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										◊

[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 1-3 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								◊

[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 1-5 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	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]						•		
74.	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 1-7 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	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								◊

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[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.

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: ≥10 MΩ Accuracy: ±10 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: ±0.002 Hz External Timebase	5334A/B	P,A,T
Frequency Standard	Frequency: 10 MHz Timebase Accuracy (Aging): $<1 \times 10^{-9}$/day	5061B	P,A
Measuring Receiver	Compatible with Power Sensors dB Relative Mode Resolution: 0.01 dB Reference Accuracy: ±1.2%	8902A	P,A,T
Microwave Frequency Counter	Frequency Range: 9 MHz to 7 GHz Timebase Accuracy (Aging): $<5 \times 10^{-10}$/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 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 ±2%, single pulse mode Level –2 V to +2 V Transition Time: 6 ns ±10%, ±1 ns Pulse Width: 150 ns to 3 µs ±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: <±1.8 dB Frequency Accuracy: <±10 kHz @ 7 GHz	8566A/B	P,A,T
Synthesized Sweeper[f]	Frequency Range: 10 MHz to 22 GHz Frequency Accuracy (CW): ± 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: ±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."

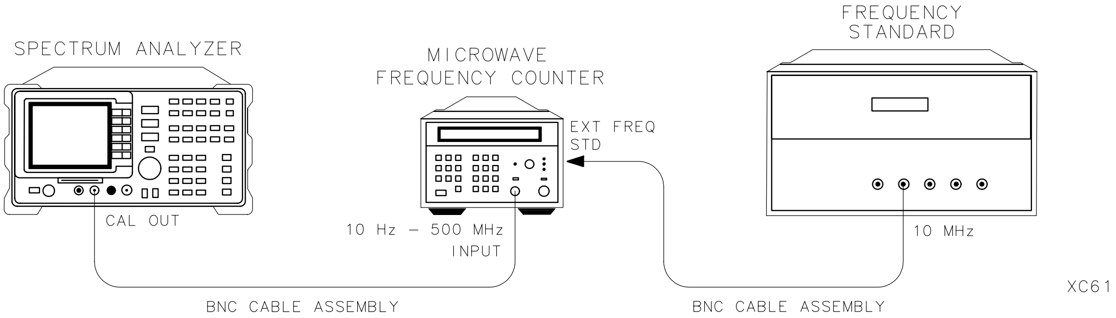
Equipment Required

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.

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)*

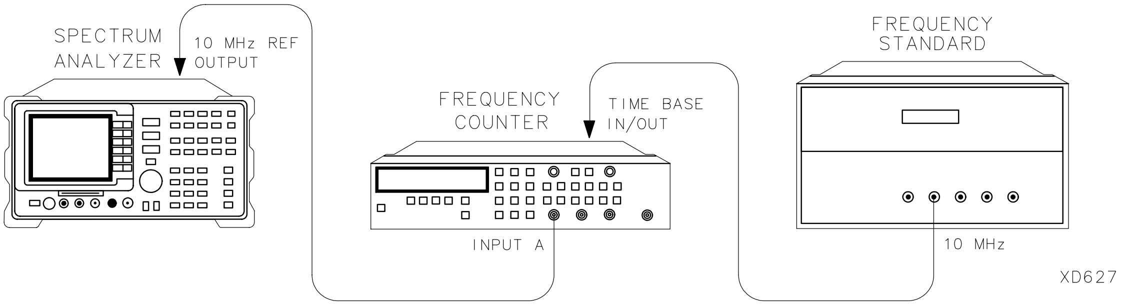
Procedure

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 ____________

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/EEX,** 10, **CHS/EEX**, 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)

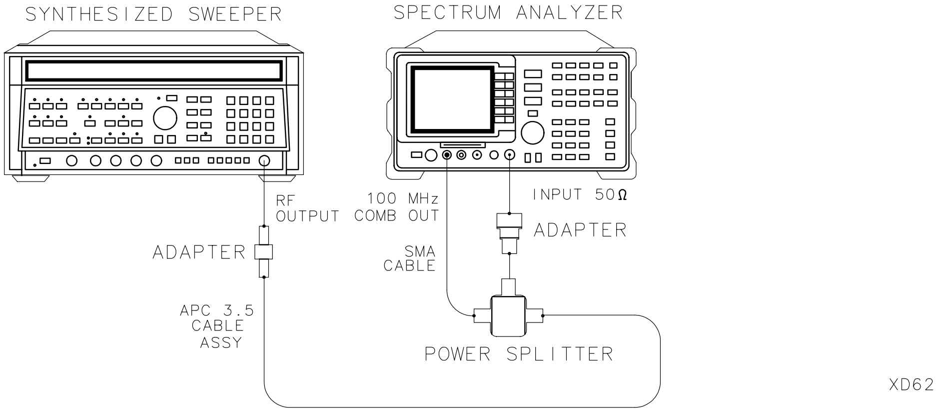
Adapter, 3.5 mm (f) to 3.5 mm (f)

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



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.

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.

Figure 2-4 8591E and 8591C Frequency Readout Accuracy Test Setup

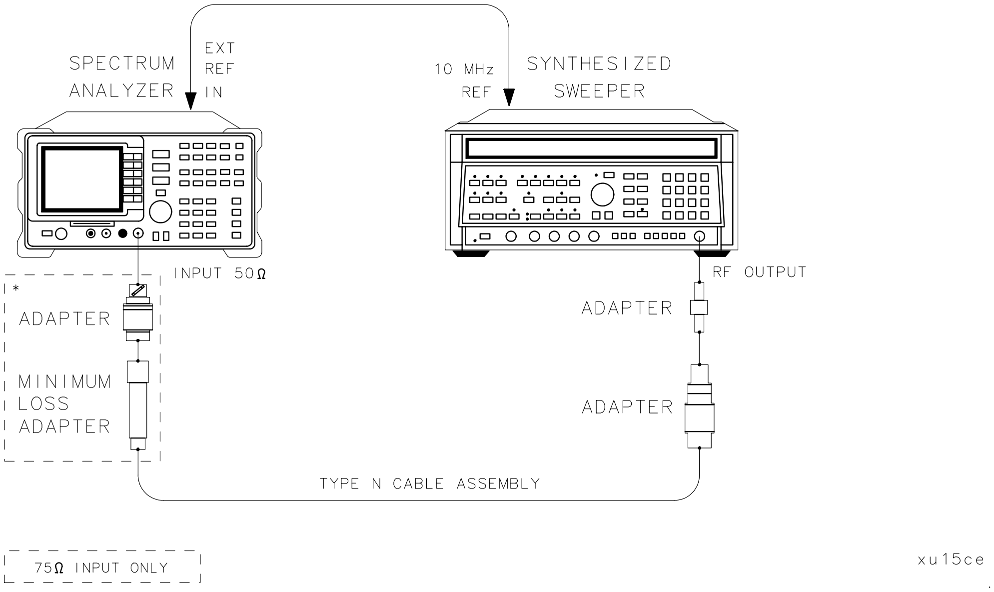
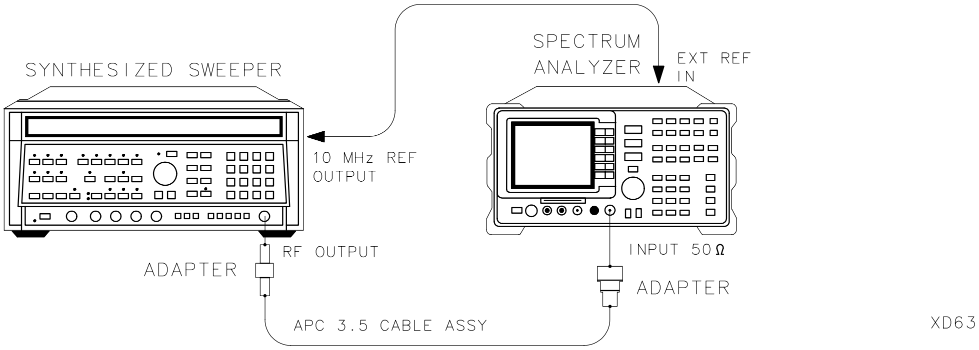


Figure 2-5 8594E and 8594Q Frequency Readout Accuracy Test Setup



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

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		
Span (MHz)	**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**

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

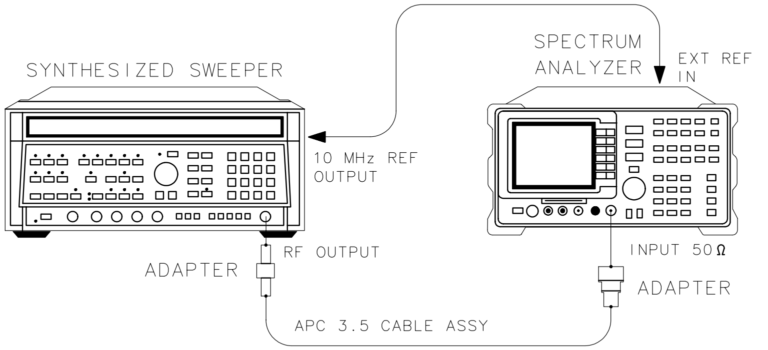
Perform “Part 1: Frequency Readout Accuracy” before “Part 2: Marker Count Accuracy.”

