.03 dB
Positive Step-to-Step Accuracy		(4) _____	+1.20 dB	±0.03 dB
Negative Step-to-Step Accuracy	-0.80 dB	(5) _____		±0.03 dB
61. Power Sweep Range				
<i>Option 010 only:</i>				
Start Power Level		(1) _____		
Stop Power Level		(2) _____		
Power Sweep Range	9.0 dB	(3) _____		±0.03 dB
63. Tracking Generator Level Flatness				
<i>Option 010 only:</i>				
Maximum Flatness				
9 kHz to 100 kHz		(1) _____	+2.0 dB	+0.42/-0.45 dB
100 kHz to 2900 MHz		(2) _____	+2.0 dB	+0.42/-0.45 dB
Minimum Flatness				
9 kHz to 100 kHz	-2.0 dB	(3) _____		+0.42/-0.45 dB
100 kHz to 2900 MHz	-2.0 dB	(4) _____		+0.42/-0.45 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
65. Harmonic Spurious Outputs				
<i>Option 010 only:</i>				
2nd Harmonic Level, 9 kHz		(1) _____	-15 dBc	+1.55/-1.80 dB
2nd Harmonic Level, 25 kHz to 900 MHz		(2) _____	-25 dBc	+1.55/-1.80 dB
2nd Harmonic Level, 1.4 GHz		(3) _____	-25 dBc	+3.45/-4.01 dB
3rd Harmonic Level, 9 kHz		(4) _____	-15 dBc	+1.55/-1.80 dB
3rd Harmonic Level, 25 kHz to 900 MHz		(5) _____	-25 dBc	+1.55/-1.80 dB
67. Non-Harmonic Spurious Outputs				
<i>Option 010 only:</i>				
Highest Non-Harmonic Response Amplitude				
9 kHz to 2000 MHz		(1) _____	-27 dBc	+1.55/-1.80 dB
2000 MHz to 2900 MHz		(2) _____	-23 dBc	+3.45/-4.01 dB
70. Tracking Generator Feedthrough				
<i>Option 010 only:</i>				
400 kHz to 2.9 GHz		(1) _____	-112 dBm	+1.59/-1.70 dB
71. Tracking Generator LO Feedthrough Amplitude				
<i>Option 010 only:</i>				
9 kHz to 1.5 GHz		(1) _____	-16 dBm	±2.02/-2.50 dB
2.9 GHz		(2) _____	-16 dBm	±2.10/-2.67 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
<i>Options 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW		(1) _____		±0.44/−0.48 dB
120 kHz EMI BW		(2) _____		±0.80/−0.98 dB
<i>Options 103 and 130 only:</i>				
200 Hz EMI BW		(3) _____		
<i>Options 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	−5.5 dB	(6) _____	−7.5 dB	±0.27 dB
10	−8.5 dB	(7) _____	−11.5 dB	±0.25 dB
2	−18.5 dB	(8) _____	−22.5 dB	±0.23 dB
1	−20.5 dB	(9) _____	−24.5 dB	±0.19 dB
Isolated Pulse	−21.5 dB	(10) _____	−25.5 dB	±0.15 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	-8.0 dB	(13) _____	-10.0 dB	±0.18 dB
10	-12.5 dB	(14) _____	-15.5 dB	±0.18 dB
2	-24.0 dB	(15) _____	-28.0 dB	±0.18 dB
1	-26.5 dB	(16) _____	-30.5 dB	±0.18 dB
Isolated Pulse	-29.5 dB	(17) _____	-33.5 dB	±0.17 dB
<i>Options 103 and 130 only:</i>	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	(18) _____	+5.0 dB	±0.24 dB
60	2.0 dB	(19) _____	5.0 dB	±0.26 dB
25	0 (Ref)	(20) _____	0 (Ref)	0 (Ref)
10	-3.0 dB	(21) _____	-5.0 dB	±0.29 dB
5	-6.0 dB	(22) _____	-9.0 dB	±0.30 dB
2	-11.0 dB	(23) _____	-15.0 dB	±0.36 dB
1	-15.0 dB	(24) _____	-19.0 dB	±0.28 dB
Isolated Pulse	-17.0 dB	(25) _____	-21.0 dB	±0.20 dB

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
73. Gate Delay Accuracy and Gate Length Accuracy				
<i>Option 105 or 107 only:</i>				
Minimum Gate Delay	0.0 μ s	(1) _____	2.0 μ s	$\pm 0.011 \mu$ s
Maximum Gate Delay	0.0 μ s	(2) _____	2.0 μ s	$\pm 0.011 \mu$ s
1 μ s Gate Length	0.8 μ s	(3) _____	1.2 μ s	$\pm 0.011 \mu$ s
65 ms Gate Length	64.99 ms	(4) _____	65.01 ms	$\pm 0.434 \mu$ s
74. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	-0.5	(1) _____	+0.5	± 0.092 dB
1.8 μ s Gate Length	-0.8	(2) _____	+0.8	± 0.092 dB
75. TV Receiver, Video Tester				
<i>Option 107 only:</i>				
Differential Gain				
Channel 2		(1) _____	6%	1.5%
7		(2) _____	6%	1.5%
14		(3) _____	6%	1.5%
33		(4) _____	6%	1.5%
38		(5) _____	6%	1.5%
77		(6) _____	6%	1.5%
Differential Phase				
Channel 2		(7) _____	4°	1°
7		(8) _____	4°	1°
14		(9) _____	4°	1°

Table 3-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
75. TV Receiver, Video Tester				
33		(10) _____	4°	1°
38		(11) _____	4°	1°
77		(12) _____	4°	1°
Chroma-Luminance Delay				
Channel 2	-45 ns	(13) _____	45 ns	±5.1 ns
7	-45 ns	(14) _____	45 ns	±5.1 ns
14	-45 ns	(15) _____	45 ns	±5.1 ns
33	-45 ns	(16) _____	45 ns	±5.1 ns
38	-45 ns	(17) _____	45 ns	±5.1 ns
77	-45 ns	(18) _____	45 ns	±5.1 ns

8596E Performance Test Record¹**Table 3-13****8596E Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8596E			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Counter	_____	_____	_____
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesizer/Level Generator	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8596E are included in this test record, therefore not all test numbers are included.

Table 3-14 8596E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement Uncertainty
	Min.	TR Entry	Max.	
1. 10 MHz Reference Accuracy				
Settability	Frequency Error			$\pm 4.2 \times 10^{-9}$
	-150 Hz	(1) _____	+150 Hz	
2. 10 MHz Reference Accuracy for Option 004				
5 Minute Warmup Error	-1×10^{-7}	(1) _____	$+1 \times 10^{-7}$	$\pm 2.004 \times 10^{-9}$
30 Minute Warmup Error	-1×10^{-8}	(2) _____	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
3. Comb Generator Frequency Accuracy				
Comb Generator Frequency	Frequency (MHz)			± 25 Hz
	99.993	(1) _____	100.007	
5. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (GHz)			± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz ± 1.0 Hz
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	(1) _____	1.50082	
10 MHz	1.49968	(2) _____	1.50032	
1 MHz	1.4999680	(3) _____	1.500032	
Frequency = 4.0 GHz				
SPAN				
20 MHz	3.99918	(4) _____	4.00082	
10 MHz	3.99968	(5) _____	4.00032	
1 MHz	3.9999680	(6) _____	4.000032	

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
5. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency = 9.0 GHz				
SPAN				
20 MHz	8.99918	(7) _____	9.00082	±2.0 Hz
10 MHz	8.99968	(8) _____	9.00032	±2.0 Hz
1 MHz	8.9999680	(9) _____	9.000032	±2.0 Hz
Frequency = 16.0 GHz				
SPAN				
20 MHz	15.99918	(10) _____	16.00082	±3.0 Hz
10 MHz	15.99958	(11) _____	16.00042	±3.0 Hz
1 MHz	15.9999680	(12) _____	16.000032	±3.0 Hz
Frequency = 21.0 GHz				
SPAN				
20 MHz	20.99918	(13) _____	21.00082	±4.0 Hz
10 MHz	20.99958	(14) _____	21.00042	±4.0 Hz
1 MHz	20.9999680	(15) _____	21.000032	±4.0 Hz
<i>Option 130 only:</i>				
20 kHz	1.49999924	(16) _____	1.50000076	±1.0 Hz
Marker Count Accuracy				
Frequency = 1.5 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	1.4999989	(17) _____	1.5000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	1.49999989	(18) _____	1.50000011	±1 Hz

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
5. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency = 4.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	3.9999989	(19) _____	4.0000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	4.9999989	(20) _____	4.0000011	±1 Hz
Frequency = 9.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	8.9999989	(21) _____	9.0000011	±2 Hz
(CNT RES = 10 Hz) 1 MHz	8.9999989	(22) _____	9.0000011	±2 Hz
Frequency = 16.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	15.9999989	(23) _____	16.0000011	±3 Hz
(CNT RES = 10 Hz) 1 MHz	15.9999989	(24) _____	16.0000011	±3 Hz
Frequency = 21.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	20.9999989	(25) _____	21.0000011	±4 Hz
(CNT RES = 10 Hz) 1 MHz	20.9999989	(26) _____	21.0000011	±4 Hz

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
5. Frequency Readout Accuracy and Marker Count Accuracy				
<i>Option 130 only:</i>				
(CNT RES = 10 Hz) 20 kHz	1.49999989	(27) _____	1.50000011	±1.0 Hz
(CNT RES = 10 Hz) 2 kHz	1.49999989	(28) _____	1.50000011	±1.0 Hz
6. Noise Sidebands				
Suppression at 10 kHz		(1) _____	-60 dBc	±1.0 dB
Suppression at 20 kHz		(2) _____	-70 dBc	±1.0 dB
Suppression at 30 kHz		(3) _____	-75 dBc	±1.0 dB
7. System Related Sidebands				
Sideband Above Signal		(1) _____	-65 dBc	±1.0 dB
Sideband Below Signal		(2) _____	-65 dBc	±1.0 dB
9. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	780 Hz	(7) _____	820 Hz	±3.54 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
11. Residual FM				
		(1) _____	250 Hz	±45.8 Hz
<i>Option 130 only:</i>		(2) _____	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRA Reading			
20 ms	15.4 ms	(1) _____	16.6 ms	±0.057 ms
100 ms	77.0 ms	(2) _____	83.0 ms	±0.283 ms
1 s	770.0 ms	(3) _____	830.0 ms	±2.83 ms
10 s	7.7 s	(4) _____	8.3 s	±23.8 ms
13. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13. Scale Fidelity				
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
<i>Option 130 only:</i>				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
<i>Option 130 only:</i>				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB
15. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies					
Model 8596E			Report No. _____		
Serial No. _____			Date _____		
Test Description	Results Measured			Measurement	
	Min.	TR Entry	Max.	Uncertainty	
15. Reference Level Accuracy					
Linear Mode Reference Level (dBm)	-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
	-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
	-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
	-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB
	-20	0 (Ref)	0 (Ref)	0 (Ref)	
	-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
	0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
	-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
	-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
	-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
	-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
	-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
	-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
<i>Option 130 only:</i> Log Mode Reference Level (dBm)	-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB
	-20	0 (Ref)	0 (Ref)	0 (Ref)	
	-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
	0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies					
Model 8596E			Report No. _____		
Serial No. _____			Date _____		
Test Description	Results Measured			Measurement	
	Min.	TR Entry	Max.	Uncertainty	
15. Reference Level Accuracy					
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB	
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB	
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB	
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB	
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB	
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB	
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB	
<i>Option 130 only:</i>					
Linear Mode					
Reference Level (dBm)					
-20	0 (Ref)	0 (Ref)	0 (Ref)		
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB	
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB	
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB	
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB	
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB	
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB	
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB	
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB	
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB	

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
16. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	−20.15 dB	(1) _____	−19.85 dB	N/A
Resolution Bandwidth Switching Uncertainty				
Resolution Bandwidth				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
1 kHz	−0.5 dB	(2) _____	+0.5 dB	+0.07/−0.08 dB
9 kHz	−0.4 dB	(3) _____	+0.4 dB	+0.07/−0.08 dB
10 kHz	−0.4 dB	(4) _____	+0.4 dB	+0.07/−0.08 dB
30 kHz	−0.4 dB	(5) _____	+0.4 dB	+0.07/−0.08 dB
100 kHz	−0.4 dB	(6) _____	+0.4 dB	+0.07/−0.08 dB
120 kHz	−0.4 dB	(7) _____	+0.4 dB	+0.07/−0.08 dB
300 kHz	−0.4 dB	(8) _____	+0.4 dB	+0.07/−0.08 dB
1 MHz	−0.4 dB	(9) _____	+0.4 dB	+0.07/−0.08 dB
3 MHz	−0.4 dB	(10) _____	+0.4 dB	+0.07/−0.08 dB
Option 130 only:				
3 kHz	0 (Ref)	0 (Ref)	0 (Ref)	
300 Hz	−0.6 dB	(11) _____	+0.6 dB	+0.07/−0.08 dB
200 Hz	−0.6 dB	(12) _____	+0.6 dB	+0.07/−0.08 dB
100 Hz	−0.6 dB	(13) _____	+0.6 dB	+0.07/−0.08 dB
30 Hz	−0.6 dB	(14) _____	+0.6 dB	+0.07/−0.08 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(9) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(10) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
3 dB Resolution Bandwidth				
300 Hz	240 Hz	(11) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(12) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(13) _____	36 Hz	±3.9 Hz
6 dB EMI Bandwidth				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
18. Calibrator Amplitude Accuracy				
	-20.4 dBm	(1) _____	-19.6 dBm	±0.2 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
23. Frequency Response				
Band 0				
Max. Positive Response		(1) _____	+1.5 dB	+0.32/−0.33 dB
Max. Negative Response	−1.5 dB	(2) _____		+0.32/−0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/−0.33 dB
Band 1				
Max. Positive Response		(4) _____	+2.0 dB	+0.40/−0.42 dB
Max. Negative Response	−2.0 dB	(5) _____		+0.40/−0.42 dB
Peak-to-Peak Response		(6) _____	3.0 dB	+0.40/−0.42 dB
Band 2				
Max. Positive Response		(7) _____	+2.5 dB	+0.42/−0.43 dB
Max. Negative Response	−2.5 dB	(8) _____		+0.42/−0.43 dB
Peak-to-Peak Response		(9) _____	4.0 dB	+0.42/−0.43 dB
28. Other Input Related Spurious Responses				
Band 0				
Maximum MKR Δ		(1) _____	−55 dBc	+1.12/−1.21 dB
Band 1 and 2				
Maximum MKR Δ		(2) _____	−55 dBc	+1.12/−1.21 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
33. Spurious Responses				
Second Harmonic Distortion				
Applied Frequency				
40 MHz		(1) _____	-50 dBc	+1.86/-2.27 dB
2.8 GHz		(3) _____	(2) _____	+2.24/-2.72 dB
Third Order Intermodulation Distortion				
33. Spurious Responses				
Frequency				
2.8 GHz		(4) _____	-54 dBc	+2.07/-2.42 dB
4.0 GHz		(5) _____	-54 dBc	+2.07/-2.42 dB
38. Gain Compression				
<2.9 GHz		(1) _____	0.5 dB	+0.21/-0.22 dB
>2.9 GHz		(2) _____	0.5 dB	+0.21/-0.22 dB
<i>Option 130 only:</i>		(3) _____	0.5 dB	+0.21/-0.22 dB
43. Displayed Average Noise				
Frequency				
400 kHz		(1) _____	-110 dBm	+1.15/-1.25 dB
1 MHz		(2) _____	-110 dBm	+1.15/-1.25 dB
1 MHz to 2.9 GHz		(3) _____	-110 dBm	+1.15/-1.25 dB
2.75 to 6.5 GHz		(4) _____	-112 dBm	+1.15/-1.25 dB
6.0 to 12.8 GHz		(5) _____	-100 dBm	+1.15/-1.25 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
48. Displayed Average Noise for Option 130				
Frequency				
400 kHz		(1) _____	-125 dBm	+1.15/-1.25 dB
1 MHz		(2) _____	-125 dBm	+1.15/-1.25 dB
1 MHz to 2.9 GHz		(3) _____	-125 dBm	+1.15/-1.25 dB
2.75 to 6.5 GHz		(4) _____	-127 dBm	+1.15/-1.25 dB
6.0 to 12.8 GHz		(5) _____	-115 dBm	+1.15/-1.25 dB
53. Residual Responses				
150 kHz to 6.5 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
56. Residual Responses for Option 130				
150 kHz to 6.5 GHz		(1) _____	-90 dBm	+1.09/-1.15 dB
58. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 μs	(4) _____	820 μs	±0.5%
100 μs	78 μs	(5) _____	82 μs	±0.5%
20 μs	15.6 μs	(6) _____	16.4 μs	±0.5%

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
60. Absolute Amplitude Accuracy				
<i>Option 010 only:</i>				
Absolute Amplitude Accuracy	-20.75 dBm	(1) _____	-19.25 dBm	+.155/- .161 dB
Positive Vernier Accuracy		(2) _____	+0.50 dB	±0.03 dB
Negative Vernier Accuracy	-0.50 dB	(3) _____		±0.03 dB
Positive Step-to-Step Accuracy		(4) _____	+0.2 dB	±0.03 dB
Negative Step-to-Step Accuracy	-0.2 dB	(5) _____		±0.03 dB
61. Power Sweep Range				
<i>Option 010 only:</i>				
Start Power Level		(1) _____		
Stop Power Level		(2) _____		
Power Sweep Range	9.0 dB	(3) _____		±0.03 dB
63. Tracking Generator Level Flatness				
<i>Option 010 only:</i>				
Maximum Flatness				
9 kHz to 100 kHz		(1) _____	+3.0 dB	+0.42/-0.45 dB
100 kHz to 2900 MHz		(2) _____	+3.0 dB	+0.42/-0.45 dB
Minimum Flatness				
9 kHz to 100 kHz	-3.0 dB	(3) _____		+0.42/-0.45 dB
100 kHz to 2900 MHz	-3.0 dB	(4) _____		+0.42/-0.45 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
65. Harmonic Spurious Outputs				
<i>Option 010 only:</i>				
2nd Harmonic Level, 9 kHz		(1) _____	-15 dBc	+1.55/-1.80 dB
2nd Harmonic Level, 25 kHz to 900 MHz		(2) _____	-25 dBc	+1.55/-1.80 dB
2nd Harmonic Level, 1.4 GHz		(3) _____	-25 dBc	+3.45/-4.01 dB
3rd Harmonic Level, 9 kHz		(4) _____	-15 dBc	+1.55/-1.80 dB
3rd Harmonic Level, 25 kHz to 900 MHz		(5) _____	-25 dBc	+1.55/-1.80 dB
67. Non-Harmonic Spurious Outputs				
<i>Option 010 only:</i>				
Highest Non-Harmonic Response Amplitude				
9 kHz to 2000 MHz		(1) _____	-27 dBc	+1.55/-1.80 dB
2000 MHz to 2900 MHz		(2) _____	-23 dBc	+3.45/-4.01 dB
70. Tracking Generator Feedthrough				
<i>Option 010 only:</i>				
400 kHz to 2.9 GHz		(1) _____	-110 dBm	+1.59/-1.70 dB
71. Tracking Generator LO Feedthrough Amplitude				
<i>Option 010 only:</i>				
9 kHz to 1.5 GHz		(1) _____	-16 dBm	±2.02/-2.50 dB
2.9 GHz		(2) _____	-16 dBm	±2.10/-2.67 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8596E Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
<i>Options 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW	(1) _____			±0.34 dB
120 kHz EMI BW	(2) _____			±0.50 dB
<i>Options 103 and 130 only:</i>				
200 Hz EMI BW	(3) _____			±0.34 dB
<i>Options 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	−5.5 dB	(6) _____	−7.5 dB	±0.27 dB
10	−8.5 dB	(7) _____	−11.5 dB	±0.25 dB
2	−18.5 dB	(8) _____	−22.5 dB	±0.23 dB
1	−15.0 dB	(9) _____	−19.0 dB	±0.19 dB
Isolated Pulse	−17.0 dB	(10) _____	−21.0 dB	±0.15 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72. CISPR Pulse Response				
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	−8.0 dB	(13) _____	−10.0 dB	±0.18 dB
10	−12.5 dB	(14) _____	−15.5 dB	±0.18 dB
2	−24.0 dB	(15) _____	−28.0 dB	±0.18 dB
1	−26.5 dB	(16) _____	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	(17) _____	−33.5 dB	±0.17 dB
<i>Options 103 and 130 only:</i>	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	(18) _____	+5.0 dB	±0.24 dB
60	2.0 dB	(19) _____	5.0 dB	±0.26 dB
25	0 (Ref)	(20) _____	0 (Ref)	0 (Ref)
10	−3.0 dB	(21) _____	−5.0 dB	±0.29 dB
5	−6.0 dB	(22) _____	−9.0 dB	±0.30 dB
2	−11.0 dB	(23) _____	−15.0 dB	±0.36 dB
1	−15.0 dB	(24) _____	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	(25) _____	−21.0 dB	±0.20 dB

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
73. Gate Delay Accuracy and Gate Length Accuracy				
<i>Option 105 or 107 only:</i>				
Minimum Gate Delay	0.0 μ s	(1) _____	2.0 μ s	$\pm 0.011 \mu$ s
Maximum Gate Delay	0.0 μ s	(2) _____	2.0 μ s	$\pm 0.011 \mu$ s
1 μ s Gate Length	0.8 μ s	(3) _____	1.2 μ s	$\pm 0.011 \mu$ s
65 ms Gate Length	64.99 ms	(4) _____	65.01 ms	$\pm 0.434 \mu$ s
74. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	-0.5	(1) _____	+0.5	± 0.092 dB
1.8 μ s Gate Length	-0.8	(2) _____	+0.8	± 0.092 dB
75. TV Receiver, Video Tester				
<i>Option 107 only:</i>				
Differential Gain				
Channel 2		(1) _____	6%	1.5%
7		(2) _____	6%	1.5%
14		(3) _____	6%	1.5%
33		(4) _____	6%	1.5%
38		(5) _____	6%	1.5%
77		(6) _____	6%	1.5%

Table 3-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
75. TV Receiver, Video Tester				
Differential Phase				
Channel 2		(7) _____	4°	1°
7		(8) _____	4°	1°
14		(9) _____	4°	1°
33		(10) _____	4°	1°
38		(11) _____	4°	1°
77		(12) _____	4°	1°
Chroma-Luminance Delay				
Channel 2	-45 ns	(13) _____	45 ns	±5.1 ns
7	-45 ns	(14) _____	45 ns	±5.1 ns
14	-45 ns	(15) _____	45 ns	±5.1 ns
33	-45 ns	(16) _____	45 ns	±5.1 ns
38	-45 ns	(17) _____	45 ns	±5.1 ns
77	-45 ns	(18) _____	45 ns	±5.1 ns

3a**Performance Test Records: If
3335A Source Not Available**

This chapter provides alternative test records, corresponding to the alternative performance tests in Chapter 2a, to be used when a 3335A source is not available. Substitute the test records in this chapter for those of the same number found in Chapter 3 when a 3335A Synthesizer Level Generator is not available.

8591C Performance Test Record¹**Table 3-1****8591C Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8591C			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator	_____	_____	_____
AM/FM Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
(Option 011 only)			
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesized Signal Generator	_____	_____	_____
Universal Frequency Counter	_____	_____	_____
Base Band Signal Source	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8591C are included in this test record, therefore not all test numbers are included.

Table 3a-2 8591C Performance Verification Test Record Part 2

Agilent Technologies Model 8591C Serial No. _____					Report No. _____ Date _____
Test Description	Results Measured			Measurement	
	Min.	TR Entry	Max.	Uncertainty	
8a. Frequency Span Readout Accuracy					
SPAN	MKRΔ Reading				
1800 MHz	1446.00MHz	(1) _____	1554.00MHz	±6.37 MHz	
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz	
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±3.54 kHz	
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz	
99.00 kHz	78.00 kHz	(5) _____	82.06 kHz	±354 Hz	
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz	
<i>Option 130 only:</i>					
1.00 kHz	0.78 kHz	(7) _____	0.82 kHz	±354 Hz	
300 Hz	N/A	(8) _____	N/A	N/A	

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
<i>Option 130 only:</i>				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
<i>Option 130 only:</i>				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14a. Reference Level Accuracy				
Log Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14a. Reference Level Accuracy				
Linear Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17a. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth Accuracy				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
<i>Option 130 only:</i>				
300 Hz	240 Hz	(9) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(10) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(11) _____	36 Hz	±3.9 Hz
6 dB Resolution Bandwidth Accuracy				
9 kHz	7.2 kHz	(12) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(13) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
19a. Frequency Response				
Max Positive Response		(1) _____	+1.5 dB	+0.32/–0.33 dB
Max Negative Response	–1.5 dB	(2) _____		+0.32/–0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/–0.33 dB

Table 3a-2 8591C Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591C		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
29a. Spurious Responses				
Second Harmonic Distortion		(1) _____	−45 dBc	+1.86/−2.27 dB
Third Order Intermodulation Distortion		(2) _____	−54 dBc	+2.07/−2.42 dB
34a. Gain Compression				
		(1) _____	0.5 dB	+0.21/−0.22 dB
<i>Option 130 only:</i>		(2) _____	0.5 dB	+0.21/−0.22 dB
57a. Fast Time Domain Sweeps				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 μs	(4) _____	820 μs	±0.5%
100 μs	78 μs	(5) _____	82 μs	±0.5%
20 μs	15.6 μs	(6) _____	16.4 μs	±0.5%
74a. Gate Card Insertion Loss				
<i>Option 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	−0.5	(1) _____	+0.5	±0.092 dB
1.8 μs Gate Length	−0.8	(2) _____	+0.8	±0.092 dB

8591E Performance Test Record¹

Table 3-3 8591E Performance Verification Test Record Part 1

Agilent Technologies			
Address _____ _____ _____ Customer _____ Tested by _____ Model 8591E Serial Number _____ Options _____ Firmware Revision _____	Report Number _____ Date _____ (e.g. 10 JAN 2000) Ambient temperature _____ °C Relative humidity _____ % Power mains line frequency _____ Hz (nominal)		
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
AM/FM Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
(Option 010 and 011 only)	_____	_____	_____
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesized Signal Generator	_____	_____	_____
Universal Frequency Counter	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8591E are included in this test record, therefore not all test numbers are included.

Table 3a-4 8591E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
8a. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±3.54 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.06 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	0.78 kHz	(7) _____	0.82 kHz	±354 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode dB from Ref Level	Cumulative Error			
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Linear Mode % of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
<i>Option 130 only:</i> % of Ref Level				
100.00	151.38 mV	0 (Ref)	164.80 mV	
70.70	105.09 mV	(69) _____	118.51 mV	±1.84 mV
50.00	72.62 mV	(70) _____	86.04 mV	±1.84 mV
35.48	49.19 mV	(71) _____	62.61 mV	±1.84 mV
25.00	151.38 mV	(72) _____	164.80 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
<i>Option 130 only:</i>				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14a. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8591E Serial No. _____					Report No. _____ Date _____
Test Description	Results Measured			Measurement	
	Min.	TR Entry	Max.	Uncertainty	
14a. Reference Level Accuracy					
Linear Mode Reference Level (dBm)					
-20	0 (Ref)	0 (Ref)	0 (Ref)		
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB	
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB	
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB	
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB	
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB	
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB	
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB	
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB	
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB	

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
14a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17a. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth Accuracy				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
<i>Option 130 only:</i>				
300 Hz	240 Hz	(9) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(10) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(11) _____	36 Hz	±3.9 Hz
6 dB Resolution Bandwidth Accuracy				
9 kHz	7.2 kHz	(12) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(13) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
19a. Frequency Response				
Max Positive Response		(1) _____	+1.5 dB	+0.32/−0.33 dB
Max Negative Response	−1.5 dB	(2) _____		+0.32/−0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/−0.33 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
29a. Spurious Responses				
Second Harmonic Distortion		(1) _____	-45 dBc	+1.86/-2.27 dB
Third Order Intermodulation Distortion		(2) _____	-54 dBc	+2.07/-2.42 dB
34a. Gain Compression				
		(1) _____	0.5 dB	+0.21/-0.22 dB
<i>Option 130 only:</i>		(2) _____	0.5 dB	+0.21/-0.22 dB
57a. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X		1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(1) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(2) _____	8.20 ms	±0.5%
1.0 ms	780 μs	(3) _____	820 μs	±0.5%
100 μs	78 μs	(4) _____	82 μs	±0.5%
20 μs	15.6 μs	(5) _____	16.4 μs	±0.5%

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
<i>Option 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW	N/A	(1) _____	N/A	N/A
120 kHz EMI BW	N/A	(2) _____	N/A	N/A
<i>Option 103 and 130 only:</i>				
200 Hz EMI BW	N/A	(3) _____	N/A	N/A
<i>Option 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	-5.5 dB	(6) _____	-7.5 dB	±0.27 dB
10	-8.5 dB	(7) _____	-11.5 dB	±0.25 dB
2	-18.5 dB	(8) _____	-22.5 dB	±0.23 dB
1	-20.5 dB	(9) _____	-24.5 dB	±0.19 dB
Isolated Pulse	-21.5 dB	(10) _____	-25.5 dB	±0.15 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
Relative Level, 120 kHz EMI BW Repetition Frequency 1000 100 20 10 2 1 Isolated Pulse	+9.0 dB 0 (Ref) -8.0 dB -12.5 dB -24.0 dB -26.5 dB -29.5 dB	(11) _____ (12) _____ (13) _____ (14) _____ (15) _____ (16) _____ (17) _____	+7.0 dB 0 (Ref) -10.0 dB -15.5 dB -28.0 dB -30.5 dB -33.5 dB	±0.17 dB 0 (Ref) ±0.18 dB ±0.18 dB ±0.18 dB ±0.18 dB ±0.17 dB
<i>Options 103 and 130 only:</i>	Amplitude Error			
Relative Level, Band A Repetition Frequency 100 60 25 10 5 2 1 Isolated Pulse	3.0 dB 2.0 dB 0 (Ref) -3.0 dB -6.0 dB -11.0 dB -15.0 dB -17.0 dB	(18) _____ (19) _____ (20) _____ (21) _____ (22) _____ (23) _____ (24) _____ (25) _____	+5.0 dB 4.0 dB 0 (Ref) -5.0 dB -9.0 dB -15.0 dB -19.0 dB -21.0 dB	±0.24 dB ±0.26 dB 0 (Ref) ±0.29 dB ±0.30 dB ±0.36 dB ±0.28 dB ±0.20 dB

Table 3a-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8591E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
74a. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	-0.5	(1) _____	+0.5	±0.092 dB
1.8 μs Gate Length	-0.8	(2) _____	+0.8	±0.092 dB

8593E Performance Test Record¹**Table 3-5****8593E Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8593E			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
(Option 010)			
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesized Signal Generator	_____	_____	_____
Universal Frequency Counter	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8593E are included in this test record, therefore not all test numbers are included.

Table 3a-6 8593E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
9a. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	0.78 kHz	(7) _____	0.82 kHz	±3.54 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode dB from Ref Level	Cumulative Error			
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
<i>Option 130 only:</i>				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
<i>Option 130 only:</i>				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Log Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8593E Serial No. _____ Report No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Linear Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17a. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth Accuracy				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
<i>Option 130 only:</i>				
300 Hz	240 Hz	(9) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(10) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(11) _____	36 Hz	±3.9 Hz
6 dB Resolution Bandwidth Accuracy				
9 kHz	7.2 kHz	(12) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(13) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
20a. Frequency Response				
Band 0				
Max Positive Response		(1) _____	+1.5 dB	+0.32/–0.33 dB
Max Negative Response	–1.5 dB	(2) _____		+0.32/–0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/–0.33 dB
Band 1				
Max Positive Response		(4) _____	+2.0 dB	+0.40/–0.42 dB
Max Negative Response	–2.0 dB	(5) _____		+0.40/–0.42 dB
Peak-to-Peak Response		(6) _____	3.0 dB	+0.40/–0.42 dB
Band 2				
Max Positive Response		(7) _____	+2.5 dB	+0.42/–0.43 dB
Max Negative Response	–2.5 dB	(8) _____		+0.42/–0.43 dB
Peak-to-Peak Response		(9) _____	4.0 dB	+0.42/–0.43 dB
Band 3				
Max Positive Response		(10) _____	+3.0 dB	+0.52/–0.55 dB
Max Negative Response	–3.0 dB	(11) _____		+0.52/–0.55 dB
Peak-to-Peak Response		(12) _____	4.0 dB	+0.52/–0.55 dB
Band 4				
Max Positive Response		(13) _____	+3.0 dB	+0.54/–0.57 dB
Max Negative Response	–3.0 dB	(14) _____		+0.54/–0.57 dB
Peak-to-Peak Response		(15) _____	4.0 dB	+0.54/–0.57 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
20a. Frequency Response				
Band 4 for Option 026 or 027				
Max Positive Response		(13) _____	+5.0 dB	+0.54/–0.57 dB
Max Negative Response	–5.0 dB	(14) _____		+0.54/–0.57 dB
Peak-to-Peak Response		(15) _____	4.0 dB	+0.54/–0.57 dB
58a. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 μs	(4) _____	820 μs	±0.5%
100 μs	78 μs	(5) _____	82 μs	±0.5%
20 μs	15.6 μs	(6) _____	16.4 μs	±0.5%

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8593E Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
<i>Option 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW	−1.5 dB	(1) _____	+1.5 dB	±0.34 dB
120 kHz EMI BW	−1.5 dB	(2) _____	+1.5 dB	±0.50 dB
<i>Options 103 and 130 only:</i>				
200 Hz EMI BW	−1.5 dB	(3) _____	+1.5 dB	±0.34 dB
<i>Option 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	−5.5 dB	(6) _____	−7.5 dB	±0.27 dB
10	−8.5 dB	(7) _____	−11.5 dB	±0.25 dB
2	−18.5 dB	(8) _____	−22.5 dB	±0.23 dB
1	−15.0 dB	(9) _____	−19.0 dB	±0.19 dB
Isolated Pulse	−17.0 dB	(10) _____	−21.0 dB	±0.15 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	−8.0 dB	(13) _____	−10.0 dB	±0.18 dB
10	−12.5 dB	(14) _____	−15.5 dB	±0.18 dB
2	−24.0 dB	(15) _____	−28.0 dB	±0.18 dB
1	−26.5 dB	(16) _____	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	(17) _____	−33.5 dB	±0.17 dB
<i>Options 103 and 130 only:</i>	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	(18) _____	+5.0 dB	±0.24 dB
60	2.0 dB	(19) _____	5.0 dB	±0.26 dB
25	0 (Ref)	(20) _____	0 (Ref)	0 (Ref)
10	−3.0 dB	(21) _____	−5.0 dB	±0.29 dB
5	−6.0 dB	(22) _____	−9.0 dB	±0.30 dB
2	−11.0 dB	(23) _____	−15.0 dB	±0.36 dB
1	−15.0 dB	(24) _____	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	(25) _____	−21.0 dB	±0.20 dB

Table 3a-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8593E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
74a. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	−0.5	(1) _____	+0.5	±0.092 dB
1.8 μs Gate Length	−0.8	(2) _____	+0.8	±0.092 dB

8594E Performance Test Record¹**Table 3-7****8594E Performance Verification Test Record Part 1**

Agilent Technologies			
Address _____	Report Number _____		
_____	Date _____		
_____	(e.g. 10 JAN 2000)		
Customer _____			
Tested by _____			
Model 8594E			
Serial Number _____	Ambient temperature _____		°C
Options _____	Relative humidity _____		%
Firmware Revision _____	Power mains line frequency _____		Hz
	(nominal)		
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Counter	_____	_____	_____
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer (Option 010)	_____	_____	_____
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesized Signal Generator	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8594E are included in this test record, therefore not all test numbers are included.

Table 3a-8 8594E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
9a. Frequency Span Readout Accuracy				
SPAN	MKRΔ Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	780 Hz	(7) _____	820 Hz	±3.54 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode dB from Ref Level	Incremental Error			
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
Option 130 only:				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
Option 130 only:				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Log Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Linear Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
<i>Option 130 only:</i> Linear Mode Reference Level (dBm) -20 -10 0 -30 -40 -50 -60 -70 -80 -90	0 (Ref) -0.40 dB -0.50 dB -0.50 dB -0.50 dB -0.50 dB -0.80 dB -1.20 dB -1.20 dB -1.30 dB -1.40 dB	0 (Ref) (28) _____ (29) _____ (30) _____ (31) _____ (32) _____ (33) _____ (34) _____ (35) _____ (36) _____	0 (Ref) +0.40 dB +0.50 dB +0.50 dB +0.50 dB +0.80 dB +1.10 dB +1.20 dB +1.30 dB +1.40 dB	±0.06 dB ±0.06 dB ±0.06 dB ±0.08 dB ±0.08 dB ±0.12 dB ±0.12 dB ±0.12 dB ±0.12 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
17a. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth Accuracy				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
<i>Option 130 only:</i>				
300 Hz	240 Hz	(9) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(10) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(11) _____	36 Hz	±3.9 Hz
6 dB Resolution Bandwidth Accuracy				
9 kHz	7.2 kHz	(12) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(13) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
21a. Frequency Response				
Max Positive Response		(1) _____	+1.5 dB	+0.32/–0.33 dB
Max Negative Response	–1.5 dB	(2) _____		+0.32/–0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/–0.33 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
<i>Options 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW	-1.5 dB	(1) _____	+1.5 dB	±0.34 dB
120 kHz EMI BW	-1.5 dB	(2) _____	+1.5 dB	±0.50 dB
<i>Options 103 and 130 only:</i>				
200 Hz EMI BW	-1.5 dB	(3) _____	+1.5 dB	±0.34 dB
<i>Options 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	-5.5 dB	(6) _____	-7.5 dB	±0.27 dB
10	-8.5 dB	(7) _____	-11.5 dB	±0.25 dB
2	-18.5 dB	(8) _____	-22.5 dB	±0.23 dB
1	-15.0 dB	(9) _____	-19.0 dB	±0.19 dB
Isolated Pulse	-17.0 dB	(10) _____	-21.0 dB	±0.15 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	-8.0 dB	(13) _____	-10.0 dB	±0.18 dB
10	-12.5 dB	(14) _____	-15.5 dB	±0.18 dB
2	-24.0 dB	(15) _____	-28.0 dB	±0.18 dB
1	-26.5 dB	(16) _____	-30.5 dB	±0.18 dB
Isolated Pulse	-29.5 dB	(17) _____	-33.5 dB	±0.17 dB
<i>Options 103 and 130 only:</i>	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	(18) _____	+5.0 dB	±0.24 dB
60	2.0 dB	(19) _____	5.0 dB	±0.26 dB
25	0 (Ref)	(20) _____	0 (Ref)	0 (Ref)
10	-3.0 dB	(21) _____	-5.0 dB	±0.29 dB
5	-6.0 dB	(22) _____	-9.0 dB	±0.30 dB
2	-11.0 dB	(23) _____	-15.0 dB	±0.36 dB
1	-20.5 dB	(24) _____	-24.5 dB	±0.28 dB
Isolated Pulse	-21.5 dB	(25) _____	-25.5 dB	±0.20 dB

Table 3a-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min. -	TR Entry	Max.	Uncertainty
74a. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	-0.5	(1) _____	+0.5	±0.092 dB
1.8 μs Gate Length	-0.8	(2) _____	+0.8	±0.092 dB

8594Q Performance Test Record¹**Table 3-9****8594Q Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8594Q			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Counter	_____	_____	_____
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
RF Power Sensor	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
Pulse Generator	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
(Option 011 only)			
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesized Signal Generator	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8594Q are included in this test record, therefore not all test numbers are included.

Table 3a-10 8594Q Performance Verification Test Record Part 2

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
9a. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz

Table 3a-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode dB from Ref Level	Cumulative Error			
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB

Table 3a-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3a-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
15a. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB

Table 3a-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB

Table 3a-10 8594Q Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8594Q		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17a. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
<i>Option 130 only:</i>				
300 Hz	240 Hz	(9) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(10) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(11) _____	36 Hz	±3.9 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(12) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(13) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz
21a. Frequency Response				
Max Positive Response		(1) _____	+1.5 dB	+0.32/−0.33 dB
Max Negative Response	−1.5 dB	(2) _____		+0.32/−0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/−0.33 dB

8595E Performance Test Record¹**Table 3-11****8595E Performance Verification Test Record Part 1**

Agilent Technologies			
Address	_____	Report Number	_____
	_____	Date	_____
	_____		(e.g. 10 JAN 2000)
Customer	_____		
Tested by	_____		
Model 8595E			
Serial Number	_____	Ambient temperature	_____ °C
Options	_____	Relative humidity	_____ %
Firmware Revision	_____	Power mains line frequency	_____ Hz
			(nominal)
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Counter	_____	_____	_____
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer (Option 011 only)	_____	_____	_____
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesized Signal Generator	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8595E are included in this test record, therefore not all test numbers are included.