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**



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.

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**

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 p 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.

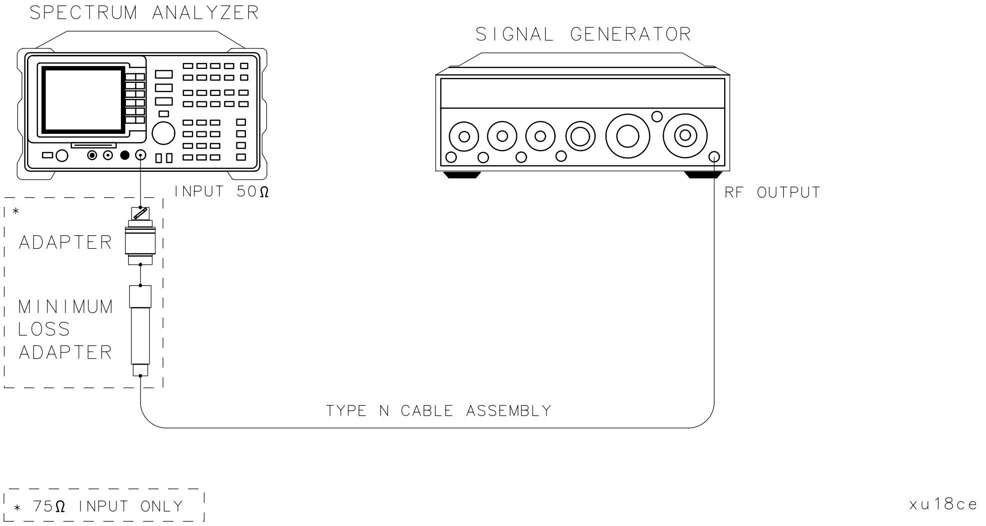
Part 1: Noise Sideband Suppression at 10 kHz

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:

    NSS = Maximum NSL – 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.

   NSS = Maximum NSL – 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.

   NSL = Maximum NSL – 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 Hz noise-power = (noise-power in dBc) – (10 x log[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

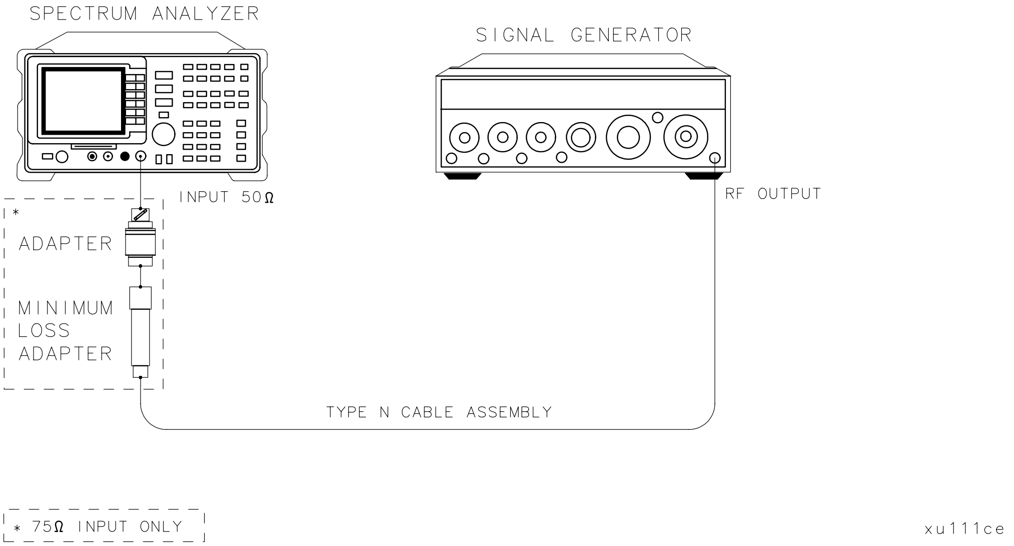
1. Set the signal generator controls as follows:

   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** ∆.

7. On the spectrum analyzer, press **FREQUENCY,** ⇑ (step-up key).

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

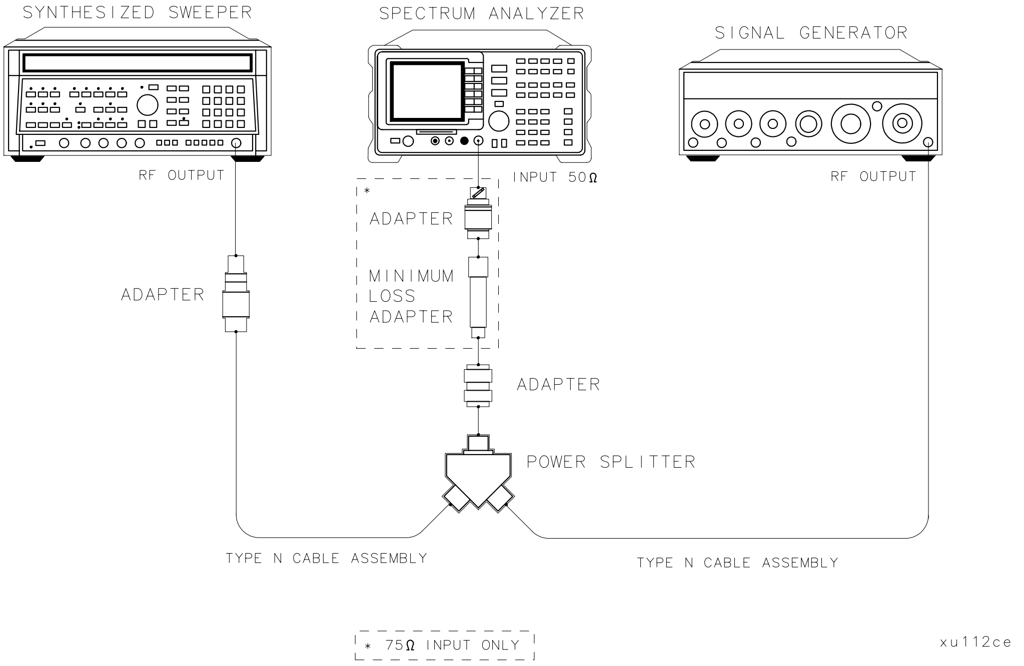
Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

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**

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.

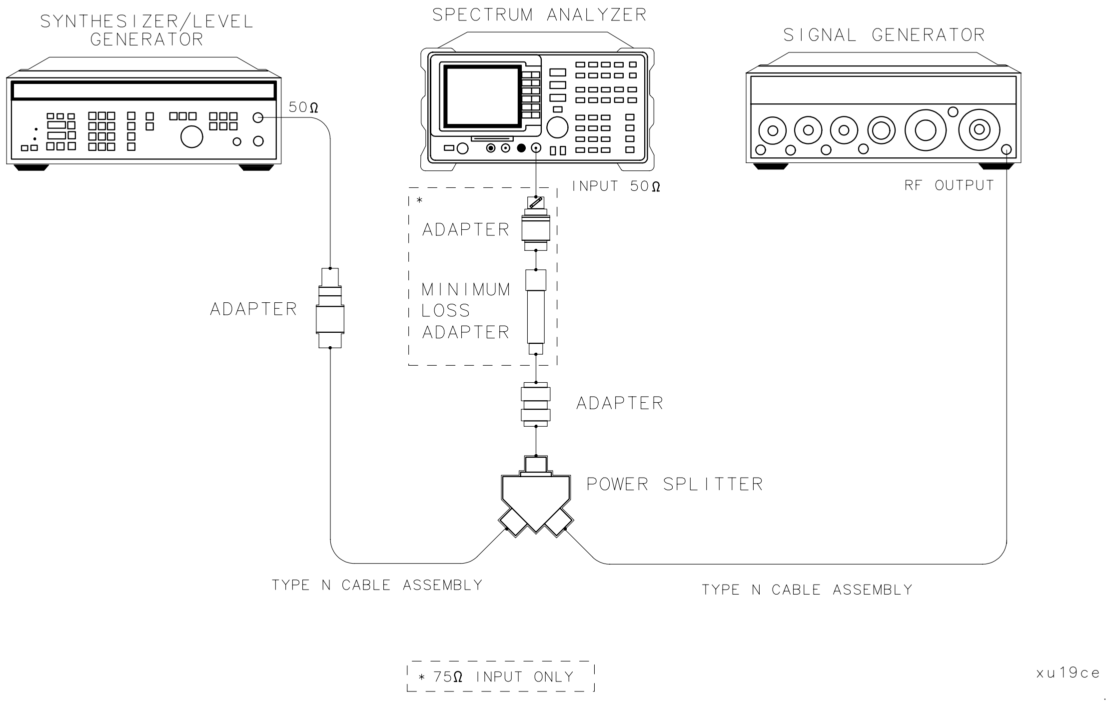
   The MKR reading should be within the 1446 MHz and 1554 MHz.

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.

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 settingslisted 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 ∆**, **NEXT PEAK**

16. Record the MKR-∆ 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.

Table 2-8 Frequency Span Readout Accuracy

Spectrum Analyzer Span Setting	Synthesizer/ Level Generator Frequency	Synthesized Sweeper Frequency	MKR-Δ Reading		
	MHz	**MHz**	**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
Option 130 Only:					
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 ±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.”

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

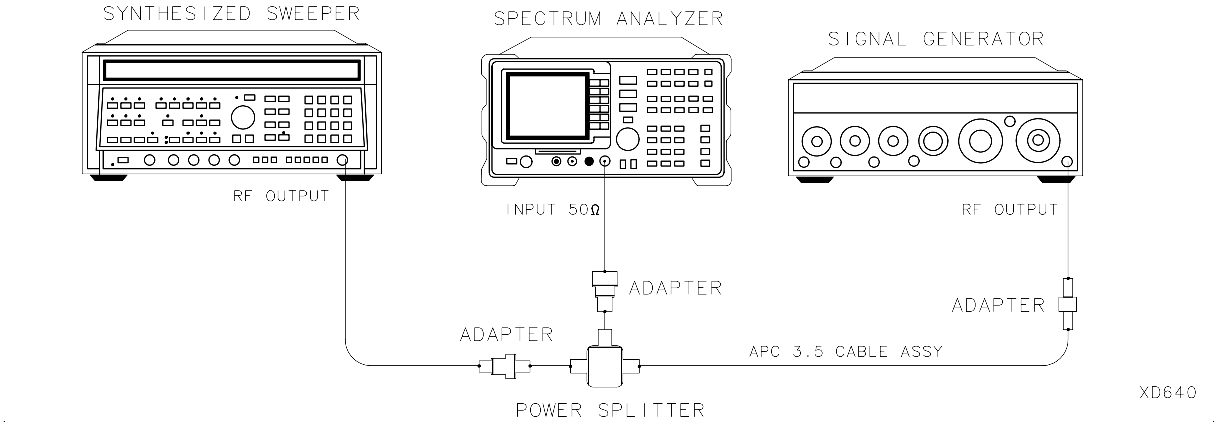
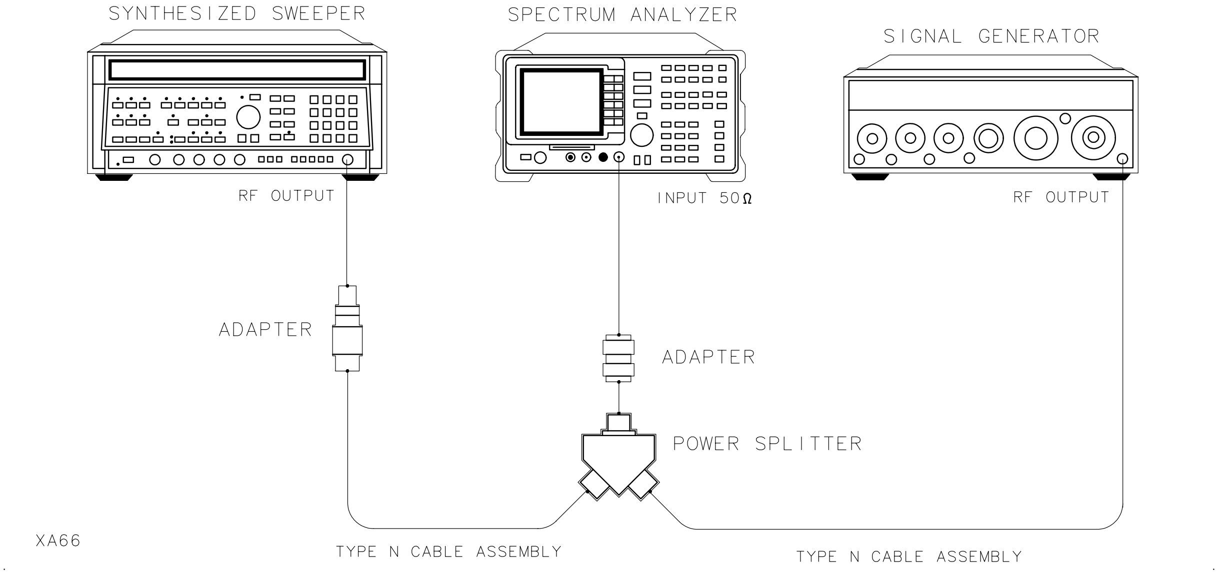


Figure 2-12 For 8594E and 8594Q Only - Frequency Span Readout Test Setup



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**

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 **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**. The marker Δ should be on the right-most signal.

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

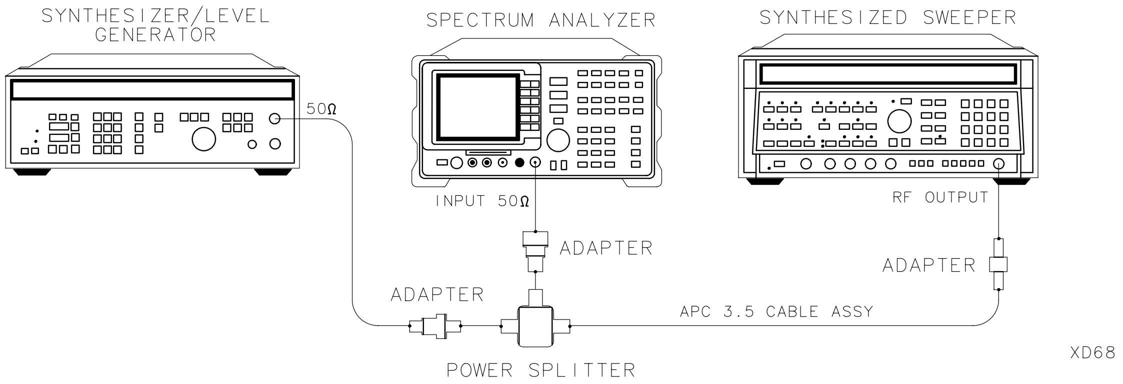
   The MKR reading should be within the 1446 MHz and 1554 MHz.

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 2-13. 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



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 ∆, **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-∆ frequency reading in the performance verification test record as TR Entry 2. The MKR-∆ 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 ∆, **NEXT PEAK**

11. Record the MKR-∆ 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		
	MHz	MHz	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
Option 130 only:					
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 ±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

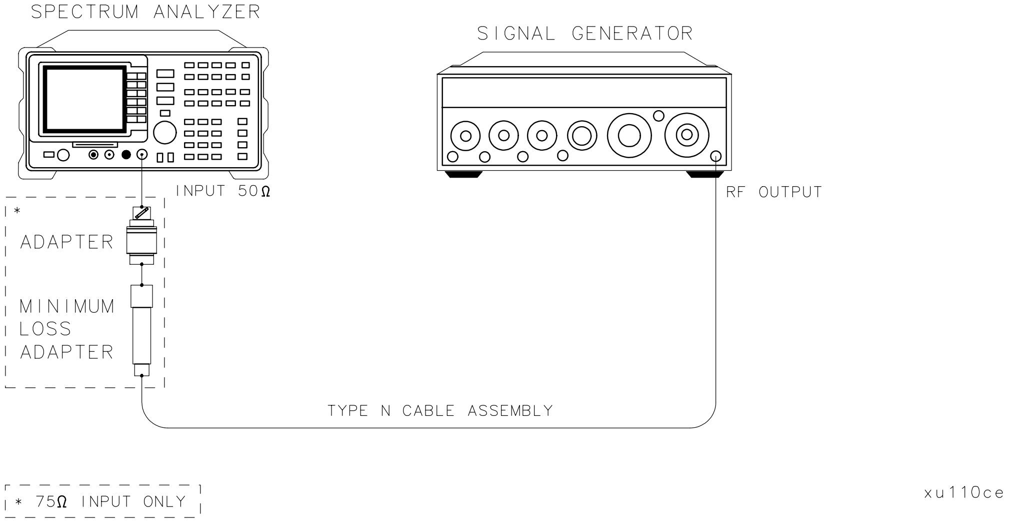
Perform part 2 in addition to part 1 only if your spectrum analyzer is equipped with Option 130. All other spectrum analyzers only perform part 1.