Table 3a-12 8595E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
9a. Frequency Span Readout Accuracy				
SPAN	MKRΔ Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	780 Hz	(7) _____	820 Hz	±3.54 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
Option 130 only:				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
Option 130 only:				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Log Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Linear Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17a. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth Accuracy				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
<i>Option 130 only:</i>				
300 Hz	240 Hz	(9) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(10) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(11) _____	36 Hz	±3.9 Hz
6 dB Resolution Bandwidth Accuracy				
9 kHz	7.2 kHz	(12) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(13) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
22a. Frequency Response				
Band 0				
Max Positive Response		(1) _____	+1.5 dB	+0.32/−0.33 dB
Max Negative Response	−1.5 dB	(2) _____		+0.32/−0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/−0.33 dB
Band 1				
Max Positive Response		(4) _____	+2.0 dB	+0.40/−0.42 dB
Max Negative Response	−2.0 dB	(5) _____		+0.40/−0.42 dB
Peak-to-Peak Response		(6) _____	3.0 dB	+0.40/−0.42 dB
58a. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 μs	(4) _____	820 μs	±0.5%
100 μs	78 μs	(5) _____	82 μs	±0.5%
20 μs	15.6 μs	(6) _____	16.4 μs	±0.5%

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8595E Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
<i>Options 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW		(1) _____		±0.44/–0.48 dB
120 kHz EMI BW		(2) _____		±0.80/–0.98 dB
<i>Options 103 and 130 only:</i>				
200 Hz EMI BW		(3) _____		
<i>Options 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	–5.5 dB	(6) _____	–7.5 dB	±0.27 dB
10	–8.5 dB	(7) _____	–11.5 dB	±0.25 dB
2	–18.5 dB	(8) _____	–22.5 dB	±0.23 dB
1	–20.5 dB	(9) _____	–24.5 dB	±0.19 dB
Isolated Pulse	–21.5 dB	(10) _____	–25.5 dB	±0.15 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	−8.0 dB	(13) _____	−10.0 dB	±0.18 dB
10	−12.5 dB	(14) _____	−15.5 dB	±0.18 dB
2	−24.0 dB	(15) _____	−28.0 dB	±0.18 dB
1	−26.5 dB	(16) _____	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	(17) _____	−33.5 dB	±0.17 dB
<i>Options 103 and 130 only:</i>	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	(18) _____	+5.0 dB	±0.24 dB
60	2.0 dB	(19) _____	5.0 dB	±0.26 dB
25	0 (Ref)	(20) _____	0 (Ref)	0 (Ref)
10	−3.0 dB	(21) _____	−5.0 dB	±0.29 dB
5	−6.0 dB	(22) _____	−9.0 dB	±0.30 dB
2	−11.0 dB	(23) _____	−15.0 dB	±0.36 dB
1	−15.0 dB	(24) _____	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	(25) _____	−21.0 dB	±0.20 dB

Table 3a-12 8595E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8595E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
74a. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	−0.5	(1) _____	+0.5	±0.092 dB
1.8 μs Gate Length	−0.8	(2) _____	+0.8	±0.092 dB

8596E Performance Test Record¹**Table 3-13****8596E Performance Verification Test Record Part 1**

Agilent Technologies			
Address _____		Report Number _____	
_____		Date _____	
_____		(e.g. 10 JAN 2000)	
Customer _____			
Tested by _____			
Model 8596E			
Serial Number _____	Ambient temperature _____		°C
Options _____	Relative humidity _____		%
Firmware Revision _____	Power mains line frequency _____		Hz
	(nominal)		
Test Equipment Used:			
Description	Model No.	Trace No.	Cal Due Date
Frequency Counter	_____	_____	_____
Frequency Standard	_____	_____	_____
Measuring Receiver	_____	_____	_____
Microwave Frequency Counter	_____	_____	_____
Power Meter	_____	_____	_____
High-Sensitivity Power Sensor	_____	_____	_____
RF Power Sensor	_____	_____	_____
Pulse Generator (Option 103)	_____	_____	_____
Signal Generator	_____	_____	_____
Microwave Spectrum Analyzer	_____	_____	_____
Synthesized Sweeper	_____	_____	_____
Synthesizer/Function Generator	_____	_____	_____
Synthesized Signal Generator	_____	_____	_____
Video Modulator	_____	_____	_____
Notes/Comments: _____			

1. Only the tests for 8596E are included in this test record, therefore not all test numbers are included.

Table 3a-14 8596E Performance Verification Test Record Part 2

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
9a. Frequency Span Readout Accuracy				
SPAN	MKRA Reading			
1800 MHz	1446.00 MHz	(1) _____	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) _____	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) _____	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) _____	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) _____	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) _____	8.20 kHz	±3.54 Hz
<i>Option 130 only:</i>				
1.00 kHz	780 Hz	(7) _____	820 Hz	±3.54 Hz
300 Hz	N/A	(8) _____	N/A	N/A

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) _____	+3.66 dB	±0.06 dB
-8	-8.38 dB	(2) _____	-7.62 dB	±0.06 dB
-12	-12.42 dB	(3) _____	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) _____	-15.54 dB	±0.06 dB
-20	-20.50 dB	(5) _____	-19.50 dB	±0.06 dB
-24	-24.54 dB	(6) _____	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) _____	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) _____	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) _____	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) _____	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) _____	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) _____	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) _____	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) _____	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) _____	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) _____	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) _____	-67.02 dB	±0.11 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(18) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(19) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(20) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(21) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(22) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(26) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(28) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(29) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(30) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) _____	+0.4 dB	±0.11 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Cumulative Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.44 dB	(33) _____	+3.56 dB	±0.06 dB
-8	-8.48 dB	(34) _____	-7.52 dB	±0.06 dB
-12	-12.52 dB	(35) _____	-11.48 dB	±0.06 dB
-16	-16.56 dB	(36) _____	-15.44 dB	±0.06 dB
-20	-20.60 dB	(37) _____	-19.40 dB	±0.06 dB
-24	-24.64 dB	(38) _____	-23.36 dB	±0.06 dB
-28	-28.68 dB	(39) _____	-27.32 dB	±0.06 dB
-32	-32.72 dB	(40) _____	-31.28 dB	±0.06 dB
-36	-36.76 dB	(41) _____	-35.24 dB	±0.06 dB
-40	-40.80 dB	(42) _____	-39.20 dB	±0.06 dB
-44	-44.84 dB	(43) _____	-43.16 dB	±0.06 dB
-48	-48.88 dB	(44) _____	-47.12 dB	±0.06 dB
-52	-52.92 dB	(45) _____	-51.08 dB	±0.06 dB
-56	-56.96 dB	(46) _____	-55.04 dB	±0.06 dB
-60	-61.00 dB	(47) _____	-59.00 dB	±0.11 dB
-64	-65.04 dB	(48) _____	-62.96 dB	±0.11 dB
-68	-69.08 dB	(49) _____	-66.92 dB	±0.11 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
<i>Option 130 only:</i>				
Log Mode	Incremental Error			
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-0.4 dB	(50) _____	+0.4 dB	±0.06 dB
-8	-0.4 dB	(51) _____	+0.4 dB	±0.06 dB
-12	-0.4 dB	(52) _____	+0.4 dB	±0.06 dB
-16	-0.4 dB	(53) _____	+0.4 dB	±0.06 dB
-20	-0.4 dB	(54) _____	+0.4 dB	±0.06 dB
-24	-0.4 dB	(55) _____	+0.4 dB	±0.06 dB
-28	-0.4 dB	(56) _____	+0.4 dB	±0.06 dB
-32	-0.4 dB	(57) _____	+0.4 dB	±0.06 dB
-36	-0.4 dB	(58) _____	+0.4 dB	±0.06 dB
-40	-0.4 dB	(59) _____	+0.4 dB	±0.06 dB
-44	-0.4 dB	(60) _____	+0.4 dB	±0.06 dB
-48	-0.4 dB	(61) _____	+0.4 dB	±0.06 dB
-52	-0.4 dB	(62) _____	+0.4 dB	±0.06 dB
-56	-0.4 dB	(63) _____	+0.4 dB	±0.06 dB
-60	-0.4 dB	(64) _____	+0.4 dB	±0.11 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
13a. Scale Fidelity				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(65) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(66) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(67) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(68) _____	62.61 mV	±1.84 mV
Option 130 only:				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.38 mV	(69) _____	164.80 mV	±1.84 mV
50.00	105.09 mV	(70) _____	118.51 mV	±1.84 mV
35.48	72.62 mV	(71) _____	86.04 mV	±1.84 mV
25.00	49.19 mV	(72) _____	62.61 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) _____	+0.25 dB	±0.05 dB
Option 130 only:				
	-0.25 dB	(74) _____	+0.25 dB	±0.05 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(1) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) _____	+1.30 dB	±0.12 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
Linear Mode Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(10) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) _____	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) _____	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) _____	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) _____	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) _____	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) _____	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) _____	+1.30 dB	±0.12 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Log Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(19) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(20) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(21) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(22) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(23) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(24) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(25) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(26) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(27) _____	+1.40 dB	±0.12 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
15a. Reference Level Accuracy				
<i>Option 130 only:</i>				
Linear Mode				
Reference Level (dBm)				
-20	0 (Ref)	0 (Ref)	0 (Ref)	
-10	-0.40 dB	(28) _____	+0.40 dB	±0.06 dB
0	-0.50 dB	(29) _____	+0.50 dB	±0.06 dB
-30	-0.50 dB	(30) _____	+0.50 dB	±0.06 dB
-40	-0.50 dB	(31) _____	+0.50 dB	±0.08 dB
-50	-0.80 dB	(32) _____	+0.80 dB	±0.08 dB
-60	-1.20 dB	(33) _____	+1.10 dB	±0.12 dB
-70	-1.20 dB	(34) _____	+1.20 dB	±0.12 dB
-80	-1.30 dB	(35) _____	+1.30 dB	±0.12 dB
-90	-1.40 dB	(36) _____	+1.40 dB	±0.12 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
17a. Resolution Bandwidth Accuracy				
3 dB Resolution Bandwidth Accuracy				
3 MHz	2.4 MHz	(1) _____	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) _____	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) _____	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) _____	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) _____	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) _____	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) _____	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) _____	1.2 kHz	±46 Hz
<i>Option 130 only:</i>				
300 Hz	240 Hz	(9) _____	360 Hz	±36 Hz
100 Hz	80 Hz	(10) _____	120 Hz	±12 Hz
30 Hz	24 Hz	(11) _____	36 Hz	±3.9 Hz
6 dB Resolution Bandwidth Accuracy				
9 kHz	7.2 kHz	(12) _____	10.8 kHz	±333 Hz
120 kHz	96 kHz	(13) _____	144 kHz	±4.44 kHz
<i>Option 130 only:</i>				
200 Hz	160 Hz	(14) _____	240 Hz	±24 Hz

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
23a. Frequency Response				
Band 0				
Max. Positive Response		(1) _____	+1.5 dB	+0.32/−0.33 dB
Max. Negative Response	−1.5 dB	(2) _____		+0.32/−0.33 dB
Peak-to-Peak Response		(3) _____	2.0 dB	+0.32/−0.33 dB
Band 1				
Max. Positive Response		(4) _____	+2.0 dB	+0.40/−0.42 dB
Max. Negative Response	−2.0 dB	(5) _____		+0.40/−0.42 dB
Peak-to-Peak Response		(6) _____	3.0 dB	+0.40/−0.42 dB
Band 2				
Max. Positive Response		(7) _____	+2.5 dB	+0.42/−0.43 dB
Max. Negative Response	−2.5 dB	(8) _____		+0.42/−0.43 dB
Peak-to-Peak Response		(9) _____	4.0 dB	+0.42/−0.43 dB
58a. Fast Time Domain Sweeps				
<i>Option 101 only:</i>				
Amplitude Resolution	0.933X	(1) _____	1.007X	0%
SWEEP TIME				
18 ms	14.04 ms	(2) _____	14.76 ms	±0.5%
10 ms	7.80 ms	(3) _____	8.20 ms	±0.5%
1.0 ms	780 μs	(4) _____	820 μs	±0.5%
100 μs	78 μs	(5) _____	82 μs	±0.5%
20 μs	15.6 μs	(6) _____	16.4 μs	±0.5%

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies Model 8596E Report No. _____ Serial No. _____ Date _____				
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
<i>Options 103 only:</i>	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW		(1) _____		±0.34 dB
120 kHz EMI BW		(2) _____		±0.50 dB
<i>Options 103 and 130 only:</i>				
200 Hz EMI BW		(3) _____		±0.34 dB
<i>Options 103 only:</i>				
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	(4) _____	+3.5 dB	±0.17 dB
100	0 (Ref)	(5) _____	0 (Ref)	0 (Ref)
20	−5.5 dB	(6) _____	−7.5 dB	±0.27 dB
10	−8.5 dB	(7) _____	−11.5 dB	±0.25 dB
2	−18.5 dB	(8) _____	−22.5 dB	±0.23 dB
1	−15.0 dB	(9) _____	−19.0 dB	±0.19 dB
Isolated Pulse	−17.0 dB	(10) _____	−21.0 dB	±0.15 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
72a. CISPR Pulse Response				
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	(11) _____	+7.0 dB	±0.17 dB
100	0 (Ref)	(12) _____	0 (Ref)	0 (Ref)
20	−8.0 dB	(13) _____	−10.0 dB	±0.18 dB
10	−12.5 dB	(14) _____	−15.5 dB	±0.18 dB
2	−24.0 dB	(15) _____	−28.0 dB	±0.18 dB
1	−26.5 dB	(16) _____	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	(17) _____	−33.5 dB	±0.17 dB
<i>Options 103 and 130 only:</i>	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	(18) _____	+5.0 dB	±0.24 dB
60	2.0 dB	(19) _____	5.0 dB	±0.26 dB
25	0 (Ref)	(20) _____	0 (Ref)	0 (Ref)
10	−3.0 dB	(21) _____	−5.0 dB	±0.29 dB
5	−6.0 dB	(22) _____	−9.0 dB	±0.30 dB
2	−11.0 dB	(23) _____	−15.0 dB	±0.36 dB
1	−15.0 dB	(24) _____	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	(25) _____	−21.0 dB	±0.20 dB

Table 3a-14 8596E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies				
Model 8596E		Report No. _____		
Serial No. _____		Date _____		
Test Description	Results Measured			Measurement
	Min.	TR Entry	Max.	Uncertainty
74a. Gate Card Insertion Loss				
<i>Option 105 or 107 only:</i>				
Gate Card Insertion Loss				
65 ms Gate Length	−0.5	(1) _____	+0.5	±0.092 dB
1.8 μs Gate Length	−0.8	(2) _____	+0.8	±0.092 dB

Performance Test Records: If 3335A Source Not Available
8596E Performance Test Record

4

8591C Specifications and Characteristics

This chapter contains specifications and characteristics for the 8591C Cable TV Analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first and are followed by the characteristics.

General	General specifications.
Cable TV	Cable TV measurement specifications and characteristics.
Frequency	Frequency-related specifications and characteristics.
Amplitude	Amplitude-related specifications and characteristics.
Option	Option-related specifications and characteristics.
Physical	Input, output and physical characteristics.

The distinction between specifications and characteristics is described as follows.

- Specifications describe warranted performance over the temperature range 0 °C to +50 °C (unless otherwise noted). The spectrum analyzer will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum analyzer is turned on, and after the CAL frequency and CAL amplitude routines have been run.
- Characteristics provide useful, but nonwarranted information about the functions and performance of the spectrum analyzer. Characteristics are specifically identified.
- Typical Performance, where listed, is not warranted, but indicates performance that most units will exhibit.
- Nominal Value indicates the expected, but not warranted, value of the parameter.

General Specifications

Temperature Range Operating Storage	0 °C to +50 °C –40 °C to +75 °C
EMI Compatibility	Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A.
Audible Noise	<37.5 dBA pressure and <5.0 Bels power (ISODP7779)
Power Requirements ON (LINE 1) Standby (LINE 0)	90 to 132 V rms, 47 to 440 Hz 195 to 250 V rms, 47 to 66 Hz Power consumption <500 VA; <180 W Power consumption <7 W
Environmental Specifications	Type tested to the environmental specifications of Mil-T-28800 class 5

Cable TV Measurement Specifications

These specifications describe warranted performance of the 8591C cable TV analyzer and the 85721A cable TV measurements personality.

Input Configuration	75 Ω BNC Female
Channel Selection	Analyzer tunes to specified channels based upon selected tune configuration.
Tune Configuration	Standard, Off-the Air, HRC, IRC (T and FM channels also in channel mode)
Channel Range	1 to 158 and 201 to 300 (channel mode) 1 to 158 (system mode)
Channel Frequencies	Defined by Code of Federal Regulations, Title 47, Telecommunications, Parts 73.603, 76.605, 76.612
Frequency Range	5 to 1002 MHz (channel mode) 54 to 896 MHz (system mode)
Amplitude Range	-15 to +70 dBmV for S/N > 30 dB
Visual-Carrier Frequency	Visual-carrier frequency is counted
Precision Frequency Reference (Standard)	
Resolution	100 Hz
Accuracy	$\pm(1.2 \times 10^{-7} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 117 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 149 \text{ Hz}$
@643.25 MHz (Ch. 94)	$\pm 187 \text{ Hz}$
Option 704 Frequency Reference*	
Resolution	1 kHz
Accuracy	$\pm(7.5 \times 10^{-6} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 524 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 2.55 \text{ kHz}$
@643.25 MHz (Ch. 94)	$\pm 4.93 \text{ kHz}$
* Will not meet FCC frequency accuracy requirements.	

Visual-to-Aural Carrier Frequency Difference	Frequency difference between visual and aural carriers is counted.
Difference Range	4.1 to 4.9 MHz
Resolution	100 Hz
Accuracy	±221 Hz for precision frequency ref (std) ±254 Hz for Option 704 frequency ref

Visual-Carrier Level	The peak amplitude of the visual carrier is measured to an absolute standard traceable to the National Institute of Standards and Technology.
Amplitude Range	–15 to +70 dBmV
Resolution	0.1 dB
Absolute Accuracy	±2.0 dB for S/N > 30 dB
Relative Accuracy	±1.0 dB relative to adjacent channels in frequency ±1.5 dB relative to all other channels

Visual-to-Aural Carrier Level Difference	The difference between peak amplitudes of the visual and aural carrier is measured.
Difference Range	0 to 25 dB
Resolution	0.1 dB
Accuracy	±0.75 dB for S/N > 30 dB

Hum/Low-Frequency Disturbance	Power-line frequency and low-frequency disturbance measured on modulated and/or unmodulated carriers. May not be valid for scrambled channels.
AM Range	0.5 to 10%
Resolution	0.1%
Accuracy	±0.4% for hum ≤3% ±0.7% for hum ≤5% ±1.3% for hum ≤10%

Visual Carrier-to-Noise Ratio (C/N)*	The C/N is calculated from the visual-carrier peak level and the minimum noise level, normalized to 4 MHz noise bandwidth.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum C/N Range	Input level dependent - See graphs
C/N Resolution	0.1 dB
C/N Accuracy	Input level and measured C/N dependent ± 1.0 to ± 3.5 dB over optimum input range
* A preamplifier and preselector filter may be required to achieve specifications.	

CSO and CTB Distortion [†]	Manual composite second order (CSO) and composite triple beat (CTB) distortions are measured relative to the visual carrier peak and require momentary disabling of the carrier. Automatic measurements are made in the channel above the channel selected and assumes that it is unused. If the analyzer has Option 107, a non-interfering CSO measurement can be made.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum CSO/CTB Range	Input level dependent - see graphs. 66 to 73 dB over optimum input range
Manual CSO/CTB Resolution	0.1 dB
System CSO/CTB Resolution	1 dB
CSO/CTB Accuracy	Input level and measured CSO/CTB dependent - See graphs ± 1.5 dB to ± 4.0 dB over optimum input range
[†] A preamplifier and preselector filter may be required to achieve specifications.	

System Frequency Response (flatness)

System amplitude variations are measured relative to a reference trace stored during the setup.

Frequency Response Setup	
Fast Sweep Time	2 s (default) for no scrambling
Slow Sweep Time	8 s (default) for fixed-amplitude scrambling
Reference-trace Storage	50 traces that include analyzer states
Frequency Response Test	
Range	1.0 dB/Div to 20 dB/Div (2 dB default)
Resolution	0.05 dB
Trace-flatness Accuracy	± 0.1 dB per dB deviation from a flat line and ± 0.75 dB maximum cumulative error
Trace-position Accuracy	0.0 dB for equal temperature at test locations and ± 0.4 dB maximum for different ambient temperatures

Frequency Specifications

Frequency Range 75 Ω	1 MHz to 1.8 GHz
Precision Frequency Reference Aging Settability Temperature Stability	$\pm 1 \times 10^{-7}/\text{year}$ $\pm 2.2 \times 10^{-8}$ $\pm 1 \times 10^{-8}$
Frequency Reference (<i>Option 704</i>) Aging Settability Temperature Stability	$\pm 2 \times 10^{-6}/\text{year}$ $\pm 0.5 \times 10^{-6}$ $\pm 5 \times 10^{-6}$
Frequency Readout Accuracy (Start, Stop, Center, Marker)	$\pm(\text{frequency readout} \times \text{frequency reference error}^* + \text{span accuracy} + 1\% \text{ of span} + 20\% \text{ of RBW} + 100 \text{ Hz})^\ddagger$
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See “Frequency Characteristics.” ‡ See “Drift” under “Stability” in Frequency Characteristics.	

Marker Count Accuracy[†]	
Frequency Span ≤ 10 MHz	±(marker frequency × frequency reference error* + counter resolution + 100 Hz)
Frequency Span > 10 MHz	±(marker frequency × frequency reference error* + counter resolution + 1 kHz)
Counter Resolution	
Frequency Span ≤ 10 MHz	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz	Selectable from 100 Hz to 100 kHz
* frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy and temperature stability). See “Frequency Characteristics.”	
[†] Marker level to displayed noise level > 25 dB, RBW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when RBW/Span < 0.01.	

Frequency Span	
Range	0 Hz (zero span), 10 kHz to 1.8 GHz
(Option 130)	0 Hz (zero span), 1 kHz to 1.8 GHz
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy	
Span ≤ 10 MHz	±2% of span [§]
Span > 10 MHz	±3% of span
[§] (Option 130) For spans < 10 kHz, add an additional 10 Hz resolution error.	

Frequency Sweep Time	
Range	20 ms to 100 s
(Option 101)	20 μs to 100 s for span 0 Hz
Accuracy	
20 ms to 100 s	±3%
20 μs to <20 ms (Option 101)	±2%
Sweep Trigger	Free Run, Single, Line, Video, External

Resolution Bandwidth	
Range	1 kHz to 3 MHz, 8 selectable resolution (3 dB) bandwidths in 1-3-10 sequence. 9 kHz and 120 kHz (6 dB) EMI bandwidths.
(Option 130)	Adds 30, 100 and 300 Hz (3 dB) bandwidths and 200 Hz (6 dB) EMI bandwidth.
Accuracy	
3 dB bandwidths	±20%

Stability	
Noise Sidebands	(1 kHz RBW, 30 Hz VBW and sample detector)
>10 kHz offset from CW signal	≤−90 dBc/Hz
>20 kHz offset from CW signal	≤−100 dBc/Hz
>30 kHz offset from CW signal	≤−105 dBc/Hz
Residual FM	
1 kHz RBW, 1 kHz VBW	≤250 Hz pk-pk in 100 ms
30 Hz RBW, 30 Hz VBW (Option 130)	≤30 Hz pk-pk in 300 ms
System-Related Sidebands	
>30 kHz offset from CW signal	≤−65 dBc

Calibrator Output Frequency	300 MHz ±(freq. ref. error* × 300 MHz)
* frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy + temperature stability). See “Frequency Characteristics.”	

Amplitude Specifications

Amplitude specifications do not apply for Analog+ mode and negative peak detector mode except as noted in “Amplitude Characteristics.”

Amplitude Range	
75 Ω	–63 dBmV to +72 dBmV
75 Ω (Option 130)	–78 dBmV to +72 dBmV

Maximum Safe Input Level	(Input attenuator ≥ 10 dB)	
	50 Ω	75 Ω (Option 001)
Average Continuous Power	+30 dBm (1 W)	+72 dBmV (0.2 W)
Peak Pulse Power	+30 dBm (1 W)	+72 dBmV (0.2 W)
dc	25 Vdc	100 Vdc

Gain Compression[†]	
>10 MHz	≤ 0.5 dB (total power at input mixer* –10 dBm)

* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).

[†] (Option 130) If RBW ≤ 300 Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes $\leq$ Reference Level + 10 dB.

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
		75 Ω
1 kHz RBW		N/A
400 kHz to 1 MHz		≤ -63 dBmV
1 MHz to 1.5 GHz		≤ -61 dBmV
1.5 GHz to 1.8 GHz		
30 Hz RBW (Option 130)		
400 kHz to 1 MHz		N/A
1 MHz to 1.5 GHz		≤ -78 dBmV
1.5 GHz to 1.8 GHz		≤ -76 dBmV

Spurious Responses	
Second Harmonic Distortion 5 MHz to 1.8 GHz	<−70 dBc for −45 dBm tone at input mixer.*
Third Order Intermodulation Distortion 5 MHz to 1.8 GHz	<−70 dBc for two −30 dBm tones at input mixer* and >50 kHz separation.
Other Input Related Spurious	<−65 dBc at ≥30 kHz offset, for −20 dBm tone at input mixer ≤1.8 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB). (For analyzers with Input 75 Ω, add another 5.7 dB to the Input Attenuator.)	

Residual Responses 1 MHz to 1.8 GHz	(Input terminated and 0 dB attenuation)	
		75 Ω
		<−38 dBmV

Display Range	
Log Scale	0 to −70 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; eight divisions displayed.
Linear Scale	eight divisions
Scale Units	dBm, dBmV, dBμV, mV, mW, nV, nW, pW, μV, μW, V, and W

Marker Readout Resolution	
	0.05 dB for log scale
	0.05% of reference level for linear scale
Fast Sweep Times for Zero Span 20 μs to 20 ms (<i>Option 101 or 301</i>)	
Frequency ≤ 1 GHz	0.7% of reference level for linear scale
Frequency > 1 GHz	1.0% of reference level for linear scale

Reference Level	
Range	
Log Scale	Minimum amplitude to maximum amplitude**
Linear Scale	–99 dBm to maximum amplitude**
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to –20 dBm reference level, 10 dB input attenuation, at a single frequency, in a fixed RBW)
0 dBm to –59.9 dBm	±(0.3 dB + 0.01 × dB from –20 dBm)
–60 dBm and below	
1 kHz to 3 MHz RBW	±(0.6 dB + 0.01 × dB from –20 dBm)
30 Hz to 300 Hz RBW (<i>Option 130</i>)	±(0.7 dB + 0.01 × dB from –20 dBm)
** See “Amplitude Range.”	

Frequency Response	(10 dB input attenuation)	
	Absolute[§]	Relative Flatness[†]
	±1.5 dB	±1.0 dB
1 MHz to 1.8 GHz		
† Referenced to midpoint between highest and lowest frequency response deviations.		
§ Referenced to 300 MHz CAL OUT.		

Calibrator Output Amplitude	
75 Ω	+28.75 dB mV ±0.4 dB

Absolute Amplitude Calibration Uncertainty^{‡‡}	±0.15 dB
‡‡ Uncertainty in the measured absolute amplitude of the CAL OUT signal at the reference settings after CAL FREQ and CAL AMPTD self-calibration. Absolute amplitude reference settings are: Reference Level –20 dBm; Input Attenuation 10 dB; Center Frequency 300 MHz; Res BW 3 kHz; Video BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON.	

Input Attenuator	
Range	0 to 60 dB, in 10 dB steps

Resolution Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz RBW)
3 kHz to 3 MHz RBW	± 0.4 dB
1 kHz RBW	± 0.5 dB
30 Hz to 300 Hz (<i>Option 130</i>)	± 0.6 dB

Linear to Log Switching	± 0.25 dB at reference level
--------------------------------	----------------------------------

Display Scale Fidelity	
Log Maximum Cumulative	
0 to -70 dB from Reference Level	
3 kHz to 3 MHz RBW	$\pm (0.3 \text{ dB} + 0.01 \times \text{dB from reference level})$
$\text{RBW} \leq 1 \text{ kHz}$	$\pm (0.4 \text{ dB} + 0.01 \times \text{dB from reference level})$
Log Incremental Accuracy	
0 to -60 dB from Reference Level	± 0.4 dB/4 dB
Linear Accuracy	$\pm 3\%$ of reference level

Option Specifications

Tracking Generator Specifications (Option 010 or 011)

All specifications apply over 0 °C to +50 °C. The spectrum-analyzer/tracking-generator combination will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum-analyzer/tracking-generator is turned on and after CAL FREQ, CAL AMPTD, CAL TRK GEN, and TRACKING PEAK have been run.

Warm-Up	30 minutes
Output Frequency	
Range	
75 Ω (Option 011)	1 MHz to 1.8 GHz
Output Power Level	
Range	
75 Ω (Option 011)	+42.8 to -27.2 dBmV
Resolution	0.1 dB
Absolute Accuracy	± 1.0 dB (at 300 MHz, +28.8 dBmV, and coupled source attenuator)
Vernier	
Range	10 dB [‡]
Accuracy	± 0.75 dB over 10 dB range (referenced to +28.8 dBmV for coupled source attenuator setting) [‡]
Output Attenuator	
Range	0 to 60 dB in 10 dB steps
[‡] See the Output Accuracy table in "Option Characteristics."	

Output Power Sweep Range 75 Ω (<i>Option 011</i>) Resolution Accuracy (zero span)	 (+27.8 to 42.8 dBmV) – (Source Attenuator Setting) 0.1 dB <1.5 dB peak-to-peak
Output Flatness (referenced to 300 MHz, 10 dB attenuator)	 ± 1.75 dB
Spurious Outputs 75 Ω (<i>Option 011</i>) Harmonic Spurs Nonharmonic Spurs	 (+42.8 dBmV output, 1 MHz to 1.8 GHz) <–25 dBc <–30 dBc
Dynamic Range Tracking Generator Feedthrough 75 Ω (<i>Option 011</i>)	 <–57.24 dBmV

Time Gated Spectrum Analysis Specifications (Option 105 or Option 107)

GATE DELAY	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(1 \mu\text{s} + (0.01\% \times \text{GATE DELAY Readout}))^\dagger$
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(0.2 \mu\text{s} + (0.01\% \times \text{GATE LENGTH Readout}))$
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 μ s	± 0.8 dB
$\geq 2 \mu\text{s}$	± 0.5 dB
Linear Scale	
< 2 μ s	$\pm 1.0\%$ of REFERENCE LEVEL
$\geq 2 \mu\text{s}$	$\pm 0.7\%$ of REFERENCE LEVEL
[†] Up to 1 μ s jitter due to 1 μ s resolution of gate delay clock. [§] With GATE ON enabled and triggered, CW Signal, Peak Detector Mode.	

TV Receiver/Video Tester (Option 107)

(Option 107 required; appropriate TV line must be selected)

Non-interfering color	(requires FCC composite, NTC-7, or CCIR 17 and CCIR 330 test signal)
Differential Gain Accuracy	6% 50 averages (default)
Differential Phase Accuracy	4° 50 averages (default)
Chroma-luminance Delay Inequality Accuracy	±45 ns
Frequency Range	50 MHz to 850 MHz
Amplitude Range	+10 dBmV to +50 dBmV at coupler input (10 dB loss)
Coupler (part number 0955-0704)	Insertion loss: < 2 dB Coupled output: -10 dB ±0.5 dB

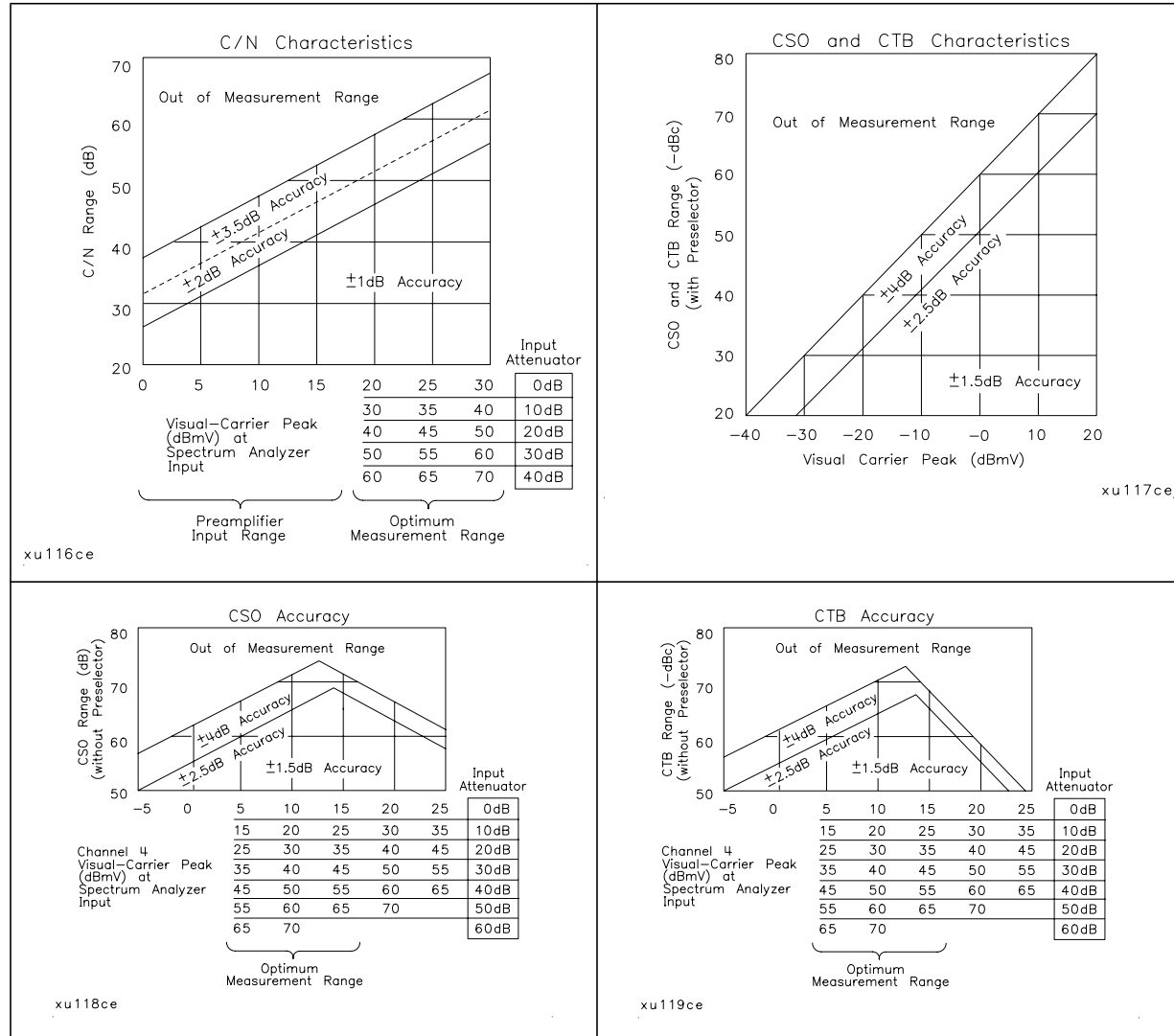
Non-Interfering Tests with Gate On*	
C/N and CSO (quiet line must be selected)	See graphs for accuracy
In-channel Frequency Response Accuracy	±0.5 dB within channel
* A preamplifier and preselector filter may be required to achieve specifications.	

Cable TV Measurement Characteristics

Depth of Modulation AM Range Resolution Accuracy	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels. 50 to 93% 0.1% ±2.0% for C/N > 40 dB
FM Deviation Range Resolution Accuracy	Peak reading of FM deviation ±100 kHz 100 Hz ±1.5 kHz

8591C Specifications and Characteristics

Cable TV Measurement Characteristics



C/N, CSO, and CTB Measurements

The four graphs summarize the combined 8591C cable TV analyzer or 8590 E-Series spectrum analyzers, and 85721A characteristics for C/N, CSO, and CTB testing on cable TV systems with up to 99 channels and up to +9 dB amplitude tilt. C/N, CSO, and CTB measurement accuracies and ranges can be read from the relevant graphs. They depend upon the visual carrier peak level and the measurement reading. For C/N measurements with a preselector, there is no optimum range and the accuracy boundaries drop by the preselector's insertion loss (typically 2 dB).

Crossmodulation

Range

Resolution

Accuracy

Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.

60 dB, usable to 65 dB

0.1 dB

±2.0 dB for xmod. <40 dB, C/N >40 dB ±2.6 dB for xmod. <50 dB, C/N >40 dB ±4.6 dB for xmod. <60 dB, C/N >40 dB

Frequency Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Precision Frequency Reference (Option 004)	
Aging	5×10^{-10} /day, 7-day average after being powered on for 7 days.
Warm-Up	1×10^{-8} after 30 minutes on.
Initial Achievable Accuracy	$\pm 2.2 \times 10^{-8}$ after being powered on for 24 hours.

Frequency Reference (Option 704)	
Aging	$\pm 2 \times 10^{-6}$ /year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Stability	
Drift* (after warmup at stabilized temperature)	
Frequency Span ≤ 10 MHz, Free Run	< 2 kHz/minute of sweep time
* Because the analyzer is locked at the center frequency before each sweep, drift occurs only during the time of one sweep. For Line, Video or External trigger, additional drift occurs while waiting for the appropriate trigger signal.	

Resolution Bandwidth (–3 dB)	
Range	1 kHz to 3 MHz, selectable in 1, 3 and 10 increments, and 5 MHz. Resolution bandwidths may be selected manually, or coupled to frequency span.
(Option 130)	Adds 30 Hz, 100 Hz, and 300 Hz bandwidths.
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio	
Resolution Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
60 dB/3 dB Bandwidth Ratio (Option 130)	
Resolution Bandwidth	
30 Hz to 300 Hz	10:1

Video Bandwidth (–3 dB)	
Range	30 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy $\pm 30\%$ and 3 MHz. Video bandwidths may be selected manually, or coupled to resolution bandwidth and frequency span.
(Option 130)	Adds 1, 3, and 10 Hz bandwidths.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
(Option 130)	Bandwidths below 30 Hz are digital bandwidths with anti-aliasing filtering.

FFT Bandwidth Factors	FLATTOP	HANNING	UNIFORM
Noise Equivalent Bandwidth [†]	3.63×	1.5×	1×
3 dB Bandwidth [†]	3.60×	1.48×	1×
Sidelobe Height	<−90 dB	−32 dB	−13 dB
Amplitude Uncertainty	0.10 dB	1.42 dB	3.92 dB
Shape Factor (60 dB BW/3 dB BW)	2.6	9.1	>300
[†] Multiply entry by one-divided-by-sweep time.			

FM Demodulation

Input Level	> (−60 dBm + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz nominal
Range	10 kHz to 1 MHz
Bandwidth	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Amplitude Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

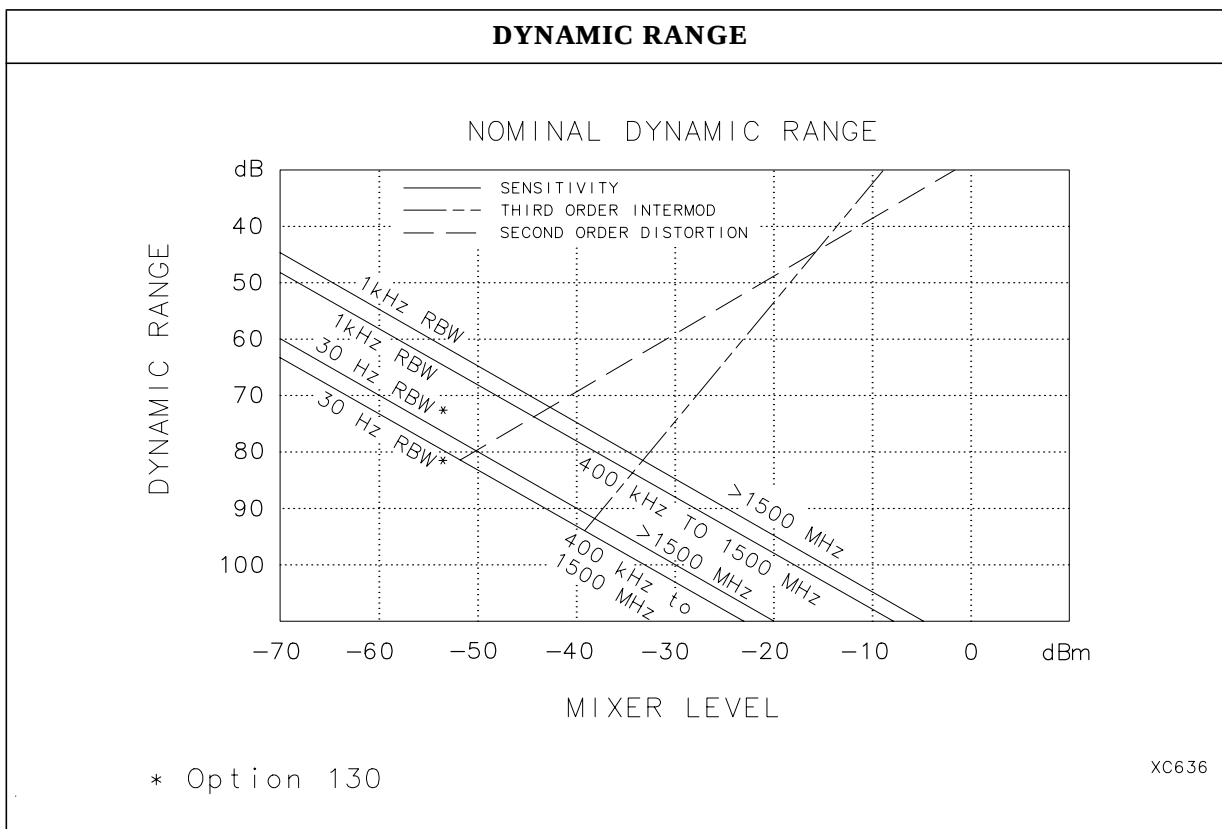
Log Scale Switching Uncertainty	Negligible error
Demod Tune Listen	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
TV Trigger Carrier Level for Trigger Compatible Formats Field Selection Trigger Polarity Line Selection	Triggers sweep of the analyzer after the sync pulse of a selected line of a TV video field. Top 60% of linear display NTSC, PAL, SECAM Even, odd, non-interlaced Positive, negative 10 to 1021
Input Attenuation Uncertainty* Attenuator Setting	
0 dB	±0.5 dB
10 dB	Reference
20 dB	±0.5 dB
30 dB	±0.6 dB
40 dB	±0.8 dB
50 dB	±1.0 dB
60 dB	±1.2 dB
* Referenced to 10 dB input attenuator setting from 9 kHz to 1.8 GHz. See the “Specifications” table under “Frequency Response.”	

Input Attenuator Repeatability	
300 MHz	± 0.03 dB
1.8 GHz	± 1.0 dB

Input Attenuator Preamplifier	
Gain: 1 MHz to 1 GHz	27 dB
1 GHz to 1.8 GHz	20 dB

Noise Figure	<5.5 dB
---------------------	---------

RF Input SWR	(Attenuator setting 10 to 60 dB)
	1.35:1



Immunity Testing	
Radiated Immunity	When tested at 3 V/m according to IEC 801-3/1984 the displayed average noise level will be within specifications over the full immunity test frequency range of 27 to 500 MHz except that at immunity test frequencies of $278.6 \text{ MHz} \pm$ selected resolution bandwidth and $321.4 \text{ MHz} \pm$ selected resolution bandwidth the displayed average noise level may be up to -45 dBm . When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to -70 dBm displayed on the screen.
Electrostatic Discharge	When an air discharge of up to 8 kV according to IEC 801-2/1991 occurs to the shells of the BNC connectors on the rear panel of the instrument spikes may be seen on the CRT display. Discharges to center pins of any of the connectors may cause damage to the associated circuitry.

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.