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 dB ±0.1 dB. Press **MARKER** Δ. Rotate the knob counterclockwise until the MKR-Δ amplitude reads −4 dB ±0.1 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 dB ±0.1 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 1of 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 dB ±0.2 dB. Press **MARKER** Δ. Rotate the knob counterclockwise until the MKR-Δ amplitude reads –4 dB ±0.3 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

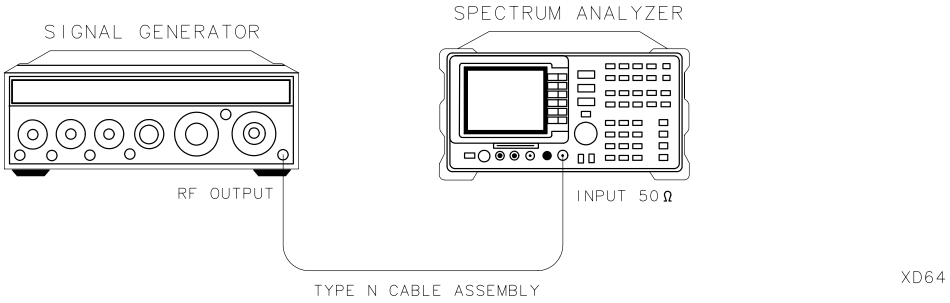
Perform part 2 in addition to part 1 only if your spectrum analyzer is equipped with Option 130. All other spectrum analyzers only perform part 1.

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)

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 →, **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**.

11. On the spectrum analyzer, press **MKR** →, **More 1of 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.

5. On the spectrum analyzer, press **PEAK SEARCH**, **MARKER** Δ.
6. Rotate the spectrum analyzer knob counterclockwise until the MKR-Δ amplitude reads −1 dB ±0.2 dB. Press **MARKER** Δ. Rotate the knob counterclockwise until the MKR-Δ amplitude reads −4 dB ±0.3 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

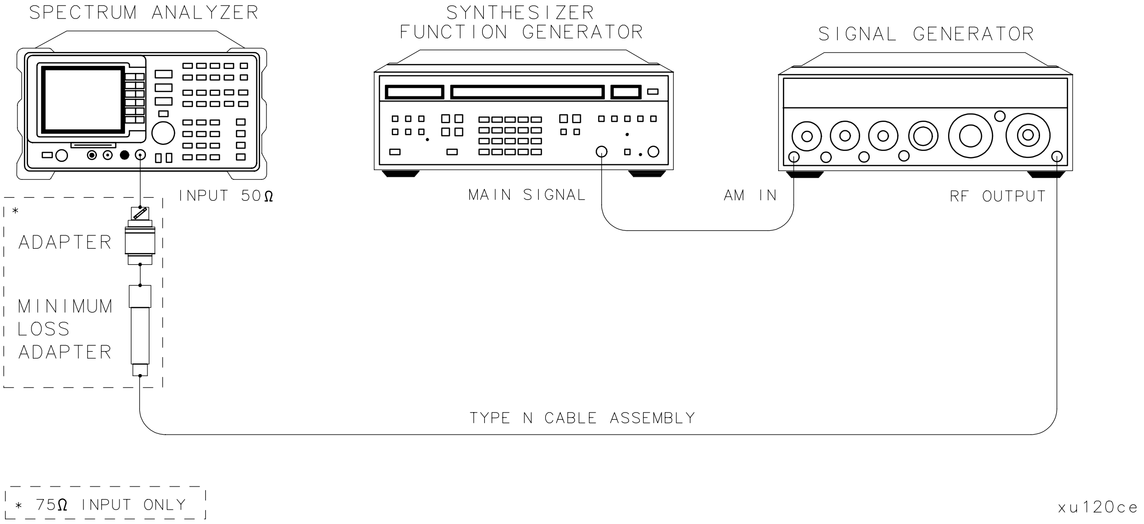
If you are testing a spectrum analyzer equipped with Option 101, perform “Fast Time Domain Sweeps,” in addition to this test.

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**

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

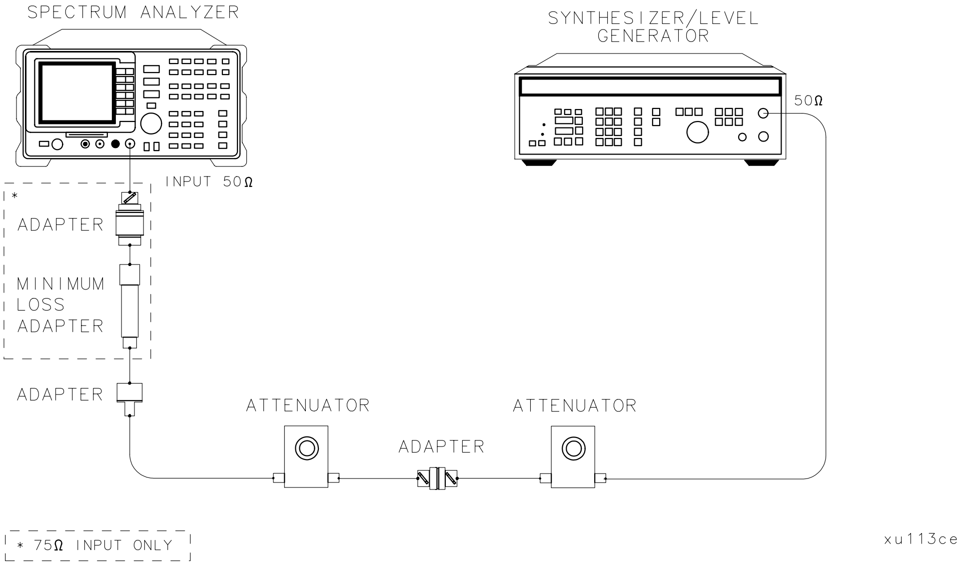
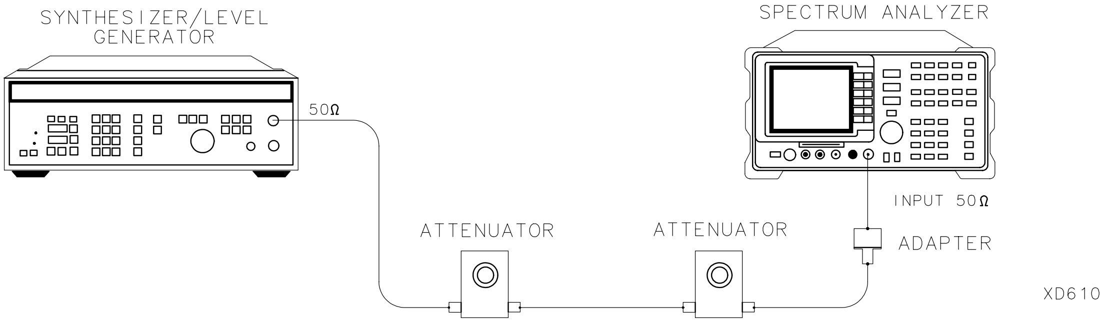


Figure 2-18 Scale Fidelity Test Setup



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 ±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 ±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 INCR ....0.05 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**

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 mV ± 0.4 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 mV ±0.4 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