In these modes, the following analyzer specifications remain as specifications:

Amplitude Range	Calibrator Output
Maximum Safe Input Level	

In these modes, the following analyzer specifications are reduced to characteristics:

Gain Compression	Reference Level
Displayed Average Noise Level	Resolution Bandwidth Switching
Spurious Responses	Linear to Log Switching
Residual Responses	Display Scale Fidelity
Display Range	Display Scale Fidelity for Narrow Bandwidths

Finally, the following analyzer specifications:

Marker Readout Resolution	Frequency Response
----------------------------------	---------------------------

are replaced by the characteristics which follow in this subsection.

Marker Readout Resolution	
(digitizing resolution)	
Log Scale	±0.31 dB
Linear Scale	
frequency ≤ 1 GHz	±0.59% of reference level
frequency > 1 GHz	±1.03% of reference level

Frequency Response in Analog+ Mode	(10 dB input attenuation, for spans ≤ 20 MHz)	
	Absolute[§]	Relative Flatness[†]
	±1.9 dB	±1.4 dB

[†] Referenced to midpoint between highest and lowest frequency response deviations.

[§] Referenced to 300 MHz CAL OUT.

Option Characteristics

Tracking Generator Characteristics Option 011

Output Tracking Drift (usable in 10 kHz bandwidth after 30-minute warmup)	1 kHz/5 minutes
Spurious Outputs (>1.8 GHz to 4.0 GHz) 75 Ω (Option 011) +42.8 dBmV, output Harmonic Nonharmonic 2121.4 MHz Feedthrough (Option 011)	<-20 dBc <-40 dBc <+3.8 dBmV
RF Power-Off Residuals 1 MHz to 1.8 GHz (Option 011)	<-66.2 dBmV
Output Attenuator Repeatability	± 0.2 dB
Output VSWR 0 dB Attenuator 10 dB Attenuator	2.5:1 1.6:1
Dynamic Range (difference between maximum power out and tracking generator feedthrough) 1 MHz to 1.8 GHz (Option 011)	>100 dB

TRACKING GENERATOR OUTPUT ACCURACY, Option 011					
(after CAL TRK GEN in auto-coupled mode)					
TG Output Power Level	Attenuator Setting	Relative Accuracy (at 300 MHz referred to +28.8 dBmV)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to +28.8 dBmV) (+0.2 dB/GHz)*	Absolute Accuracy (+0.2 dB/GHz)*
+42.76 to +31.77 dBmV	0 dB	±1.25 dB	±2.25 dB	±2.75 dB	±3.75 dB
+31.76 to +21.77 dBmV	10 dB	±0.75 dB	±1.75 dB	±2.25 dB	±3.25 dB
+28.76 dBmV	10 dB	0 dB Reference	±1.0 dB	±1.50 dB	±2.50 dB
+21.76 to +11.77 dBmV	20 dB	±1.25 dB	±2.25 dB	±2.75 dB	±3.75 dB
+11.76 to +1.77 dBmV	30 dB	±1.35 dB	±2.35 dB	±2.85 dB	±3.85 dB
+1.76 to -8.23 dBmV	40 dB	±1.55 dB	±2.55 dB	±3.05 dB	±4.05 dB
-8.24 to -18.23 dBmV	50 dB	±1.75 dB	±2.75 dB	±3.25 dB	±4.25 dB
-18.24 to -27.23 dBmV	60 dB	±1.95 dB	±2.95 dB	±3.45 dB	±4.45 dB
* Add 0.2 dB/GHz of tuned frequency to the value in this column for complete accuracy specification relative to frequency.					

Physical Characteristics

Front-Panel Inputs and Outputs

INPUT 75Ω Connector Impedance	BNC female 75 Ω nominal
RF OUT (<i>Option 010, 011</i>) Connector (<i>Option 011</i>) Impedance (<i>Option 011</i>) Maximum Safe Reverse Level (<i>Option 011</i>)	75 Ω BNC female 75 Ω nominal +69 dBmV (0.1 W), 100 Vdc
TV IN (<i>Option 107</i>) Connector Impedance	75 Ω BNC female 75 Ω nominal
PROBE POWER [‡] Voltage/Current	+15 Vdc, $\pm 7\%$ at 150 mA max. –12.6 Vdc $\pm 10\%$ at 150 mA max.
[‡] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.5 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.	

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT Connector Impedance Output Amplitude	BNC female 50 Ω nominal >0 dBm
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EXT REF IN	
Connector	BNC female Note: Analyzer noise sideband and spurious response performance may be affected by the quality of the external reference used.
Input Amplitude Range	–2 to +10 dBm
Frequency	10 MHz
AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	–10 to –60 dBm
Impedance	50 Ω nominal
AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)
EARPHONE (<i>Option 102 or 103</i>)	
Connector	1/8 inch monaural jack
EXT ALC INPUT (<i>Option 011</i>)	
Impedance	1 M Ω
Polarity	Positive or negative
Range	–66 dBV to +6 dBV
Connector	BNC
EXT KEYBOARD (<i>Option 041 or 043</i>)	
Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.	
EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (TTL).

GATE TRIGGER INPUT (<i>Option 105 or 107</i>) Connector Trigger Level GATE OUTPUT (<i>Option 105 or 107</i>) Connector Output Level	BNC female minimum pulse width >30 ns (TTL) BNC female High = gate on; Low = gate off (TTL)
HI-SWEEP IN/OUT Connector Output Input	BNC female High = sweep, Low = retrace (TTL) Open collector, low stops sweep.
MONITOR OUTPUT (Spectrum Analyzer Display) Connector Format SYNC NRM SYNC NTSC SYNC PAL	BNC female Internal Monitor NTSC Compatible 15.75 kHz horizontal rate 60 Hz vertical rate PAL Compatible 15.625 kHz horizontal rate 50 Hz vertical rate
REMOTE INTERFACE GPIB and Parallel (<i>Option 041</i>) GPIB Codes RS-232 and Parallel (<i>Option 043</i>)	 10833A, B, C or D and 25 pin subminiature D-shell, female for parallel SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28 9 pin subminiature D-shell, male for RS-232 and 25 pin subminiature D-shell, female for parallel

SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp

TV MON OUTPUT (<i>Option 107</i>)	
Connector	BNC female
Output	Baseband video output from TV Receiver

TV TRIG OUT (<i>Options 101 and 102</i>)	
Connector	BNC female
Amplitude	Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

AUX INTERFACE				
Connector Type: 9 Pin Subminiature “D”				
Connector Pinout				
Pin #	Function	Current	“Logic” Mode	“Serial Bit” Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7 [†]	−15 Vdc ±7%	150 mA	—	—
8*	+5 Vdc ±5%	150 mA	—	—
9 [†]	+15 Vdc ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants.				
† Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the −12.6 Vdc on the PROBE POWER and the −15 Vdc on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net	
8591C	14.1 kg (31 lb)
Shipping	
8591C	16.8 kg (37 lb)

DIMENSIONS

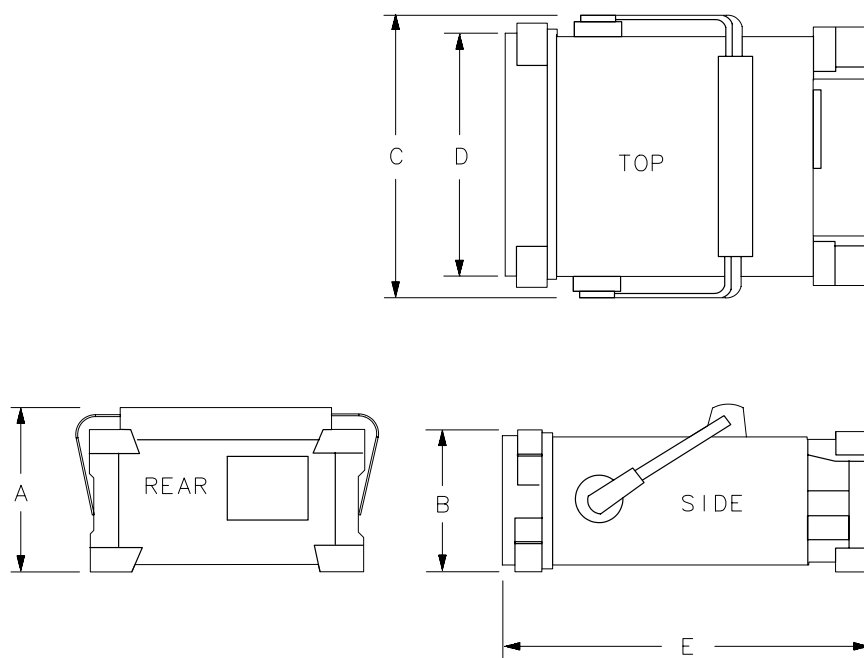
A 8 in (200 mm)

B 7.25 in (184 mm)

C 14.69 in (373 mm)

D 13.25 in (337 mm)

E 18.12 in (460.5 mm)



FORMAT 100

5

8591E Specifications and Characteristics

This chapter contains specifications and characteristics for the 8591E Spectrum Analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first and are followed by the characteristics.

General	General specifications.
Frequency	Frequency-related specifications and characteristics.
Amplitude	Amplitude-related specifications and characteristics.
Cable TV	Cable TV measurement specifications and characteristics.
Option	Option-related specifications and characteristics.
Physical	Input, output and physical characteristics.

The distinction between specifications and characteristics is described as follows.

- Specifications describe warranted performance over the temperature range 0 °C to +50 °C (unless otherwise noted). The spectrum analyzer will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum analyzer is turned on, and after the CAL frequency and CAL amplitude routines have been run.
- Characteristics provide useful, but non-warranted information about the functions and performance of the spectrum analyzer. Characteristics are specifically identified.
- Typical Performance, where listed, is not warranted, but indicates performance that most units will exhibit.
- Nominal Value indicates the expected, but not warranted, value of the parameter.

0 °C to +50 °C with Option 015 or Option 016 operating/carrying case.

General Specifications

All specifications apply over 0 °C to +55 °C unless equipped with Option 015 or 016. The analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the analyzer is turned on and after CAL FREQ and CAL AMPTD have been run.

Temperature Range	
Operating	0 °C to +55 °C*
Storage	–40 °C to +75 °C
* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.	
EMI Compatibility	
Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A.	
Audible Noise	
<37.5 dBA pressure and <5.0 Bels power (ISODP7779)	
Power Requirements	
ON (LINE 1)	90 to 132 V rms, 47 to 440 Hz 195 to 250 V rms, 47 to 66 Hz Power consumption <500 VA; <180 W
Standby (LINE 0)	Power consumption <7 W
Environmental Specifications	
Type tested to the environmental specifications of Mil-T-28800 class 5	

Frequency Specifications

Frequency Range 75 Ω (Option 001)	9 kHz to 1.8 GHz 1 MHz to 1.8 GHz
Frequency Reference Aging Settability Temperature Stability	$\pm 2 \times 10^{-6}$ /year $\pm 0.5 \times 10^{-6}$ $\pm 5 \times 10^{-6}$
Precision Frequency Reference (Option 004) Aging Settability Temperature Stability	$\pm 1 \times 10^{-7}$ /year $\pm 2.2 \times 10^{-8}$ $\pm 1 \times 10^{-8}$
Frequency Readout Accuracy (Start, Stop, Center, Marker)	$\pm(\text{frequency readout} \times \text{frequency reference error}^* + \text{span accuracy} + 1\% \text{ of span} + 20\% \text{ of RBW} + 100 \text{ Hz})^\ddagger$
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See "Frequency Characteristics." ‡ See "Drift" under "Stability" in Frequency Characteristics.	

Marker Count Accuracy[†]	
Frequency Span ≤ 10 MHz	±(marker frequency × frequency reference error* + counter resolution + 100 Hz)
Frequency Span > 10 MHz	±(marker frequency × frequency reference error* + counter resolution + 1 kHz)
Counter Resolution	
Frequency Span ≤ 10 MHz	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz	Selectable from 100 Hz to 100 kHz
* frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy and temperature stability). See “Frequency Characteristics.”	
[†] Marker level to displayed noise level > 25 dB, RBW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when RBW/Span < 0.01.	

Frequency Span	
Range	0 Hz (zero span), 10 kHz to 1.8 GHz
(Option 130)	0 Hz (zero span), 1 kHz to 1.8 GHz
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy	
Span ≤ 10 MHz	±2% of span [§]
Span > 10 MHz	±3% of span
[§] (Option 130) For spans < 10 kHz, add an additional 10 Hz resolution error.	

Frequency Sweep Time	
Range	20 ms to 100 s
(Option 101)	20 μs to 100 s for span 0 Hz
Accuracy	
20 ms to 100 s	±3%
20 μs to <20 ms (Option 101)	±2%
Sweep Trigger	Free Run, Single, Line, Video, External

Resolution Bandwidth	
Range	1 kHz to 3 MHz, 8 selectable resolution (3 dB) bandwidths in 1-3-10 sequence. 9 kHz and 120 kHz (6 dB) EMI bandwidths.
(Option 130)	Adds 30, 100 and 300 Hz (3 dB) bandwidths and 200 Hz (6 dB) EMI bandwidth.
Accuracy	
3 dB bandwidths	±20%

Stability	
Noise Sidebands	(1 kHz RBW, 30 Hz VBW and sample detector)
>10 kHz offset from CW signal	≤−90 dBc/Hz
>20 kHz offset from CW signal	≤−100 dBc/Hz
>30 kHz offset from CW signal	≤−105 dBc/Hz
Residual FM	
1 kHz RBW, 1 kHz VBW	≤250 Hz pk-pk in 100 ms
30 Hz RBW, 30 Hz VBW (Option 130)	≤30 Hz pk-pk in 300 ms
System-Related Sidebands	
>30 kHz offset from CW signal	≤−65 dBc

Calibrator Output Frequency	300 MHz ±(freq. ref. error* × 300 MHz)
* frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy + temperature stability). See “Frequency Characteristics.”	

Amplitude Specifications

Amplitude specifications do not apply for Analog+ mode and negative peak detector mode except as noted in “Amplitude Characteristics.”

Amplitude Range	
50 Ω	–115 dBm to +30 dBm
50 Ω (Option 130)	–130 dBm to +30 dBm
75 Ω	–63 dBmV to +72 dBmV
75 Ω (Options 001 and 130)	–78 dBmV to +72 dBmV

Maximum Safe Input Level	(Input attenuator ≥ 10 dB)	
	50 Ω	75 Ω (Option 001)
Average Continuous Power	+30 dBm (1 W)	+72 dBmV (0.2 W)
Peak Pulse Power	+30 dBm (1 W)	+72 dBmV (0.2 W)
dc	25 Vdc	100 Vdc

Gain Compression [‡]	
>10 MHz	≤ 0.5 dB (total power at input mixer* –10 dBm)

* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).

[‡] (Option 130) If RBW ≤ 300 Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes $\leq$ Reference Level + 10 dB.

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
	50 Ω	75 Ω (Option 001)
1 kHz RBW		
400 kHz to 1 MHz	≤ -115 dBm	N/A
1 MHz to 1.5 GHz	≤ -115 dBm	≤ -63 dBmV
1.5 GHz to 1.8 GHz	≤ -113 dBm	≤ -61 dBmV
30 Hz RBW (Option 130)		
400 kHz to 1 MHz	≤ -130 dBm	N/A
1 MHz to 1.5 GHz	≤ -130 dBm	≤ -78 dBmV
1.5 GHz to 1.8 GHz	≤ -128 dBm	≤ -76 dBmV

Spurious Responses	
Second Harmonic Distortion 5 MHz to 1.8 GHz	<−70 dBc for −45 dBm tone at input mixer.*
Third Order Intermodulation Distortion 5 MHz to 1.8 GHz	<−70 dBc for two −30 dBm tones at input mixer* and >50 kHz separation.
Other Input Related Spurious	<−65 dBc at ≥30 kHz offset, for −20 dBm tone at input mixer ≤1.8 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB). (For analyzers with Input 75 Ω, add another 5.7 dB to the Input Attenuator.)	

Residual Responses	(Input terminated and 0 dB attenuation)	
	50 Ω	75 Ω (Option 001)
	150 kHz to 1 MHz	<−90 dBm
1 MHz to 1.8 GHz	<−90 dBm	N/A
		<−38 dBmV

Display Range	
Log Scale	0 to −70 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; eight divisions displayed.
Linear Scale	eight divisions
Scale Units	dBm, dBmV, dBμV, mV, mW, nV, nW, pW, μV, μW, V, and W

Marker Readout Resolution	
	0.05 dB for log scale
	0.05% of reference level for linear scale
Fast Sweep Times for Zero Span 20 μs to 20 ms (Option 101 or 301)	
Frequency ≤ 1 GHz	0.7% of reference level for linear scale
Frequency > 1 GHz	1.0% of reference level for linear scale

Reference Level	
Range	
Log Scale	Minimum amplitude to maximum amplitude**
Linear Scale	–99 dBm to maximum amplitude**
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to –20 dBm reference level, 10 dB input attenuation, at a single frequency, in a fixed RBW)
0 dBm to –59.9 dBm	±(0.3 dB + 0.01 × dB from –20 dBm)
–60 dBm and below	
1 kHz to 3 MHz RBW	±(0.6 dB + 0.01 × dB from –20 dBm)
30 Hz to 300 Hz RBW (<i>Option 130</i>)	±(0.7 dB + 0.01 × dB from –20 dBm)
** See “Amplitude Range.”	

Frequency Response	(10 dB input attenuation)	
	Absolute[§]	Relative Flatness[†]
	9 kHz to 1.8 GHz	±1.5 dB
		±1.0 dB
† Referenced to midpoint between highest and lowest frequency response deviations.		
§ Referenced to 300 MHz CAL OUT.		

Calibrator Output Amplitude	
50 Ω	–20 dBm ±0.4 dB
75 Ω (<i>Option 001</i>)	+28.75 dB mV ±0.4 dB

Absolute Amplitude Calibration Uncertainty^{‡‡}	±0.15 dB
‡‡ Uncertainty in the measured absolute amplitude of the CAL OUT signal at the reference settings after CAL FREQ and CAL AMPTD self-calibration. Absolute amplitude reference settings are: Reference Level –20 dBm; Input Attenuation 10 dB; Center Frequency 300 MHz; Res BW 3 kHz; Video BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON.	

Input Attenuator	
Range	0 to 60 dB, in 10 dB steps
Resolution Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz RBW)
3 kHz to 3 MHz RBW	± 0.4 dB
1 kHz RBW	± 0.5 dB
30 Hz to 300 Hz (<i>Option 130</i>)	± 0.6 dB
Linear to Log Switching	± 0.25 dB at reference level
Display Scale Fidelity	
Log Maximum Cumulative	
0 to -70 dB from Reference Level	
3 kHz to 3 MHz RBW	$\pm (0.3 \text{ dB} + 0.01 \times \text{dB from reference level})$
$\text{RBW} \leq 1 \text{ kHz}$	$\pm (0.4 \text{ dB} + 0.01 \times \text{dB from reference level})$
Log Incremental Accuracy	
0 to -60 dB from Reference Level	$\pm 0.4 \text{ dB}/4 \text{ dB}$
Linear Accuracy	$\pm 3\%$ of reference level

Cable TV Measurement Specifications

These specifications describe warranted performance of the spectrum analyzer and the 85721A cable TV measurements personality.

Input Configuration	75 Ω BNC Female
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Channel Selection	Analyzer tunes to specified channels based upon selected tune configuration.
Tune Configuration	Standard, Off-the Air, HRC, IRC (T and FM channels also in channel mode)
Channel Range	1 to 158 and 201 to 300 (channel mode) 1 to 158 (system mode)
Channel Frequencies	Defined by Code of Federal Regulations, Title 47, Telecommunications, Parts 73.603, 76.605, 76.612
Frequency Range	5 to 1002 MHz (channel mode) 54 to 896 MHz (system mode)
Amplitude Range	-15 to +70 dBmV for S/N > 30 dB

Visual-Carrier Frequency	Visual-carrier frequency is counted
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Frequency Reference* (Standard)	
Resolution	1 kHz
Accuracy	$\pm(7.5 \times 10^{-6} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 524 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 2.55 \text{ kHz}$
@643.25 MHz (Ch. 94)	$\pm 4.93 \text{ kHz}$
* Will not meet FCC frequency accuracy requirements.	

Precision Frequency Reference (Option 004)	
Resolution	100 Hz
Accuracy	$\pm(1.2 \times 10^{-7} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 117 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 149 \text{ Hz}$
@643.25 MHz (Ch. 94)	$\pm 187 \text{ Hz}$

Visual-to-Aural Carrier Frequency Difference Difference Range Resolution Accuracy	Frequency difference between visual and aural carriers is counted. 4.1 to 4.9 MHz 100 Hz ± 221 Hz for precision frequency ref (std) ± 254 Hz for Option 704 frequency ref
Visual-Carrier Level Amplitude Range Resolution Absolute Accuracy Relative Accuracy	The peak amplitude of the visual carrier is measured to an absolute standard traceable to the National Institute of Standards and Technology. -15 to +70 dBmV 0.1 dB ± 2.0 dB for S/N > 30 dB ± 1.0 dB relative to adjacent channels in frequency ± 1.5 dB relative to all other channels
Visual-to-Aural Carrier Level Difference Difference Range Resolution Accuracy	The difference between peak amplitudes of the visual and aural carrier is measured. 0 to 25 dB 0.1 dB ± 0.75 dB for S/N > 30 dB
Hum/Low-Frequency Disturbance AM Range Resolution Accuracy	Power-line frequency and low-frequency disturbance measured on modulated and/or unmodulated carriers. May not be valid for scrambled channels. 0.5 to 10% 0.1% $\pm 0.4\%$ for hum $\leq 3\%$ $\pm 0.7\%$ for hum $\leq 5\%$ $\pm 1.3\%$ for hum $\leq 10\%$

Visual Carrier-to-Noise Ratio (C/N)*	The C/N is calculated from the visual-carrier peak level and the minimum noise level, normalized to 4 MHz noise bandwidth.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum C/N Range	Input level dependent - See graphs
C/N Resolution	0.1 dB
C/N Accuracy	Input level and measured C/N dependent ± 1.0 to ± 3.5 dB over optimum input range
* A preamplifier and preselector filter may be required to achieve specifications.	

CSO and CTB Distortion [†]	Manual composite second order (CSO) and composite triple beat (CTB) distortions are measured relative to the visual carrier peak and require momentary disabling of the carrier. Automatic measurements are made in the channel above the channel selected and assumes that it is unused. If the analyzer has Option 107, a non-interfering CSO measurement can be made.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum CSO/CTB Range	Input level dependent - see graphs. 66 to 73 dB over optimum input range
Manual CSO/CTB Resolution	0.1 dB
System CSO/CTB Resolution	1 dB
CSO/CTB Accuracy	Input level and measured CSO/CTB dependent - See graphs ± 1.5 dB to ± 4.0 dB over optimum input range
[†] A preamplifier and preselector filter may be required to achieve specifications.	

System Frequency Response (flatness)

System amplitude variations are measured relative to a reference trace stored during the setup.

Frequency Response Setup	
Fast Sweep Time	2 s (default) for no scrambling
Slow Sweep Time	8 s (default) for fixed-amplitude scrambling
Reference-trace Storage	50 traces that include analyzer states

Frequency Response Test	
Range	1.0 dB/Div to 20 dB/Div (2 dB default)
Resolution	0.05 dB
Trace-flatness Accuracy	± 0.1 dB per dB deviation from a flat line and ± 0.75 dB maximum cumulative error
Trace-position Accuracy	0.0 dB for equal temperature at test locations and ± 0.4 dB maximum for different ambient temperatures

Option Specifications

Tracking Generator Specifications (Option 010 or 011)

All specifications apply over 0 °C to +55 °C*. The spectrum-analyzer/tracking-generator combination will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum-analyzer/tracking-generator is turned on and after CAL FREQ, CAL AMPTD, CAL TRK GEN, and TRACKING PEAK have been run.

* 0 °C to +50 °C with Option 015 or Option 016

Warm-Up	30 minutes
Output Frequency	
Range	
50 Ω (Option 010)	100 kHz to 1.8 GHz
75 Ω (Option 011)	1 MHz to 1.8 GHz
Output Power Level	
Range	
50 Ω (Option 010)	0 to –70 dBm
75 Ω (Option 011)	+42.8 to –27.2 dBmV
Resolution	0.1 dB
Absolute Accuracy	± 1.0 dB (at 300 MHz, –20 dBm, and coupled source attenuator) (Option 011: use +28.8 dBmV instead of –20 dBm)
Vernier	
Range	10 dB [‡]
Accuracy	± 0.75 dB over 10 dB range (referenced to –20 dBm for coupled source attenuator setting) [‡] (Option 011: referenced to +28.8 dBmV instead of –20 dBm)
Output Attenuator	
Range	0 to 60 dB in 10 dB steps
[‡] See the Output Accuracy table in “Option Characteristics.”	

Output Power Sweep	
Range	
50 Ω (Option 010)	(–15 dBm to 0 dBm) – (Source Attenuator Setting)
75 Ω (Option 011)	(+27.8 to 42.8 dBmV) – (Source Attenuator Setting)
Resolution	0.1 dB
Accuracy (zero span)	<1.5 dB peak-to-peak

Output Flatness	
(referenced to 300 MHz, 10 dB attenuator)	± 1.75 dB

Spurious Outputs	
50 Ω (Option 010)	(0 dBm output, 100 kHz to 1.8 GHz)
75 Ω (Option 011)	(+42.8 dBmV output, 1 MHz to 1.8 GHz)
Harmonic Spurs	<–25 dBc
Nonharmonic Spurs	<–30 dBc

Dynamic Range	
Tracking Generator Feedthrough	
50 Ω (Option 010)	<–106 dBm
75 Ω (Option 011)	<–57.24 dBmV

Quasi-Peak Detector Specifications (Option 103)

The Option 103 specifications and characteristics are not valid with Option 001 or 011.

The specifications for Quasi-Peak Detector (Option 103) have been based on the following:

- The spectrum analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radioélectriques (CISPR) Section 1, Clause 2.

The 200 Hz bandwidth is available only with Option 130. The 1 kHz resolution bandwidth may be used to approximate a quasi-peak measurement without Option 130. A quasi-peak measurement using the 1 kHz bandwidth will be greater than or equal to a quasi-peak measurement using a 200 Hz bandwidth.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the spectrum analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, resolution bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB)	Frequency Band		
	120 kHz EMI BW 0.03 to 1 GHz	9 kHz EMI BW 0.15 to 30 MHz	(Option 130) 200 Hz EMI BW 10 to 150 kHz
1000	$+8.0 \pm 1.0$	$+4.5 \pm 1.0$	—
100	0 dB (reference)*	0 dB (reference)*	$+4.0 \pm 1.0$
60	—	—	$+3.0 \pm 1.0$
25	—	—	0 dB (reference)*
20	-9.0 ± 1.0	-6.5 ± 1.0	—
10	-14.0 ± 1.5	-10.0 ± 1.5	-4.0 ± 1.0
5	—	—	-7.5 ± 1.5
2	-26.0 ± 2.0	-20.5 ± 2.0	-13.0 ± 2.0
1	-28.5 ± 2.0	-22.5 ± 2.0	-17.0 ± 2.0
Isolated Pulse	-31.5 ± 2.0	-23.5 ± 2.0	-19.0 ± 2.0
* Reference pulse amplitude accuracy relative to a 66 dB μ V CW signal is <1.5 dB. CISPR reference pulse: 0.044 μ Vs for 0.03 to 1 GHz, 0.316 μ Vs for 0.15 to 30 MHz, 13.5 ± 1.5 μ Vs for 10 to 150 kHz (Option 130).			

Time Gated Spectrum Analysis Specifications (Option 105 or Option 107)

GATE DELAY	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(1 \mu\text{s} + (0.01\% \times \text{GATE DELAY Readout}))^\dagger$
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(0.2 \mu\text{s} + (0.01\% \times \text{GATE LENGTH Readout}))$
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 μ s	± 0.8 dB
$\geq 2 \mu\text{s}$	± 0.5 dB
Linear Scale	
< 2 μ s	$\pm 1.0\%$ of REFERENCE LEVEL
$\geq 2 \mu\text{s}$	$\pm 0.7\%$ of REFERENCE LEVEL
[†] Up to 1 μ s jitter due to 1 μ s resolution of gate delay clock. [§] With GATE ON enabled and triggered, CW Signal, Peak Detector Mode.	

TV Receiver/Video Tester (Option 107)

(Option 107 required; appropriate TV line must be selected)

Non-interfering color	(requires FCC composite, NTC-7, or CCIR 17 and CCIR 330 test signal)
Differential Gain Accuracy	6% 50 averages (default)
Differential Phase Accuracy	4° 50 averages (default)
Chroma-luminance Delay Inequality Accuracy	±45 ns
Frequency Range	50 MHz to 850 MHz
Amplitude Range	+10 dBmV to +50 dBmV at coupler input (10 dB loss)
Coupler (part number 0955-0704)	Insertion loss: < 2 dB Coupled output: -10 dB ±0.5 dB

Non-Interfering Tests with Gate On*	
C/N and CSO (quiet line must be selected)	See graphs for accuracy
In-channel Frequency Response Accuracy	±0.5 dB within channel
* A preamplifier and preselector filter may be required to achieve specifications.	

Frequency Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Frequency Reference	
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$
Aging	$\pm 1.0 \times 10^{-7}/\text{day}$

Precision Frequency Reference (Option 004)	
Aging	$5 \times 10^{-10}/\text{day}$, 7-day average after being powered on for 7 days.
Warm-Up	1×10^{-8} after 30 minutes on.
Initial Achievable Accuracy	$\pm 2.2 \times 10^{-8}$ after being powered on for 24 hours.

Stability	
Drift* (after warmup at stabilized temperature)	
Frequency Span ≤ 10 MHz, Free Run	< 2 kHz/minute of sweep time

* Because the analyzer is locked at the center frequency before each sweep, drift occurs only during the time of one sweep. For Line, Video or External trigger, additional drift occurs while waiting for the appropriate trigger signal.	
--	--

Resolution Bandwidth (–3 dB)	
Range	1 kHz to 3 MHz, selectable in 1, 3 and 10 increments, and 5 MHz. Resolution bandwidths may be selected manually, or coupled to frequency span.
(Option 130)	Adds 30 Hz, 100 Hz, and 300 Hz bandwidths.
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio	
Resolution Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
60 dB/3 dB Bandwidth Ratio	
(Option 130)	
Resolution Bandwidth	
30 Hz to 300 Hz	10:1

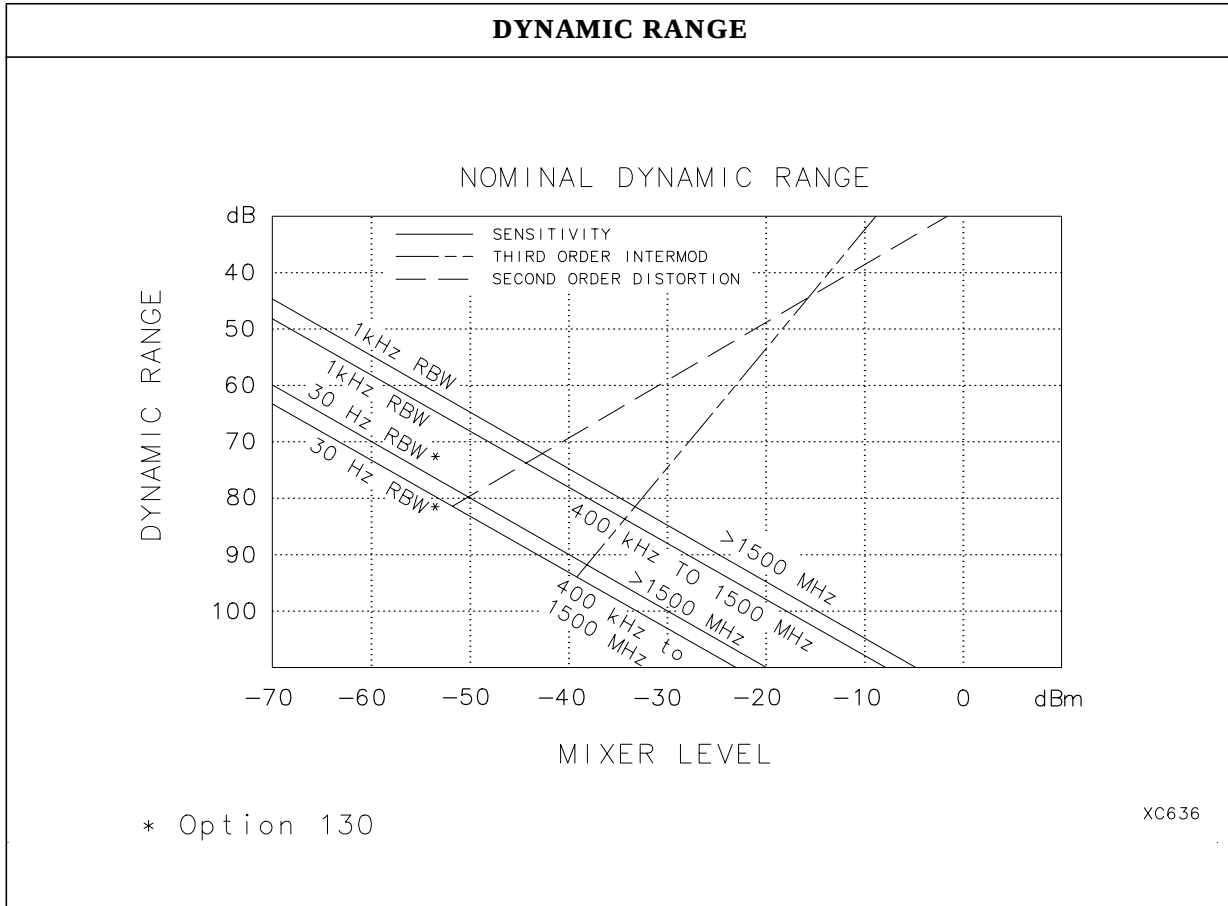
Video Bandwidth (–3 dB)	
Range	30 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy $\pm 30\%$ and 3 MHz. Video bandwidths may be selected manually, or coupled to resolution bandwidth and frequency span.
(Option 130)	Adds 1, 3, and 10 Hz bandwidths.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
(Option 130)	Bandwidths below 30 Hz are digital bandwidths with anti-aliasing filtering.

FFT Bandwidth Factors	FLATTOP	HANNING	UNIFORM
Noise Equivalent Bandwidth [†]	3.63×	1.5×	1×
3 dB Bandwidth [†]	3.60×	1.48×	1×
Sidelobe Height	<−90 dB	−32 dB	−13 dB
Amplitude Uncertainty	0.10 dB	1.42 dB	3.92 dB
Shape Factor (60 dB BW/3 dB BW)	2.6	9.1	>300
[†] Multiply entry by one-divided-by-sweep time.			

Amplitude Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Log Scale Switching Uncertainty	Negligible error
Demod Tune Listen	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
Input Attenuation Uncertainty* Attenuator Setting 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB	±0.5 dB Reference ±0.5 dB ±0.6 dB ±0.8 dB ±1.0 dB ±1.2 dB
* Referenced to 10 dB input attenuator setting from 9 kHz to 1.8 GHz. See the “Specifications” table under “Frequency Response.”	
Input Attenuator Repeatability 300 MHz 1.8 GHz	±0.03 dB ±1.0 dB
RF Input SWR	(Attenuator setting 10 to 60 dB) 1.35:1



Immunity Testing

Radiated Immunity

When tested at 3 V/m according to IEC 801-3/1984 the displayed average noise level will be within specifications over the full immunity test frequency range of 27 to 500 MHz except that at immunity test frequencies of 278.6 MHz $\pm$ selected resolution bandwidth and 321.4 MHz $\pm$ selected resolution bandwidth the displayed average noise level may be up to -45 dBm. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to -70 dBm displayed on the screen.

Electrostatic Discharge

When an air discharge of up to 8 kV according to IEC 801-2/1991 occurs to the shells of the BNC connectors on the rear panel of the instrument spikes may be seen on the CRT display. Discharges to center pins of any of the connectors may cause damage to the associated circuitry.

**Analog+ Mode and Negative Peak Detector Mode
(Options 101 and 301)**

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.

In these modes, the following analyzer specifications remain as specifications:

Amplitude Range

Maximum Safe Input Level

Calibrator Output

In these modes, the following analyzer specifications are reduced to characteristics:

Gain Compression

Displayed Average Noise Level

Spurious Responses

Residual Responses

Display Range

Reference Level

Resolution Bandwidth Switching

Linear to Log Switching

Display Scale Fidelity

Display Scale Fidelity for Narrow Bandwidths

Finally, the following analyzer specifications:

Marker Readout Resolution

Frequency Response

are replaced by the characteristics which follow in this subsection.

Marker Readout Resolution

(digitizing resolution)

Log Scale

Linear Scale

frequency ≤ 1 GHz

frequency > 1 GHz

± 0.31 dB

$\pm 0.59\%$ of reference level

$\pm 1.03\%$ of reference level

Frequency Response in Analog+ Mode

(10 dB input attenuation, for spans ≤ 20 MHz)

Absolute[§]

Relative Flatness[†]

± 1.9 dB

± 1.4 dB

[†] Referenced to midpoint between highest and lowest frequency response deviations.

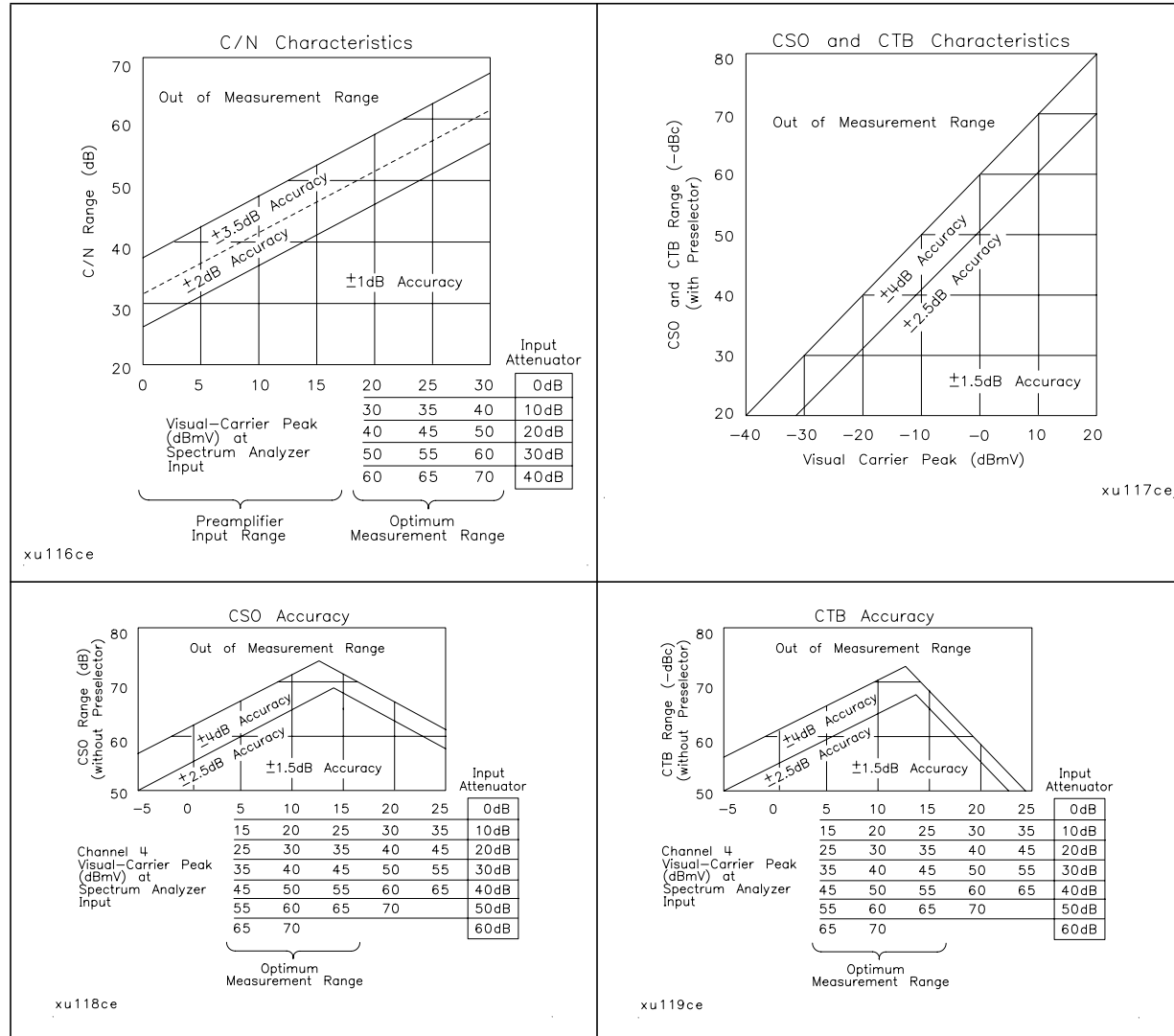
[§] Referenced to 300 MHz CAL OUT.

Cable TV Measurement Characteristics

Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	$\pm 2.0\%$ for $C/N > 40$ dB
FM Deviation	Peak reading of FM deviation
Range	± 100 kHz
Resolution	100 Hz
Accuracy	± 1.5 kHz

8591E Specifications and Characteristics

Cable TV Measurement Characteristics



C/N, CSO, and CTB Measurements

The four graphs summarize the combined 8591C cable TV analyzer or 8590 E-Series spectrum analyzers, and 85721A characteristics for C/N, CSO, and CTB testing on cable TV systems with up to 99 channels and up to +9 dB amplitude tilt. C/N, CSO, and CTB measurement accuracies and ranges can be read from the relevant graphs. They depend upon the visual carrier peak level and the measurement reading. For C/N measurements with a preselector, there is no optimum range and the accuracy boundaries drop by the preselector's insertion loss (typically 2 dB).

Crossmodulation

Range

Resolution

Accuracy

Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.

60 dB, usable to 65 dB

0.1 dB

±2.0 dB for xmod. <40 dB, C/N >40 dB ±2.6 dB for xmod. <50 dB, C/N >40 dB ±4.6 dB for xmod. <60 dB, C/N >40 dB

Option Characteristics

Demod Tune Listen <i>(Option 102 or 103)</i>	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
TV Trigger <i>(Options 101 and 102)</i> Carrier Level for Trigger Compatible Formats Field Selection Trigger Polarity Line Selection	Triggers sweep of the analyzer after the sync pulse of a selected line of a TV video field. Top 60% of linear display NTSC, PAL, SECAM Even, odd, non-interlaced Positive, negative 10 to 1021

Tracking Generator Characteristics (Option 010 or 011)

Output Tracking Drift (usable in 10 kHz bandwidth after 30-minute warmup)	1 kHz/5 minutes
Spurious Outputs (>1.8 GHz to 4.0 GHz) 50 Ω <i>(Option 010)</i> dBm output 75 Ω <i>(Option 011)</i> +42.8 dBmV, output Harmonic Nonharmonic 2121.4 MHz Feedthrough <i>(Option 010)</i> <i>(Option 011)</i>	<-20 dBc <-40 dBc <-45 dBm <+3.8 dBmV

RF Power-Off Residuals 100 kHz to 1.8 GHz (<i>Option 010</i>) 1 MHz to 1.8 GHz (<i>Option 011</i>)	<−115 dBm <−66.2 dBmV
Output Attenuator Repeatability	±0.2 dB
Output VSWR 0 dB Attenuator 10 dB Attenuator	2.5:1 1.6:1
Dynamic Range (difference between maximum power out and tracking generator feedthrough) 100 kHz to 1.8 GHz (<i>Option 010</i>) 1 MHz to 1.8 GHz (<i>Option 011</i>)	>106 dB >100 dB

Tracking Generator Characteristics (Option 010)

TRACKING GENERATOR OUTPUT ACCURACY, Option 010					
(after CAL TRK GEN in auto-coupled mode)					
TG Output Power Level	Attenuator Setting	Relative Accuracy (at 300MHz referred to -20 dBm)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to -20 dBm) (+0.2 dB/GHz)*	Absolute Accuracy (+0.2 dB/GHz)*
0 to -10.9 dBm	0 dB	±1.25 dB	±2.25 dB	±2.75 dB	±3.75 dB
-11 to -20.9 dBm	10 dB	±0.75 dB	±1.75 dB	±2.25 dB	±3.25 dB
-20 dBm	10 dB	0 dB Reference	±1.0 dB	±1.50 dB	±2.50 dB
-21 to -30.9 dBm	20 dB	±1.25 dB	±2.25 dB	±2.75 dB	±3.75 dB
-31 to -40.9 dBm	30 dB	±1.35 dB	±2.35 dB	±2.85 dB	±3.85 dB
-41 to -50.9 dBm	40 dB	±1.55 dB	±2.55 dB	±3.05 dB	±4.05 dB
-51 to -60.9 dBm	50 dB	±1.75 dB	±2.75 dB	±3.25 dB	±4.25 dB
-61 to -70 dBm	60 dB	±1.95 dB	±2.95 dB	±3.45 dB	±4.45 dB
* Add 0.2 dB/GHz of tuned frequency to the value in this column for complete accuracy specification relative to frequency.					

TRACKING GENERATOR OUTPUT ACCURACY, Option 011					
(after CAL TRK GEN in auto-coupled mode)					
TG Output Power Level	Attenuator Setting	Relative Accuracy (at 300 MHz referred to +28.8 dBmV)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to +28.8 dBmV) (+0.2 dB/GHz)*	Absolute Accuracy (+0.2 dB/GHz)*
+42.76 to +31.77 dBmV	0 dB	±1.25 dB	±2.25 dB	±2.75 dB	±3.75 dB
+31.76 to +21.77 dBmV	10 dB	±0.75 dB	±1.75 dB	±2.25 dB	±3.25 dB
+28.76 dBmV	10 dB	0 dB Reference	±1.0 dB	±1.50 dB	±2.50 dB
+21.76 to +11.77 dBmV	20 dB	±1.25 dB	±2.25 dB	±2.75 dB	±3.75 dB
+11.76 to +1.77 dBmV	30 dB	±1.35 dB	±2.35 dB	±2.85 dB	±3.85 dB
+1.76 to -8.23 dBmV	40 dB	±1.55 dB	±2.55 dB	±3.05 dB	±4.05 dB
-8.24 to -18.23 dBmV	50 dB	±1.75 dB	±2.75 dB	±3.25 dB	±4.25 dB
-18.24 to -27.23 dBmV	60 dB	±1.95 dB	±2.95 dB	±3.45 dB	±4.45 dB
* Add 0.2 dB/GHz of tuned frequency to the value in this column for complete accuracy specification relative to frequency.					

Quasi-Peak Detector Characteristics (Option 103)

Quasi-Peak Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation (Option 102, 103, or 301)

Input Level	> (−60 dBm + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz nominal
Range	10 kHz to 1 MHz
Bandwidth	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Physical Characteristics

Front-Panel Inputs and Outputs

INPUT 50Ω Connector Impedance INPUT 75Ω (<i>Option 001</i>) Connector Impedance	Type N female 50 Ω nominal BNC female 75 Ω nominal
RF OUT (<i>Option 010, 011</i>) Connector (<i>Option 010</i>) (<i>Option 011</i>) Impedance (<i>Option 010</i>) (<i>Option 011</i>) Maximum Safe Reverse Level (<i>Option 010</i>) (<i>Option 011</i>)	 Type N female 75 Ω BNC female 50 Ω nominal 75 Ω nominal +20 dBm (0.1 W), 25 Vdc +69 dBmV (0.1 W), 100 Vdc
PROBE POWER ‡ Voltage/Current	+15 Vdc, ±7% at 150 mA max. −12.6 Vdc ±10% at 150 mA max.
‡ Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the −12.5 Vdc on the PROBE POWER and the −15 Vdc on the AUX INTERFACE cannot exceed 150 mA.	

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>0 dBm
EXT REF IN	
Connector	BNC female
	Note: Analyzer noise sideband and spurious response performance may be affected by the quality of the external reference used.
Input Amplitude Range	-2 to +10 dBm
Frequency	10 MHz
AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	-10 to -60 dBm
Impedance	50 Ω nominal
AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)
EARPHONE (Option 102 or 103)	
Connector	1/8 inch monaural jack
EXT ALC INPUT (Option 010 or 011)	
Impedance	1 M Ω
Polarity	Positive or negative
Range	-66 dBV to +6 dBV
Connector	BNC
EXT KEYBOARD (Option 041 or 043)	
	Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.

Chapter 5

REMOTE INTERFACE	
GPIB and Parallel (<i>Option 041</i>)	10833A, B, C or D and 25 pin subminiature D-shell, female for parallel
GPIB Codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28
RS-232 and Parallel (<i>Option 043</i>)	9 pin subminiature D-shell, male for RS-232 and 25 pin subminiature D-shell, female for parallel
SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp
TV IN (<i>Option 107</i>)	
Connector	75 Ω BNC female
Impedance	75 Ω nominal
TV MON OUTPUT (<i>Option 107</i>)	
Connector	BNC female
Output	Baseband video output from TV Receiver
TV TRIG OUT (<i>Options 101 and 102</i>)	
Connector	BNC female
Amplitude	Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

AUX INTERFACE				
Connector Type: 9 Pin Subminiature “D”				
Connector Pinout				
Pin #	Function	Current	“Logic” Mode	“Serial Bit” Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7 [†]	–15 Vdc ±7%	150 mA	—	—
8*	+5 Vdc ±5%	150 mA	—	—
9 [†]	+15 Vdc ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants.				
† Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.6 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net	
8591E	15.4 kg (34 lb)
Shipping	
8591E	16.8 kg (37 lb)

DIMENSIONS

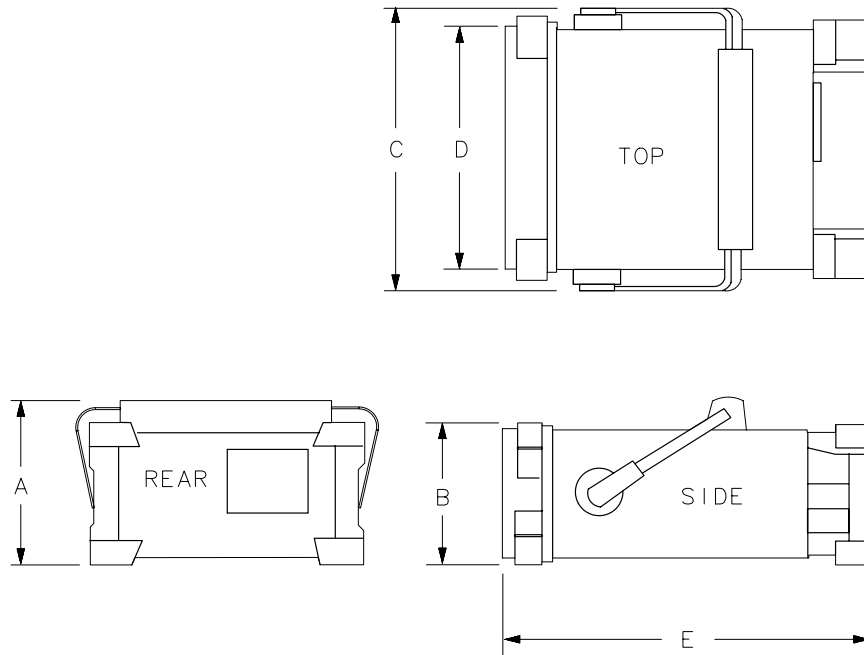
A 8 in (200 mm)

B 7.25 in (184 mm)

C 14.69 in (373 mm)

D 13.25 in (337 mm)

E 18.12 in (460.5 mm)



FORMAT 100

6

8593E Specifications and Characteristics

This chapter contains specifications and characteristics for the 8593E Spectrum Analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first and are followed by the characteristics.

General	General specifications.
Frequency	Frequency-related specifications and characteristics.
Amplitude	Amplitude-related specifications and characteristics.
Cable TV	Cable TV measurement specifications and characteristics.
Option	Option-related specifications and characteristics.
Physical	Input, output and physical characteristics.

The distinction between specifications and characteristics is described as follows.

- Specifications describe warranted performance over the temperature range 0 °C to +50 °C (unless otherwise noted). The spectrum analyzer will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum analyzer is turned on, and after the CAL frequency and CAL amplitude routines have been run.
- Characteristics provide useful, but non-warranted information about the functions and performance of the spectrum analyzer. Characteristics are specifically identified.
- Typical Performance, where listed, is not warranted, but indicates performance that most units will exhibit.
- Nominal Value indicates the expected, but not warranted, value of the parameter.

0 °C to +50 °C with Option 015 or Option 016 operating/carrying case.

General Specifications

All specifications apply over 0 °C to +55 °C unless equipped with Option 015 or 016. The analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the analyzer is turned on and after CAL FREQ, CAL AMPTD and CAL YTF have been run.

Temperature Range	
Operating	0 °C to +55 °C*
Storage	–40 °C to +75 °C
* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.	
EMI Compatibility	
Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A.	
Audible Noise	
<37.5 dBA pressure and <5.0 Bels power (ISODP7779)	
Power Requirements	
ON (LINE 1)	90 to 132 V rms, 47 to 440 Hz 195 to 250 V rms, 47 to 66 Hz Power consumption <500 VA; <180 W
Standby (LINE 0)	Power consumption <7 W
Environmental Specifications	
Type tested to the environmental specifications of Mil-T-28800 class 5	

Frequency Specifications

Frequency Range		9 kHz to 22.0 GHz
Band	(Options 026 or 027)	9 kHz to 26.5 GHz
	LO Harmonic (N)	
0	1 [—]	9 kHz to 2.9 GHz
1	1 [—]	2.75 GHz to 6.5 GHz
2	2 [—]	6.0 GHz to 12.8 GHz
3	3 [—]	12.4 GHz to 19.4 GHz
4	4 [—]	19.1 GHz to 22.0 GHz
(Options 026 or 027)		
4	4 [—]	19.1 GHz to 26.5 GHz

Frequency Reference	
Aging	$\pm 2 \times 10^{-6}/\text{year}$
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference (Option 004)	
Aging	$\pm 1 \times 10^{-7}/\text{year}$
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy (Start, Stop, Center, Marker)	
	$\pm(\text{frequency readout} \times \text{frequency reference error}^* + \text{span accuracy} + 1\% \text{ of span} + 20\% \text{ of RBW} + 100 \text{ Hz} \times N^{\dagger\dagger})^{\ddagger}$

* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See “Frequency Characteristics.”

$\dagger\dagger$ N = LO harmonic. See “Frequency Range.”

$\ddagger$ See “Drift” under “Stability” in Frequency Characteristics.

Marker Count Accuracy[†]	
Frequency Span ≤ 10 MHz $\times N^{\dagger\dagger}$	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 100 \text{ Hz} \times N^{\dagger\dagger})$
Frequency Span > 10 MHz $\times N^{\dagger\dagger}$	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 1 \text{ kHz} \times N^{\dagger\dagger})$
Counter Resolution	
Frequency Span ≤ 10 MHz $\times N^{\dagger\dagger}$	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz $\times N^{\dagger\dagger}$	Selectable from 100 Hz to 100 kHz
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy and temperature stability). See “Frequency Characteristics.” [†] Marker level to displayed noise level > 25 dB, RBW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when RBW/Span < 0.01. ^{††} N = LO harmonic. See “Frequency Range.”	

Frequency Span	
Range	0 Hz (zero span), $(10 \text{ kHz} \times N^{\dagger\dagger})$ to 19.25 GHz**
(Option 130)	0 Hz (zero span), $(1 \text{ kHz} \times N^{\dagger\dagger})$ to 19.25 GHz**
Resolution	Four digits or $20 \text{ Hz} \times N^{\dagger\dagger}$, whichever is greater.
Accuracy (single band spans)	
Span ≤ 10 MHz $\times N^{\dagger\dagger}$	$\pm 2\%$ of span [§]
Span > 10 MHz $\times N^{\dagger\dagger}$	$\pm 3\%$ of span
** Maximum span is 23.25 GHz for Option 026 or 027. ^{††} N = LO harmonic. See “Frequency Range.” [§] (Option 130) For spans $< 10 \text{ kHz} \times N^{\dagger\dagger}$, add an additional $10 \text{ Hz} \times N^{\dagger\dagger}$ resolution error.	

Frequency Sweep Time Range <i>(Option 101)</i> Accuracy 20 ms to 100 s 20 μ s to <20 ms <i>(Option 101)</i> Sweep Trigger	 20 ms to 100 s 20 μ s to 100 s for span 0 Hz $\pm 3\%$ $\pm 2\%$ Free Run, Single, Line, Video, External
Resolution Bandwidth Range <i>(Option 130)</i> Accuracy 3 dB bandwidths	 1 kHz to 3 MHz, 8 selectable resolution (3 dB) bandwidths in 1-3-10 sequence. 9 kHz and 120 kHz (6 dB) EMI bandwidths. Adds 30, 100 and 300 Hz (3 dB) bandwidths and 200 Hz (6 dB) EMI bandwidth. $\pm 20\%$
Stability Noise Sidebands >10 kHz offset from CW signal >20 kHz offset from CW signal >30 kHz offset from CW signal Residual FM 1 kHz RBW, 1 kHz VBW 30 Hz RBW, 30 Hz VBW <i>(Option 130)</i> System-Related Sidebands >30 kHz offset from CW signal	 (1 kHz RBW, 30 Hz VBW and sample detector) $\leq -90 \text{ dBc/Hz} + 20 \text{ Log } N^{\dagger\dagger}$ $\leq -100 \text{ dBc/Hz} + 20 \text{ Log } N^{\dagger\dagger}$ $\leq -105 \text{ dBc/Hz} + 20 \text{ Log } N^{\dagger\dagger}$ $\leq (250 \times N^{\dagger\dagger}) \text{ Hz pk-pk in 100 ms}$ $\leq (30 \times N^{\dagger\dagger}) \text{ Hz pk-pk in 300 ms}$ $\leq -65 \text{ dBc} + 20 \text{ Log } N^{\dagger\dagger}$
$\dagger\dagger$ N = LO harmonic. See "Frequency Range."	

Calibrator Output Frequency	300 MHz $\pm$ (freq. ref. error* $\times$ 300 MHz)
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See "Frequency Characteristics."	

Comb Generator Frequency	100 MHz fundamental frequency
Accuracy	$\pm 0.007\%$ of comb tooth frequency

Amplitude Specifications

Amplitude specifications do not apply for Analog+ mode and negative peak detector mode except as noted in “Amplitude Characteristics.”

Amplitude Range (Option 130)	–114 dBm to +30 dBm –129 dBm to +30 dBm
--	--

Maximum Safe Input Level	
Average Continuous Power	+30 dBm (1 W, 7.1 V rms), input attenuation ≥ 10 dB.
Peak Pulse Power	+50 dBm (100 W) for <10 μ s pulse width and $<1\%$ duty cycle, input attenuation ≥ 30 dB.
dc	0 Vdc

Gain Compression [‡] >10 MHz	≤ 0.5 dB (total power at input mixer* –10 dBm)
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB). [‡] (Option 130) If RBW ≤ 300 Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes $\leq$ Reference Level + 10 dB.	

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
	1 kHz RBW	30 Hz RBW (Option 130)
400 kHz to 2.9 GHz	≤ -112 dBm	≤ -127 dBm
2.75 GHz to 6.5 GHz	≤ -114 dBm	≤ -129 dBm
6.0 GHz to 12.8 GHz	≤ -102 dBm	≤ -117 dBm
12.4 GHz to 19.4 GHz	≤ -98 dBm	≤ -113 dBm
19.1 GHz to 22 GHz	≤ -92 dBm	≤ -107 dBm
19.1 GHz to 26.5 GHz (Options 026 and 027)	≤ -87 dBm	≤ -102 dBm

Spurious Responses Second Harmonic Distortion 10 MHz to 2.9 GHz > 2.75 GHz Third Order Intermodulation Distortion >10 MHz Other Input Related Spurious 9 kHz to 18 GHz 18 GHz to 22 GHz	 < -70 dBc for -40 dBm tone at input mixer.* < -100 dBc for -10 dBm tone at input mixer* (or below displayed average noise level). < -70 dBc for two -30 dBm tones at input mixer* and > 50 kHz separation. < -65 dBc at ≥ 30 kHz offset, for -20 dBm tone at input mixer ≤ 18 GHz. < -60 dBc at ≥ 30 kHz, for -20 dBm tone at input mixer ≤ 22 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).	

Residual Responses 150 kHz to 2.9 GHz (Band 0) 2.75 GHz to 6.5 GHz (Band 1)	(Input terminated and 0 dB attenuation) < -90 dBm < -90 dBm
--	---

Display Range Log Scale Linear Scale Scale Units	0 to -70 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; eight divisions displayed. eight divisions dBm, dBmV, dB μ V, mV, mW, nV, nW, pW, μ V, μ W, V, and W
--	--

Marker Readout Resolution Fast Sweep Times for Zero Span 20 μ s to 20 ms (<i>Option 101 or 301</i>) Frequency ≤ 1 GHz Frequency > 1 GHz	0.05 dB for log scale 0.05% of reference level for linear scale 0.7% of reference level for linear scale 1.0% of reference level for linear scale
---	--

Reference Level	
Range	
Log Scale	Minimum amplitude to maximum amplitude**
Linear Scale	–99 dBm to maximum amplitude**
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to –20 dBm reference level, 10 dB input attenuation, at a single frequency, in a fixed RBW)
0 dBm to –59.9 dBm	±(0.3 dB + 0.01 × dB from –20 dBm)
–60 dBm and below	
1 kHz to 3 MHz RBW	±(0.6 dB + 0.01 × dB from –20 dBm)
30 Hz to 300 Hz RBW (<i>Option 130</i>)	±(0.7 dB + 0.01 × dB from –20 dBm)
** See “Amplitude Range.”	

Frequency Response	(10 dB input attenuation)	
	Absolute[§]	Relative Flatness[†]
Preselector peaked in band > 0		
9 kHz to 2.9 GHz	±1.5 dB	±1.0 dB
2.75 GHz to 6.5 GHz	±2.0 dB	±1.5 dB
6.0 GHz to 12.8 GHz	±2.5 dB	±2.0 dB
12.4 GHz to 19.4 GHz	±3.0 dB	±2.0 dB
19.1 GHz to 22 GHz	±3.0 dB	±2.0 dB
19.1 GHz to 26.5 GHz (<i>Options 026 and 027</i>)	±5.0 dB	±2.0 dB
† Referenced to midpoint between highest and lowest frequency response deviations.		
§ Referenced to 300 MHz CAL OUT.		

Calibrator Output	
Amplitude	–20 dBm ±0.4 dB

Absolute Amplitude Calibration Uncertainty^{‡‡}	±0.15 dB
^{‡‡} Uncertainty in the measured absolute amplitude of the CAL OUT signal at the reference settings after CAL FREQ and CAL AMPTD self-calibration. Absolute amplitude reference settings are: Reference Level –20 dBm; Input Attenuation 10 dB; Center Frequency 300 MHz; Res BW 3 kHz; Video BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON.	
Input Attenuator	
Range	0 to 70 dB, in 10 dB steps
Resolution Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz RBW)
3 kHz to 3 MHz RBW	±0.4 dB
1 kHz RBW	±0.5 dB
30 Hz to 300 Hz (<i>Option 130</i>)	±0.6 dB
Linear to Log Switching	±0.25 dB at reference level
Display Scale Fidelity	
Log Maximum Cumulative	
0 to –70 dB from Reference Level	
3 kHz to 3 MHz RBW	± (0.3 dB + 0.01 × dB from reference level)
RBW ≤ 1 kHz	± (0.4 dB + 0.01 × dB from reference level)
Log Incremental Accuracy	
0 to –60 dB from Reference Level	±0.4 dB/4 dB
Linear Accuracy	±3% of reference level

Cable TV Measurement Specifications

These specifications describe warranted performance of the spectrum analyzer and the 85721A cable TV measurements personality.

Input Configuration	75 Ω BNC Female
Channel Selection	Analyzer tunes to specified channels based upon selected tune configuration.
Tune Configuration	Standard, Off-the Air, HRC, IRC (T and FM channels also in channel mode)
Channel Range	1 to 158 and 201 to 300 (channel mode) 1 to 158 (system mode)
Channel Frequencies	Defined by Code of Federal Regulations, Title 47, Telecommunications, Parts 73.603, 76.605, 76.612
Frequency Range	5 to 1002 MHz (channel mode) 54 to 896 MHz (system mode)
Amplitude Range	-15 to +70 dBmV for S/N > 30 dB
Visual-Carrier Frequency	Visual-carrier frequency is counted
Frequency Reference* (Standard)	
Resolution	1 kHz
Accuracy	$\pm(7.5 \times 10^{-6} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 524 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 2.55 \text{ kHz}$
@643.25 MHz (Ch. 94)	$\pm 4.93 \text{ kHz}$
* Will not meet FCC frequency accuracy requirements.	
Precision Frequency Reference (Option 004)	
Resolution	100 Hz
Accuracy	$\pm(1.2 \times 10^{-7} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 117 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 149 \text{ Hz}$
@643.25 MHz (Ch. 94)	$\pm 187 \text{ Hz}$

Visual-to-Aural Carrier Frequency Difference	Frequency difference between visual and aural carriers is counted.
Difference Range	4.1 to 4.9 MHz
Resolution	100 Hz
Accuracy	±221 Hz for precision frequency ref (std) ±254 Hz for Option 704 frequency ref

Visual-Carrier Level	The peak amplitude of the visual carrier is measured to an absolute standard traceable to the National Institute of Standards and Technology.
Amplitude Range	–15 to +70 dBmV
Resolution	0.1 dB
Absolute Accuracy	±2.0 dB for S/N > 30 dB
Relative Accuracy	±1.0 dB relative to adjacent channels in frequency ±1.5 dB relative to all other channels

Visual-to-Aural Carrier Level Difference	The difference between peak amplitudes of the visual and aural carrier is measured.
Difference Range	0 to 25 dB
Resolution	0.1 dB
Accuracy	±0.75 dB for S/N > 30 dB

Hum/Low-Frequency Disturbance	Power-line frequency and low-frequency disturbance measured on modulated and/or unmodulated carriers. May not be valid for scrambled channels.
AM Range	0.5 to 10%
Resolution	0.1%
Accuracy	±0.4% for hum ≤3% ±0.7% for hum ≤5% ±1.3% for hum ≤10%

Visual Carrier-to-Noise Ratio (C/N)*	The C/N is calculated from the visual-carrier peak level and the minimum noise level, normalized to 4 MHz noise bandwidth.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum C/N Range	Input level dependent - See graphs
C/N Resolution	0.1 dB
C/N Accuracy	Input level and measured C/N dependent ± 1.0 to ± 3.5 dB over optimum input range
* A preamplifier and preselector filter may be required to achieve specifications.	

CSO and CTB Distortion [†]	Manual composite second order (CSO) and composite triple beat (CTB) distortions are measured relative to the visual carrier peak and require momentary disabling of the carrier. Automatic measurements are made in the channel above the channel selected and assumes that it is unused. If the analyzer has Option 107, a non-interfering CSO measurement can be made.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum CSO/CTB Range	Input level dependent - see graphs. 66 to 73 dB over optimum input range
Manual CSO/CTB Resolution	0.1 dB
System CSO/CTB Resolution	1 dB
CSO/CTB Accuracy	Input level and measured CSO/CTB dependent - See graphs ± 1.5 dB to ± 4.0 dB over optimum input range
[†] A preamplifier and preselector filter may be required to achieve specifications.	

System Frequency Response (flatness)

System amplitude variations are measured relative to a reference trace stored during the setup.

Frequency Response Setup	
Fast Sweep Time	2 s (default) for no scrambling
Slow Sweep Time	8 s (default) for fixed-amplitude scrambling
Reference-trace Storage	50 traces that include analyzer states

Frequency Response Test	
Range	1.0 dB/Div to 20 dB/Div (2 dB default)
Resolution	0.05 dB
Trace-flatness Accuracy	± 0.1 dB per dB deviation from a flat line and ± 0.75 dB maximum cumulative error
Trace-position Accuracy	0.0 dB for equal temperature at test locations and ± 0.4 dB maximum for different ambient temperatures

Option Specifications

Tracking Generator Specifications (Option 010)

All specifications apply over 0 °C to +55 °C.* The spectrum-analyzer/tracking-generator combination will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum-analyzer/tracking-generator is turned on and after CAL FREQ, CAL AMPTD, CAL TRK GEN, and TRACKING PEAK have been run.

* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.

NOTE: There are two models of the tracking generator. One has a frequency range of 300 kHz to 2.9 GHz, typically analyzers with a serial prefix of 3431A and below. The newer tracking generator has a range of 9 kHz to 2.9 GHz, typically serial prefix of 3440A or higher. Check the front panel for the tracking generator output frequency range of the installed generator.

Warm-Up	30 minutes
Output Frequency Range*	9 kHz to 2.9 GHz 300 kHz to 2.9 GHz
* Refer to the "Note" in the description above.	

Output Power Level	
Range	–1 dBm to –66 dBm
Resolution	0.1 dB
Absolute Amplitude Accuracy (at 25 °C ±10 °C)	
(–20 dBm at 300 MHz)	±0.75 dB
Vernier [‡]	
Range	9 dB
Accuracy (at 25 °C ±10 °C)	
(–20 dBm at 300 MHz, 16 dB attenuation)	
Incremental	±0.20 dB/dB
Cumulative	±0.50 dB total
Output Attenuator	
Range	0 to 56 dB in 8 dB steps
[‡] See the Output Accuracy table in “Option Characteristics.”	

Output Power Sweep	
Range	(–10 dBm to –1 dBm) – (Source Attenuator Setting)
Resolution	0.1 dB

Output Flatness	
(referenced to 300 MHz, –20 dBm)	
Frequency > 10 MHz	±2.0 dB
Frequency ≤ 10 MHz	±3.0 dB

Spurious Output (–1 dBm output)	
Harmonic Spurs from 9 kHz to 2.9 GHz	
TG Output 9 kHz to 20 kHz	≤–15 dBc
TG Output 20 kHz to 2.9 GHz	≤–25 dBc
Harmonic Spurs from 300 kHz to 2.9 GHz	
TG Output 300 kHz to 2.9 GHz	≤–25 dBc
Nonharmonic Spurs from 9 kHz to 2.9 GHz	
TG Output 9 kHz to 2.0 GHz	≤–27 dBc
TG Output 2.0 GHz to 2.9 GHz	≤–23 dBc
Nonharmonic Spurs from 300 kHz to 2.9 GHz	
TG Output 300 kHz to 2.0 GHz	≤–27 dBc
TG Output 2.0 GHz to 2.9 GHz	≤–23 dBc
LO Feedthrough	
LO Frequency 3.9217 to 6.8214 GHz	≤–16 dBm

Tracking Generator Feedthrough	
400 kHz to 2.9 MHz	<–112 dBm

Quasi-Peak Detector Specifications (Option 103)

The specifications for Quasi-Peak Detector (Option 103) have been based on the following:

- The spectrum analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radioélectriques (CISPR) Section 1, Clause 2.

The 200 Hz bandwidth is available only with Option 130. The 1 kHz resolution bandwidth may be used to approximate a quasi-peak measurement without Option 130. A quasi-peak measurement using the 1 kHz bandwidth will be greater than or equal to a quasi-peak measurement using a 200 Hz bandwidth.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the spectrum analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, resolution bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB)	Frequency Band		
	120 kHz EMI BW 0.03 to 1 GHz	9 kHz EMI BW 0.15 to 30 MHz	(Option 130) 200 Hz EMI BW 10 to 150 kHz
Pulse Repetition Frequency (Hz)			
1000	$+8.0 \pm 1.0$	$+4.5 \pm 1.0$	—
100	0 dB (reference)*	0 dB (reference)*	$+4.0 \pm 1.0$
60	—	—	$+3.0 \pm 1.0$
25	—	—	0 dB (reference)*
20	-9.0 ± 1.0	-6.5 ± 1.0	—
10	-14.0 ± 1.5	-10.0 ± 1.5	-4.0 ± 1.0
5	—	—	-7.5 ± 1.5
2	-26.0 ± 2.0	-20.5 ± 2.0	-13.0 ± 2.0
1	-28.5 ± 2.0	-22.5 ± 2.0	-17.0 ± 2.0
Isolated Pulse	-31.5 ± 2.0	-23.5 ± 2.0	-19.0 ± 2.0
* Reference pulse amplitude accuracy relative to a 66 dB μ V CW signal is <1.5 dB. CISPR reference pulse: 0.044 μ Vs for 0.03 to 1 GHz, 0.316 μ Vs for 0.15 to 30 MHz, 13.5 ± 1.5 μ Vs for 10 to 150 kHz (Option 130).			

Time Gated Spectrum Analysis Specifications (Option 105 or Option 107)

GATE DELAY	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(1 \mu\text{s} + (0.01\% \times \text{GATE DELAY Readout}))^\dagger$
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(0.2 \mu\text{s} + (0.01\% \times \text{GATE LENGTH Readout}))$
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 μ s	± 0.8 dB
$\geq 2 \mu\text{s}$	± 0.5 dB
Linear Scale	
< 2 μ s	$\pm 1.0\%$ of REFERENCE LEVEL
$\geq 2 \mu\text{s}$	$\pm 0.7\%$ of REFERENCE LEVEL
[†] Up to 1 μ s jitter due to 1 μ s resolution of gate delay clock. [§] With GATE ON enabled and triggered, CW Signal, Peak Detector Mode.	

TV Receiver/Video Tester (Option 107)

(Option 107 required; appropriate TV line must be selected)

Non-interfering color	(requires FCC composite, NTC-7, or CCIR 17 and CCIR 330 test signal)
Differential Gain Accuracy	6% 50 averages (default)
Differential Phase Accuracy	4° 50 averages (default)
Chroma-luminance Delay Inequality Accuracy	±45 ns
Frequency Range	50 MHz to 850 MHz
Amplitude Range	+10 dBmV to +50 dBmV at coupler input (10 dB loss)
Coupler (part number 0955-0704)	Insertion loss: < 2 dB Coupled output: -10 dB ±0.5 dB

Non-Interfering Tests with Gate On*	
C/N and CSO (quiet line must be selected)	See graphs for accuracy
In-channel Frequency Response Accuracy	±0.5 dB within channel
* A preamplifier and preselector filter may be required to achieve specifications.	

Frequency Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Frequency Reference	
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$
Aging	$\pm 1.0 \times 10^{-7}/\text{day}$
Precision Frequency Reference (Option 004)	
Aging	$5 \times 10^{-10}/\text{day}$, 7-day average after being powered on for 7 days.
Warm-Up	1×10^{-8} after 30 minutes on.
Initial Achievable Accuracy	$\pm 2.2 \times 10^{-8}$ after being powered on for 24 hours.
Stability	
Drift* (after warmup at stabilized temperature)	
Frequency Span $\leq (10 \times N^{\dagger})$ MHz	$\leq (2 \times N^{\dagger\dagger})$ kHz/minute of sweep time*
* Because the analyzer is locked at the center frequency before each sweep, drift occurs only during the time of one sweep. For Line, Video, or External trigger, additional drift occurs while waiting for the appropriate trigger signal. $^{\dagger\dagger} N = \text{LO harmonic. See "Frequency Range."}$	

Resolution Bandwidth (–3 dB)	
Range	1 kHz to 3 MHz, selectable in 1, 3 and 10 increments, and 5 MHz. Resolution bandwidths may be selected manually, or coupled to frequency span.
(Option 130)	Adds 30 Hz, 100 Hz, and 300 Hz bandwidths.
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio	
Resolution Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
60 dB/3 dB Bandwidth Ratio (Option 130)	
Resolution Bandwidth	
30 Hz to 300 Hz	10:1

Video Bandwidth (–3 dB)	
Range	30 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy $\pm 30\%$ and 3 MHz. Video bandwidths may be selected manually, or coupled to resolution bandwidth and frequency span.
(Option 130)	Adds 1, 3, and 10 Hz bandwidths.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
(Option 130)	Bandwidths below 30 Hz are digital bandwidths with anti-aliasing filtering.

FFT Bandwidth Factors	FLATTOP	HANNING	UNIFORM
Noise Equivalent Bandwidth [†]	3.63×	1.5×	1×
3 dB Bandwidth [†]	3.60×	1.48×	1×
Sidelobe Height	<−90 dB	−32 dB	−13 dB
Amplitude Uncertainty	0.10 dB	1.42 dB	3.92 dB
Shape Factor (60 dB BW/3 dB BW)	2.6	9.1	>300
[†] Multiply entry by one-divided-by-sweep time.			

Amplitude Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Log Scale Switching Uncertainty	Negligible error
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Demod Tune Listen	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
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Input Attenuation Uncertainty*			
Attenuator Setting	9 kHz to 12.4 GHz	12.4 to 19 GHz	19 to 22 GHz
0 dB	±0.75 dB	±1.0 dB	±1.0 dB
10 dB	Reference	Reference	Reference
20 dB	±0.75 dB	±0.75 dB	±1.0 dB
30 dB	±0.75 dB	±1.0 dB	±1.25 dB
40 dB	±0.75 dB	±1.25 dB	±2.0 dB
50 dB	±1.0 dB	±1.5 dB	±2.5 dB
60 dB	±1.5 dB	±2.0 dB	±3.0 dB
70 dB	±2.0 dB	±2.5 dB	±3.5 dB
* Referenced to 10 dB input attenuator setting. See the “Specifications” table under “Frequency Response.”			

Input Attenuator 10 dB Step Uncertainty	(Attenuator setting 10 to 70 dB)
Center Frequency	
9 kHz to 19 GHz	±1.0 dB/10 dB
19 GHz to 22 GHz	±1.5 dB/10 dB

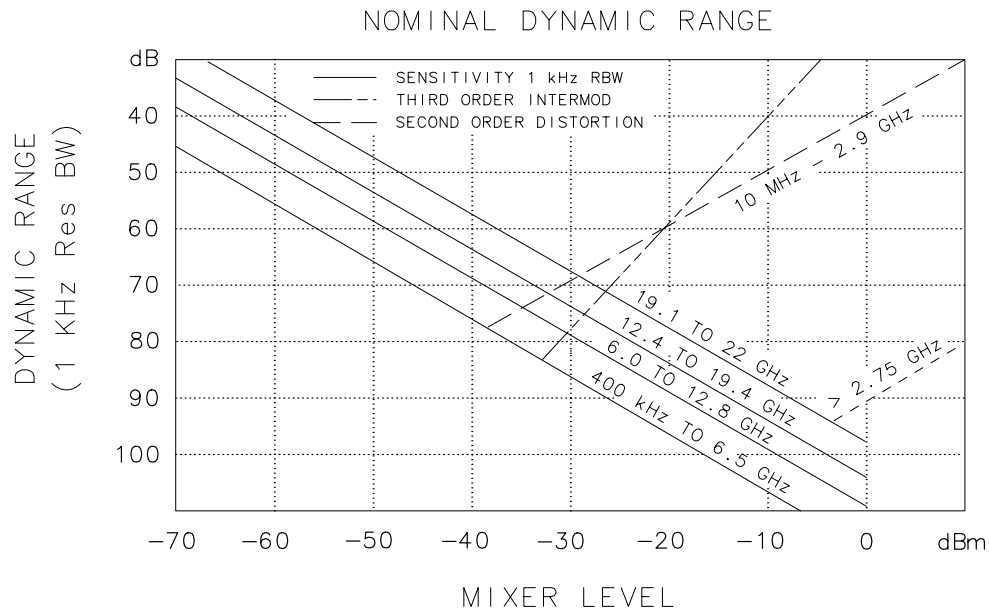
Input Attenuator Repeatability	±0.05 dB
---------------------------------------	----------

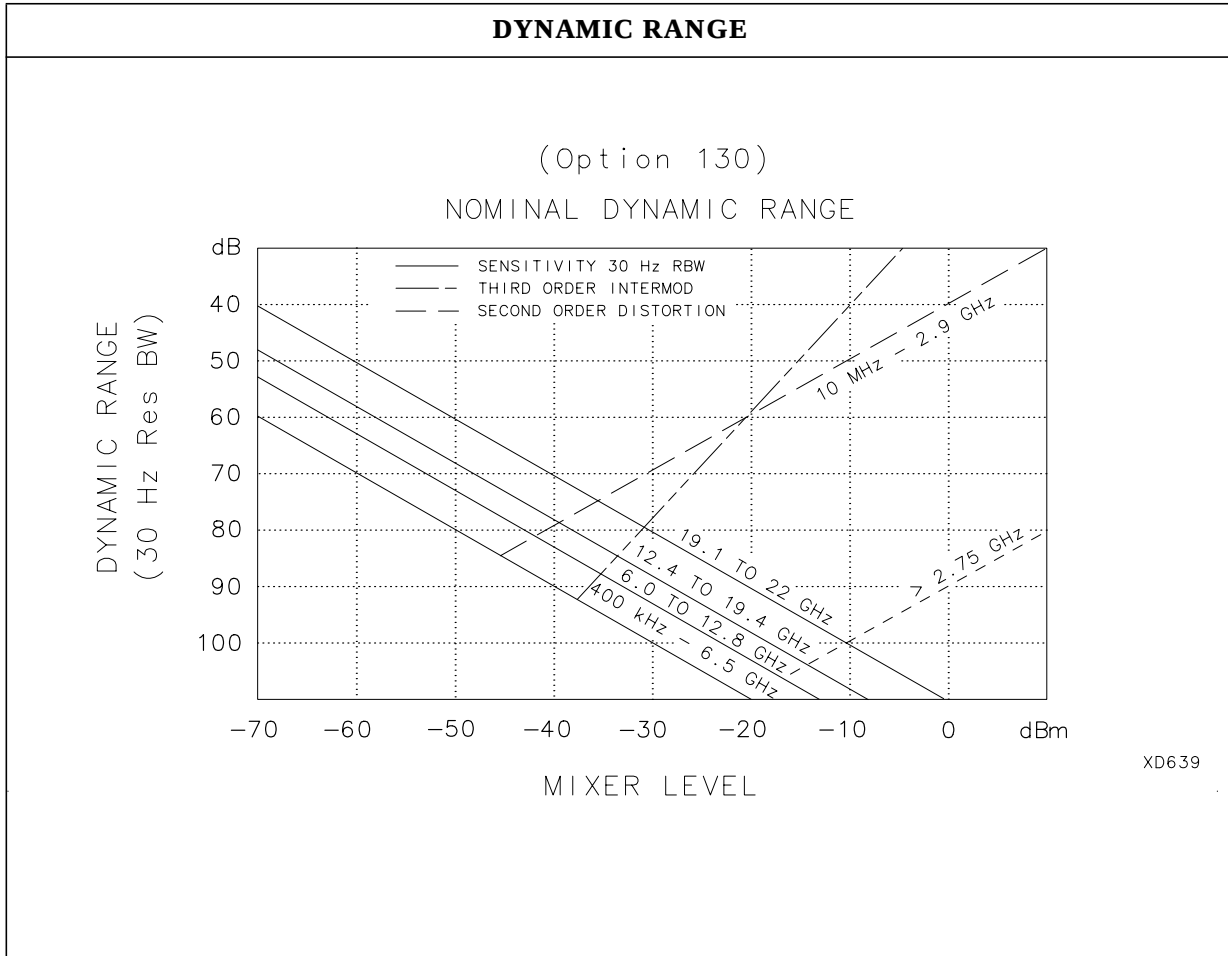
RF Input SWR	
10 dB attenuation	
Frequency	
300 MHz	1.15:1
10 dB to 70 dB attenuation	
Band	
9 kHz to 2.9 GHz	1.3:1
2.75 GHz to 6.5 GHz	1.5:1
6.0 GHz to 12.8 GHz	1.6:1
12.4 GHz to 19.4 GHz	2.0:1
19.1 GHz to 22.0 GHz	3.0:1

Unpeaked Frequency Response	(10 dB input attenuation)	
	Absolute[§]	Relative Flatness[†]
Without Preselector Peaking, Span ≤ 50 MHz		
2.75 GHz to 6.5 GHz	±4.0 dB	±3.5 dB
6.0 GHz to 12.8 GHz	±4.5 dB	±4.0 dB
12.4 GHz to 19.4 GHz	±6.0 dB	±5.0 dB
19.1 GHz to 22 GHz	±6.0 dB	±5.0 dB

[†] Referenced to midpoint between highest and lowest frequency response deviations.

[§] Referenced to 300 MHz CAL OUT.

DYNAMIC RANGE



Immunity Testing

Radiated Immunity

When tested at 3 V/m according to IEC 801-3/1984 the displayed average noise level will be within specifications over the full immunity test frequency range of 27 to 500 MHz except that at immunity test frequencies of 278.6 MHz $\pm$ selected resolution bandwidth and 321.4 MHz $\pm$ selected resolution bandwidth the displayed average noise level may be up to -45 dBm. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to -70 dBm displayed on the screen.