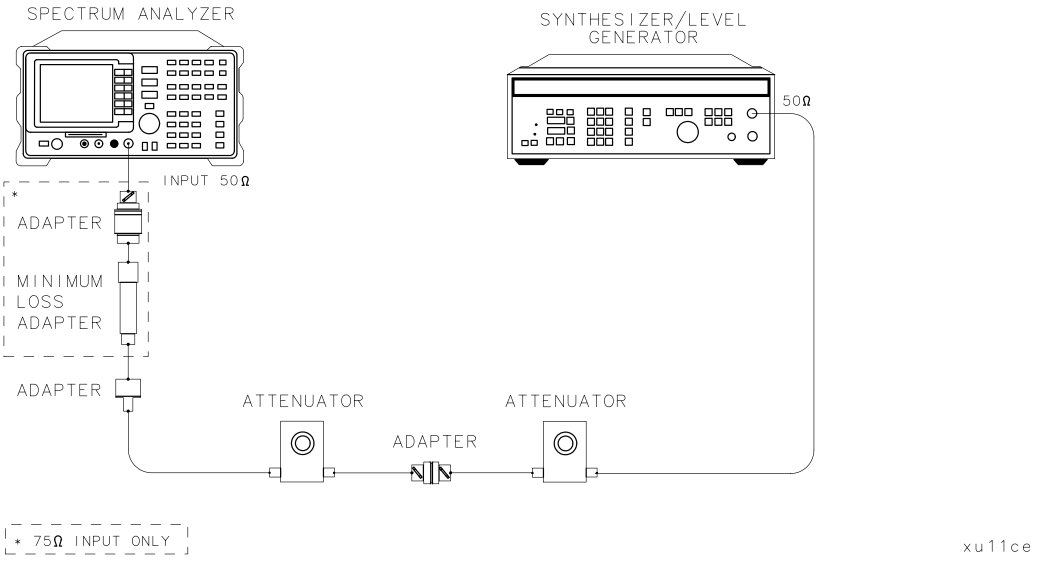
   AMPTD INCR ....10 dB

   OUTPUT ....50 Ω

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

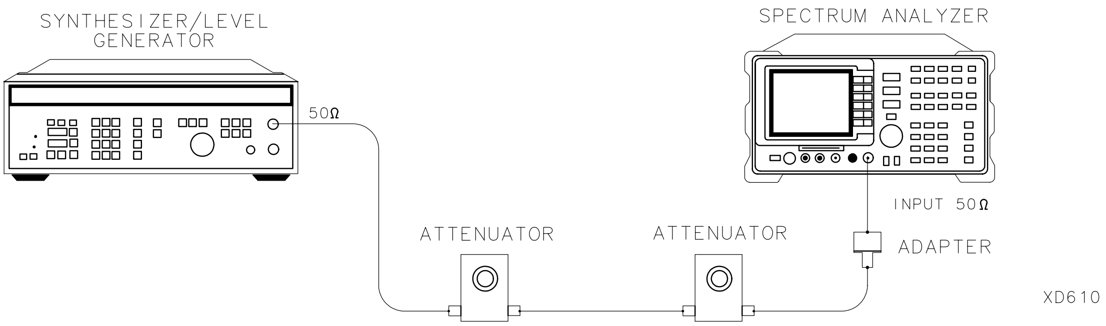
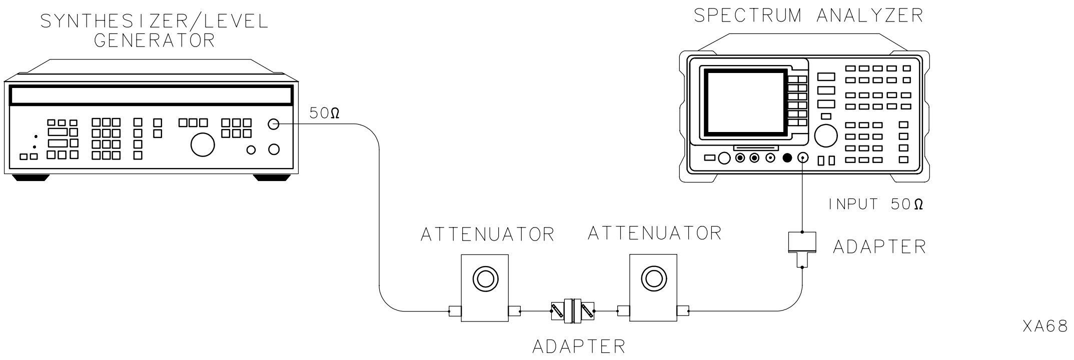


Figure 2-21 Reference Level Accuracy Test Setup, 8594E and 8594Q Only



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.

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

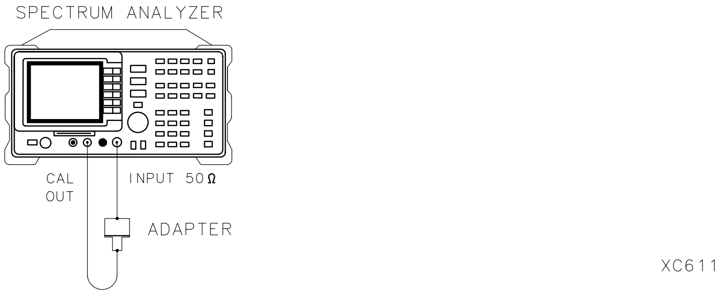
Cable, BNC, 75 Ω, 30 cm (12 in)

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.

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.

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

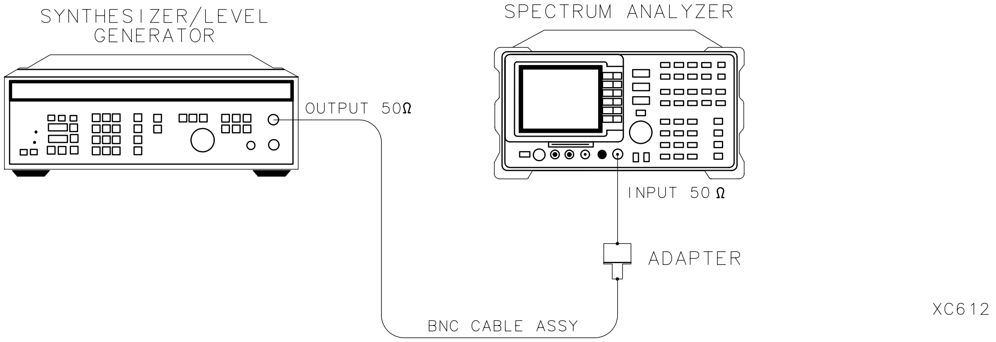
Cable, BNC (75 Ω), 122 cm (48 in)

Procedure

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

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

Figure 2-23 Resolution Bandwidth 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 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.

   AMPLITUDE ....0 dBm

   AMPTD INCR ....3 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** ∆ 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.

    RES BW Accuracy = Upper Frequency – 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).

21. Press **MARKER DELTA** on the spectrum analyzer.

22. On the synthesizer/level generator, press INCR ⇑ (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.

    RES BW Accuracy = Upper Frequency – 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.

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 MHz ± [300 MHz × 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.

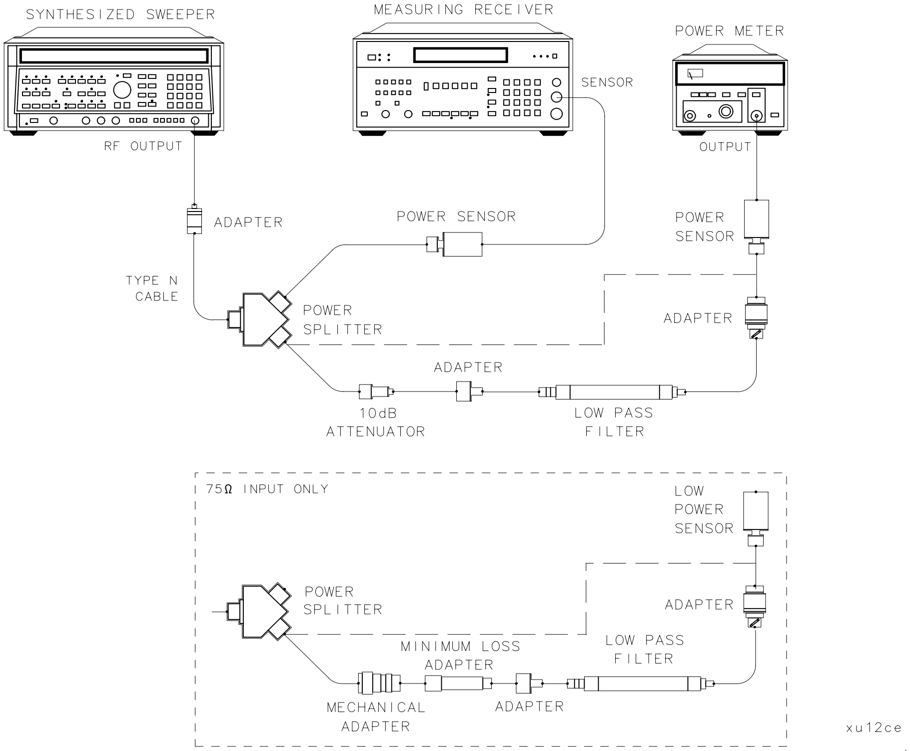
2. Zero and calibrate the power meter and low-power power sensor, as described in the power meter operation manual.
3. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

   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.

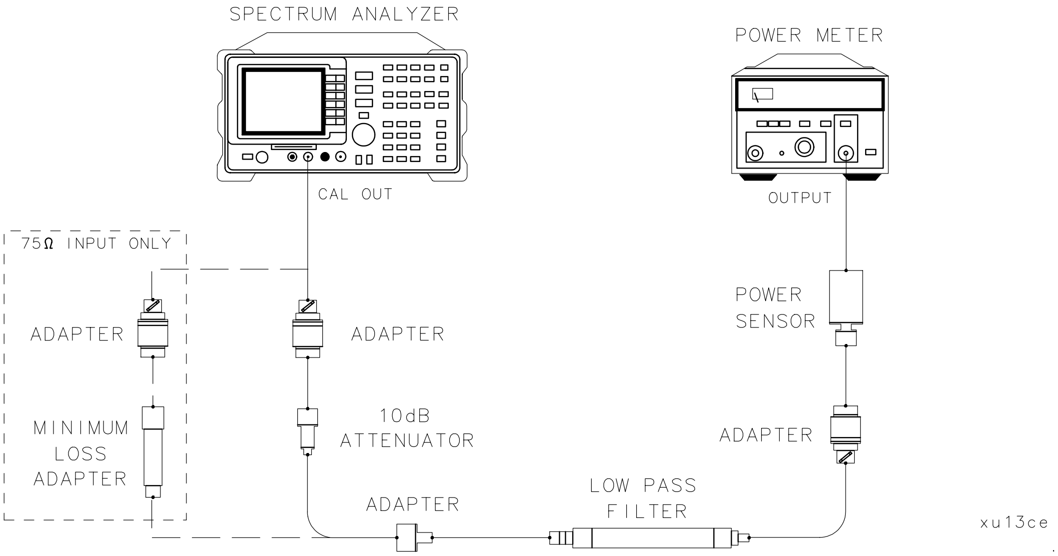
    Example: If the Mismatch Error is +0.3 dB and the Uncorrected Insertion Loss is –10.2 dB, subtract the mismatch error from the insertion loss to yield a corrected reading of –10.5 dB.