Electrostatic Discharge	When an air discharge of up to 8 kV according to IEC 801-2/1991 occurs to the shells of the BNC connectors on the rear panel of the instrument spikes may be seen on the CRT display. Discharges to center pins of any of the connectors may cause damage to the associated circuitry.
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Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.	
In these modes, the following analyzer specifications remain as specifications:	
Amplitude Range Maximum Safe Input Level	Calibrator Output
In these modes, the following analyzer specifications are reduced to characteristics:	
Gain Compression Displayed Average Noise Level Spurious Responses Residual Responses Display Range	Reference Level Resolution Bandwidth Switching Linear to Log Switching Display Scale Fidelity Display Scale Fidelity for Narrow Bandwidths
Finally, the following analyzer specifications:	
Marker Readout Resolution	Frequency Response
are replaced by the characteristics which follow in this subsection.	

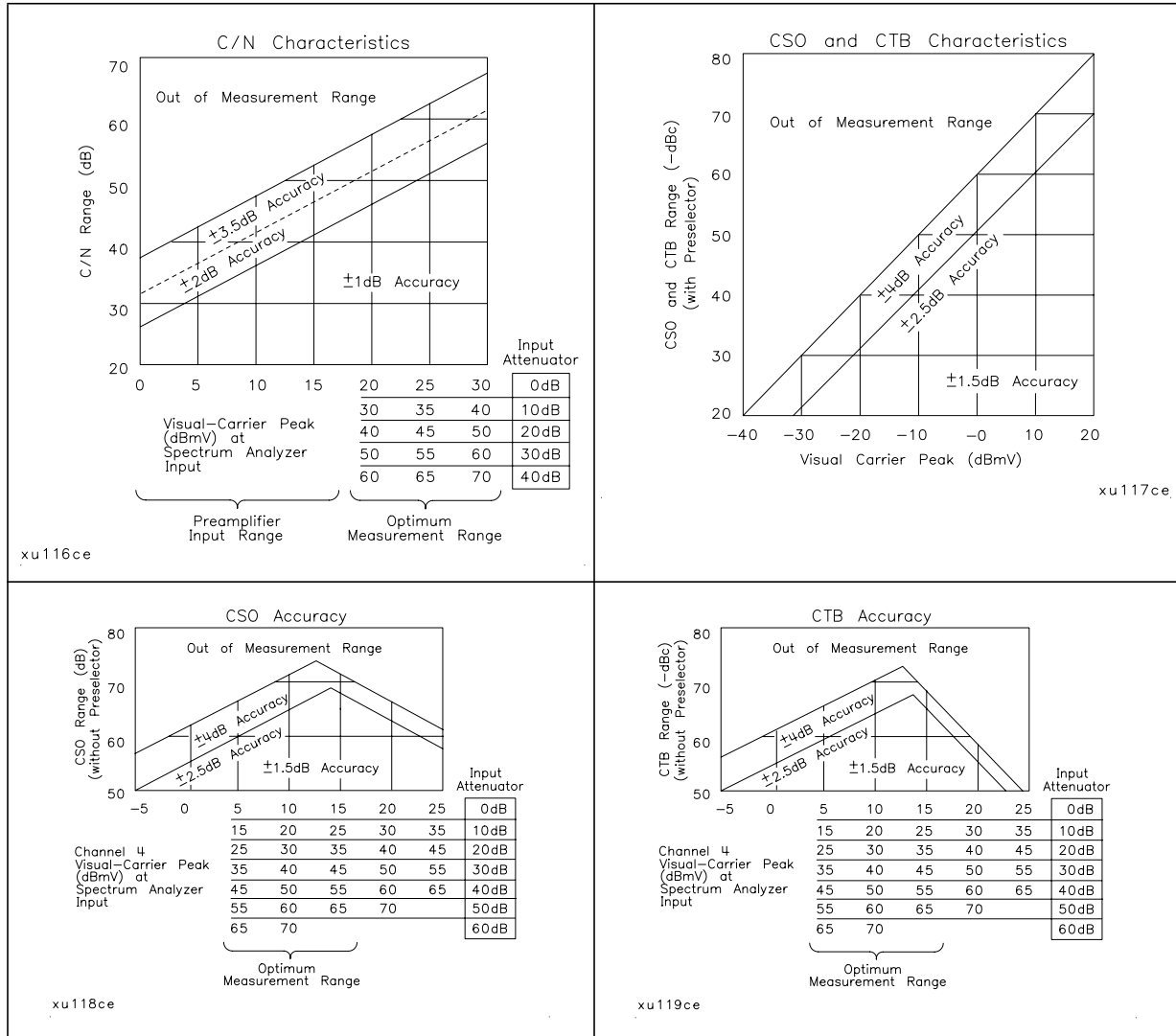
Marker Readout Resolution (digitizing resolution) Log Scale Linear Scale frequency $\leq$ 1 GHz frequency $>$ 1 GHz	 ± 0.31 dB $\pm 0.59\%$ of reference level $\pm 1.03\%$ of reference level
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Frequency Response in Analog+ Mode Preselector peaked in band > 0	(10 dB input attenuation, for spans $\leq$ 20 MHz)	
	Absolute [§]	Relative Flatness [†]
9 kHz to 2.9 GHz	± 2.0 dB	± 1.5 dB
2.75 GHz to 6.4 GHz	± 2.5 dB	± 2.0 dB
6.0 GHz to 12.8 GHz	± 3.0 dB	± 2.5 dB
12.4 GHz to 19.4 GHz	± 3.5 dB	± 2.5 dB
19.1 GHz to 22 GHz	± 3.5 dB	± 2.5 dB
19.1 GHz to 26.5 GHz (<i>Option 026 or 027</i>)	± 5.5 dB	± 2.5 dB
[†] Referenced to midpoint between highest and lowest frequency response deviations. [§] Referenced to 300 MHz CAL OUT.		

Cable TV Measurement Characteristics

Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	$\pm 2.0\%$ for C/N > 40 dB

FM Deviation	Peak reading of FM deviation
Range	± 100 kHz
Resolution	100 Hz
Accuracy	± 1.5 kHz



C/N, CSO, and CTB Measurements

The four graphs summarize the combined 8591C cable TV analyzer or 8590 E-Series spectrum analyzers, and 85721A characteristics for C/N, CSO, and CTB testing on cable TV systems with up to 99 channels and up to +9 dB amplitude tilt. C/N, CSO, and CTB measurement accuracies and ranges can be read from the relevant graphs. They depend upon the visual carrier peak level and the measurement reading. For C/N measurements with a preselector, there is no optimum range and the accuracy boundaries drop by the preselector's insertion loss (typically 2 dB).

Crossmodulation

Range

Resolution

Accuracy

Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.

60 dB, usable to 65 dB

0.1 dB

±2.0 dB for xmod. <40 dB, C/N >40 dB ±2.6 dB for xmod. <50 dB, C/N >40 dB ±4.6 dB for xmod. <60 dB, C/N >40 dB

Option Characteristics

Demod Tune Listen <i>(Option 102 or 103)</i>	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
TV Trigger <i>(Options 101 and 102)</i> Carrier Level for Trigger Compatible Formats Field Selection Trigger Polarity Line Selection	Triggers sweep of the analyzer after the sync pulse of a selected line of a TV video field. Top 60% of linear display NTSC, PAL, SECAM Even, odd, non-interlaced Positive, negative 10 to 1021

Tracking Generator Characteristics (Option 010)

Tracking Drift (Usable in a 1 kHz RBW after 5-minute warmup)	1.5 kHz/5 minute
RF Power Off Residuals 9 kHz to 2.9 GHz	<-120 dBm
Dynamic Range (difference between maximum power out and tracking generator feedthrough)	>111 dB
Output Attenuator Repeatability 9 kHz to 300 MHz 300 kHz to 300 MHz 300 MHz to 2.0 GHz 2.0 GHz to 2.9 GHz	±0.1 dB ±0.1 dB ±0.2 dB ±0.3 dB

Output VSWR	
0 dB Attenuator	<3.0:1
8 dB Attenuator	<1.5:1

TRACKING GENERATOR OUTPUT ACCURACY, Option 010 (after CAL TRK GEN in auto-coupled mode, Frequency > 10 MHz, 25°C ± 10°C)					
TG Output Power Level	Attenuator Setting	Relative Accuracy (at 300 MHz referred to -20 dBm)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to -20 dBm)	Absolute Accuracy
-1 to -10 dBm	0 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
-10 to -18 dBm	8 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
-20 dBm	16 dB	Reference	0.75 dB	2.0 dB	2.75 dB
-18 to -26 dBm	16 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
-26 to -34 dBm	24 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
-34 to -42 dBm	32 dB	1.6 dB	2.35 dB	3.6 dB	4.35 dB
-42 to -50 dBm	40 dB	1.8 dB	2.55 dB	3.8 dB	4.55 dB
-50 to -58 dBm	48 dB	2.0 dB	2.75 dB	4.0 dB	4.75 dB
-58 to -66 dBm	56 dB	2.1 dB	2.85 dB	4.1 dB	4.85 dB

Quasi-Peak Detector Characteristics (Option 103)

Quasi-Peak Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation (Option 102, 103, or 301)

Input Level	> (−60 dBm + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz nominal
Range	10 kHz to 1 MHz
Bandwidth	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Physical Characteristics

Front-Panel Inputs and Outputs

INPUT 50Ω	
Connector	Type N female
Impedance	50 Ω nominal
INPUT 50Ω (Option 026)	
Connector	APC 3.5 male
Impedance	50 Ω nominal
INPUT 50Ω (Option 027)	
Connector	Type N female with adapter to SMA female
Impedance	50 Ω nominal
100 MHz COMB OUT	
Connector	SMA female
Output Level	+27 dBm
Frequency	100 MHz fundamental
RF OUT (Option 010)	
Connector	Type N female
Impedance	50 Ω nominal
PROBE POWER [‡]	
Voltage/Current	+15 Vdc, ±7% at 150 mA max. –12.6 Vdc ±10% at 150 mA max.
[‡] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.5 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.	

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>0 dBm
EXT REF IN	
Connector	BNC female
	Note: Analyzer noise sideband and spurious response performance may be affected by the quality of the external reference used.
Input Amplitude Range	-2 to +10 dBm
Frequency	10 MHz
AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	-10 to -60 dBm
Impedance	50 Ω nominal
AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)
EARPHONE (<i>Option 102 or 103</i>)	
Connector	1/8 inch monaural jack
EXT ALC INPUT (<i>Option 010</i>)	
Input Impedance	>10 k Ω
Polarity	Use with negative detector
EXT KEYBOARD (<i>Option 041 or 043</i>)	
	Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.

EXT TRIG INPUT Connector Trigger Level	BNC female Positive edge initiates sweep in EXT TRIG mode (TTL).
GATE TRIGGER INPUT <i>(Option 105 or 107)</i> Connector Trigger Level GATE OUTPUT <i>(Option 105 or 107)</i> Connector Output Level	BNC female minimum pulse width >30 ns (TTL) BNC female High = gate on; Low = gate off (TTL)
LO OUTPUT <i>(Option 009 or 010)</i> Connector Impedance Frequency Range Output Level	Note: LO output must be terminated in 50 Ω SMA female 50 Ω nominal 3.0 to 6.8214 GHz +11 to +18 dBm
SWEEP + TUNE OUTPUT <i>(Option 009)</i> Connector Impedance (dc coupled) Range Sweep + Tune Output	BNC female 2 k Ω 0 to +10 V 0.36 V/GHz of center frequency
HI-SWEEP IN/OUT Connector Output Input	BNC female High = sweep, Low = retrace (TTL) Open collector, low stops sweep.

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TV TRIG OUT (<i>Options 101 and 102</i>)	
Connector	BNC female
Amplitude	Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

AUX INTERFACE				
Connector Type: 9 Pin Subminiature "D"				
Connector Pinout				
Pin #	Function	Current	"Logic" Mode	"Serial Bit" Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7 [†]	−15 Vdc ±7%	150 mA	—	—
8*	+5 Vdc ±5%	150 mA	—	—
9 [†]	+15 Vdc ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants. [†] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the −12.6 Vdc on the PROBE POWER and the −15 Vdc on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net 8593E	16.4 kg (36 lb)
Shipping 8593E	19.1 kg (42 lb)

DIMENSIONS

A 8 in (200 mm)
B 7.25 in (184 mm)
C 14.69 in (373 mm)
D 13.25 in (337 mm)
E 18.12 in (460.5 mm)

Technical drawing of the 8593E device showing three views: Top, Rear, and Side. The Top view shows dimensions C and D. The Rear view shows dimension A. The Side view shows dimensions B and E.

FORMAT 100

7

8594E Specifications and Characteristics

This chapter contains specifications and characteristics for the 8594E Spectrum Analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first and are followed by the characteristics.

General	General specifications.
Frequency	Frequency-related specifications and characteristics.
Amplitude	Amplitude-related specifications and characteristics.
Cable TV	Cable TV measurement specifications and characteristics.
Option	Option-related specifications and characteristics.
Physical	Input, output and physical characteristics.

The distinction between specifications and characteristics is described as follows.

- Specifications describe warranted performance over the temperature range 0 °C to +50 °C (unless otherwise noted). The spectrum analyzer will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum analyzer is turned on, and after the CAL frequency and CAL amplitude routines have been run.
- Characteristics provide useful, but non-warranted information about the functions and performance of the spectrum analyzer. Characteristics are specifically identified.
- Typical Performance, where listed, is not warranted, but indicates performance that most units will exhibit.
- Nominal Value indicates the expected, but not warranted, value of the parameter.

0 °C to +50 °C with Option 015 or Option 016 operating/carrying case.

General Specifications

All specifications apply over 0 °C to +55 °C unless equipped with Option 015 or 016. The analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the analyzer is turned on and after CAL FREQ and CAL AMPTD have been run.

Temperature Range	
Operating	0 °C to +55 °C*
Storage	–40 °C to +75 °C
* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.	
EMI Compatibility	
Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A.	
Audible Noise	
<37.5 dBA pressure and <5.0 Bels power (ISODP7779)	
Power Requirements	
ON (LINE 1)	90 to 132 V rms, 47 to 440 Hz 195 to 250 V rms, 47 to 66 Hz Power consumption <500 VA; <180 W
Standby (LINE 0)	Power consumption <7 W
Environmental Specifications	
Type tested to the environmental specifications of Mil-T-28800 class 5	

Frequency Specifications

Frequency Range	
dc Coupled	9 kHz to 2.9 GHz
ac Coupled	100 kHz to 2.9 GHz

Frequency Reference	
Aging	$\pm 2 \times 10^{-6}/\text{year}$
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference (Option 004)	
Aging	$\pm 1 \times 10^{-7}/\text{year}$
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy (Start, Stop, Center, Marker)	
	$\pm(\text{frequency readout} \times \text{frequency reference error}^* + \text{span accuracy} + 1\% \text{ of span} + 20\% \text{ of RBW} + 100 \text{ Hz})^\ddagger$

* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See "Frequency Characteristics."

‡ See "Drift" under "Stability" in Frequency Characteristics.

Marker Count Accuracy[†]	
Frequency Span ≤ 10 MHz	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 100 \text{ Hz})$
Frequency Span > 10 MHz	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 1 \text{ kHz})$
Counter Resolution	
Frequency Span ≤ 10 MHz	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz	Selectable from 100 Hz to 100 kHz
* frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy and temperature stability). See “Frequency Characteristics.”	
[†] Marker level to displayed noise level > 25 dB, RBW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when RBW/Span < 0.01.	

Frequency Span	
Range	0 Hz (zero span), 10 kHz to 2.9 GHz
(Option 130)	0 Hz (zero span), 1 kHz to 2.9 GHz
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy	
Span ≤ 10 MHz	$\pm 2\%$ of span [§]
Span > 10 MHz	$\pm 3\%$ of span
[§] (Option 130) For spans < 10 kHz, add an additional 10 Hz resolution error.	

Frequency Sweep Time	
Range	20 ms to 100 s
(Option 101)	20 μs to 100 s for span 0 Hz
Accuracy	
20 ms to 100 s	$\pm 3\%$
20 μs to < 20 ms (Option 101)	$\pm 2\%$
Sweep Trigger	Free Run, Single, Line, Video, External

Resolution Bandwidth	
Range	1 kHz to 3 MHz, 8 selectable resolution (3 dB) bandwidths in 1-3-10 sequence. 9 kHz and 120 kHz (6 dB) EMI bandwidths.
(Option 130)	Adds 30, 100 and 300 Hz (3 dB) bandwidths and 200 Hz (6 dB) EMI bandwidth.
Accuracy	
3 dB bandwidths	±20%

Stability	
Noise Sidebands	(1 kHz RBW, 30 Hz VBW and sample detector)
>10 kHz offset from CW signal	≤−90 dBc/Hz
>20 kHz offset from CW signal	≤−100 dBc/Hz
>30 kHz offset from CW signal	≤−105 dBc/Hz
Residual FM	
1 kHz RBW, 1 kHz VBW	≤250 Hz pk-pk in 100 ms
30 Hz RBW, 30 Hz VBW (Option 130)	≤30 Hz pk-pk in 300 ms
System-Related Sidebands	
>30 kHz offset from CW signal	≤−65 dBc

Calibrator Output Frequency	300 MHz ±(freq. ref. error* × 300 MHz)
* frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy + temperature stability). See “Frequency Characteristics.”	

Amplitude Specifications

Amplitude specifications do not apply for Analog+ mode and negative peak detector mode except as noted in “Amplitude Characteristics.”

Amplitude Range	–112 dBm to +30 dBm
(Option 130)	–127 dBm to +30 dBm

Maximum Safe Input Level	
Average Continuous Power	+30 dBm (1 W, 7.1 V rms), input attenuation ≥ 10 dB.
Peak Pulse Power	+50 dBm (100 W) for $<10 \mu\text{s}$ pulse width and $<1\%$ duty cycle, input attenuation ≥ 30 dB.
dc	0 V (dc coupled) 50 V (ac coupled)

Gain Compression[‡]	
>10 MHz	≤ 0.5 dB (total power at input mixer* –10 dBm)
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).	
[‡] (Option 130) If $\text{RBW} \leq 300$ Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes $\leq$ Reference Level + 10 dB.	

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
	1 kHz RBW	30 Hz RBW (Option 130)
400 kHz to <5 MHz	≤ -107 dBm	≤ -122 dBm
5 MHz to 2.9 GHz	≤ -112 dBm	≤ -127 dBm

Spurious Responses Second Harmonic Distortion >10 MHz Third Order Intermodulation Distortion >10 MHz Other Input Related Spurious	 <−70 dBc for −40 dBm tone at input mixer.* <−70 dBc for two −30 dBm tones at input mixer* and >50 kHz separation. <−65 dBc at ≥30 kHz offset, for −20 dBm tone at input mixer ≤2.9 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).	

Residual Responses 150 kHz to 2.9 GHz	(Input terminated and 0 dB attenuation) <−90 dBm
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Display Range Log Scale Linear Scale Scale Units	 0 to −70 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; eight divisions displayed. eight divisions dBm, dBmV, dBμV, mV, mW, nV, nW, pW, μV, μW, V, and W
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Marker Readout Resolution Fast Sweep Times for Zero Span 20 μs to 20 ms (<i>Option 101 or 301</i>) Frequency ≤ 1 GHz Frequency > 1 GHz	0.05 dB for log scale 0.05% of reference level for linear scale 0.7% of reference level for linear scale 1.0% of reference level for linear scale
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Reference Level	
Range	
Log Scale	Minimum amplitude to maximum amplitude**
Linear Scale	–99 dBm to maximum amplitude**
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to –20 dBm reference level, 10 dB input attenuation, at a single frequency, in a fixed RBW)
0 dBm to –59.9 dBm	±(0.3 dB + 0.01 × dB from –20 dBm)
–60 dBm and below	
1 kHz to 3 MHz RBW	±(0.6 dB + 0.01 × dB from –20 dBm)
30 Hz to 300 Hz RBW (Option 130)	±(0.7 dB + 0.01 × dB from –20 dBm)
** See “Amplitude Range.”	

Frequency Response (dc coupled)	(10 dB input attenuation)	
	Absolute[§]	Relative Flatness[†]
9 kHz to 2.9 GHz	±1.5 dB	±1.0 dB
[†] Referenced to midpoint between highest and lowest frequency response deviations. [§] Referenced to 300 MHz CAL OUT.		

Calibrator Output	
Amplitude	–20 dBm ±0.4 dB

Absolute Amplitude Calibration Uncertainty^{‡‡}	±0.15 dB
^{‡‡} Uncertainty in the measured absolute amplitude of the CAL OUT signal at the reference settings after CAL FREQ and CAL AMPTD self-calibration. Absolute amplitude reference settings are: Reference Level –20 dBm; Input Attenuation 10 dB; Center Frequency 300 MHz; Res BW 3 kHz; Video BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON, DC Coupled.	

Input Attenuator	
Range	0 to 70 dB, in 10 dB steps

Resolution Bandwidth Switching Uncertainty 3 kHz to 3 MHz RBW 1 kHz RBW 30 Hz to 300 Hz (<i>Option 130</i>)	(At reference level, referenced to 3 kHz RBW) ± 0.4 dB ± 0.5 dB ± 0.6 dB
Linear to Log Switching	± 0.25 dB at reference level
Display Scale Fidelity Log Maximum Cumulative 0 to -70 dB from Reference Level 3 kHz to 3 MHz RBW RBW ≤ 1 kHz Log Incremental Accuracy 0 to -60 dB from Reference Level Linear Accuracy	 $\pm (0.3 \text{ dB} + 0.01 \times \text{dB from reference level})$ $\pm (0.4 \text{ dB} + 0.01 \times \text{dB from reference level})$ $\pm 0.4 \text{ dB}/4 \text{ dB}$ $\pm 3\%$ of reference level

Cable TV Measurement Specifications

These specifications describe warranted performance of the spectrum analyzer and the 85721A cable TV measurements personality.

Input Configuration	75 Ω BNC Female
Channel Selection	Analyzer tunes to specified channels based upon selected tune configuration.
Tune Configuration	Standard, Off-the Air, HRC, IRC (T and FM channels also in channel mode)
Channel Range	1 to 158 and 201 to 300 (channel mode) 1 to 158 (system mode)
Channel Frequencies	Defined by Code of Federal Regulations, Title 47, Telecommunications, Parts 73.603, 76.605, 76.612
Frequency Range	5 to 1002 MHz (channel mode) 54 to 896 MHz (system mode)
Amplitude Range	-15 to +70 dBmV for S/N > 30 dB
Visual-Carrier Frequency	Visual-carrier frequency is counted
Frequency Reference* (Standard)	
Resolution	1 kHz
Accuracy	$\pm(7.5 \times 10^{-6} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 524 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 2.55 \text{ kHz}$
@643.25 MHz (Ch. 94)	$\pm 4.93 \text{ kHz}$
* Will not meet FCC frequency accuracy requirements.	
Precision Frequency Reference (Option 004)	
Resolution	100 Hz
Accuracy	$\pm(1.2 \times 10^{-7} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 117 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 149 \text{ Hz}$
@643.25 MHz (Ch. 94)	$\pm 187 \text{ Hz}$

Visual-to-Aural Carrier Frequency Difference Difference Range Resolution Accuracy	Frequency difference between visual and aural carriers is counted. 4.1 to 4.9 MHz 100 Hz ±221 Hz for precision frequency ref (std) ±254 Hz for Option 704 frequency ref
Visual-Carrier Level Amplitude Range Resolution Absolute Accuracy Relative Accuracy	The peak amplitude of the visual carrier is measured to an absolute standard traceable to the National Institute of Standards and Technology. -15 to +70 dBmV 0.1 dB ±2.0 dB for S/N > 30 dB ±1.0 dB relative to adjacent channels in frequency ±1.5 dB relative to all other channels
Visual-to-Aural Carrier Level Difference Difference Range Resolution Accuracy	The difference between peak amplitudes of the visual and aural carrier is measured. 0 to 25 dB 0.1 dB ±0.75 dB for S/N > 30 dB
Hum/Low-Frequency Disturbance AM Range Resolution Accuracy	Power-line frequency and low-frequency disturbance measured on modulated and/or unmodulated carriers. May not be valid for scrambled channels. 0.5 to 10% 0.1% ±0.4% for hum ≤3% ±0.7% for hum ≤5% ±1.3% for hum ≤10%

Visual Carrier-to-Noise Ratio (C/N)*	The C/N is calculated from the visual-carrier peak level and the minimum noise level, normalized to 4 MHz noise bandwidth.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum C/N Range	Input level dependent - See graphs
C/N Resolution	0.1 dB
C/N Accuracy	Input level and measured C/N dependent ± 1.0 to ± 3.5 dB over optimum input range
* A preamplifier and preselector filter may be required to achieve specifications.	

CSO and CTB Distortion [†]	Manual composite second order (CSO) and composite triple beat (CTB) distortions are measured relative to the visual carrier peak and require momentary disabling of the carrier. Automatic measurements are made in the channel above the channel selected and assumes that it is unused. If the analyzer has Option 107, a non-interfering CSO measurement can be made.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum CSO/CTB Range	Input level dependent - see graphs. 66 to 73 dB over optimum input range
Manual CSO/CTB Resolution	0.1 dB
System CSO/CTB Resolution	1 dB
CSO/CTB Accuracy	Input level and measured CSO/CTB dependent - See graphs ± 1.5 dB to ± 4.0 dB over optimum input range
[†] A preamplifier and preselector filter may be required to achieve specifications.	

System Frequency Response (flatness)

System amplitude variations are measured relative to a reference trace stored during the setup.

Frequency Response Setup	
Fast Sweep Time	2 s (default) for no scrambling
Slow Sweep Time	8 s (default) for fixed-amplitude scrambling
Reference-trace Storage	50 traces that include analyzer states

Frequency Response Test	
Range	1.0 dB/Div to 20 dB/Div (2 dB default)
Resolution	0.05 dB
Trace-flatness Accuracy	± 0.1 dB per dB deviation from a flat line and ± 0.75 dB maximum cumulative error
Trace-position Accuracy	0.0 dB for equal temperature at test locations and ± 0.4 dB maximum for different ambient temperatures

Option Specifications

Tracking Generator Specifications (Option 010)

All specifications apply over 0 °C to +55 °C.* The spectrum-analyzer/tracking-generator combination will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum-analyzer/tracking-generator is turned on and after CAL FREQ, CAL AMPTD, CAL TRK GEN, and TRACKING PEAK have been run.

* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.

NOTE: There are two models of the tracking generator. One has a frequency range of 300 kHz to 2.9 GHz, typically analyzers with a serial prefix of 3431A and below. The newer tracking generator has a range of 9 kHz to 2.9 GHz, typically serial prefix of 3440A or higher. Check the front panel for the tracking generator output frequency range of the installed generator.

Warm-Up	30 minutes
Output Frequency Range*	9 kHz to 2.9 GHz 300 kHz to 2.9 GHz
* Refer to the “Note” in the description above.	

Output Power Level	
Range	–1 dBm to –66 dBm
Resolution	0.1 dB
Absolute Amplitude Accuracy (at 25 °C ±10 °C)	
(–20 dBm at 300 MHz)	±0.75 dB
Vernier [‡]	
Range	9 dB
Accuracy (at 25 °C ±10 °C)	
(–20 dBm at 300 MHz, 16 dB attenuation)	
Incremental	±0.20 dB/dB
Cumulative	±0.50 dB total
Output Attenuator	
Range	0 to 56 dB in 8 dB steps
[‡] See the Output Accuracy table in “Option Characteristics.”	

Output Power Sweep	
Range	(–10 dBm to –1 dBm) – (Source Attenuator Setting)
Resolution	0.1 dB

Output Flatness	
(referenced to 300 MHz, –20 dBm)	
Frequency > 10 MHz	±2.0 dB
Frequency ≤ 10 MHz	±3.0 dB

Spurious Output (–1 dBm output)	
Harmonic Spurs from 9 kHz to 2.9 GHz	
TG Output 9 kHz to 20 kHz	≤–15 dBc
TG Output 20 kHz to 2.9 GHz	≤–25 dBc
Harmonic Spurs from 300 kHz to 2.9 GHz	
TG Output 300 kHz to 2.9 GHz	≤–25 dBc
Nonharmonic Spurs from 9 kHz to 2.9 GHz	
TG Output 9 kHz to 2.0 GHz	≤–27 dBc
TG Output 2.0 GHz to 2.9 GHz	≤–23 dBc
Nonharmonic Spurs from 300 kHz to 2.9 GHz	
TG Output 300 kHz to 2.0 GHz	≤–27 dBc
TG Output 2.0 GHz to 2.9 GHz	≤–23 dBc
LO Feedthrough	
LO Frequency 3.9217 to 6.8214 GHz	≤–16 dBm

Tracking Generator Feedthrough	
400 kHz to 5 MHz	<–107 dBm
5 MHz to 2.9 GHz	<–112 dBm

Quasi-Peak Detector Specifications (Option 103)

The specifications for Quasi-Peak Detector (Option 103) have been based on the following:

- The spectrum analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radio électriques (CISPR) Section 1, Clause 2.

The 200 Hz bandwidth is available only with Option 130. The 1 kHz resolution bandwidth may be used to approximate a quasi-peak measurement without Option 130. A quasi-peak measurement using the 1 kHz bandwidth will be greater than or equal to a quasi-peak measurement using a 200 Hz bandwidth.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the spectrum analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, resolution bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB)	Frequency Band		
	120 kHz EMI BW 0.03 to 1 GHz	9 kHz EMI BW 0.15 to 30 MHz	(Option 130) 200 Hz EMI BW 10 to 150 kHz
Pulse Repetition Frequency (Hz)			
1000	+8.0 ± 1.0	+4.5 ± 1.0	—
100	0 dB (reference)*	0 dB (reference)*	+4.0 ± 1.0
60	—	—	+3.0 ± 1.0
25	—	—	0 dB (reference)*
20	−9.0 ± 1.0	−6.5 ± 1.0	—
10	−14.0 ± 1.5	−10.0 ± 1.5	−4.0 ± 1.0
5	—	—	−7.5 ± 1.5
2	−26.0 ± 2.0	−20.5 ± 2.0	−13.0 ± 2.0
1	−28.5 ± 2.0	−22.5 ± 2.0	−17.0 ± 2.0
Isolated Pulse	−31.5 ± 2.0	−23.5 ± 2.0	−19.0 ± 2.0
* Reference pulse amplitude accuracy relative to a 66 dBμV CW signal is <1.5 dB. CISPR reference pulse: 0.044 μVs for 0.03 to 1 GHz, 0.316 μVs for 0.15 to 30 MHz, 13.5 ± 1.5 μVs for 10 to 150 kHz (Option 130).			

Time Gated Spectrum Analysis Specifications (Option 105 or Option 107)

GATE DELAY	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(1 \mu\text{s} + (0.01\% \times \text{GATE DELAY Readout}))^\dagger$
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(0.2 \mu\text{s} + (0.01\% \times \text{GATE LENGTH Readout}))$
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 μ s	± 0.8 dB
$\geq 2 \mu\text{s}$	± 0.5 dB
Linear Scale	
< 2 μ s	$\pm 1.0\%$ of REFERENCE LEVEL
$\geq 2 \mu\text{s}$	$\pm 0.7\%$ of REFERENCE LEVEL
[†] Up to 1 μ s jitter due to 1 μ s resolution of gate delay clock. [§] With GATE ON enabled and triggered, CW Signal, Peak Detector Mode.	

TV Receiver/Video Tester (Option 107)

(Option 107 required; appropriate TV line must be selected)

Non-interfering color	(requires FCC composite, NTC-7, or CCIR 17 and CCIR 330 test signal)
Differential Gain Accuracy	6% 50 averages (default)
Differential Phase Accuracy	4° 50 averages (default)
Chroma-luminance Delay Inequality Accuracy	±45 ns
Frequency Range	50 MHz to 850 MHz
Amplitude Range	+10 dBmV to +50 dBmV at coupler input (10 dB loss)
Coupler (part number 0955-0704)	Insertion loss: < 2 dB Coupled output: -10 dB ±0.5 dB

Non-Interfering Tests with Gate On*	
C/N and CSO (quiet line must be selected)	See graphs for accuracy
In-channel Frequency Response Accuracy	±0.5 dB within channel
* A preamplifier and preselector filter may be required to achieve specifications.	

Frequency Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Frequency Reference	
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$
Aging	$\pm 1.0 \times 10^{-7}/\text{day}$

Precision Frequency Reference (Option 004)	
Aging	$5 \times 10^{-10}/\text{day}$, 7-day average after being powered on for 7 days.
Warm-Up	1×10^{-8} after 30 minutes on.
Initial Achievable Accuracy	$\pm 2.2 \times 10^{-8}$ after being powered on for 24 hours.

Stability	
Drift* (after warmup at stabilized temperature)	
Frequency Span ≤ 10 MHz, Free Run	< 2 kHz/minute of sweep time
* Because the analyzer is locked at the center frequency before each sweep, drift occurs only during the time of one sweep. For Line, Video or External trigger, additional drift occurs while waiting for the appropriate trigger signal.	

Resolution Bandwidth (–3 dB)	
Range	1 kHz to 3 MHz, selectable in 1, 3 and 10 increments, and 5 MHz. Resolution bandwidths may be selected manually, or coupled to frequency span.
(Option 130)	Adds 30 Hz, 100 Hz, and 300 Hz bandwidths.
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio	
Resolution Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
60 dB/3 dB Bandwidth Ratio	
(Option 130)	
Resolution Bandwidth	
30 Hz to 300 Hz	10:1

Video Bandwidth (–3 dB)	
Range	30 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy $\pm 30\%$ and 3 MHz. Video bandwidths may be selected manually, or coupled to resolution bandwidth and frequency span.
(Option 130)	Adds 1, 3, and 10 Hz bandwidths.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
(Option 130)	Bandwidths below 30 Hz are digital bandwidths with anti-aliasing filtering.

FFT Bandwidth Factors	FLATTOP	HANNING	UNIFORM
Noise Equivalent Bandwidth [†]	3.63×	1.5×	1×
3 dB Bandwidth [†]	3.60×	1.48×	1×
Sidelobe Height	<−90 dB	−32 dB	−13 dB
Amplitude Uncertainty	0.10 dB	1.42 dB	3.92 dB
Shape Factor (60 dB BW/3 dB BW)	2.6	9.1	>300
[†] Multiply entry by one-divided-by-sweep time.			

Amplitude Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

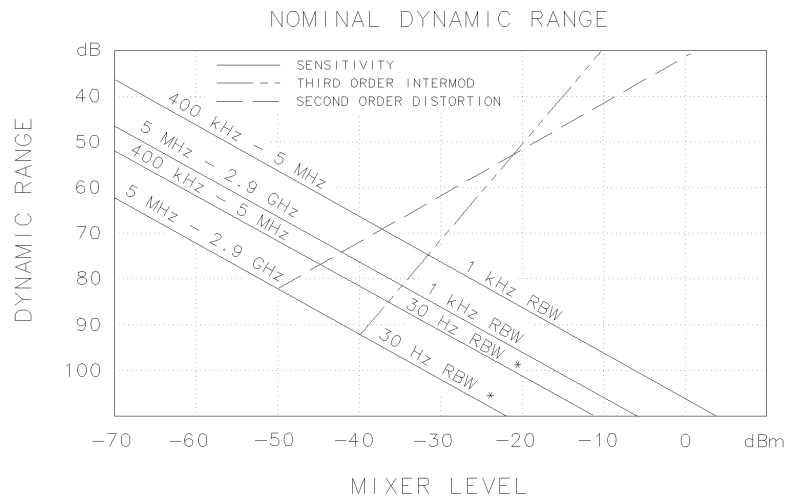
Log Scale Switching Uncertainty	Negligible error
Demod Tune Listen	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
Input Attenuation Uncertainty* Attenuator Setting 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	±0.2 dB Reference ±0.4 dB ±0.5 dB ±0.7 dB ±0.8 dB ±1.0 dB ±1.0 dB
* Referenced to 10 dB input attenuator setting. See the “Specifications” table under “Frequency Response.”	
ac Coupled Insertion Loss[‡] 100 kHz to 300 kHz 300 kHz to 1 MHz 1 MHz to 100 MHz 100 MHz to 2.9 GHz	0.7 dB 0.7 dB 0.05 dB 0.05 dB + (0.06 × F) [†] dB
[†] F = frequency in GHz. [‡] Referenced to dc coupled mode.	

Input Attenuator 10 dB Step Uncertainty	(Attenuator setting 10 to 70 dB) ± 0.8 dB/10 dB
--	--

Input Attenuator Repeatability	± 0.05 dB
---------------------------------------	---------------

RF Input SWR	dc Coupled	ac Coupled
10 dB attenuation		
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
100 kHz to 300 kHz	1.3:1	2.3:1
300 kHz to 1 MHz	1.3:1	1.4:1
1 MHz to 2.9 GHz	1.3:1	1.3:1

DYNAMIC RANGE



*Option 130

XA636

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

In these modes, the following analyzer specifications remain as specifications:

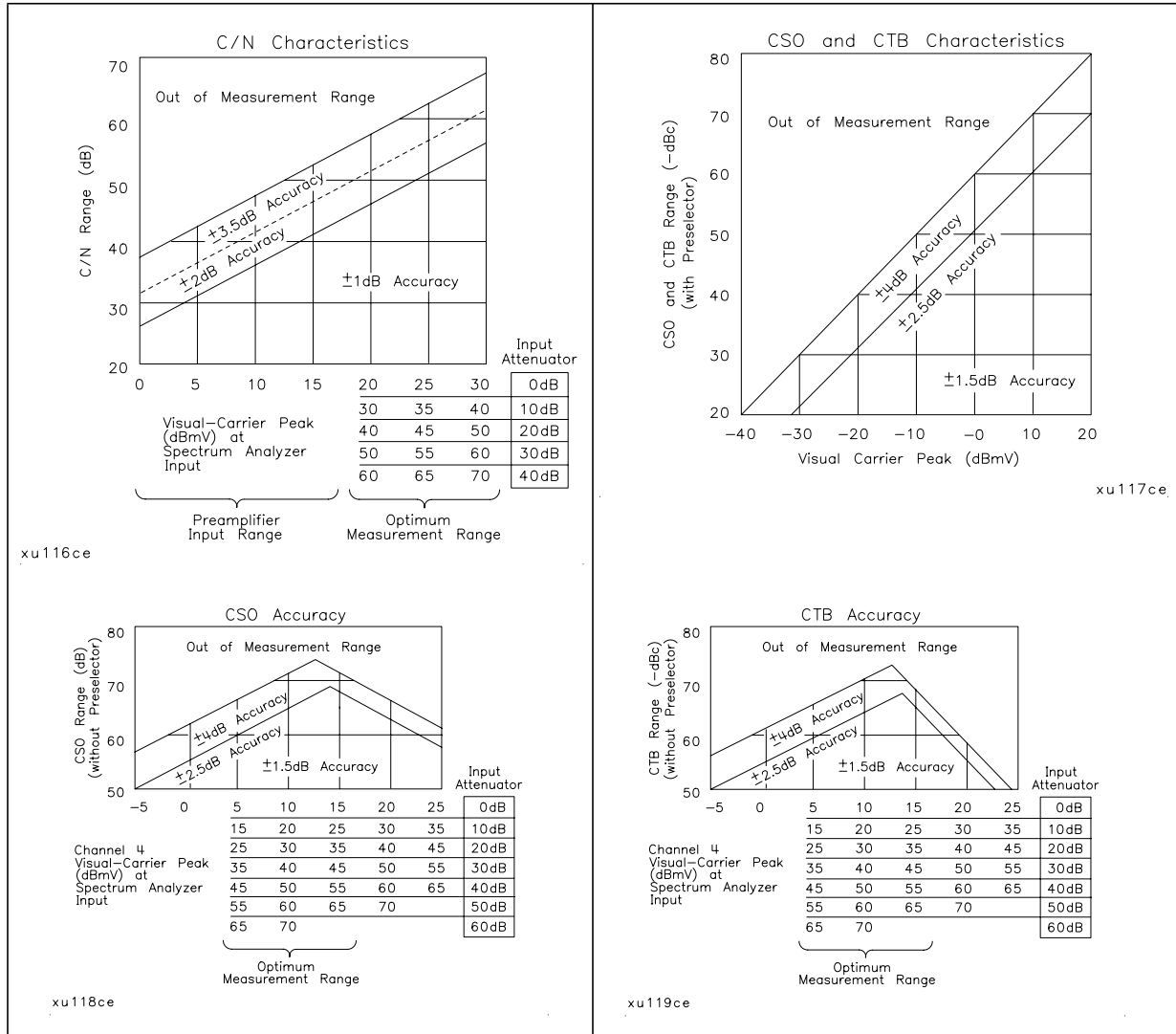
Chapter 7

Marker Readout Resolution (digitizing resolution) Log Scale Linear Scale frequency ≤ 1 GHz frequency > 1 GHz	 ± 0.31 dB $\pm 0.59\%$ of reference level $\pm 1.03\%$ of reference level	
Frequency Response in Analog+ Mode (dc coupled) 9 kHz to 2.9 GHz	(10 dB input attenuation, for spans ≤ 20 MHz)	
	Absolute[§]	Relative Flatness[†]
	± 2.0 dB	± 1.5 dB
[†] Referenced to midpoint between highest and lowest frequency response deviations. [§] Referenced to 300 MHz CAL OUT.		

Cable TV Measurement Characteristics

Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	$\pm 2.0\%$ for C/N > 40 dB

FM Deviation	Peak reading of FM deviation
Range	± 100 kHz
Resolution	100 Hz
Accuracy	± 1.5 kHz



C/N, CSO, and CTB Measurements

The four graphs summarize the combined 8591C cable TV analyzer or 8590 E-Series spectrum analyzers, and 85721A characteristics for C/N, CSO, and CTB testing on cable TV systems with up to 99 channels and up to +9 dB amplitude tilt. C/N, CSO, and CTB measurement accuracies and ranges can be read from the relevant graphs. They depend upon the visual carrier peak level and the measurement reading. For C/N measurements with a preselector, there is no optimum range and the accuracy boundaries drop by the preselector's insertion loss (typically 2 dB).

Crossmodulation

Range

Resolution

Accuracy

Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.

60 dB, usable to 65 dB

0.1 dB

±2.0 dB for xmod. <40 dB, C/N >40 dB ±2.6 dB for xmod. <50 dB, C/N >40 dB ±4.6 dB for xmod. <60 dB, C/N >40 dB

Option Characteristics

Demod Tune Listen (<i>Option 102 or 103</i>)	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
TV Trigger (<i>Options 101 and 102</i>)	Triggers sweep of the analyzer after the sync pulse of a selected line of a TV video field.
Carrier Level for Trigger	Top 60% of linear display
Compatible Formats	NTSC, PAL, SECAM
Field Selection	Even, odd, non-interlaced
Trigger Polarity	Positive, negative
Line Selection	10 to 1021

Tracking Generator Characteristics (Option 010)

Tracking Drift (Usable in a 1 kHz RBW after 5-minute warmup)	1.5 kHz/5 minute
RF Power Off Residuals 9 kHz to 2.9 GHz	<-120 dBm
Dynamic Range (difference between maximum power out and tracking generator feedthrough) Frequency < 5 MHz Frequency ≥ 5 MHz	>106 dB >111 dB

Output Attenuator Repeatability	
9 kHz to 300 MHz	±0.1 dB
300 kHz to 300 MHz	±0.1 dB
300 MHz to 2.0 GHz	±0.2 dB
2.0 GHz to 2.9 GHz	±0.3 dB

Output VSWR	
0 dB Attenuator	<3.0:1
8 dB Attenuator	<1.5:1

TRACKING GENERATOR OUTPUT ACCURACY, Option 010					
(after CAL TRK GEN in auto-coupled mode, Frequency > 10 MHz, 25°C ± 10°C)					
TG Output Power Level	Attenuator Setting	Relative Accuracy (at 300 MHz referred to -20 dBm)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to -20 dBm)	Absolute Accuracy
-1 to -10 dBm	0 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
-10 to -18 dBm	8 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
-20 dBm	16 dB	Reference	0.75 dB	2.0 dB	2.75 dB
-18 to -26 dBm	16 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
-26 to -34 dBm	24 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
-34 to -42 dBm	32 dB	1.6 dB	2.35 dB	3.6 dB	4.35 dB
-42 to -50 dBm	40 dB	1.8 dB	2.55 dB	3.8 dB	4.55 dB
-50 to -58 dBm	48 dB	2.0 dB	2.75 dB	4.0 dB	4.75 dB
-58 to -66 dBm	56 dB	2.1 dB	2.85 dB	4.1 dB	4.85 dB

Quasi-Peak Detector Characteristics (Option 103)

Quasi-Peak Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation (Option 102, 103, or 301)

Input Level	> (−60 dBm + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz nominal
Range	10 kHz to 1 MHz
Bandwidth	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Physical Characteristics

Front-Panel Inputs and Outputs

INPUT 50Ω	
Connector	Type N female
Impedance	50 Ω nominal
RF OUT (<i>Option 010</i>)	
Connector	Type N female
Impedance	50 Ω nominal
PROBE POWER [‡]	
Voltage/Current	+15 Vdc, $\pm 7\%$ at 150 mA max. –12.6 Vdc $\pm 10\%$ at 150 mA max.
[‡] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.5 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.	

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>0 dBm
EXT REF IN	
Connector	BNC female
	Note: Analyzer noise sideband and spurious response performance may be affected by the quality of the external reference used.
Input Amplitude Range	–2 to +10 dBm
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	–10 to –60 dBm
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EARPHONE (<i>Option 102 or 103</i>)	
Connector	1/8 inch monaural jack

EXT ALC INPUT (<i>Option 010</i>)	
Input Impedance	>10 k Ω
Polarity	Use with negative detector

EXT KEYBOARD (<i>Option 041 or 043</i>)	
Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.	

EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (TTL).

GATE TRIGGER INPUT (<i>Option 105 or 107</i>)	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT (<i>Option 105 or 107</i>)	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

LO OUTPUT (<i>Option 009 or 010</i>)	Note: LO output must be terminated in 50 Ω
Connector	SMA female
Impedance	50 Ω nominal
Frequency Range	3.0 to 6.8214 GHz
Output Level	+11 to +18 dBm

SWEEP + TUNE OUTPUT (<i>Option 009</i>)	
Connector	BNC female
Impedance (dc coupled)	2 k Ω
Range	0 to +10 V
Sweep + Tune Output	0.36 V/GHz of center frequency

HI-SWEEP IN/OUT	
Connector	BNC female
Output	High = sweep, Low = retrace (TTL)
Input	Open collector, low stops sweep.

MONITOR OUTPUT (Spectrum Analyzer Display)	
Connector	BNC female
Format	
SYNC NRM	Internal Monitor
SYNC NTSC	NTSC Compatible
	15.75 kHz horizontal rate
	60 Hz vertical rate
SYNC PAL	PAL Compatible
	15.625 kHz horizontal rate
	50 Hz vertical rate

REMOTE INTERFACE	
GPIB and Parallel (<i>Option 041</i>) GPIB Codes RS-232 and Parallel (<i>Option 043</i>)	10833A, B, C or D and 25 pin subminiature D-shell, female for parallel SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28 9 pin subminiature D-shell, male for RS-232 and 25 pin subminiature D-shell, female for parallel
SWEEP OUTPUT	
Connector Amplitude	BNC female 0 to +10 V ramp
TV IN (<i>Option 107</i>)	
Connector Impedance	75 Ω BNC female 75 Ω nominal
TV TRIG OUT (<i>Options 101 and 102</i>)	
Connector Amplitude	BNC female Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

AUX INTERFACE				
Connector Type: 9 Pin Subminiature “D”				
Connector Pinout				
Pin #	Function	Current	“Logic” Mode	“Serial Bit” Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7 [†]	–15 Vdc ±7%	150 mA	—	—
8*	+5 Vdc ±5%	150 mA	—	—
9 [†]	+15 Vdc ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants. [†] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.6 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net	
8594E	16.4 kg (36 lb)
Shipping	
8594E	19.1 kg (42 lb)

DIMENSIONS

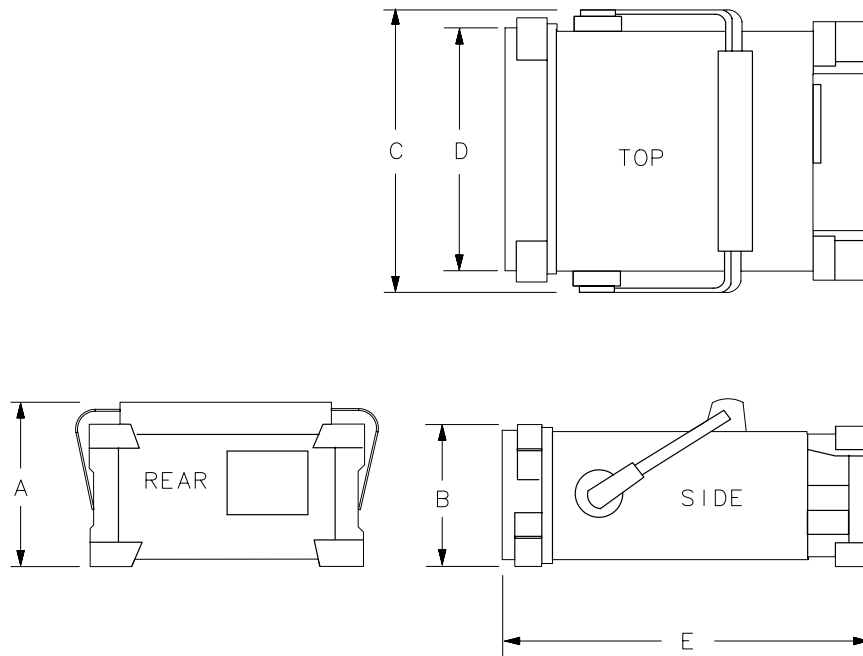
A 8 in (200 mm)

B 7.25 in (184 mm)

C 14.69 in (373 mm)

D 13.25 in (337 mm)

E 18.12 in (460.5 mm)



FORMAT 100

8

8594Q Specifications and Characteristics

This chapter contains specifications and characteristics for the 8594Q QAM Analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first and are followed by the characteristics.

General	General specifications.
QAM Measurement	QAM measurement specifications and characteristics.
Spectrum Analysis Frequency	Frequency-related specifications and characteristics.
Spectrum Analysis Amplitude	Amplitude-related specifications and characteristics.
Physical	Input, output and physical characteristics.

The distinction between specifications and characteristics is described as follows.

- Specifications describe warranted performance over the temperature range 0 °C to +50 °C (unless otherwise noted). The spectrum analyzer will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum analyzer is turned on, and after the CAL frequency and CAL amplitude routines have been run.
- Characteristics provide useful, but non-warranted information about the functions and performance of the spectrum analyzer. Characteristics are specifically identified.
- Typical Performance, where listed, is not warranted, but indicates performance that most units will exhibit.
- Nominal Value indicates the expected, but not warranted, value of the parameter.

0 °C to +50 °C with Option 015 or Option 016 operating/carrying case.

General Specifications

All specifications apply over 0 °C to +55 °C unless equipped with Option 015 or 016. The analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the analyzer is turned on and after CAL FREQ and CAL AMPTD have been run.

Temperature Range	
Operating	0 °C to +55 °C*
Storage	–40 °C to +75 °C
* 0 °C to +50 °C with Option 016 operating and carrying case.	
EMI Compatibility	
Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A.	
Audible Noise	
<37.5 dBA pressure and <5.0 Bels power (ISODP7779)	
Power Requirements	
ON (LINE 1)	90 to 132 V rms, 47 to 440 Hz 195 to 250 V rms, 47 to 66 Hz Power consumption <500 VA; <180 W
Standby (LINE 0)	Power consumption <7 W
Environmental Specifications	
Type tested to the environmental specifications of Mil-T-28800 class 5	

QAM Analysis Measurement Specifications

These specifications describe the warranted performance of the 8594Q analyzer with the 8594Q Option 190/195 DVB-C QAM hardware and application software. Typical performance on corresponding specifications is noted.

Channel Selection	
Standard Tuning Ranges	DVB-C D channel 31–41, 330–445 CCIR VHF S channel 21–41 CCIR UHF U channel 21–69
User Defined Channel Tuning	10 MHz–2.9 GHz 10 MHz–1 GHz (with internal preamplifier)

DVB-C Standard Channel Bandwidths	
DVB-C Channel Bandwidths available	8 MHz, 4 MHz, and 2 MHz

Average Power Measurement		
Without Preamplifier		
	Single Carrier at Input	Multiple Carriers at Input*
Minimum average power in 8 MHz bandwidth [†]	–60 dBm (–62 dBm typical)	–40 dBm (–42 dBm typical)
Average power accuracy (averaging 10 traces)	±2.8 dB (±1 dB typical)	±2.8 dB (±1 dB typical)
* Total incident power at Input $50\Omega < +20$ dBm. † Without external pad. With external pad, add pad value. For 4 MHz bandwidth, subtract 3 dB. For 2 MHz bandwidth, subtract 6 dB.		

Modulation Accuracy Measurement *		
Residual Error Vector Magnitude (EVM)	Residual EVM with a Single Carrier at Input	Residual EVM with Multiple Carriers at Input[§]
Channel Bandwidth 8 MHz, 4 MHz, 2 MHz	1.47% [†] (1.16% typical[‡])	2.07% [†] (1.74% typical[‡])
Minimum average power for modulation accuracy measurement		–55 dBm ^{††}
* All measurements using 800 symbols. † Reflects mean residual EVM of 50 individual measurements. ‡ Typical values are at 20 °C – 30 °C (room) temperature. § Total incident power at Input 50Ω < +20 dBm. †† Single carrier at input with internal preamplifier and no external pad.		

Modulation Accuracy Measurement *		
Residual Modulation Error Ratio (MER)	Residual MER with a Single Carrier at Input	Residual MER with Multiple Carriers at Input[§]
Channel Bandwidth 8 MHz, 4 MHz, 2 MHz	33 dB [†] (35 dB typical[‡])	30 dB [†] (31.5 dB typical[‡])
Minimum average power for modulation accuracy measurement		–55 dBm ^{††}
* All measurements using 800 symbols. † Reflects mean residual MER of 50 individual measurements. ‡ Typical values are at 20 °C – 30 °C (room) temperature. § Total incident power at Input 50Ω < +20 dBm. †† Single carrier at input with internal preamplifier and no external pad.		

PID Statistics Measurement	
Maximum number of PID's analyzed simultaneously	64
Transport stream net data rate	1% (no averaging)
PID net data rate	1% (no averaging)
Transport stream gross data rate	1% (no averaging)

Multiplex Overview Measurement	
Maximum number of PID's detected in transport stream	5000
Maximum number of PID's analyzed simultaneously	11
Transport stream net data rate	1% (no averaging)
PID net data rate	1% (no averaging)
Transport stream gross data rate	1% (no averaging)

Spectrum Analysis Frequency Specifications

Frequency Range	
dc Coupled	9 kHz to 2.9 GHz
ac Coupled	100 kHz to 2.9 GHz

Frequency Reference (<i>Option 704</i>)	
Aging	$\pm 2 \times 10^{-6}/\text{year}$
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference (<i>Option 190</i>)	
Aging	$\pm 1 \times 10^{-7}/\text{year}$
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy (Start, Stop, Center, Marker)	$\pm(\text{frequency readout} \times \text{frequency reference error}^* + \text{span accuracy} + 1\% \text{ of span} + 20\% \text{ of RBW} + 100 \text{ Hz})^\ddagger$
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See "Spectrum Analysis Frequency Characteristics."	
‡ See "Drift" under "Stability" in "Spectrum Analysis Frequency Characteristics."	

Marker Count Accuracy [†]	
Frequency Span ≤ 10 MHz	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 100 \text{ Hz})$
Frequency Span > 10 MHz	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 1 \text{ kHz})$
Counter Resolution	
Frequency Span ≤ 10 MHz	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz	Selectable from 100 Hz to 100 kHz
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy and temperature stability). See "Spectrum Analysis Frequency Characteristics."	

† Marker level to displayed noise level > 25 dB, RBW/Span $\geq$ 0.01. Span $\leq$ 300 MHz. Reduce SPAN annotation is displayed when RBW/Span < 0.01.

Frequency Span	
Range	0 Hz (zero span), 10 kHz to 2.9 GHz
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy	
Span $\leq$ 10 MHz	$\pm 2\%$ of span
Span > 10 MHz	$\pm 3\%$ of span

Frequency Sweep Time	
Range	20 ms to 100 s
Accuracy	
20 ms to 100 s	±3%
Sweep Trigger	Free Run, Single, Line, Video, External

Resolution Bandwidth	
Range	1 kHz to 3 MHz, 8 selectable resolution (3 dB) bandwidths in 1-3-10 sequence. 9 kHz and 120 kHz (6 dB) EMI bandwidths.
Accuracy	
3 dB bandwidths	±20%

Stability	
Noise Sidebands	(1 kHz RBW, 30 Hz VBW and sample detector)
>10 kHz offset from CW signal	≤ -90 dBc/Hz
>20 kHz offset from CW signal	≤ -100 dBc/Hz
>30 kHz offset from CW signal	≤ -105 dBc/Hz
Residual FM	
1 kHz RBW, 1 kHz VBW	≤ 250 Hz pk-pk in 100 ms
System-Related Sidebands	
>30 kHz offset from CW signal	≤ -65 dBc

Calibrator Output Frequency	300 MHz $\pm$ (freq. ref. error* $\times$ 300 MHz)
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See "Spectrum Analysis Frequency Characteristics."	

Spectrum Analysis Amplitude Specifications

Amplitude specifications only apply with internal preamplifier turned off.

Amplitude Range	–112 dBm to +30 dBm	
Maximum Safe Input Level		
Average Continuous Power	+30 dBm (1 W, 7.1 V rms), input attenuation ≥10 dB.	
Peak Pulse Power	+50 dBm (100 W) for <10 μs pulse width and <1% duty cycle, input attenuation ≥30 dB.	
dc	0 V (dc coupled) 50 V (ac coupled)	
Gain Compression		
>10 MHz	≤0.5 dB (total power at input mixer* –10 dBm)	
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB) + Preamplifier Gain (dB)		
Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
	1 kHz RBW	
400 kHz to <5 MHz	≤–107 dBm	
5 MHz to 2.9 GHz	≤–112 dBm	

Spurious Responses Second Harmonic Distortion >10 MHz Third Order Intermodulation Distortion >10 MHz Other Input Related Spurious	 <−70 dBc for −40 dBm tone at input mixer.* <−70 dBc for two −30 dBm tones at input mixer* and >50 kHz separation. <−65 dBc at ≥30 kHz offset, for −20 dBm tone at input mixer ≤2.9 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB) + Preamplifier Gain (dB).	
Residual Responses 150 kHz to 2.9 GHz	(Input terminated and 0 dB attenuation) <−90 dBm
Display Range Log Scale Linear Scale Scale Units	0 to −70 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; eight divisions displayed. eight divisions dBm, dBmV, dBμV, mV, mW, nV, nW, pW, μV, μW, V, and W
Marker Readout Resolution	0.05 dB for log scale 0.05% of reference level for linear scale

Reference Level	
Range	
Log Scale	Minimum amplitude to maximum amplitude**
Linear Scale	–99 dBm to maximum amplitude**
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to –20 dBm reference level, 10 dB input attenuation, at a single frequency, in a fixed RBW)
0 dBm to –59.9 dBm	±(0.3 dB + 0.01 × dB from –20 dBm)
–60 dBm and below	
1 kHz to 3 MHz RBW	±(0.6 dB + 0.01 × dB from –20 dBm)
** See “Amplitude Range.”	

Frequency Response (dc coupled)	(10 dB input attenuation)	
	Absolute [§]	Relative Flatness [†]
9 kHz to 2.9 GHz	±1.5 dB	±1.0 dB
† Referenced to midpoint between highest and lowest frequency response deviations.		
§ Referenced to 300 MHz CAL OUT.		

Calibrator Output	
Amplitude	–20 dBm ±0.4 dB

Absolute Amplitude Calibration Uncertainty ^{‡‡}	±0.15 dB
^{‡‡} Uncertainty in the measured absolute amplitude of the CAL OUT signal at the reference settings after CAL FREQ and CAL AMPTD self-calibration. Absolute amplitude reference settings are: Reference Level –20 dBm; Input Attenuation 10 dB; Center Frequency 300 MHz; Res BW 3 kHz; Video BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON, DC Coupled.	

Input Attenuator	
Range	0 to 70 dB, in 10 dB steps

Resolution Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz RBW)
3 kHz to 3 MHz RBW	± 0.4 dB
1 kHz RBW	± 0.5 dB

Linear to Log Switching	± 0.25 dB at reference level
--------------------------------	----------------------------------

Display Scale Fidelity	
Log Maximum Cumulative	
0 to -70 dB from Reference Level	
3 kHz to 3 MHz RBW	$\pm (0.3 \text{ dB} + 0.01 \times \text{dB from reference level})$
1 kHz RBW	$\pm (0.4 \text{ dB} + 0.01 \times \text{dB from reference level})$
Log Incremental Accuracy	
0 to -60 dB from Reference Level	± 0.4 dB/4 dB
Linear Accuracy	$\pm 3\%$ of reference level

QAM Analysis Measurement Characteristics

These are not specifications. Characteristics provide useful but non-warranted information about the 8594Q Option 190/195 performance.

Demodulator Characteristics	
Supported Digital Modulation Format:	64 QAM
Nyquist Filter Alpha:	0.15
Real Time DFE/FFE Adaptive Equalizer	

Supported Symbol Rates			
Channel Bandwidth	8 MHz	4 MHz	2 MHz
Symbol Rate	6.9 MHz	3.45 MHz	1.725 MHz
	6.89 MHz	3.445 MHz	1.72 MHz
	6.875 MHz	3.4375 MHz	1.71875 MHz
	6.872 MHz	3.436 MHz	1.718 MHz

Adjacent Channel Power Measurement	
Adjacent channel power dynamic range	58 dB

Internal Preamplifier Characteristics	
Maximum Safe Input Level	−5 dBm (average or peak power)
Gain	23 dB ±3 dB
Frequency Range	100 kHz to 1 GHz
Flatness	±0.5 dB
Noise Figure	4.0 dB maximum
TOI	+14 dBm minimum

Average Power Measurement			
With Internal Preamplifier*		Single Carrier at Input	Multiple Carriers at Input[†]
Minimum average power in 8 MHz bandwidth [‡]		–81 dBm (–83 dBm typical)	–41 dBm (–43 dBm typical)
Average power accuracy (averaging 10 traces)		±2.8 dB (±1 dB typical)	±2.8 dB (±1 dB typical)
* Gain error of the internal preamplifier not included. † Total incident power at Input $50\Omega < +17$ dBm. ‡ Without external pad. With external pad, add pad value. For 4 MHz bandwidth, subtract 3 dB. For 2 MHz bandwidth, subtract 6 dB.			

Immunity Testing	
Radiated Immunity	When tested at 3 V/m, according to IEC 801-3/1984, the residual EVM level will be within specifications over the full immunity test frequency range of 27 to 500 MHz except that at immunity test frequencies of 278.6 MHz ± selected resolution bandwidth and 321.4 MHz ± selected resolution bandwidth, the residual EVM may be up to 8.0%. When the analyzer tuned frequency is identical to the immunity test signal frequency the residual EVM may be up to 8.0%.
Electrostatic Discharge:	When an air discharge of up to 8 kV according to IEC 801-2/1991 occurs to the shells of the BNC connectors on the rear panel of the instrument, spikes may be seen on the CRT display. Discharges to the center pins of any of the connectors may cause damage to the associated circuitry.

Reed-Solomon Error Statistics Measurement Measurement Displays: Byte error count Byte error ratio Packet error count Packet error ratio Estimated bit error count Estimated bit error ratio	
Bit Error Ratio Measurement Measurement Stimulus Types: $2^{23}-1$ continuous PRBS Sync (47 hex, no inversion) + 203-byte $2^{23}-1$ PRBS (*) R-S encoded packet with payload of 187 bytes of $2^{23}-1$ PRBS (*) R-S encoded packet with user-definable PID and payload of 184 bytes of $2^{23}-1$ PRBS (*) R-S encoded packet with null PID value and payload of 184 bytes of 0's	

Spectrum Analysis Frequency Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Frequency Reference (<i>Option 704</i>)	
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$
Aging	$\pm 1.0 \times 10^{-7}/\text{day}$

Precision Frequency Reference (<i>Option 190</i>)	
Aging	$5 \times 10^{-10}/\text{day}$, 7-day average after being powered on for 7 days.
Warm-Up	1×10^{-8} after 30 minutes on.
Initial Achievable Accuracy	$\pm 2.2 \times 10^{-8}$ after being powered on for 24 hours.

Stability	
Drift* (after warmup at stabilized temperature)	
Frequency Span ≤ 10 MHz, Free Run	< 2 kHz/minute of sweep time

* Because the analyzer is locked at the center frequency before each sweep, drift occurs only during the time of one sweep. For Line, Video or External trigger, additional drift occurs while waiting for the appropriate trigger signal.

Resolution Bandwidth (–3 dB)	
Range	1 kHz to 3 MHz, selectable in 1, 3 and 10 increments, and 5 MHz. Resolution bandwidths may be selected manually, or coupled to frequency span.
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio	
Resolution Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1

Video Bandwidth (–3 dB)	
Range	30 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy $\pm 30\%$ and 3 MHz. Video bandwidths may be selected manually, or coupled to resolution bandwidth and frequency span.
Shape	Post detection, single pole low-pass filter used to average displayed noise.

FFT Bandwidth Factors			
	FLATTOP	HANNING	UNIFORM
Noise Equivalent Bandwidth [†]	3.63×	1.5×	1×
3 dB Bandwidth [†]	3.60×	1.48×	1×
Sidelobe Height	<–90 dB	–32 dB	–13 dB
Amplitude Uncertainty	0.10 dB	1.42 dB	3.92 dB
Shape Factor (60 dB BW/3 dB BW)	2.6	9.1	>300
[†] Multiply entry by one-divided-by-sweep time.			

Input Level	> (−60 dBm + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz nominal
Range	10 kHz to 1 MHz
Bandwidth	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Spectrum Analysis Amplitude Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Amplitude characteristics only apply with internal preamplifier turned off.

Log Scale Switching Uncertainty	Negligible error
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Input Attenuation Uncertainty*	
Attenuator Setting	
0 dB	±0.2 dB
10 dB	Reference
20 dB	±0.4 dB
30 dB	±0.5 dB
40 dB	±0.7 dB
50 dB	±0.8 dB
60 dB	±1.0 dB
70 dB	±1.0 dB
* Referenced to 10 dB input attenuator setting. See “Frequency Response” in “Spectrum Analysis Amplitude Specifications.”	

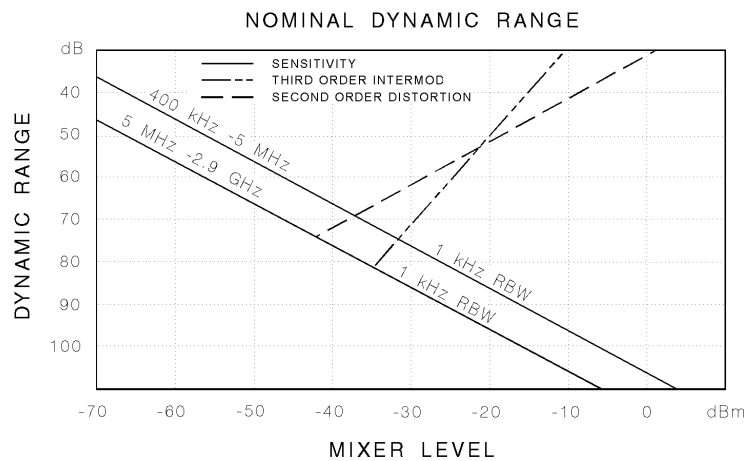
ac Coupled Insertion Loss[‡]	
100 kHz to 300 kHz	0.7 dB
300 kHz to 1 MHz	0.7 dB
1 MHz to 100 MHz	0.05 dB
100 MHz to 2.9 GHz	$0.05 \text{ dB} + (0.06 \times F)^{\dagger} \text{ dB}$
[†] F = frequency in GHz.	
[‡] Referenced to dc coupled mode.	

Input Attenuator 10 dB Step Uncertainty	(Attenuator setting 10 to 70 dB) ±0.8 dB/10 dB
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Input Attenuator Repeatability	±0.05 dB
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RF Input SWR	dc Coupled	ac Coupled
10 dB attenuation		
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
100 kHz to 300 kHz	1.3:1	2.3:1
300 kHz to 1 MHz	1.3:1	1.4:1
1 MHz to 2.9 GHz	1.3:1	1.3:1

DYNAMIC RANGE



wq11

Immunity Testing	
Radiated Immunity	When tested at 3 V/m according to IEC 801-3/1984 the displayed average noise level will be within specifications over the full immunity test frequency range of 27 to 500 MHz except that at immunity test frequencies of 278.6 MHz $\pm$ selected resolution bandwidth and 321.4 MHz $\pm$ selected resolution bandwidth the displayed average noise level may be up to -45 dBm. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to -70 dBm displayed on the screen.
Electrostatic Discharge	When an air discharge of up to 8 kV according to IEC 801-2/1991 occurs to the shells of the BNC connectors on the rear panel of the instrument spikes may be seen on the CRT display. Discharges to center pins of any of the connectors may cause damage to the associated circuitry.

Physical Characteristics

Front-Panel Inputs and Outputs

INPUT 50Ω	
Connector	Type N female
Impedance	50 Ω nominal

PROBE POWER ‡	
Voltage/Current	+15 Vdc, $\pm 7\%$ at 150 mA max. –12.6 Vdc $\pm 10\%$ at 150 mA max.
‡ Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.5 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.	

PROBE POWER	
Voltage/Current	+15 Vdc, $\pm 7\%$ at 150 mA max. –12.6 Vdc $\pm 10\%$ at 150 mA max.

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>0 dBm

EXT REF IN	
Connector	BNC female Note: Analyzer noise sideband and spurious response performance may be affected by the quality of the external reference used.
Input Amplitude Range	–2 to +10 dBm
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	–10 to –60 dBm
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EXT KEYBOARD (<i>Option 041 or 043</i>)	Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.
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EXT KEYBOARD	Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.
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EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (TTL).

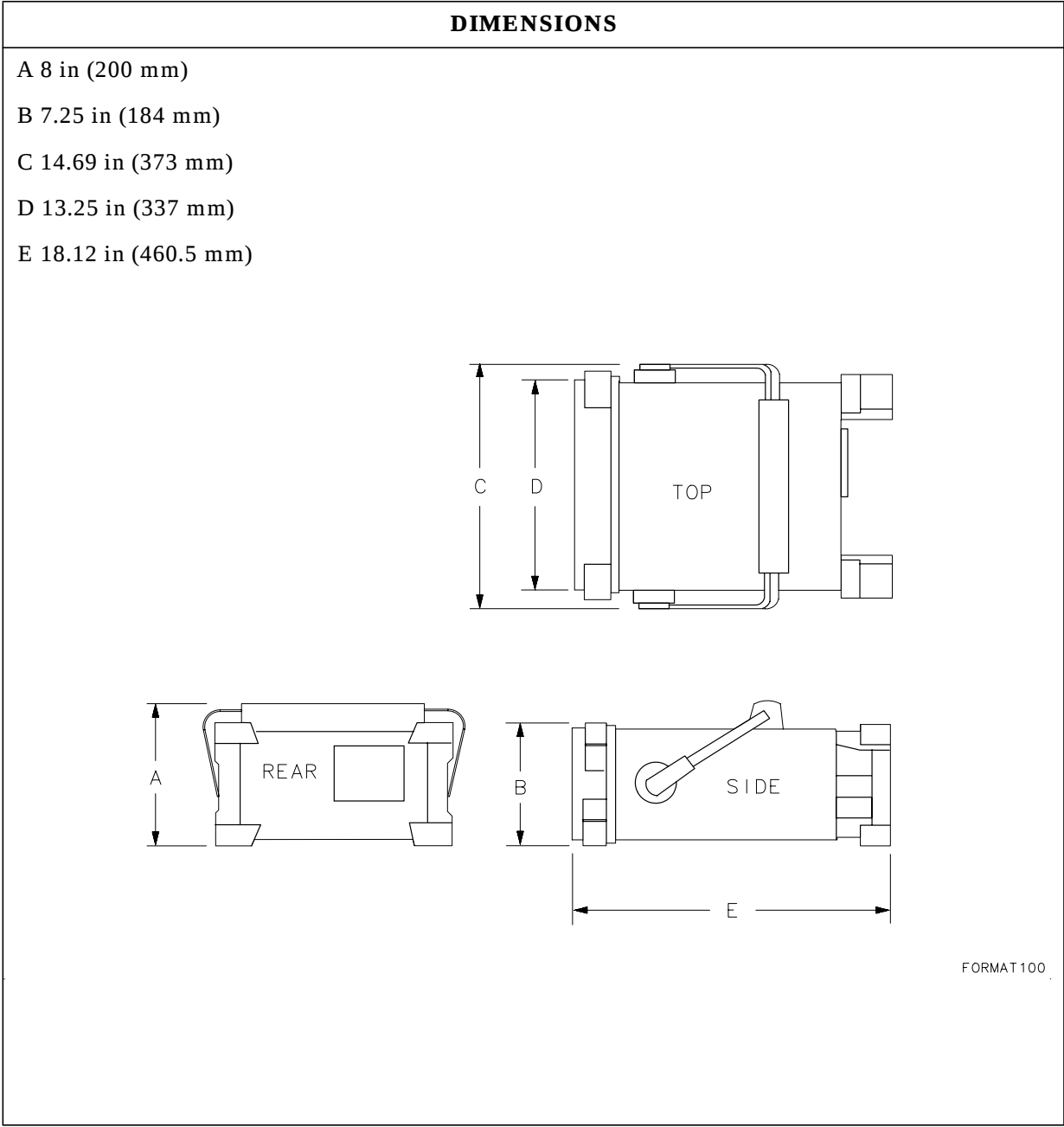
Digital Video Outputs	
Parallel Data Output (<i>Option 195</i>)	Recovered data stream available from DVB-PI (DVB parallel interface) 25 pin subminiature D-type female connector. 188 or 204 byte mode, user selectable.
Serial Data Output (<i>Option 195</i>)	Recovered data stream available from 75 Ω BNC connector, typically meets DVB-ASI (DVB asynchronous serial interface) requirements. 188 or 204 byte mode, user selectable.

HI-SWEEP IN/OUT	
Connector	BNC female
Output	High = sweep, Low = retrace (TTL)
Input	Open collector, low stops sweep.

Chapter 8

AUX INTERFACE				
Connector Type: 9 Pin Subminiature “D”				
Connector Pinout				
Pin #	Function	Current	“Logic” Mode	“Serial Bit” Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7 [†]	–15 Vdc ±7%	150 mA	—	—
8*	+5 Vdc ±5%	150 mA	—	—
9 [†]	+15 Vdc ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants. [†] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.6 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net	
8594Q	16.4 kg (36 lb)
Shipping	
8594Q	19.1 kg (42 lb)



9

8595E Specifications and Characteristics

This chapter contains specifications and characteristics for the 8595E Spectrum Analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first and are followed by the characteristics.

General	General specifications.
Frequency	Frequency-related specifications and characteristics.
Amplitude	Amplitude-related specifications and characteristics.
Cable TV	Cable TV measurement specifications and characteristics.
Option	Option-related specifications and characteristics.
Physical	Input, output and physical characteristics.

The distinction between specifications and characteristics is described as follows.

- Specifications describe warranted performance over the temperature range 0 °C to +50 °C (unless otherwise noted). The spectrum analyzer will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum analyzer is turned on, and after the CAL frequency and CAL amplitude routines have been run.
- Characteristics provide useful, but non-warranted information about the functions and performance of the spectrum analyzer. Characteristics are specifically identified.
- Typical Performance, where listed, is not warranted, but indicates performance that most units will exhibit.
- Nominal Value indicates the expected, but not warranted, value of the parameter.

0 °C to +50 °C with Option 015 or Option 016 operating/carrying case.

General Specifications

All specifications apply over 0 °C to +55 °C unless equipped with Option 015 or 016. The analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the analyzer is turned on and after CAL FREQ, CAL AMPTD and CAL YTF have been run.

Temperature Range	
Operating	0 °C to +55 °C*
Storage	–40 °C to +75 °C
* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.	
EMI Compatibility	
Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A.	
Audible Noise	
<37.5 dBA pressure and <5.0 Bels power (ISODP7779)	
Power Requirements	
ON (LINE 1)	90 to 132 V rms, 47 to 440 Hz 195 to 250 V rms, 47 to 66 Hz
Standby (LINE 0)	Power consumption <500 VA; <180 W Power consumption <7 W
Environmental Specifications	
Type tested to the environmental specifications of Mil-T-28800 class 5	

Frequency Specifications

Frequency Range	
dc Coupled	9 kHz to 6.5 GHz
ac Coupled	100 kHz to 6.5 GHz

Frequency Reference	
Aging	$\pm 2 \times 10^{-6}/\text{year}$
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference (Option 004)	
Aging	$\pm 1 \times 10^{-7}/\text{year}$
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy (Start, Stop, Center, Marker)	$\pm(\text{frequency readout} \times \text{frequency reference error}^* + \text{span accuracy} + 1\% \text{ of span} + 20\% \text{ of RBW} + 100 \text{ Hz})^\ddagger$
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* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See "Frequency Characteristics."

‡ See "Drift" under "Stability" in Frequency Characteristics.

Marker Count Accuracy[†]	
Frequency Span ≤ 10 MHz	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 100 \text{ Hz})$
Frequency Span > 10 MHz	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 1 \text{ kHz})$
Counter Resolution	
Frequency Span ≤ 10 MHz	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz	Selectable from 100 Hz to 100 kHz

* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy and temperature stability). See "Frequency Characteristics."

[†] Marker level to displayed noise level > 25 dB, RBW/SPAN ≥ 0.01 . Span ≤ 300 MHz. Reduce SPAN annotation is displayed when RBW/SPAN < 0.01 .

Frequency Span	
Range	0 Hz (zero span), 10 kHz to 6.5 GHz
(Option 130)	0 Hz (zero span), 1 kHz to 6.5 GHz
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy (single band spans)	
Span ≤ 10 MHz	$\pm 2\%$ of span [§]
Span > 10 MHz	$\pm 3\%$ of span
[§] (Option 130) For Spans < 10 kHz, add an additional 10 Hz resolution error.	

Frequency Sweep Time	
Range	
	20 ms to 100 s
(Option 101)	20 μ s to 100 s for span 0 Hz
Accuracy	
20 ms to 100 s	$\pm 3\%$
20 μ s to < 20 ms (Option 101)	$\pm 2\%$
Sweep Trigger	Free Run, Single, Line, Video, External

Resolution Bandwidth	
Range	1 kHz to 3 MHz, 8 selectable resolution (3 dB) bandwidths in 1-3-10 sequence. 9 kHz and 120 kHz (6 dB) EMI bandwidths.
(Option 130)	
Accuracy	Adds 30, 100 and 300 Hz (3 dB) bandwidths and 200 Hz (6 dB) EMI bandwidth.
3 dB bandwidths	$\pm 20\%$

Stability Noise Sidebands >10 kHz offset from CW signal 20 kHz offset from CW signal >30 kHz offset from CW signal Residual FM 1 kHz RBW, 1 kHz VBW 30 Hz RBW, 30 Hz VBW (<i>Option 130</i>) System-Related Sidebands >30 kHz offset from CW signal	(1 kHz RBW, 30 Hz VBW and sample detector) ≤ -90 dBc/Hz ≤ -100 dBc/Hz ≤ -105 dBc/Hz ≤ 250 Hz pk-pk in 100 ms ≤ 30 Hz pk-pk in 300 ms ≤ -65 dBc
Calibrator Output Frequency	300 MHz $\pm$ (freq. ref. error* $\times$ 300 MHz)
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See "Frequency Characteristics."	

Amplitude Specifications

Amplitude specifications do not apply for Analog+ mode and negative peak detector mode except as noted in “Amplitude Characteristics.”

Amplitude Range (Option 130)	–112 dBm to +30 dBm –127 dBm to +30 dBm
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Maximum Safe Input Level Average Continuous Power Peak Pulse Power dc	+30 dBm (1 W, 7.1 V rms), input attenuation ≥ 10 dB. +50 dBm (100 W) for $<10 \mu\text{s}$ pulse width and $<1\%$ duty cycle, input attenuation ≥ 30 dB. 0 V (dc coupled) 50 V (ac coupled)
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Gain Compression [‡] >10 MHz	≤ 0.5 dB (total power at input mixer* –10 dBm)
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* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).

[‡] (Option 130) If $\text{RBW} \leq 300$ Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes $\leq$ Reference Level + 10 dB.

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
	1 kHz RBW	30 Hz RBW (Option 130)
	400 kHz to 2.9 GHz 2.75 GHz to 6.5 GHz	≤ -110 dBm ≤ -112 dBm
		≤ -125 dBm ≤ -127 dBm

Spurious Responses Second Harmonic Distortion >10 MHz >2.75 GHz Third Order Intermodulation Distortion >10 MHz Other Input Related Spurious	<−70 dBc for −40 dBm tone at input mixer.* <−100 dBc for −10 dBm tone at input mixer* (or below displayed average noise level). <−70 dBc for two −30 dBm tones at input mixer* and >50 kHz separation. <−65 dBc at ≥30 kHz offset, for −20 dBm tone at input mixer ≤6.5 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).	
Residual Responses 150 kHz to 6.5 GHz	(Input terminated and 0 dB attenuation) <−90 dBm
Display Range Log Scale Linear Scale Scale Units	0 to −70 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; eight divisions displayed. eight divisions dBm, dBmV, dBμV, mV, mW, nV, nW, pW, μV, μW, V, and W
Marker Readout Resolution Fast Sweep Times for Zero Span 20 μs to 20 ms (<i>Option 101 or 301</i>) Frequency ≤ 1 GHz Frequency > 1 GHz	0.05 dB for log scale 0.05% of reference level for linear scale 0.7% of reference level for linear scale 1.0% of reference level for linear scale

Reference Level	
Range	Minimum amplitude to maximum amplitude**
Log Scale	–99 dBm to maximum amplitude**
Linear Scale	
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to –20 dBm reference level, 10 dB input attenuation, at a single frequency, in a fixed RBW)
0 dBm to –59.9 dBm	
–60 dBm and below	±(0.3 dB + 0.01 × dB from –20 dBm)
1 kHz to 3 MHz RBW	±(0.6 dB + 0.01 × dB from –20 dBm)
30 Hz to 300 Hz RBW (<i>Option 130</i>)	±(0.7 dB + 0.01 × dB from –20 dBm)
** See “Amplitude Range.”	

Frequency Response (dc coupled)	(10 dB input attenuation)	
	Absolute [§]	Relative Flatness [†]
9 kHz to 2.9 GHz	±1.5 dB	±1.0 dB
2.75 GHz to 6.5 GHz (preselector peaked)	±2.0 dB	±1.5 dB
† Referenced to midpoint between highest and lowest frequency response deviations.		
§ Referenced to 300 MHz CAL OUT.		

Calibrator Output	
Amplitude	–20 dBm ±0.4 dB

Absolute Amplitude Calibration Uncertainty ^{‡‡}	±0.15 dB
‡‡ Uncertainty in the measured absolute amplitude of the CAL OUT signal at the reference settings after CAL FREQ and CAL AMPTD self-calibration. Absolute amplitude reference settings are: Reference Level –20 dBm; Input Attenuation 10 dB; Center Frequency 300 MHz; Res BW 3 kHz; Video BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON, DC Coupled.	

Input Attenuator Range	0 to 70 dB, in 10 dB steps
Resolution Bandwidth Switching Uncertainty 3 kHz to 3 MHz RBW 1 kHz RBW 30 Hz to 300 Hz (<i>Option 130</i>)	(At reference level, referenced to 3 kHz RBW) ± 0.4 dB ± 0.5 dB ± 0.6 dB
Linear to Log Switching	± 0.25 dB at reference level
Display Scale Fidelity Log Maximum Cumulative 0 to -70 dB from Reference Level 3 kHz to 3 MHz RBW RBW ≤ 1 kHz Log Incremental Accuracy 0 to -60 dB from Reference Level Linear Accuracy	 $\pm (0.3 \text{ dB} + 0.01 \times \text{dB from reference level})$ $\pm (0.4 \text{ dB} + 0.01 \times \text{dB from reference level})$ $\pm 0.4 \text{ dB}/4 \text{ dB}$ $\pm 3\%$ of reference level

Cable TV Measurement Specifications

These specifications describe warranted performance of the spectrum analyzer and the 85721A cable TV measurements personality.