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.

   CAL OUT Power = PMR – 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:

   CAL OUT Power = (–30 dB) – (–10.0 dB) = –20 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 dBm ±0.4 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.

   Dbmv = Dbm + 48.75 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

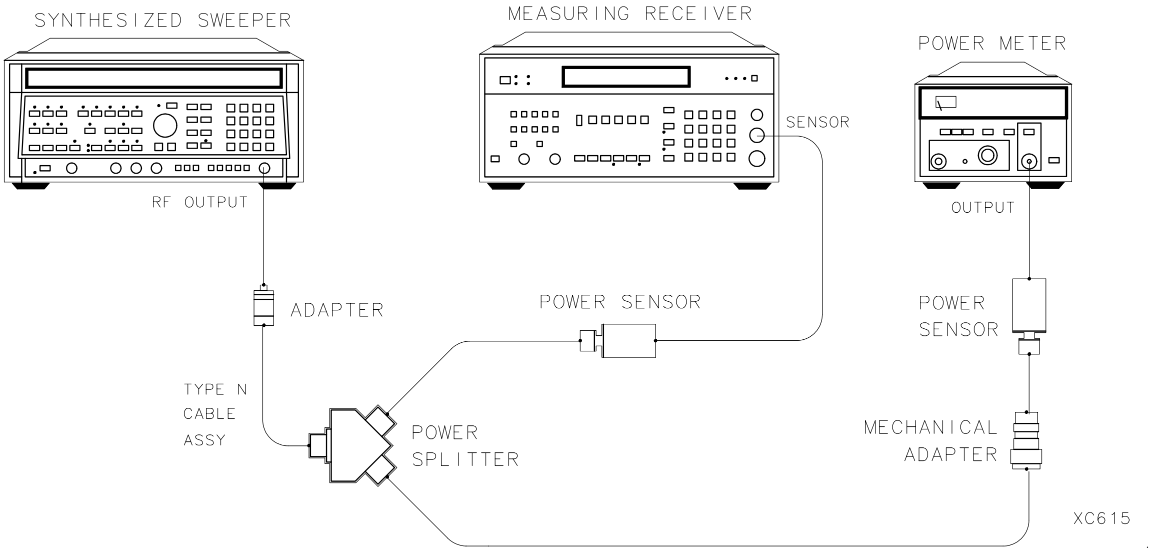
The following procedure is only for spectrum analyzers equipped with 75 Ω input. If your spectrum analyzer is *not* equipped with 75 Ω input, proceed with step 1 of “Frequency Response ≥50 MHz.”

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 ⇑ (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.

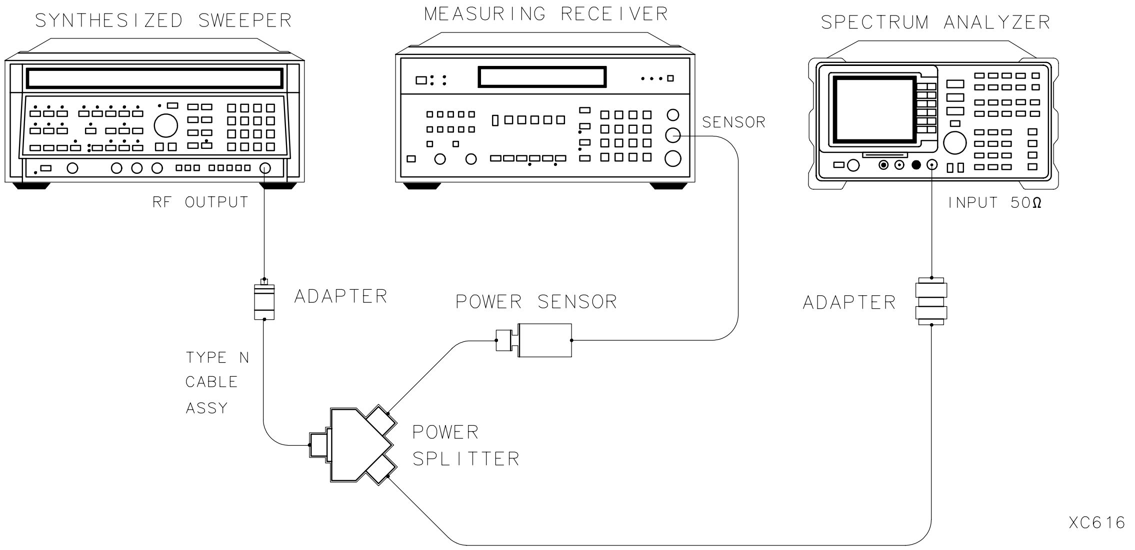
Frequency Response, ≥50 MHz

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.

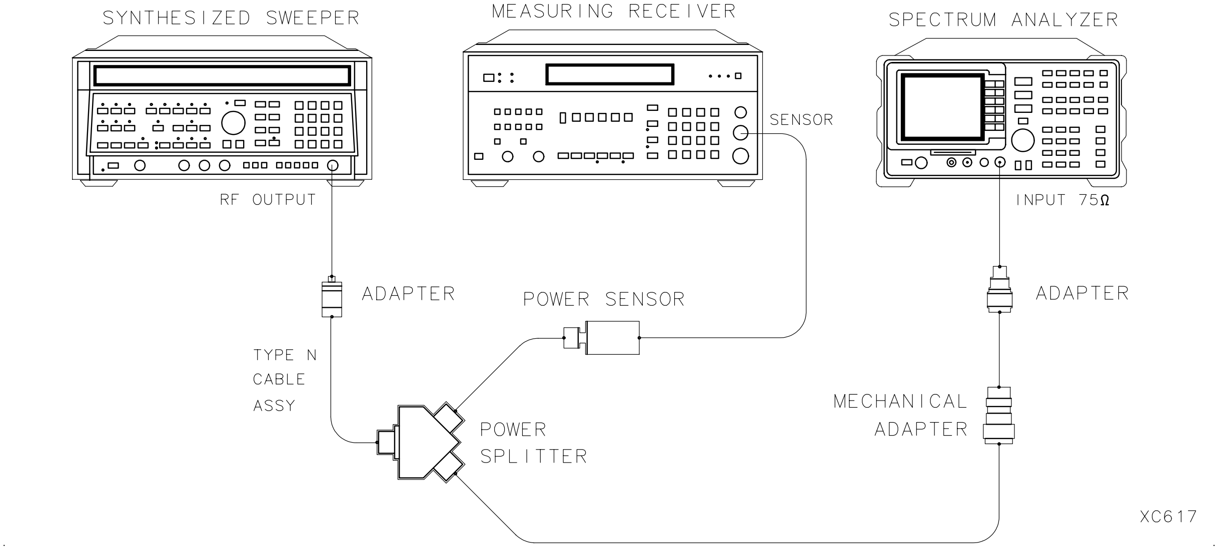
   75 Ω input only: Refer to Figure 2-28.

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 dBm ±0.05 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 dBm ±0.05 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 ⇑ (step-up key), then on the spectrum analyzer, press **FREQUENCY**, and ⇑ (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.

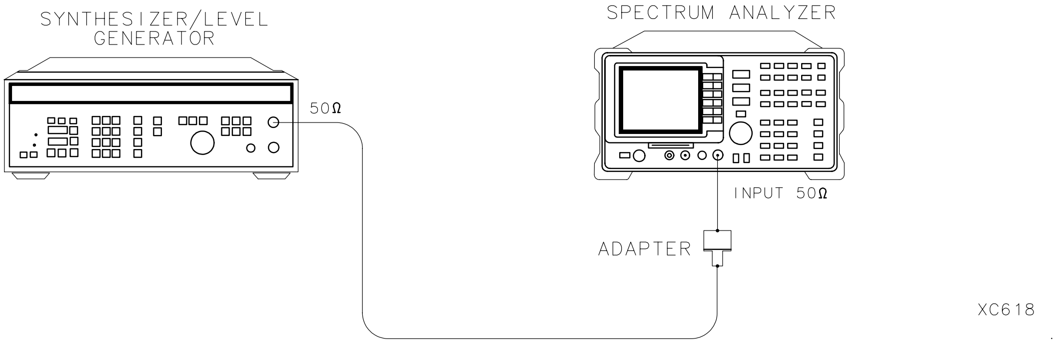
    75 Ω input only: Starting with the error at 50 MHz, subtract the System Error from the Error Relative to 300 MHz and record the result as the Corrected Error in Table 2-29.

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.

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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)

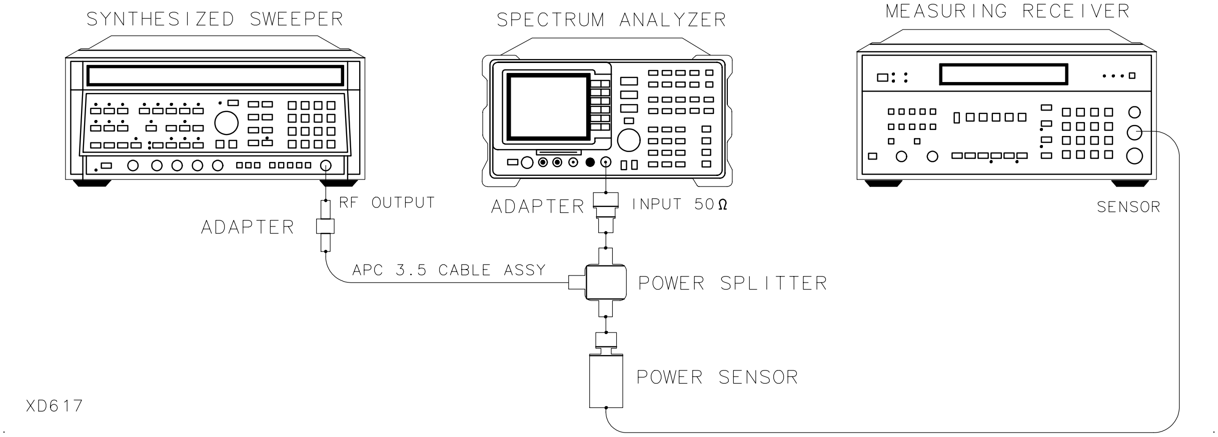
Cable, APC 3.5, 91 cm (36 in) *(2 required)*

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



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 dBm ±0.1 dB.
7. Press RATIO on the measuring receiver.

Frequency Response, Band 0, ≥50 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 dBm ±0.1 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 dBm ±0.1 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 ⇑ (step up) key and on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ±0.1 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 ⇑ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ±0.1 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 ⇑ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, and ⇑ (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 dBm ±0.1 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 ⇑ (step up), then on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ±0.1 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 ⇑ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, ⇑ (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

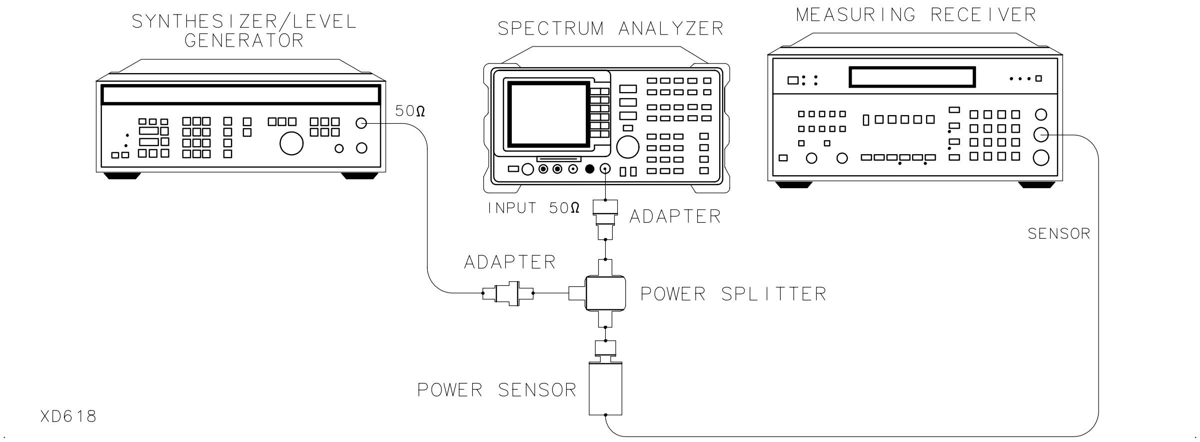
    SPAN, 100, **kHz**

    BW, **RES BW AUTO MAN**, 10, **kHz**

49. Connect the equipment as shown if 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)

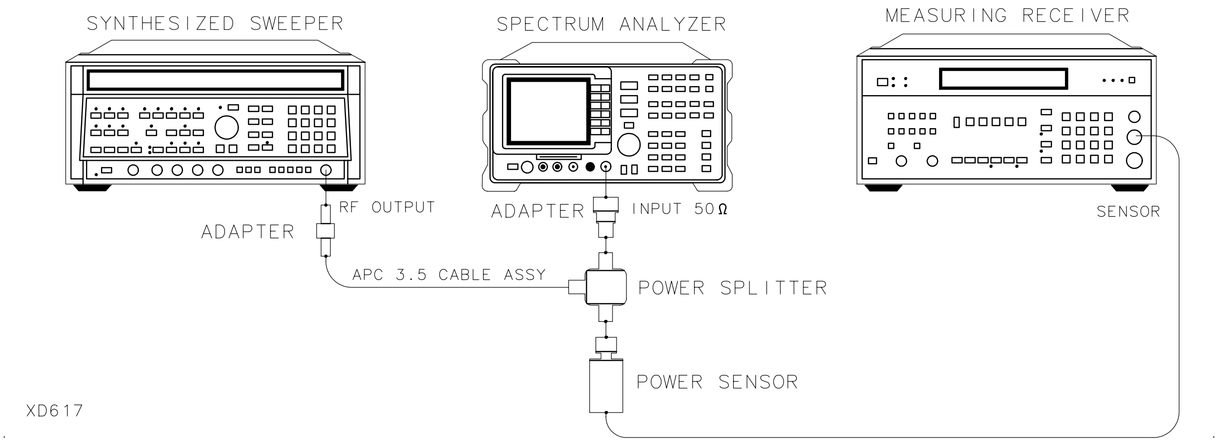
Cable, BNC, 122 cm (48 in)

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 dBm ±0.1 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 dBm ±0.1 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 dBm ±0.1 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 ⇑ (step up) key.

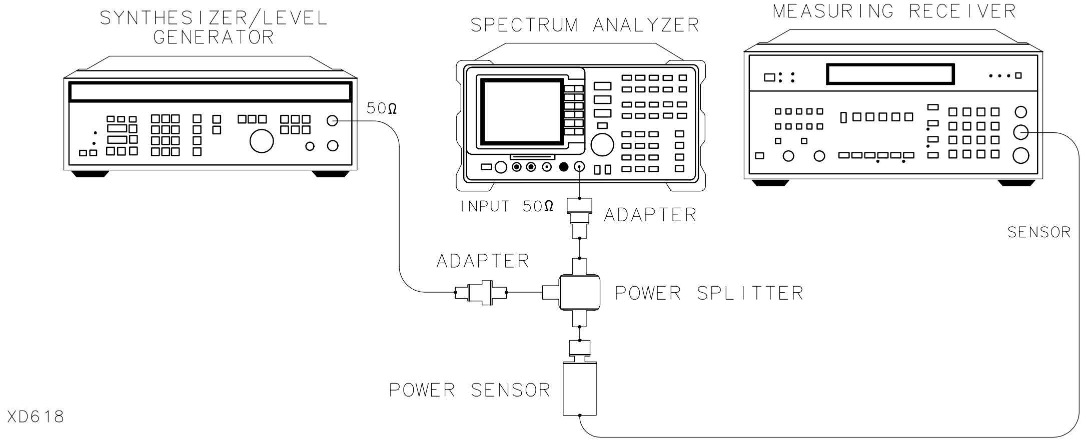
17. On the spectrum analyzer, press **FREQUENCY**, ⇑ (step up) key to step through the remaining frequencies listed in Table 2-38.

    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



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 ∆

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)

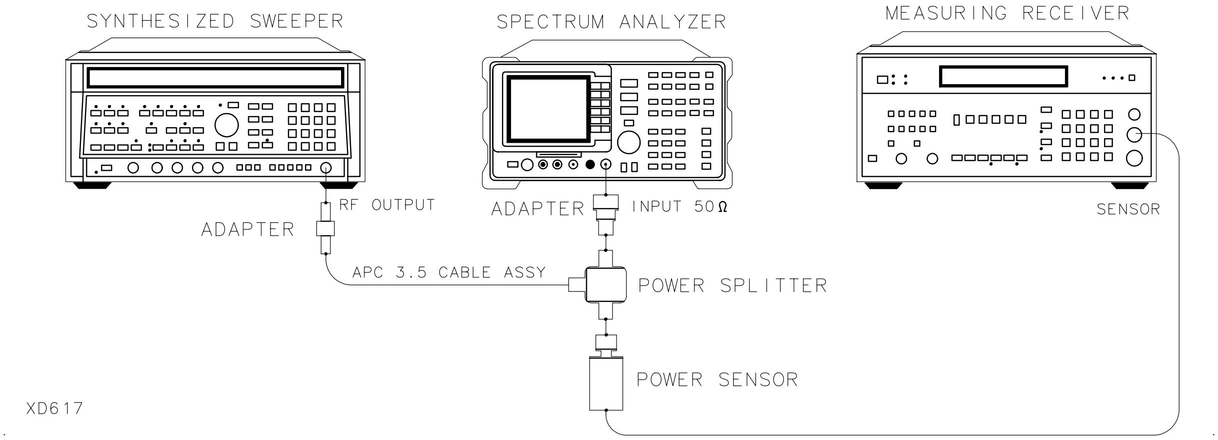
Cable, BNC, 122 cm (48 in)

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



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 dBm ±0.1 dB.