Input Configuration	75 Ω BNC Female
Channel Selection Tune Configuration Channel Range Channel Frequencies Frequency Range Amplitude Range	Analyzer tunes to specified channels based upon selected tune configuration. Standard, Off-the Air, HRC, IRC (T and FM channels also in channel mode) 1 to 158 and 201 to 300 (channel mode) 1 to 158 (system mode) Defined by Code of Federal Regulations, Title 47, Telecommunications, Parts 73.603, 76.605, 76.612 5 to 1002 MHz (channel mode) 54 to 896 MHz (system mode) -15 to +70 dBmV for S/N > 30 dB
Visual-Carrier Frequency	Visual-carrier frequency is counted
Frequency Reference* (Standard) Resolution Accuracy @55.25 MHz (Ch. 2) @325.25 MHz (Ch. 41) @643.25 MHz (Ch. 94)	1 kHz $\pm(7.5 \times 10^{-6} \times \text{carrier frequency} + 110 \text{ Hz})$ $\pm 524 \text{ Hz}$ $\pm 2.55 \text{ kHz}$ $\pm 4.93 \text{ kHz}$
* Will not meet FCC frequency accuracy requirements.	
Precision Frequency Reference (Option 004) Resolution Accuracy @55.25 MHz (Ch. 2) @325.25 MHz (Ch. 41) @643.25 MHz (Ch. 94)	100 Hz $\pm(1.2 \times 10^{-7} \times \text{carrier frequency} + 110 \text{ Hz})$ $\pm 117 \text{ Hz}$ $\pm 149 \text{ Hz}$ $\pm 187 \text{ Hz}$

Visual-to-Aural Carrier Frequency Difference Difference Range Resolution Accuracy	Frequency difference between visual and aural carriers is counted. 4.1 to 4.9 MHz 100 Hz ± 221 Hz for precision frequency ref (std) ± 254 Hz for Option 704 frequency ref
Visual-Carrier Level Amplitude Range Resolution Absolute Accuracy Relative Accuracy	The peak amplitude of the visual carrier is measured to an absolute standard traceable to the National Institute of Standards and Technology. -15 to +70 dBmV 0.1 dB ± 2.0 dB for S/N > 30 dB ± 1.0 dB relative to adjacent channels in frequency ± 1.5 dB relative to all other channels
Visual-to-Aural Carrier Level Difference Difference Range Resolution Accuracy	The difference between peak amplitudes of the visual and aural carrier is measured. 0 to 25 dB 0.1 dB ± 0.75 dB for S/N > 30 dB
Hum/Low-Frequency Disturbance AM Range Resolution Accuracy	Power-line frequency and low-frequency disturbance measured on modulated and/or unmodulated carriers. May not be valid for scrambled channels. 0.5 to 10% 0.1% $\pm 0.4\%$ for hum $\leq 3\%$ $\pm 0.7\%$ for hum $\leq 5\%$ $\pm 1.3\%$ for hum $\leq 10\%$

Visual Carrier-to-Noise Ratio (C/N)* Optimum Input Range Maximum C/N Range C/N Resolution C/N Accuracy	The C/N is calculated from the visual-carrier peak level and the minimum noise level, normalized to 4 MHz noise bandwidth. See the graphs in the characteristics section of this chapter. Input level dependent - See graphs 0.1 dB Input level and measured C/N dependent ± 1.0 to ± 3.5 dB over optimum input range
* A preamplifier and preselector filter may be required to achieve specifications.	

CSO and CTB Distortion [†] Optimum Input Range Maximum CSO/CTB Range Manual CSO/CTB Resolution System CSO/CTB Resolution CSO/CTB Accuracy	Manual composite second order (CSO) and composite triple beat (CTB) distortions are measured relative to the visual carrier peak and require momentary disabling of the carrier. Automatic measurements are made in the channel above the channel selected and assumes that it is unused. If the analyzer has Option 107, a non-interfering CSO measurement can be made. See the graphs in the characteristics section of this chapter. Input level dependent - see graphs. 66 to 73 dB over optimum input range 0.1 dB 1 dB Input level and measured CSO/CTB dependent - See graphs ± 1.5 dB to ± 4.0 dB over optimum input range
[†] A preamplifier and preselector filter may be required to achieve specifications.	

System Frequency Response (flatness)

System amplitude variations are measured relative to a reference trace stored during the setup.

Frequency Response Setup Fast Sweep Time Slow Sweep Time Reference-trace Storage	2 s (default) for no scrambling 8 s (default) for fixed-amplitude scrambling 50 traces that include analyzer states
Frequency Response Test Range Resolution Trace-flatness Accuracy Trace-position Accuracy	1.0 dB/Div to 20 dB/Div (2 dB default) 0.05 dB ± 0.1 dB per dB deviation from a flat line and ± 0.75 dB maximum cumulative error 0.0 dB for equal temperature at test locations and ± 0.4 dB maximum for different ambient temperatures

Option Specifications

Tracking Generator Specifications (Option 010)

All specifications apply over 0 °C to +55 °C.* The spectrum-analyzer/tracking-generator combination will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum-analyzer/tracking-generator is turned on and after CAL FREQ, CAL AMPTD, CAL TRK GEN, and TRACKING PEAK have been run.

* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.

NOTE: There are two models of the tracking generator. One has a frequency range of 300 kHz to 2.9 GHz, typically analyzers with a serial prefix of 3431A and below. The newer tracking generator has a range of 9 kHz to 2.9 GHz, typically serial prefix of 3440A or higher. Check the front panel for the tracking generator output frequency range of the installed generator.

Warm-Up	30 minutes
Output Frequency Range*	9 kHz to 2.9 GHz 300 kHz to 2.9 GHz
* Refer to the "Note" in the description above.	

Output Power Level	
Range	–1 dBm to –66 dBm
Resolution	0.1 dB
Absolute Amplitude Accuracy (at 25 °C ±10 °C) (–20 dBm at 300 MHz)	±0.75 dB
Vernier [‡]	
Range	9 dB
Accuracy (at 25 °C ±10 °C) (–20 dBm at 300 MHz, 16 dB attenuation)	
Incremental	±0.20 dB/dB
Cumulative	±0.50 dB total
Output Attenuator	
Range	0 to 56 dB in 8 dB steps
[‡] See the Output Accuracy table in “Option Characteristics.”	

Output Power Sweep	
Range	(–10 dBm to –1 dBm) – (Source Attenuator Setting)
Resolution	0.1 dB

Output Flatness (referenced to 300 MHz, –20 dBm)	
Frequency > 10 MHz	±2.0 dB
Frequency ≤ 10 MHz	±3.0 dB

Spurious Output (–1 dBm output)	
Harmonic Spurs from 9 kHz to 2.9 GHz	
TG Output 9 kHz to 20 kHz	≤–15 dBc
TG Output 20 kHz to 2.9 GHz	≤–25 dBc
Harmonic Spurs from 300 kHz to 2.9 GHz	
TG Output 300 kHz to 2.9 GHz	≤–25 dBc
Nonharmonic Spurs from 9 kHz to 2.9 GHz	
TG Output 9 kHz to 2.0 GHz	≤–27 dBc
TG Output 2.0 GHz to 2.9 GHz	≤–23 dBc
Nonharmonic Spurs from 300 kHz to 2.9 GHz	
TG Output 300 kHz to 2.0 GHz	≤–27 dBc
TG Output 2.0 GHz to 2.9 GHz	≤–23 dBc
LO Feedthrough	
LO Frequency 3.9217 to 6.8214 GHz	≤–16 dBm

Tracking Generator Feedthrough	
400 kHz to 2.9 GHz	<–110 dBm

Quasi-Peak Detector Specifications (Option 103)

The specifications for Quasi-Peak Detector (Option 103) have been based on the following:

- The spectrum analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comit'e International Sp'ecial des Perturbations Radio'electriques (CISPR) Section 1, Clause 2.

The 200 Hz bandwidth is available only with Option 130. The 1 kHz resolution bandwidth may be used to approximate a quasi-peak measurement without Option 130. A quasi-peak measurement using the 1 kHz bandwidth will be greater than or equal to a quasi-peak measurement using a 200 Hz bandwidth.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the spectrum analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, resolution bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB)	Frequency Band		
	120 kHz EMI BW	9 kHz EMI BW	(Option 130) 200 Hz EMI BW
Pulse Repetition Frequency (Hz)	0.03 to 1 GHz	0.15 to 30 MHz	10 to 150 kHz
1000	+8.0 ± 1.0	+4.5 ± 1.0	—
100	0 dB (reference)*	0 dB (reference)*	+4.0 ± 1.0
60	—	—	+3.0 ± 1.0
25	—	—	0 dB (reference)*
20	−9.0 ± 1.0	−6.5 ± 1.0	—
10	−14.0 ± 1.5	−10.0 ± 1.5	−4.0 ± 1.0
5	—	—	−7.5 ± 1.5
2	−26.0 ± 2.0	−20.5 ± 2.0	−13.0 ± 2.0
1	−28.5 ± 2.0	−22.5 ± 2.0	−17.0 ± 2.0
Isolated Pulse	−31.5 ± 2.0	−23.5 ± 2.0	−19.0 ± 2.0
* Reference pulse amplitude accuracy relative to a 66 dBμV CW signal is <1.5 dB. CISPR reference pulse: 0.044 μVs for 0.03 to 1 GHz, 0.316 μVs for 0.15 to 30 MHz, 13.5 ± 1.5 μVs for 10 to 150 kHz (Option 130).			

Time Gated Spectrum Analysis Specifications (Option 105 or Option 107)

GATE DELAY	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(1 \mu\text{s} + (0.01\% \times \text{GATE DELAY Readout}))^\dagger$
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(0.2 \mu\text{s} + (0.01\% \times \text{GATE LENGTH Readout}))$
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 μ s	± 0.8 dB
$\geq 2 \mu\text{s}$	± 0.5 dB
Linear Scale	
< 2 μ s	$\pm 1.0\%$ of REFERENCE LEVEL
$\geq 2 \mu\text{s}$	$\pm 0.7\%$ of REFERENCE LEVEL
[†] Up to 1 μ s jitter due to 1 μ s resolution of gate delay clock. [§] With GATE ON enabled and triggered, CW Signal, Peak Detector Mode.	

TV Receiver/Video Tester (Option 107)

(Option 107 required; appropriate TV line must be selected)

Non-interfering color	(requires FCC composite, NTC-7, or CCIR 17 and CCIR 330 test signal)
Differential Gain Accuracy	6% 50 averages (default)
Differential Phase Accuracy	4° 50 averages (default)
Chroma-luminance Delay Inequality Accuracy	±45 ns
Frequency Range	50 MHz to 850 MHz
Amplitude Range	+10 dBmV to +50 dBmV at coupler input (10 dB loss)
Coupler (part number 0955-0704)	Insertion loss: < 2 dB Coupled output: -10 dB ±0.5 dB

Non-Interfering Tests with Gate On*	
C/N and CSO (quiet line must be selected)	See graphs for accuracy
In-channel Frequency Response Accuracy	±0.5 dB within channel
* A preamplifier and preselector filter may be required to achieve specifications.	

Frequency Characteristics

These are not specifications. Characteristics provide useful but non-warranted information about instrument performance.

Frequency Reference	
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$
Aging	$\pm 1.0 \times 10^{-7}/\text{day}$

Precision Frequency Reference (Option 004)	
Aging	$5 \times 10^{-10}/\text{day}$, 7-day average after being powered on for 7 days.
Warm-Up	1×10^{-8} after 30 minutes on.
Initial Achievable Accuracy	$\pm 2.2 \times 10^{-8}$ after being powered on for 24 hours.

Stability	
Drift* (after warmup at stabilized temperature)	
Frequency Span ≤ 10 MHz, Free Run	< 2 kHz/minute of sweep time
* Because the analyzer is locked at the center frequency before each sweep, drift occurs only during the time of one sweep. For Line, Video or External trigger, additional drift occurs while waiting for the appropriate trigger signal.	

Resolution Bandwidth (–3 dB)	
Range	1 kHz to 3 MHz, selectable in 1, 3 and 10 increments, and 5 MHz. Resolution bandwidths may be selected manually, or coupled to frequency span.
(Option 130)	Adds 30 Hz, 100 Hz, and 300 Hz bandwidths.
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio	
Resolution Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
60 dB/3 dB Bandwidth Ratio (Option 130)	
Resolution Bandwidth	
30 Hz to 300 Hz	10:1

Video Bandwidth (–3 dB)	
Range	30 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy $\pm 30\%$ and 3 MHz. Video bandwidths may be selected manually, or coupled to resolution bandwidth and frequency span.
(Option 130)	Adds 1, 3, and 10 Hz bandwidths.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
(Option 130)	Bandwidths below 30 Hz are digital bandwidths with anti-aliasing filtering.

FFT Bandwidth Factors			
	FLATTOP	HANNING	UNIFORM
Noise Equivalent Bandwidth [†]	3.63×	1.5×	1×
3 dB Bandwidth [†]	3.60×	1.48×	1×
Sidelobe Height	<−90 dB	−32 dB	−13 dB
Amplitude Uncertainty	0.10 dB	1.42 dB	3.92 dB
Shape Factor (60 dB BW/3 dB BW)	2.6	9.1	>300
[†] Multiply entry by one-divided-by-sweep time.			

Amplitude Characteristics

These are not specifications. Characteristics provide useful but non-warranted information about instrument performance.

Log Scale Switching Uncertainty	Negligible error
Demod Tune Listen	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
Input Attenuation Uncertainty*	
Attenuator Setting	
0 dB	±0.2 dB
10 dB	Reference
20 dB	±0.4 dB
30 dB	±0.5 dB
40 dB	±0.7 dB
50 dB	±0.8 dB
60 dB	±1.0 dB
70 dB	±1.0 dB
* Referenced to 10 dB input attenuator setting. See the “Specifications” table under “Frequency Response.”	

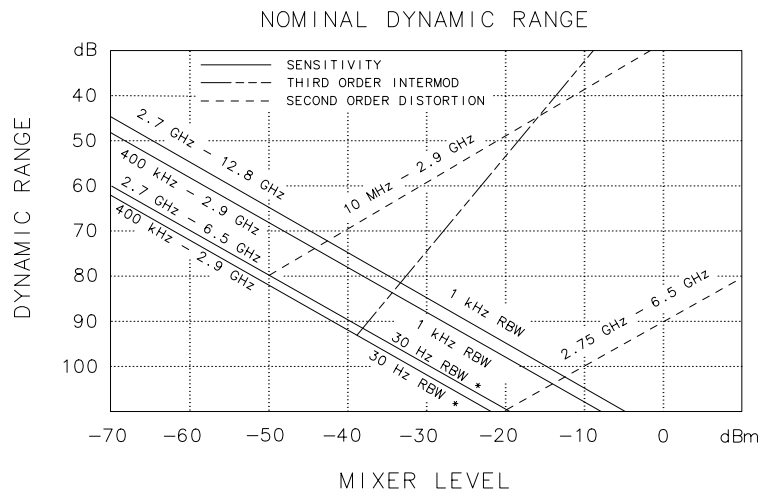
ac Coupled Insertion Loss [‡]	
100 kHz to 300 kHz	0.7 dB
300 kHz to 1 MHz	0.2 dB
1 MHz to 100 MHz	0.07 dB
100 MHz to 2.9 GHz	0.05 dB + (0.06 × F) ^{‡‡} dB
2.9 GHz to 6.5 GHz	0.05 dB + (0.13 × F) ^{‡‡} dB
[‡] Referenced to dc coupled mode. ^{‡‡} F = frequency in GHz	

Input Attenuator 10 dB Step Uncertainty	(Attenuator setting 10 to 70 dB) ±0.8 dB/10 dB
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Input Attenuator Repeatability	±0.05 dB
---------------------------------------	----------

RF Input SWR		
10 dB attenuation	dc Coupled	ac Coupled
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
100 kHz to 300 kHz	1.3:1	2.3:1
300 kHz to 1 MHz	1.3:1	1.4:1
1 MHz to 2.9 GHz	1.3:1	1.3:1
2.9 GHz to 6.5 GHz	1.5:1	1.6:1

Unpeaked Frequency Response (dc coupled)	(10 dB input attenuation)	
Without Preselector Peaking, Span ≤ 50 MHz	Absolute [§]	Relative Flatness [†]
2.75 GHz to 6.5 GHz	±4.0 dB	±3.5 dB
[†] Referenced to midpoint between highest and lowest frequency response deviations. [§] Referenced to 300 MHz CAL OUT.		

DYNAMIC RANGE

* Option 130

XG640

Immunity Testing**Radiated Immunity**

When tested at 3 V/m according to IEC 801-3/1984 the displayed average noise level will be within specifications over the full immunity test frequency range of 27 to 500 MHz except that at immunity test frequencies of $278.6 \text{ MHz} \pm$ selected resolution bandwidth and $321.4 \text{ MHz} \pm$ selected resolution bandwidth the displayed average noise level may be up to -45 dBm . When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to -70 dBm displayed on the screen.

Electrostatic Discharge

When an air discharge of up to 8 kV according to IEC 801-2/1991 occurs to the shells of the BNC connectors on the rear panel of the instrument spikes may be seen on the CRT display. Discharges to center pins of any of the connectors may cause damage to the associated circuitry.

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance. In these modes, the following analyzer specifications remain as specifications:	
Amplitude Range Maximum Safe Input Level	Calibrator Output
In these modes, the following analyzer specifications are reduced to characteristics:	
Gain Compression Displayed Average Noise Level Spurious Responses Residual Responses Display Range	Reference Level Resolution Bandwidth Switching Linear to Log Switching Display Scale Fidelity Display Scale Fidelity for Narrow Bandwidths
Finally, the following analyzer specifications:	
Marker Readout Resolution	Frequency Response
are replaced by the characteristics which follow in this subsection.	

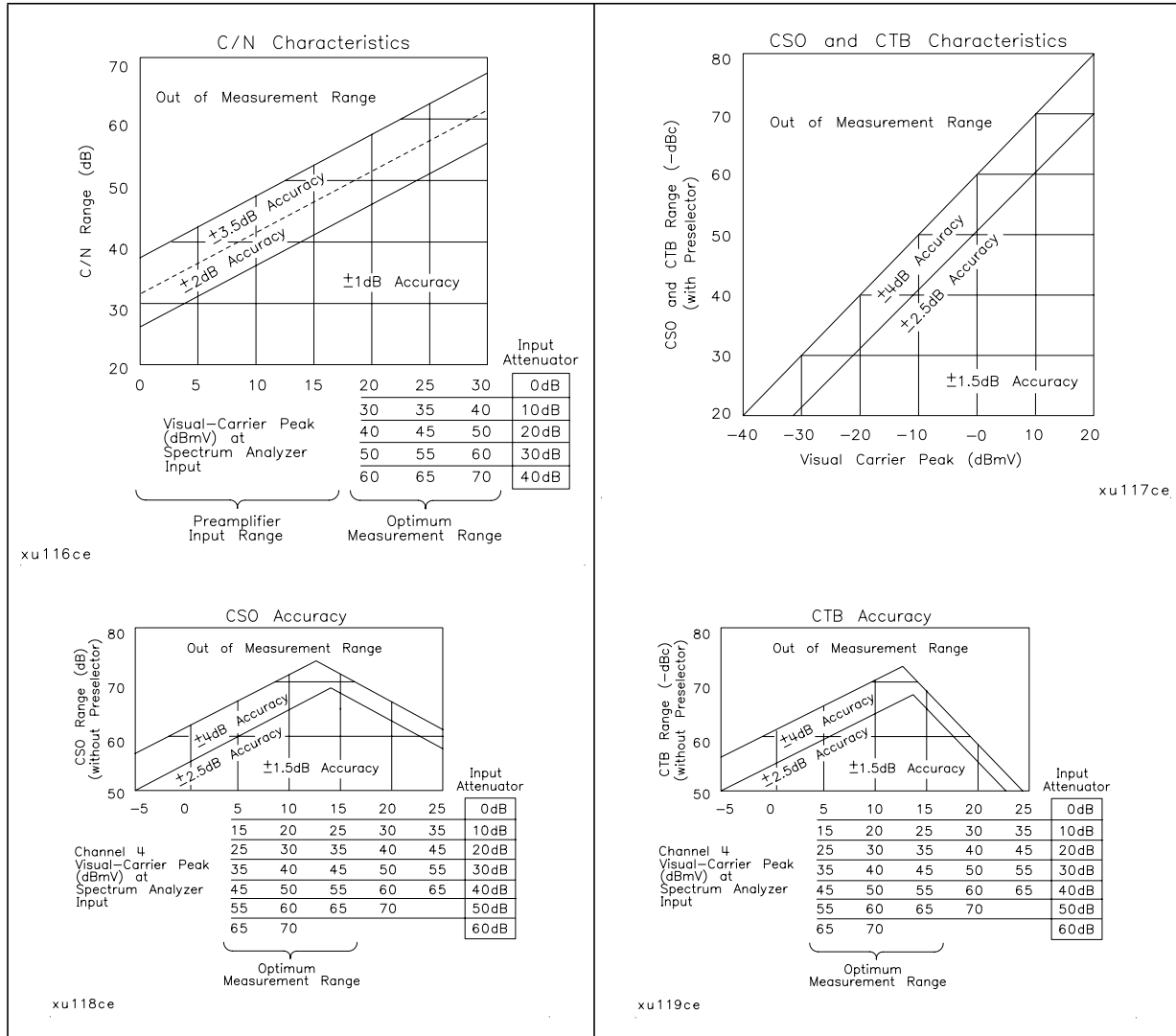
Marker Readout Resolution (digitizing resolution) Log Scale Linear Scale frequency ≤ 1 GHz frequency > 1 GHz	± 0.31 dB $\pm 0.59\%$ of reference level $\pm 1.03\%$ of reference level
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Frequency Response in Analog+ Mode (dc coupled)	(10 dB input attenuation, for spans ≤ 20 MHz)	
	Absolute [§]	Relative Flatness [†]
9 kHz to 2.9 GHz	± 2.0 dB	± 1.5 dB
2.75 GHz to 6.5 GHz (preselector peaked)	± 2.5 dB	± 2.0 dB
[†] Referenced to midpoint between highest and lowest frequency response deviations. [§] Referenced to 300 MHz CAL OUT.		

Cable TV Measurement Characteristics

Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	$\pm 2.0\%$ for $C/N > 40$ dB

FM Deviation	Peak reading of FM deviation
Range	± 100 kHz
Resolution	100 Hz
Accuracy	± 1.5 kHz



C/N, CSO, and CTB Measurements

The four graphs summarize the combined 8591C cable TV analyzer or 8590 E-Series spectrum analyzers, and 85721A characteristics for C/N, CSO, and CTB testing on cable TV systems with up to 99 channels and up to +9 dB amplitude tilt. C/N, CSO, and CTB measurement accuracies and ranges can be read from the relevant graphs. They depend upon the visual carrier peak level and the measurement reading. For C/N measurements with a preselector, there is no optimum range and the accuracy boundaries drop by the preselector's insertion loss (typically 2 dB).

Crossmodulation

Range

Resolution

Accuracy

Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.

60 dB, usable to 65 dB

0.1 dB

±2.0 dB for xmod. <40 dB, C/N >40 dB

±2.6 dB for xmod. <50 dB, C/N >40 dB

±4.6 dB for xmod. <60 dB, C/N >40 dB

Option Characteristics

Demod Tune Listen (<i>Option 102 or 103</i>)	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
TV Trigger (<i>Options 101 and 102</i>) Carrier Level for Trigger Compatible Formats Field Selection Trigger Polarity Line Selection	Triggers sweep of the analyzer after the sync pulse of a selected line of a TV video field. Top 60% of linear display NTSC, PAL, SECAM Even, odd, non-interlaced Positive, negative 10 to 1021

Tracking Generator Characteristics (Option 010)

Tracking Drift (Usable in a 1 kHz RBW after 5-minute warmup)	1.5 kHz/5 minute
RF Power Off Residuals 9 kHz to 2.9 GHz	<-120 dBm
Dynamic Range (difference between maximum power out and tracking generator feedthrough)	>109 dB
Output Attenuator Repeatability 9 kHz to 300 MHz 300 kHz to 300 MHz 300 MHz to 2.0 GHz 2.0 GHz to 2.9 GHz	±0.1 dB ±0.1 dB ±0.2 dB ±0.3 dB

Output VSWR	
0 dB Attenuator	<3.0:1
8 dB Attenuator	<1.5:1

TRACKING GENERATOR OUTPUT ACCURACY, Option 010 (after CAL TRK GEN in auto-coupled mode, Frequency > 10 MHz, 25°C ± 10°C)					
TG Output Power Level	Attenuator Setting	Relative Accuracy (at 300 MHz referred to -20 dBm)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to -20 dBm)	Absolute Accuracy
-1 to -10 dBm	0 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
-10 to -18 dB	8 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
-20 dBm	16 dB	Reference	0.75 dB	2.0 dB	2.75 dB
-18 to -26 dBm	16 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
-26 to -34 dBm	24 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
-34 to -42 dBm	32 dB	1.6 dB	2.35 dB	3.6 dB	4.35 dB
-42 to -50 dBm	40 dB	1.8 dB	2.55 dB	3.8 dB	4.55 dB
-50 to -58 dBm	48 dB	2.0 dB	2.75 dB	4.0 dB	4.75 dB
-58 to -66 dBm	56 dB	2.1 dB	2.85 dB	4.1 dB	4.85 dB

Quasi-Peak Detector Characteristics (Option 103)

Quasi-Peak Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation (Option 102, 103, or 301)

Input Level	> (−60 dBm + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz nominal
Range	10 kHz to 1 MHz
Bandwidth	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Physical Characteristics

Front-Panel Inputs and Outputs

INPUT 50Ω	
Connector	Type N female
Impedance	50 Ω nominal

RF OUT (Option 010)	
Connector	Type N female
Impedance	50 Ω nominal

PROBE POWER [‡]	
Voltage/Current	+15 Vdc, $\pm 7\%$ at 150 mA max. –12.6 Vdc $\pm 10\%$ at 150 mA max.
[‡] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.5 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.	

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>0 dBm

EXT REF IN	
Connector	BNC female
	Note: Analyzer noise sideband and spurious response performance may be affected by the quality of the external reference used.
Input Amplitude Range	–2 to +10 dBm
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	–10 to –60 dBm
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EARPHONE (<i>Option 102 or 103</i>)	
Connector	1/8 inch monaural jack

EXT ALC INPUT (<i>Option 010</i>)	
Input Impedance	>10 k Ω
Polarity	Use with negative detector

EXT KEYBOARD (<i>Option 041 or 043</i>)	
Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.	

EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (TTL).

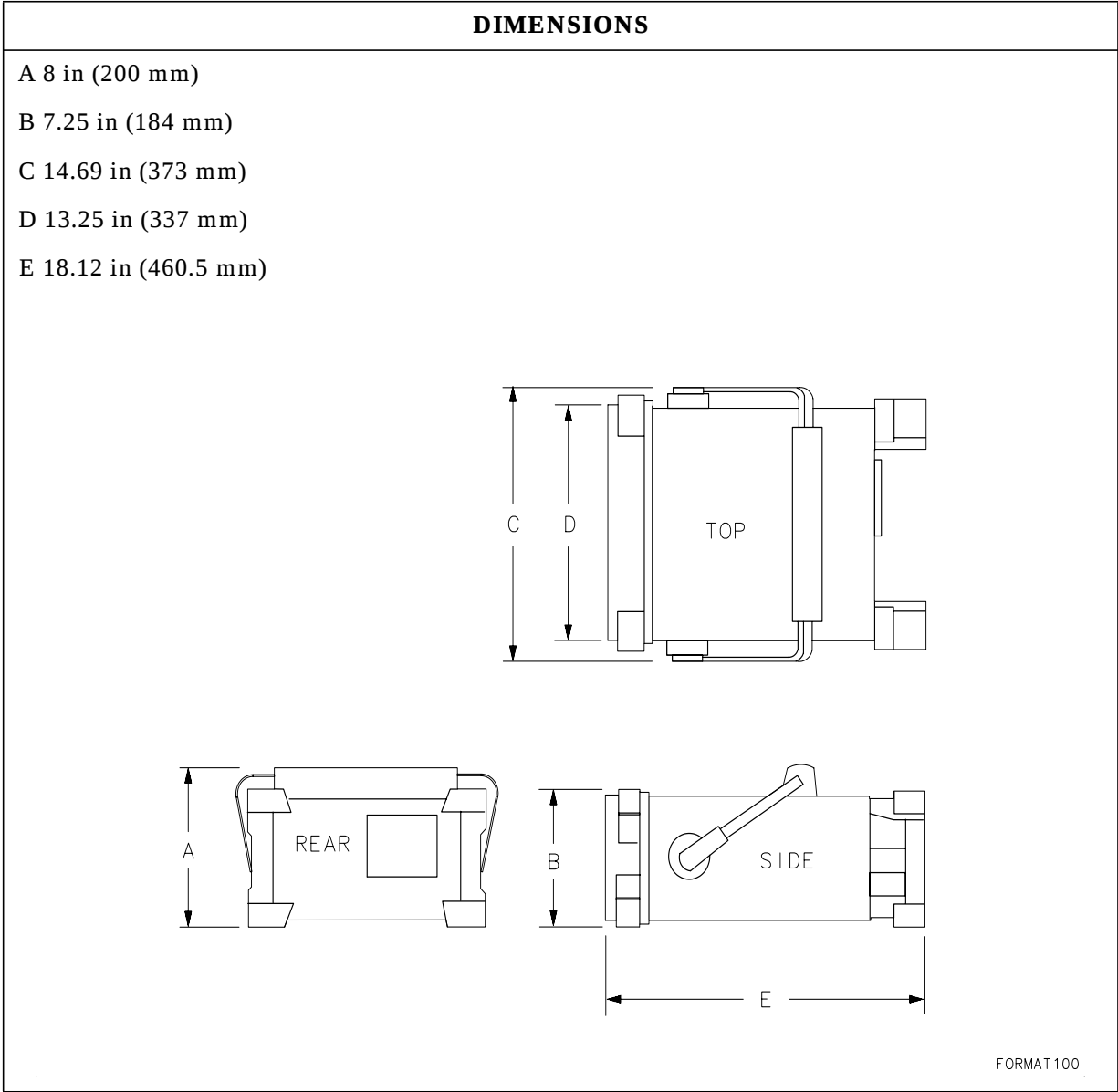
GATE TRIGGER INPUT (<i>Option 105 or 107</i>)	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT (<i>Option 105 or 107</i>)	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

LO OUTPUT (<i>Option 009 or 010</i>) Connector Impedance Frequency Range Output Level	Note: LO output must be terminated in 50 Ω SMA female 50 Ω nominal 3.0 to 6.8214 GHz +11 to +18 dBm
SWEEP + TUNE OUTPUT (<i>Option 009</i>) Connector Impedance (dc coupled) Range Sweep + Tune Output	 BNC female 2 k Ω 0 to +10 V 0.36 V/GHz of center frequency
HI-SWEEP IN/OUT Connector Output Input	 BNC female High = sweep, Low = retrace (TTL) Open collector, low stops sweep.
MONITOR OUTPUT (Spectrum Analyzer Display) Connector Format SYNC NRM SYNC NTSC SYNC PAL	 BNC female Internal Monitor NTSC Compatible 15.75 kHz horizontal rate 60 Hz vertical rate PAL Compatible 15.625 kHz horizontal rate 50 Hz vertical rate

REMOTE INTERFACE	
GPIB and Parallel (<i>Option 041</i>)	10833A, B, C or D and 25 pin subminiature D-shell, female for parallel
GPIB Codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28
RS-232 and Parallel (<i>Option 043</i>)	9 pin subminiature D-shell, male for RS-232 and 25 pin subminiature D-shell, female for parallel
SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp
TV IN (<i>Option 107</i>)	
Connector	75 Ω BNC female
Impedance	75 Ω nominal
TV TRIG OUT (<i>Options 101 and 102</i>)	
Connector	BNC female
Amplitude	Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

AUX INTERFACE				
Connector Type: 9 Pin Subminiature “D”				
Connector Pinout				
Pin #	Function	Current	“Logic” Mode	“Serial Bit” Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7 [†]	–15 Vdc ±7%	150 mA	—	—
8*	+5 Vdc ±5%	150 mA	—	—
9 [†]	+15 Vdc ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants. [†] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.6 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net	
8595E	16.4 kg (36 lb)
Shipping	
8595E	19.1 kg (42 lb)



10

**8596E Specifications and
Characteristics**

This chapter contains specifications and characteristics for the 8596E Spectrum Analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first and are followed by the characteristics.

General	General specifications.
Frequency	Frequency-related specifications and characteristics.
Amplitude	Amplitude-related specifications and characteristics.
Cable TV	Cable TV measurement specifications and characteristics.
Option	Option-related specifications and characteristics.
Physical	Input, output and physical characteristics.

The distinction between specifications and characteristics is described as follows.

- Specifications describe warranted performance over the temperature range 0 °C to +50 °C (unless otherwise noted). The spectrum analyzer will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum analyzer is turned on, and after the CAL frequency and CAL amplitude routines have been run.
- Characteristics provide useful, but non-warranted information about the functions and performance of the spectrum analyzer. Characteristics are specifically identified.
- Typical Performance, where listed, is not warranted, but indicates performance that most units will exhibit.
- Nominal Value indicates the expected, but not warranted, value of the parameter.

General Specifications

All specifications apply over 0 °C to +55 °C unless equipped with Option 015 or 016. The analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the analyzer is turned on and after CAL FREQ, CAL AMPTD and CAL YTF have been run.

Temperature Range	
Operating	0 °C to +55 °C*
Storage	–40 °C to +75 °C
* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.	
EMI Compatibility	
Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A.	
Audible Noise	
<37.5 dBA pressure and <5.0 Bels power (ISODP7779)	
Power Requirements	
ON (LINE 1)	90 to 132 V rms, 47 to 440 Hz 195 to 250 V rms, 47 to 66 Hz Power consumption <500 VA; <180 W
Standby (LINE 0)	Power consumption <7 W
Environmental Specifications	
Type tested to the environmental specifications of Mil-T-28800 class 5	

Frequency Specifications

Frequency Range		
dc Coupled		9 kHz to 12.8 GHz
ac Coupled		100 kHz to 12.8 GHz
Band	LO Harmonic (N)	
0	1 [—]	9 kHz to 2.9 GHz (dc coupled)
0	1 [—]	100 kHz to 2.9 GHz (ac coupled)
1	1 [—]	2.75 GHz to 6.5 GHz
2	2 [—]	6.0 GHz to 12.8 GHz

Frequency Reference		
Aging		$\pm 2 \times 10^{-6}/\text{year}$
Settability		$\pm 0.5 \times 10^{-6}$
Temperature Stability		$\pm 5 \times 10^{-6}$

Precision Frequency Reference (Option 004)		
Aging		$\pm 1 \times 10^{-7}/\text{year}$
Settability		$\pm 2.2 \times 10^{-8}$
Temperature Stability		$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy		
(Start, Stop, Center, Marker)		$\pm(\text{frequency readout} \times \text{frequency reference error}^* + \text{span accuracy} + 1\% \text{ of span} + 20\% \text{ of RBW} + 100 \text{ Hz} \times N^{\dagger\dagger})^{\ddagger}$
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See “Frequency Characteristics.”		
$\dagger\dagger$ N = LO harmonic. See “Frequency Range.”		
$\ddagger$ See “Drift” under “Stability” in Frequency Characteristics.		

Marker Count Accuracy[†]	
Frequency Span $\leq 10 \text{ MHz} \times N^{\dagger\dagger}$	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 100 \text{ Hz} \times N^{\dagger\dagger})$
Frequency Span $> 10 \text{ MHz} \times N^{\dagger\dagger}$	$\pm(\text{marker frequency} \times \text{frequency reference error}^* + \text{counter resolution} + 1 \text{ kHz} \times N^{\dagger\dagger})$
Counter Resolution	
Frequency Span $\leq 10 \text{ MHz} \times N^{\dagger\dagger}$	Selectable from 10 Hz to 100 kHz
Frequency Span $> 10 \text{ MHz} \times N^{\dagger\dagger}$	Selectable from 100 Hz to 100 kHz
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy and temperature stability). See “Frequency Characteristics.” [†] Marker level to displayed noise level $> 25 \text{ dB}$, $\text{RBW}/\text{Span} \geq 0.01$. Span $\leq 300 \text{ MHz}$. Reduce SPAN annotation is displayed when $\text{RBW}/\text{Span} < 0.01$. ^{††} N = LO harmonic. See “Frequency Range.”	

Frequency Span	
Range	0 Hz (zero span), $(10 \text{ kHz} \times N^{\dagger\dagger}) \text{ kHz}$ to 12.8 GHz
(Option 130)	0 Hz (zero span), $(1 \text{ kHz} \times N^{\dagger\dagger})$ to 12.8 GHz
Resolution	Four digits or $20 \text{ Hz} \times N^{\dagger\dagger}$, whichever is greater.
Accuracy (single band spans)	
Span $\leq 10 \text{ MHz} \times N^{\dagger\dagger}$	$\pm 2\%$ of span [§]
Span $> 10 \text{ MHz} \times N^{\dagger\dagger}$	$\pm 3\%$ of span
^{††} N = LO harmonic. See “Frequency Range.” [§](Option 130) For spans $< 10 \text{ kHz} \times N^{\dagger\dagger}$, add an additional $10 \text{ Hz} \times N^{\dagger\dagger}$ resolution error.	

Frequency Sweep Time Range <i>(Option 101)</i> Accuracy 20 ms to 100 s 20 μ s to <20 ms <i>(Option 101)</i> Sweep Trigger	 20 ms to 100 s 20 μ s to 100 s for span 0 Hz $\pm 3\%$ $\pm 2\%$ Free Run, Single, Line, Video, External
Resolution Bandwidth Range <i>(Option 130)</i> Accuracy 3 dB bandwidths	 1 kHz to 3 MHz, 8 selectable resolution (3 dB) bandwidths in 1-3-10 sequence. 9 kHz and 120 kHz (6 dB) EMI bandwidths. Adds 30, 100 and 300 Hz (3 dB) bandwidths and 200 Hz (6 dB) EMI bandwidth. $\pm 20\%$
Stability Noise Sidebands >10 kHz offset from CW signal >20 kHz offset from CW signal >30 kHz offset from CW signal Residual FM 1 kHz RBW, 1 kHz VBW 30 Hz RBW, 30 Hz VBW <i>(Option 130)</i> System-Related Sidebands >30 kHz offset from CW signal	 (1 kHz RBW, 30 Hz VBW and sample detector) $\leq -90 \text{ dBc/Hz} + 20 \text{ Log } N^{\dagger\dagger}$ $\leq -100 \text{ dBc/Hz} + 20 \text{ Log } N^{\dagger\dagger}$ $\leq -105 \text{ dBc/Hz} + 20 \text{ Log } N^{\dagger\dagger}$ $\leq (250 \times N^{\dagger\dagger}) \text{ Hz pk-pk in 100 ms}$ $\leq (30 \times N^{\dagger\dagger}) \text{ Hz pk-pk in 300 ms}$ $\leq -65 \text{ dBc} + 20 \text{ Log } N^{\dagger\dagger}$
$\dagger\dagger$ N = LO harmonic. See "Frequency Range."	

Calibrator Output Frequency	300 MHz $\pm$ (freq. ref. error* $\times$ 300 MHz)
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability). See "Frequency Characteristics."	
Comb Generator Frequency	100 MHz fundamental frequency
Accuracy	$\pm 0.007\%$ of comb tooth frequency

Amplitude Specifications

Amplitude specifications do not apply for Analog+ mode and negative peak detector mode except as noted in “Amplitude Characteristics.”

Amplitude Range	–112 dBm to +30 dBm
(Option 130)	–127 dBm to +30 dBm

Maximum Safe Input Level	
Average Continuous Power	+30 dBm (1 W, 7.1 V rms), input attenuation ≥ 10 dB.
Peak Pulse Power	+50 dBm (100 W) for <10 μ s pulse width and $<1\%$ duty cycle, input attenuation ≥ 30 dB.
dc	0 V (dc coupled) 50 V (ac coupled)

Gain Compression[‡]	
>10 MHz	≤ 0.5 dB (total power at input mixer* –10 dBm)

* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).

[‡] (Option 130) If RBW ≤ 300 Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes $\leq$ Reference Level + 10 dB.

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
	1 kHz RBW	30 Hz RBW (Option 130)
400 kHz to 2.9 GHz	≤ -110 dBm	≤ -125 dBm
2.75 GHz to 6.5 GHz	≤ -112 dBm	≤ -127 dBm
6.0 GHz to 12.8 GHz	≤ -100 dBm	≤ -115 dBm

Spurious Responses Second Harmonic Distortion >10 MHz >2.75 GHz Third Order Intermodulation Distortion >10 MHz Other Input Related Spurious	<−70 dBc for −40 dBm tone at input mixer.* <−100 dBc for −10 dBm tone at input mixer* (or below displayed average noise level). <−70 dBc for two −30 dBm tones at input mixer* and >50 kHz separation. <−65 dBc at ≥30 kHz offset, for −20 dBm tone at input mixer ≤12.8 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).	

Residual Responses 150 kHz to 2.9 GHz (Band 0) 2.75 GHz to 6.5 GHz (Band 1)	(Input terminated and 0 dB attenuation) <−90 dBm <−90 dBm
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Display Range Log Scale Linear Scale Scale Units	0 to −70 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; eight divisions displayed. eight divisions dBm, dBmV, dBμV, mV, mW, nV, nW, pW, μV, μW, V, and W
--	--

Marker Readout Resolution Fast Sweep Times for Zero Span 20 μs to 20 ms (<i>Option 101 or 301</i>) Frequency ≤ 1 GHz Frequency > 1 GHz	0.05 dB for log scale 0.05% of reference level for linear scale 0.7% of reference level for linear scale 1.0% of reference level for linear scale
---	--

Reference Level	
Range	
Log Scale	Minimum amplitude to maximum amplitude**
Linear Scale	–99 dBm to maximum amplitude**
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to –20 dBm reference level, 10 dB input attenuation, at a single frequency, in a fixed RBW)
0 dBm to –59.9 dBm	±(0.3 dB + 0.01 × dB from –20 dBm)
–60 dBm and below	
1 kHz to 3 MHz RBW	±(0.6 dB + 0.01 × dB from –20 dBm)
30 Hz to 300 Hz RBW (<i>Option 130</i>)	±(0.7 dB + 0.01 × dB from –20 dBm)
** See “Amplitude Range.”	

Frequency Response (dc coupled)	(10 dB input attenuation)	
	Absolute[§]	Relative Flatness[†]
9 kHz to 2.9 GHz	±1.5 dB	±1.0 dB
2.75 GHz to 6.5 GHz (preselector peaked)	±2.0 dB	±1.5 dB
6.0 GHz to 12.8 GHz (preselector peaked)	±2.5 dB	±2.0 dB
† Referenced to midpoint between highest and lowest frequency response deviations.		
§ Referenced to 300 MHz CAL OUT.		

Calibrator Output	
Amplitude	–20 dBm ±0.4 dB

Absolute Amplitude Calibration Uncertainty^{‡‡}	±0.15 dB
‡‡ Uncertainty in the measured absolute amplitude of the CAL OUT signal at the reference settings after CAL FREQ and CAL AMPTD self-calibration. Absolute amplitude reference settings are: Reference Level –20 dBm; Input Attenuation 10 dB; Center Frequency 300 MHz; Res BW 3 kHz; Video BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON, DC Coupled.	

Input Attenuator	
Range	0 to 70 dB, in 10 dB steps
Resolution Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz RBW)
3 kHz to 3 MHz RBW	± 0.4 dB
1 kHz RBW	± 0.5 dB
30 Hz to 300 Hz (<i>Option 130</i>)	± 0.6 dB
Linear to Log Switching	± 0.25 dB at reference level
Display Scale Fidelity	
Log Maximum Cumulative	
0 to -70 dB from Reference Level	
3 kHz to 3 MHz RBW	$\pm (0.3 \text{ dB} + 0.01 \times \text{dB from reference level})$
$\text{RBW} \leq 1 \text{ kHz}$	$\pm (0.4 \text{ dB} + 0.01 \times \text{dB from reference level})$
Log Incremental Accuracy	
0 to -60 dB from Reference Level	± 0.4 dB/4 dB
Linear Accuracy	$\pm 3\%$ of reference level

Cable TV Measurement Specifications

These specifications describe warranted performance of the spectrum analyzer and the 85721A cable TV measurements personality.

Input Configuration	75 Ω BNC Female
Channel Selection	Analyzer tunes to specified channels based upon selected tune configuration.
Tune Configuration	Standard, Off-the Air, HRC, IRC (T and FM channels also in channel mode)
Channel Range	1 to 158 and 201 to 300 (channel mode) 1 to 158 (system mode)
Channel Frequencies	Defined by Code of Federal Regulations, Title 47, Telecommunications, Parts 73.603, 76.605, 76.612
Frequency Range	5 to 1002 MHz (channel mode) 54 to 896 MHz (system mode)
Amplitude Range	-15 to +70 dBmV for S/N > 30 dB
Visual-Carrier Frequency	Visual-carrier frequency is counted
Frequency Reference* (Standard)	
Resolution	1 kHz
Accuracy	$\pm(7.5 \times 10^{-6} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 524 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 2.55 \text{ kHz}$
@643.25 MHz (Ch. 94)	$\pm 4.93 \text{ kHz}$
* Will not meet FCC frequency accuracy requirements.	
Precision Frequency Reference (Option 004)	
Resolution	100 Hz
Accuracy	$\pm(1.2 \times 10^{-7} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	$\pm 117 \text{ Hz}$
@325.25 MHz (Ch. 41)	$\pm 149 \text{ Hz}$
@643.25 MHz (Ch. 94)	$\pm 187 \text{ Hz}$

Visual-to-Aural Carrier Frequency Difference Difference Range Resolution Accuracy	Frequency difference between visual and aural carriers is counted. 4.1 to 4.9 MHz 100 Hz ± 221 Hz for precision frequency ref (std) ± 254 Hz for Option 704 frequency ref
Visual-Carrier Level Amplitude Range Resolution Absolute Accuracy Relative Accuracy	The peak amplitude of the visual carrier is measured to an absolute standard traceable to the National Institute of Standards and Technology. –15 to +70 dBmV 0.1 dB ± 2.0 dB for S/N > 30 dB ± 1.0 dB relative to adjacent channels in frequency ± 1.5 dB relative to all other channels
Visual-to-Aural Carrier Level Difference Difference Range Resolution Accuracy	The difference between peak amplitudes of the visual and aural carrier is measured. 0 to 25 dB 0.1 dB ± 0.75 dB for S/N > 30 dB
Hum/Low-Frequency Disturbance AM Range Resolution Accuracy	Power-line frequency and low-frequency disturbance measured on modulated and/or unmodulated carriers. May not be valid for scrambled channels. 0.5 to 10% 0.1% $\pm 0.4\%$ for hum $\leq 3\%$ $\pm 0.7\%$ for hum $\leq 5\%$ $\pm 1.3\%$ for hum $\leq 10\%$

Visual Carrier-to-Noise Ratio (C/N)*	The C/N is calculated from the visual-carrier peak level and the minimum noise level, normalized to 4 MHz noise bandwidth.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum C/N Range	Input level dependent - See graphs
C/N Resolution	0.1 dB
C/N Accuracy	Input level and measured C/N dependent ± 1.0 to ± 3.5 dB over optimum input range
* A preamplifier and preselector filter may be required to achieve specifications.	

CSO and CTB Distortion [†]	Manual composite second order (CSO) and composite triple beat (CTB) distortions are measured relative to the visual carrier peak and require momentary disabling of the carrier. Automatic measurements are made in the channel above the channel selected and assumes that it is unused. If the analyzer has Option 107, a non-interfering CSO measurement can be made.
Optimum Input Range	See the graphs in the characteristics section of this chapter.
Maximum CSO/CTB Range	Input level dependent - see graphs. 66 to 73 dB over optimum input range
Manual CSO/CTB Resolution	0.1 dB
System CSO/CTB Resolution	1 dB
CSO/CTB Accuracy	Input level and measured CSO/CTB dependent - See graphs ± 1.5 dB to ± 4.0 dB over optimum input range
[†] A preamplifier and preselector filter may be required to achieve specifications.	

System Frequency Response (flatness)

System amplitude variations are measured relative to a reference trace stored during the setup.

Frequency Response Setup	
Fast Sweep Time	2 s (default) for no scrambling
Slow Sweep Time	8 s (default) for fixed-amplitude scrambling
Reference-trace Storage	50 traces that include analyzer states

Frequency Response Test	
Range	1.0 dB/Div to 20 dB/Div (2 dB default)
Resolution	0.05 dB
Trace-flatness Accuracy	± 0.1 dB per dB deviation from a flat line and ± 0.75 dB maximum cumulative error
Trace-position Accuracy	0.0 dB for equal temperature at test locations and ± 0.4 dB maximum for different ambient temperatures

Option Specifications

Tracking Generator Specifications (Option 010)

All specifications apply over 0 °C to +55 °C.* The spectrum-analyzer/tracking-generator combination will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the spectrum-analyzer/tracking-generator is turned on and after CAL FREQ, CAL AMPTD, CAL TRK GEN, and TRACKING PEAK have been run.

* 0 °C to +50 °C with Option 015 or Option 016 operating and carrying case.

NOTE: There are two models of the tracking generator. One has a frequency range of 300 kHz to 2.9 GHz, typically analyzers with a serial prefix of 3431A and below. The newer tracking generator has a range of 9 kHz to 2.9 GHz, typically serial prefix of 3440A or higher. Check the front panel for the tracking generator output frequency range of the installed generator.

Warm-Up	30 minutes
Output Frequency Range*	9 kHz to 2.9 GHz 300 kHz to 2.9 GHz
* Refer to the "Note" in the description above.	

Output Power Level	
Range	–1 dBm to –66 dBm
Resolution	0.1 dB
Absolute Amplitude Accuracy (at 25 °C ±10 °C) (–20 dBm at 300 MHz)	±0.75 dB
Vernier [‡]	
Range	9 dB
Accuracy (at 25 °C ±10 °C) (–20 dBm at 300 MHz, 16 dB attenuation)	
Incremental	±0.20 dB/dB
Cumulative	±0.50 dB total
Output Attenuator	
Range	0 to 56 dB in 8 dB steps
[‡] See the Output Accuracy table in “Option Characteristics.”	

Output Power Sweep	
Range	(–10 dBm to –1 dBm) – (Source Attenuator Setting)
Resolution	0.1 dB

Output Flatness	
(referenced to 300 MHz, –20 dBm)	
Frequency > 10 MHz	±2.0 dB
Frequency ≤ 10 MHz	±3.0 dB

Spurious Output (–1 dBm output)	
Harmonic Spurs from 9 kHz to 2.9 GHz	
TG Output 9 kHz to 20 kHz	≤–15 dBc
TG Output 20 kHz to 2.9 GHz	≤–25 dBc
Harmonic Spurs from 300 kHz to 2.9 GHz	
TG Output 300 kHz to 2.9 GHz	≤–25 dBc
Nonharmonic Spurs from 9 kHz to 2.9 GHz	
TG Output 9 kHz to 2.0 GHz	≤–27 dBc
TG Output 2.0 GHz to 2.9 GHz	≤–23 dBc
Nonharmonic Spurs from 300 kHz to 2.9 GHz	
TG Output 300 kHz to 2.0 GHz	≤–27 dBc
TG Output 2.0 GHz to 2.9 GHz	≤–23 dBc
LO Feedthrough	
LO Frequency 3.9217 to 6.8214 GHz	≤–16 dBm

Tracking Generator Feedthrough	
400 kHz to 2.9 GHz	<–110 dBm

Quasi-Peak Detector Specifications (Option 103)

The specifications for Quasi-Peak Detector (Option 103) have been based on the following:

- The spectrum analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radio électriques (CISPR) Section 1, Clause 2.

The 200 Hz bandwidth is available only with Option 130. The 1 kHz resolution bandwidth may be used to approximate a quasi-peak measurement without Option 130. A quasi-peak measurement using the 1 kHz bandwidth will be greater than or equal to a quasi-peak measurement using a 200 Hz bandwidth.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the spectrum analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, resolution bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB)	Frequency Band		
Pulse Repetition Frequency (Hz)	120 kHz EMI BW 0.03 to 1 GHz	9 kHz EMI BW 0.15 to 30 MHz	(Option 130) 200 Hz EMI BW 10 to 150 kHz
1000	+8.0 ± 1.0	+4.5 ± 1.0	—
100	0 dB (reference)*	0 dB (reference)*	+4.0 ± 1.0
60	—	—	+3.0 ± 1.0
25	—	—	0 dB (reference)*
20	−9.0 ± 1.0	−6.5 ± 1.0	—
10	−14.0 ± 1.5	−10.0 ± 1.5	−4.0 ± 1.0
5	—	—	−7.5 ± 1.5
2	−26.0 ± 2.0	−20.5 ± 2.0	−13.0 ± 2.0
1	−28.5 ± 2.0	−22.5 ± 2.0	−17.0 ± 2.0
Isolated Pulse	−31.5 ± 2.0	−23.5 ± 2.0	−19.0 ± 2.0
* Reference pulse amplitude accuracy relative to a 66 dBμV CW signal is <1.5 dB. CISPR reference pulse: 0.044 μVs for 0.03 to 1 GHz, 0.316 μVs for 0.15 to 30 MHz, 13.5 ± 1.5 μVs for 10 to 150 kHz (Option 130).			

**Time Gated Spectrum Analysis Specifications
(Option 105 or Option 107)**

GATE DELAY	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(1 \mu\text{s} + (0.01\% \times \text{GATE DELAY Readout}))^\dagger$
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 μ s to 65.535 ms
Resolution	1 μ s
Accuracy	$\pm(0.2 \mu\text{s} + (0.01\% \times \text{GATE LENGTH Readout}))$
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 μ s	± 0.8 dB
$\geq 2 \mu\text{s}$	± 0.5 dB
Linear Scale	
< 2 μ s	$\pm 1.0\%$ of REFERENCE LEVEL
$\geq 2 \mu\text{s}$	$\pm 0.7\%$ of REFERENCE LEVEL
[†] Up to 1 μ s jitter due to 1 μ s resolution of gate delay clock. [§] With GATE ON enabled and triggered, CW Signal, Peak Detector Mode.	

TV Receiver/Video Tester (Option 107)

(Option 107 required; appropriate TV line must be selected)

Non-interfering color	(requires FCC composite, NTC-7, or CCIR 17 and CCIR 330 test signal)
Differential Gain Accuracy	6% 50 averages (default)
Differential Phase Accuracy	4° 50 averages (default)
Chroma-luminance Delay Inequality Accuracy	±45 ns
Frequency Range	50 MHz to 850 MHz
Amplitude Range	+10 dBmV to +50 dBmV at coupler input (10 dB loss)
Coupler (part number 0955-0704)	Insertion loss: < 2 dB Coupled output: -10 dB ±0.5 dB

Non-Interfering Tests with Gate On*	
C/N and CSO (quiet line must be selected)	See graphs for accuracy
In-channel Frequency Response Accuracy	±0.5 dB within channel
* A preamplifier and preselector filter may be required to achieve specifications.	

Frequency Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Frequency Reference	
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$
Aging	$\pm 1.0 \times 10^{-7}/\text{day}$

Precision Frequency Reference (Option 004)	
Aging	$5 \times 10^{-10}/\text{day}$, 7-day average after being powered on for 7 days.
Warm-Up	1×10^{-8} after 30 minutes on.
Initial Achievable Accuracy	$\pm 2.2 \times 10^{-8}$ after being powered on for 24 hours.

Stability	
Drift* (after warmup at stabilized temperature)	
Frequency Span $\leq (10 \times N^{\dagger})$ MHz	$\leq (2 \times N^{\dagger\dagger})$ kHz/minute of sweep time*
* Because the analyzer is locked at the center frequency before each sweep, drift occurs only during the time of one sweep. For Line, Video, or External trigger, additional drift occurs while waiting for the appropriate trigger signal. $\dagger\dagger$ N = LO harmonic. See "Frequency Range."	

Resolution Bandwidth (–3 dB)	
Range	1 kHz to 3 MHz, selectable in 1, 3 and 10 increments, and 5 MHz. Resolution bandwidths may be selected manually, or coupled to frequency span.
(Option 130)	Adds 30 Hz, 100 Hz, and 300 Hz bandwidths.
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio	
Resolution Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
60 dB/3 dB Bandwidth Ratio (Option 130)	
Resolution Bandwidth	
30 Hz to 300 Hz	10:1

Video Bandwidth (–3 dB)	
Range	30 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy $\pm 30\%$ and 3 MHz. Video bandwidths may be selected manually, or coupled to resolution bandwidth and frequency span.
(Option 130)	Adds 1, 3, and 10 Hz bandwidths.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
(Option 130)	Bandwidths below 30 Hz are digital bandwidths with anti-aliasing filtering.

FFT Bandwidth Factors	FLATTOP	HANNING	UNIFORM
Noise Equivalent Bandwidth [†]	3.63×	1.5×	1×
3 dB Bandwidth [†]	3.60×	1.48×	1×
Sidelobe Height	<−90 dB	−32 dB	−13 dB
Amplitude Uncertainty	0.10 dB	1.42 dB	3.92 dB
Shape Factor (60 dB BW/3 dB BW)	2.6	9.1	>300
[†] Multiply entry by one-divided-by-sweep time.			

Amplitude Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Log Scale Switching Uncertainty	Negligible error
Demod Tune Listen	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
Input Attenuation Uncertainty* Attenuator Setting 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	±0.2 dB Reference ±0.4 dB ±0.5 dB ±0.7 dB ±0.8 dB ±1.0 dB ±1.0 dB
* Referenced to 10 dB input attenuator setting. See the “Specifications” table under “Frequency Response.”	

ac Coupled Insertion Loss [‡]	
100 kHz to 300 kHz	0.7 dB
300 kHz to 1 MHz	0.2 dB
1 MHz to 100 MHz	0.07 dB
100 MHz to 2.9 GHz	0.05 dB + (0.06 × F) ^{‡‡} dB
2.9 GHz to 6.5 GHz	0.05 dB + (0.13 × F) ^{‡‡} dB
6.5 GHz to 12.8 GHz	0.65 dB + (0.04 × F) ^{‡‡} dB
[‡] Referenced to dc coupled mode. ^{‡‡} F = frequency in GHz.	

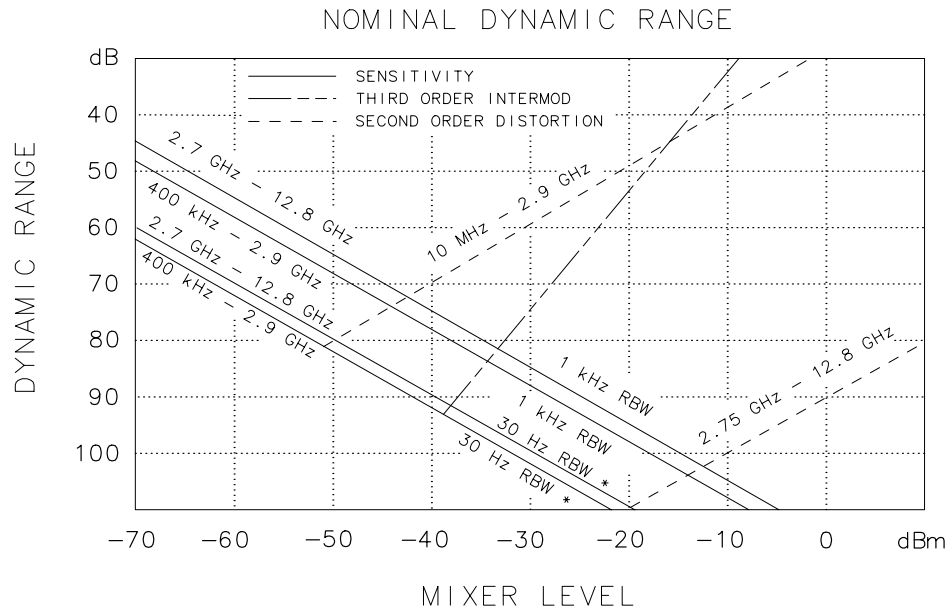
Input Attenuator 10 dB Step Uncertainty	(Attenuator setting 10 to 70 dB)
	±0.8 dB/10 dB

Input Attenuator Repeatability	±0.05 dB
---------------------------------------	----------

RF Input SWR		
10 dB attenuation	dc Coupled	ac Coupled
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
100 kHz to 300 kHz	1.3:1	2.3:1
300 kHz to 1 MHz	1.3:1	1.4:1
1 MHz to 2.9 GHz	1.3:1	1.3:1
2.9 GHz to 6.5 GHz	1.5:1	1.6:1
6.5 GHz to 12.8 GHz	1.6:1	1.9:1

Unpeaked Frequency Response (dc coupled)	(10 dB input attenuation)	
Without Preselector Peaking, Span ≤ 50 MHz	Absolute [§]	Relative Flatness [†]
2.75 GHz to 6.5 GHz	±4.0 dB	±3.5 dB
6.0 GHz to 12.8 GHz	±4.5 dB	±4.0 dB
[†] Referenced to midpoint between highest and lowest frequency response deviations. [§] Referenced to 300 MHz CAL OUT.		

DYNAMIC RANGE



* Option 130

XF637

When an air discharge of up to 8 kV according to IEC 801-2/1991 occurs to the shells of the BNC connectors on the rear panel of the instrument spikes may be seen on the CRT display. Discharges to center pins of any of the connectors may cause damage to the associated circuitry.

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.

In these modes, the following analyzer specifications remain as specifications:

Amplitude Range	Calibrator Output
Maximum Safe Input Level	

In these modes, the following analyzer specifications are reduced to characteristics:

Gain Compression	Reference Level
Displayed Average Noise Level	Resolution Bandwidth Switching
Spurious Responses	Linear to Log Switching
Residual Responses	Display Scale Fidelity
Display Range	Display Scale Fidelity for Narrow Bandwidths

Finally, the following analyzer specifications:

Marker Readout Resolution	Frequency Response
are replaced by the characteristics which follow in this subsection.	

Marker Readout Resolution	
(digitizing resolution)	
Log Scale	±0.31 dB
Linear Scale	-
frequency ≤ 1 GHz	±0.59% of reference level
frequency > 1 GHz	±1.03% of reference level

Frequency Response in Analog+ Mode (dc coupled)	(10 dB input attenuation, for spans ≤ 20 MHz)	
	Absolute[§]	Relative Flatness[†]
	9 kHz to 2.9 GHz	±2.0 dB
	2.75 GHz to 6.5 GHz (preselector peaked)	±2.5 dB
	6.0 GHz to 12.8 GHz (preselector peaked)	±3.0 dB
		±2.5 dB

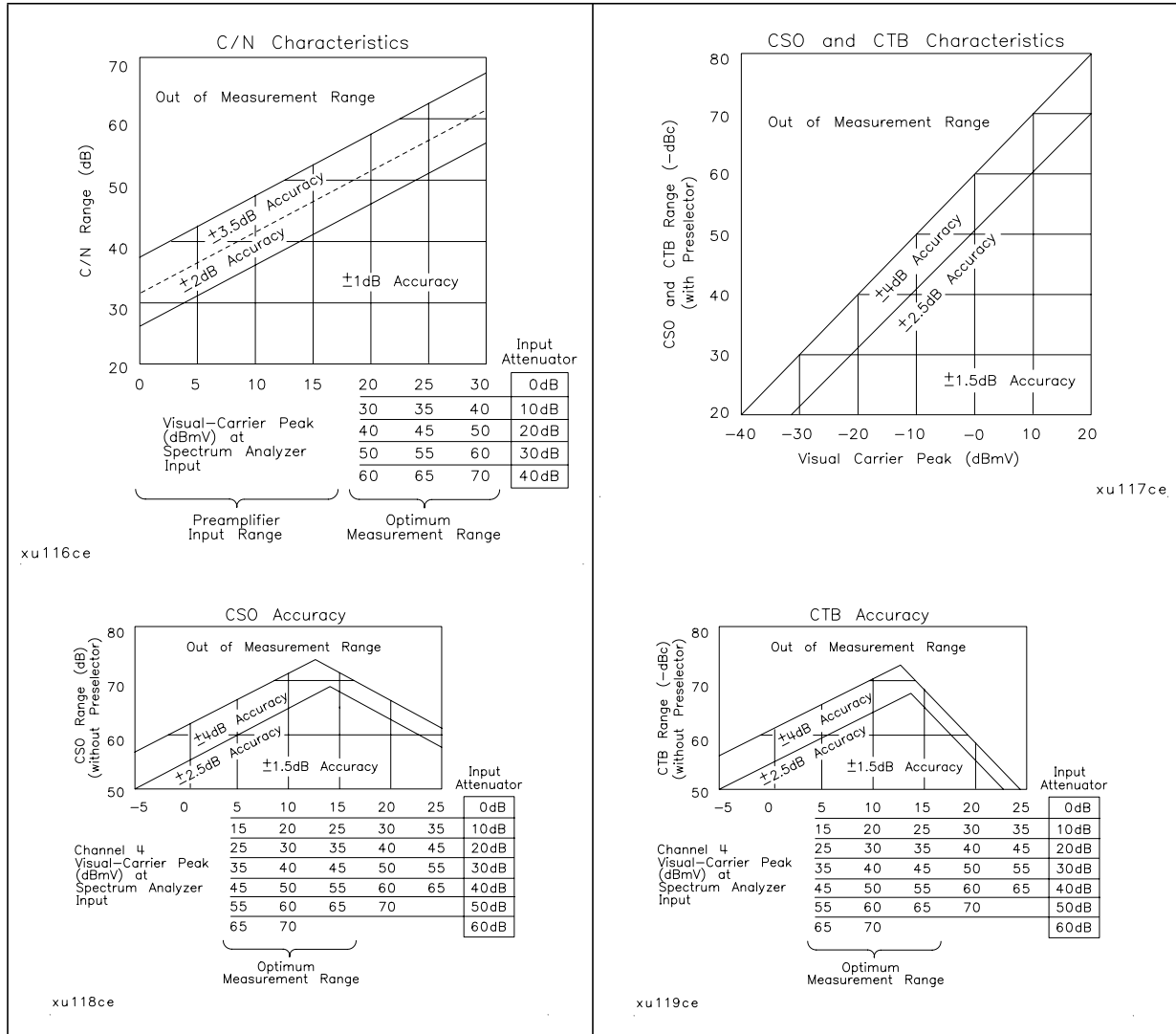
[†] Referenced to midpoint between highest and lowest frequency response deviations.

[§] Referenced to 300 MHz CAL OUT.

Cable TV Measurement Characteristics

Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	$\pm 2.0\%$ for $C/N > 40$ dB

FM Deviation	Peak reading of FM deviation
Range	± 100 kHz
Resolution	100 Hz
Accuracy	± 1.5 kHz



C/N, CSO, and CTB Measurements

The four graphs summarize the combined 8591C cable TV analyzer or 8590 E-Series spectrum analyzers, and 85721A characteristics for C/N, CSO, and CTB testing on cable TV systems with up to 99 channels and up to +9 dB amplitude tilt. C/N, CSO, and CTB measurement accuracies and ranges can be read from the relevant graphs. They depend upon the visual carrier peak level and the measurement reading. For C/N measurements with a preselector, there is no optimum range and the accuracy boundaries drop by the preselector's insertion loss (typically 2 dB).

Crossmodulation

Range

Resolution

Accuracy

Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.

60 dB, usable to 65 dB

0.1 dB

±2.0 dB for xmod. <40 dB, C/N >40 dB ±2.6 dB for xmod. <50 dB, C/N >40 dB ±4.6 dB for xmod. <60 dB, C/N >40 dB

Option Characteristics

Demod Tune Listen (<i>Option 102 or 103</i>)	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.
TV Trigger (<i>Options 101 and 102</i>) Carrier Level for Trigger Compatible Formats Field Selection Trigger Polarity Line Selection	Triggers sweep of the analyzer after the sync pulse of a selected line of a TV video field. Top 60% of linear display NTSC, PAL, SECAM Even, odd, non-interlaced Positive, negative 10 to 1021

Tracking Generator Characteristics (Option 010)

Tracking Drift (Usable in a 1 kHz RBW after 5-minute warmup)	1.5 kHz/5 minute
RF Power Off Residuals 9 kHz to 2.9 GHz	<-120 dBm
Dynamic Range (difference between maximum power out and tracking generator feedthrough)	>109 dB
Output Attenuator Repeatability 9 kHz to 300 MHz 300 kHz to 300 MHz 300 MHz to 2.0 GHz 2.0 GHz to 2.9 GHz	±0.1 dB ±0.1 dB ±0.2 dB ±0.3 dB

Output VSWR	
0 dB Attenuator	<3.0:1
8 dB Attenuator	<1.5:1

TRACKING GENERATOR OUTPUT ACCURACY, Option 010 (after CAL TRK GEN in auto-coupled mode, Frequency > 10 MHz, 25°C ± 10°C)					
TG Output Power Level	Attenuator Setting	Relative Accuracy (at 300 MHz referred to -20 dBm)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to -20 dBm)	Absolute Accuracy
-1 to -10 dBm	0 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
-10 to -18 dB	8 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
-20 dBm	16 dB	Reference	0.75 dB	2.0 dB	2.75 dB
-18 to -26 dBm	16 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
-26 to -34 dBm	24 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
-34 to -42 dBm	32 dB	1.6 dB	2.35 dB	3.6 dB	4.35 dB
-42 to -50 dBm	40 dB	1.8 dB	2.55 dB	3.8 dB	4.55 dB
-50 to -58 dBm	48 dB	2.0 dB	2.75 dB	4.0 dB	4.75 dB
-58 to -66 dBm	56 dB	2.1 dB	2.85 dB	4.1 dB	4.85 dB

Quasi-Peak Detector Characteristics (Option 103)

Quasi-Peak Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation (Option 102, 103, or 301)

Input Level	> (−60 dBm + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz nominal
Range	10 kHz to 1 MHz
Bandwidth	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Physical Characteristics

Front-Panel Inputs and Outputs

INPUT 50Ω	
Connector	Type N female
Impedance	50 Ω nominal

100 MHz COMB OUT	
Connector	SMA female
Output Level	+27 dBm
Frequency	100 MHz fundamental

RF OUT (<i>Option 010</i>)	
Connector	Type N female
Impedance	50 Ω nominal

PROBE POWER ‡	
Voltage/Current	+15 Vdc, ±7% at 150 mA max. –12.6 Vdc ±10% at 150 mA max.

‡ Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.5 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.	
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Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>0 dBm
EXT REF IN	
Connector	BNC female
	Note: Analyzer noise sideband and spurious response performance may be affected by the quality of the external reference used.
Input Amplitude Range	-2 to +10 dBm
Frequency	10 MHz
AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	-10 to -60 dBm
Impedance	50 Ω nominal
AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)
EARPHONE (<i>Option 102 or 103</i>)	
Connector	1/8 inch monaural jack
EXT ALC INPUT (<i>Option 010</i>)	
Input Impedance	>10 k Ω
Polarity	Use with negative detector
EXT KEYBOARD (<i>Option 041 or 043</i>)	
	Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.

EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (TTL).

GATE TRIGGER INPUT <i>(Option 105 or 107)</i>	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT <i>(Option 105 or 107)</i>	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

LO OUTPUT <i>(Option 009 or 010)</i>	
	Note: LO output must be terminated in 50 Ω
Connector	SMA female
Impedance	50 Ω nominal
Frequency Range	3.0 to 6.8214 GHz
Output Level	+11 to +18 dBm

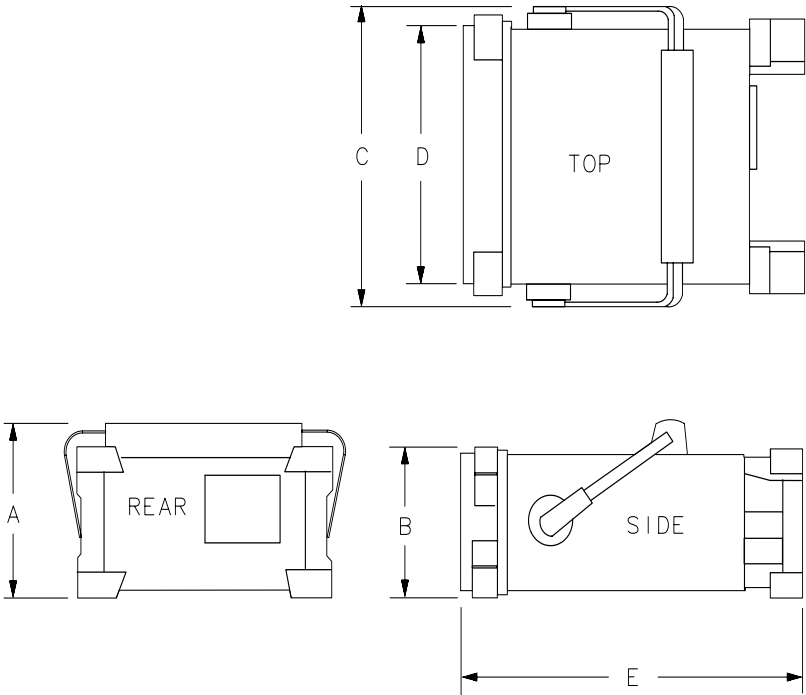
SWEEP + TUNE OUTPUT <i>(Option 009)</i>	
Connector	BNC female
Impedance (dc coupled)	2 k Ω
Range	0 to +10 V
Sweep + Tune Output	0.36 V/GHz of center frequency

HI-SWEEP IN/OUT	
Connector	BNC female
Output	High = sweep, Low = retrace (TTL)
Input	Open collector, low stops sweep.

Chapter 10

AUX INTERFACE				
Connector Type: 9 Pin Subminiature “D”				
Connector Pinout				
Pin #	Function	Current	“Logic” Mode	“Serial Bit” Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7 [†]	–15 Vdc ±7%	150 mA	—	—
8*	+5 Vdc ±5%	150 mA	—	—
9 [†]	+15 Vdc ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants. [†] Total current drawn from the +15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the –12.6 Vdc on the PROBE POWER and the –15 Vdc on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net 8596E	16.4 kg (36 lb)
Shipping 8596E	19.1 kg (42 lb)

DIMENSIONS	
A 8 in (200 mm) B 7.25 in (184 mm) C 14.69 in (373 mm) D 13.25 in (337 mm) E 18.12 in (460.5 mm)	
 Technical drawings of the 8596E device showing three views: Top, Rear, and Side. The Top view shows dimensions C and D. The Rear view shows dimension A. The Side view shows dimensions B and E.	
FORMAT100	

11

If You Have a Problem

Your spectrum analyzer is built to provide dependable service. It is unlikely that you will experience a problem. However, Agilent Technologies' worldwide sales and service organization is ready to provide the support you need.

Calling Agilent Technologies Sales and Service Offices

Sales and service offices are located around the world to provide complete support for your spectrum analyzer. To obtain servicing information or to order replacement parts, contact the nearest Agilent Technologies Sales and Service Office listed in Table 11-1. In any correspondence or telephone conversations, refer to the spectrum analyzer by its model number and full serial number. With this information, the Agilent Technologies representative can quickly determine whether your unit is still within its warranty period.

Before calling Agilent Technologies

Before calling Agilent Technologies or returning the spectrum analyzer for service, please make the checks listed in “Check the basics.” If you still have a problem please read the warranty printed at the front of this guide. If your spectrum analyzer is covered by a separate maintenance agreement, please be familiar with its terms.

Agilent Technologies offers several maintenance plans to service your spectrum analyzer after warranty expiration. Call your Agilent Technologies Sales and Service Office for full details.

If you want to service the spectrum analyzer yourself after warranty expiration, contact your Agilent Technologies Sales and Service Office to obtain the most current test and maintenance information.

Check the basics

In general, a problem can be caused by a hardware failure, a software error, or a user error. Often problems may be solved by repeating what was being done when the problem occurred. A few minutes spent in performing these simple checks may eliminate time spent waiting for instrument repair.

- ☐ Check that the spectrum analyzer is plugged into the proper ac power source.
- ☐ Check that the line socket has power.
- ☐ Check that the rear-panel voltage selector switch is set correctly.
- ☐ Check that the line fuse is good.
- ☐ Check that the spectrum analyzer is turned on.
- ☐ Check that the light above **LINE** is on, indicating that the power supply is on.
- ☐ Check that the other equipment, cables, and connectors are connected properly and operating correctly.
- ☐ Check the equipment settings in the procedure that was being used when the problem occurred.
- ☐ Check that the test being performed and the expected results are within the specifications and capabilities of the spectrum analyzer. Refer to the appropriate specifications chapter in this guide.
- ☐ Check the spectrum analyzer display for error messages. Refer to the *8590 E-Series and L-Series Spectrum Analyzer User's Guide*.
- ☐ Check operation by performing the verification procedures in this guide. Record all results in the appropriate performance test record.
- ☐ Check for problems similar to those described in the *8590 E-Series and L-Series Spectrum Analyzer User's Guide*.

By internet, phone, or fax, get assistance with all your test and measurement needs.

Table 11-1 Contacting Agilent

Online assistance: www.agilent.com/find/assist

United States (tel) 1 800 452 4844	Japan (tel) (+81) 426 56 7832 (fax) (+81) 426 56 7840	New Zealand (tel) 0 800 738 378 (fax) (+64) 4 495 8950	Europe (tel) (+31) 20 547 2323 (fax) (+31) 20 547 2390
Canada (tel) 1 877 894 4414 (fax) (905) 282 6495	Latin America (tel) (305) 269 7500 (fax) (305) 269 7599	Australia (tel) 1 800 629 485 (fax) (+61) 3 9210 5947	

Asia Call Center Numbers

Country	Phone Number	Fax Number
Singapore	1-800-375-8100	(65) 836-0252
Malaysia	1-800-828-848	1-800-801664
Philippines	(632) 8426802 1-800-16510170 (PLDT Subscriber Only)	(632) 8426809 1-800-16510288 (PLDT Subscriber Only)
Thailand	(088) 226-008 (outside Bangkok) (662) 661-3999 (within Bangkok)	(66) 1-661-3714
Hong Kong	800-930-871	(852) 2506 9233
Taiwan	0800-047-866	(886) 2 25456723
People's Republic of China	800-810-0189 (preferred) 10800-650-0021	10800-650-0121
India	1-600-11-2929	000-800-650-1101

Returning the Spectrum Analyzer for Service

Use the information in this section if it is necessary to return the spectrum analyzer to Agilent Technologies.

Package the spectrum analyzer for shipment

Use the following steps to package the spectrum analyzer for shipment to Agilent Technologies for service:

1. Fill in a service tag and attach it to the instrument. Please be as specific as possible about the nature of the problem. Send a copy of any or all of the following information:
 - Any error messages that appeared on the spectrum analyzer display.
 - A completed Performance Test record. (located in Chapter 3 or Chapter 3a).
 - Any other specific data on the performance of the spectrum analyzer.

CAUTION

Damage to the spectrum analyzer can result from using packaging materials other than those specified. Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the instrument or prevent it from shifting in the carton. Styrene pellets cause equipment damage by generating static electricity and by lodging in the spectrum analyzer fan.

2. Use the original packaging materials or a strong shipping container that is made of double-walled, corrugated cardboard with 159 kg (350 lb) bursting strength. The carton must be both large enough and strong enough to accommodate the spectrum analyzer and allow at least 3 to 4 inches on all sides of the spectrum analyzer for packing material.
3. If you have a front-panel cover, install it on the instrument; if not, protect the front panel with cardboard.
4. Surround the instrument with at least 3 to 4 inches of packing material, or enough to prevent the instrument from moving in the carton. If packing foam is not available, the best alternative is SD-240 Air Cap™ from Sealed Air Corporation (Hayward, CA 94545). Air Cap looks like a plastic sheet covered with 1-1/4 inch air-filled bubbles. Use the pink Air Cap to reduce static electricity. Wrap the instrument several times in the material to both protect the instrument and prevent it from moving in the carton.

5. Seal the shipping container securely with strong nylon adhesive tape.
6. Mark the shipping container “FRAGILE, HANDLE WITH CARE” to ensure careful handling.
7. Retain copies of all shipping papers.

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Safety and Regulatory Information

Your spectrum analyzer is built to provide dependable service. It is unlikely that you will experience a problem. However, Agilent Technologies' worldwide sales and service organization is ready to provide the support you need.

Safety Symbols

The following safety symbols are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument.

WARNING

The *warning* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a *warning* sign until the indicated conditions are fully understood and met. until the indicated conditions are fully understood and met.

CAUTION

The *caution* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a *caution* sign.

General Safety Considerations

WARNING	<i>Before this instrument is switched on, make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact.</i> Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal can result in personal injury.
WARNING	This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited.
WARNING	If this instrument is to be energized via an external autotransformer for voltage reduction, make sure that its common terminal is connected to a neutral (earthed pole) of the power supply.
WARNING	No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.
WARNING	There are many points in the instrument which can, if contacted, cause personal injury. Be extremely careful. Any adjustments or service procedures that require operation of the instrument with protective covers removed should be performed only by trained service personnel.
WARNING	If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.
WARNING	For continued protection against fire hazard replace line fuse only with same type and rating (F 5A/250V). The use of other fuses or material is prohibited.

WARNING	The power cord is connected to internal capacitors that may remain live for 10 seconds after disconnecting the plug from its power supply.
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WARNING	The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch (disconnecting device).
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CAUTION	<i>Before this instrument is switched on, make sure its primary power circuitry has been adapted to the voltage of the ac power source.</i>
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Failure to set the ac power input to the correct voltage could cause damage to the instrument when the ac power cable is plugged in.

CAUTION	Always use the three-prong ac power cord supplied with this instrument. Failure to ensure adequate earth grounding by not using this cord may cause instrument damage.
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CAUTION	Before switching on this instrument, make sure that the line voltage selector switch is set to the voltage of the power supply and the correct fuse is installed. Assure the supply voltage is in the specified range.
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This instrument has autoranging line voltage input; be sure the supply voltage is within the specified range.

CAUTION	This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 1010 and 664 respectively.
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CAUTION	Ventilation Requirements: When installing the instrument in a cabinet, the convection into and out of the instrument must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the instrument by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.
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Regulatory Information

IEC Compliance

This instrument has been designed and tested in accordance with IEC Publications 1010, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

Instrument Markings



The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the documentation.



The CE mark is a registered trademark of the European Community. (If accompanied by a year, it is when the design was proven.)



The CSA mark is a registered trademark of the Canadian Standards Association.



This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.



This symbol indicates that the input power required is AC.



This symbol is used to mark the ON position of the power line switch.



This symbol is used to mark the OFF position of the power line switch.

Declaration of Conformity

DECLARATION OF CONFORMITY											
According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014											
Manufacturer's Name:	Agilent Technologies, Inc.										
Manufacturer's Address:	1400 Fountaingrove Parkway Santa Rosa, CA 95403-1799 USA										
Declares that the products											
Product Name:	Spectrum Analyzer										
Model Number :	8591C, 8591E, 8593E, 8594E, 8594Q, 8595E, 8596E										
Product Options:	This declaration covers all options of the above products.										
Conform to the following product specifications:											
<table border="0"><thead><tr><th><u>Standard</u></th><th><u>Limit</u></th></tr></thead><tbody><tr><td>EMC: CISPR 11:1990 / EN 55011-1991</td><td>Group 1, Class A</td></tr><tr><td>IEC 801-2:1984/EN 50082-1:1992</td><td>4 kV CD, 8 kV AD</td></tr><tr><td>IEC 801-3:1984/EN 50082-1:1992</td><td>3 V/m, 80 - 1000 MHz</td></tr><tr><td>IEC 801-4:1988/EN 50082-1:1992</td><td>0.5 kV sig., 1 kV power</td></tr></tbody></table>	<u>Standard</u>	<u>Limit</u>	EMC: CISPR 11:1990 / EN 55011-1991	Group 1, Class A	IEC 801-2:1984/EN 50082-1:1992	4 kV CD, 8 kV AD	IEC 801-3:1984/EN 50082-1:1992	3 V/m, 80 - 1000 MHz	IEC 801-4:1988/EN 50082-1:1992	0.5 kV sig., 1 kV power	
<u>Standard</u>	<u>Limit</u>										
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IEC 801-3:1984/EN 50082-1:1992	3 V/m, 80 - 1000 MHz										
IEC 801-4:1988/EN 50082-1:1992	0.5 kV sig., 1 kV power										
Safety: IEC 61010-1:1990 + A1:1992 + A2:1995 / EN 61010-1:1993 +A2:1995 CAN/CSA-C22.2 No. 1010.1-92											
Supplementary Information: The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carry the CE-marking accordingly.											
											
Santa Rosa, CA, USA 28 March 2001	Greg Pfeiffer/Quality Engineering Manager										
For further information, please contact your local Agilent Technologies sales office, agent or distributor.											

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