7. Press RATIO on the measuring receiver.

Frequency Response, Band 0, ≥50 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 dBm ±0.1 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 dBm ±0.1 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 ⇑ (step up) key and on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ±0.1 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 ⇑ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, ⇑ (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:

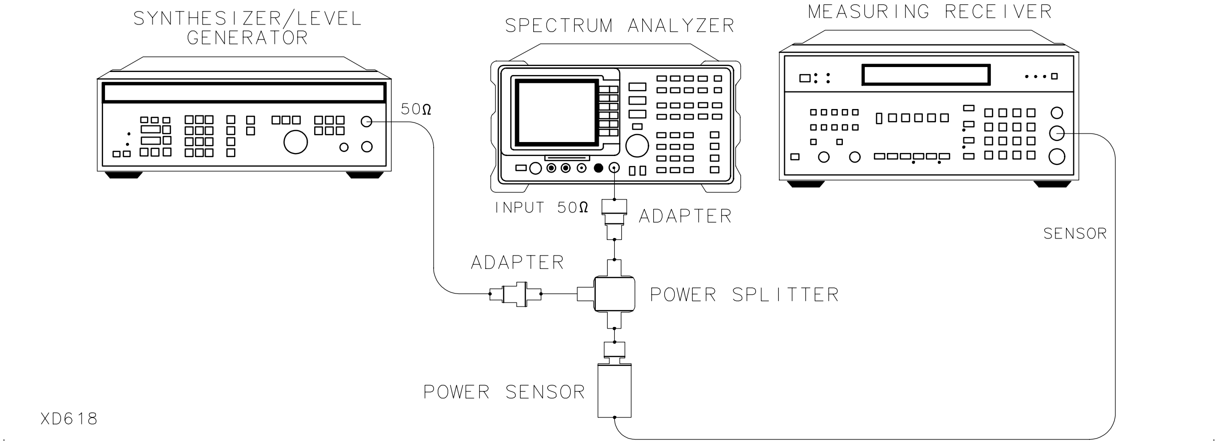
FREQUENCY .... 50 MHz

AMPLITUDE ....−8 dBm

AMPTD INCR ....0.05 dB

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

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



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)

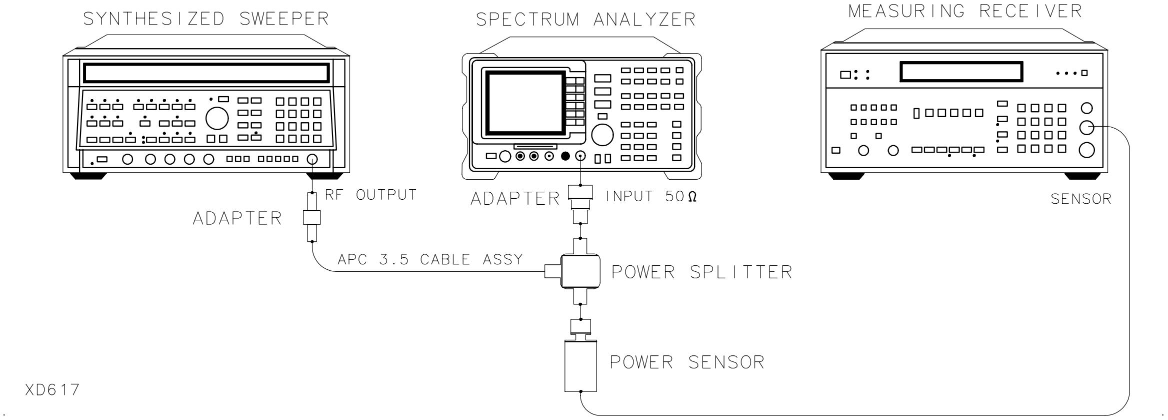
Procedure

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 dBm ±0.1 dB.

7. Press RATIO on the measuring receiver.

Frequency Response, Band 0, ≥50 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 dBm ±0.1 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 dBm ±0.1 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 ⇑ (step up) key and on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ±0.1 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 ⇑ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ±0.1 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 ⇑ (step up) key, then on the spectrum analyzer, press **FREQUENCY**, and ⇑ (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

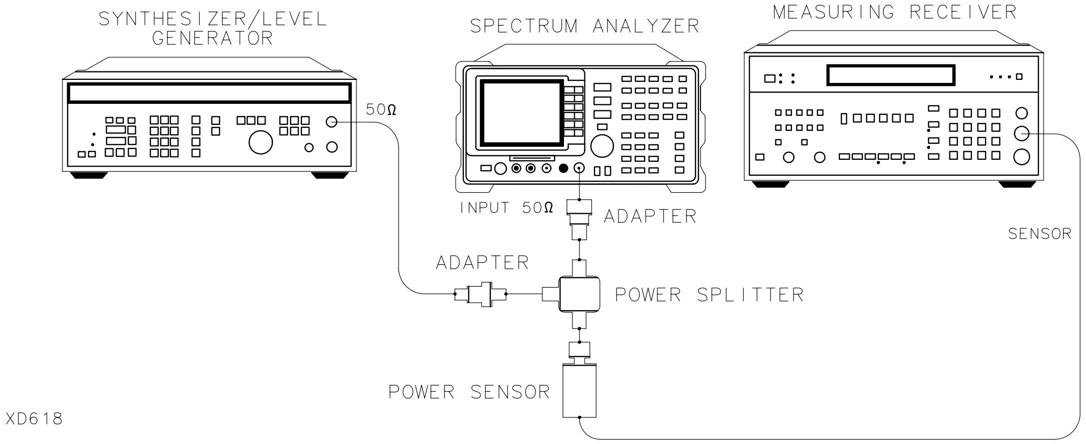
33.Set the frequency synthesizer controls as follows:

FREQUENCY .... 50 MHz
AMPLITUDE .... –8 dBm
AMPTD INCR .... 0.05 dB

34.Connect the equipment as shown if 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.

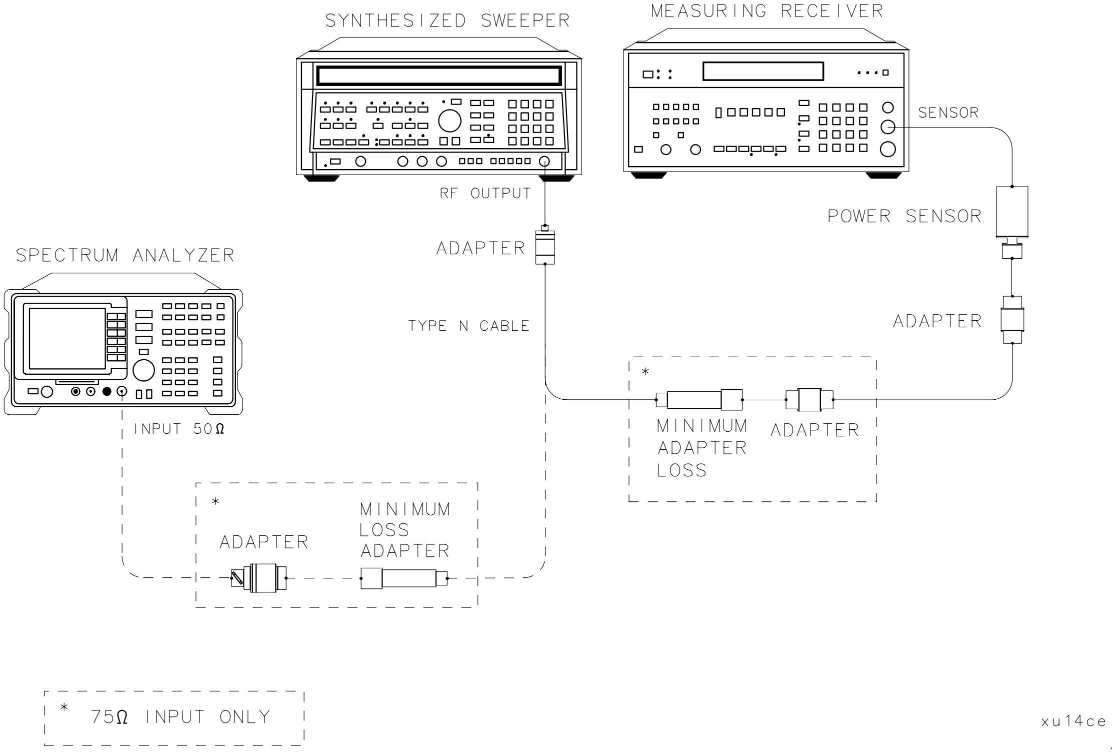
2. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:

   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



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

4. Adjust the synthesized sweeper power level for a –20 dBm ±0.1 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 dBm ±0.1 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 dBm ±0.1 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**

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:

    a. 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.

    b. Press **SGL SWP** and wait for the completion of a new sweep.

    c. 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:

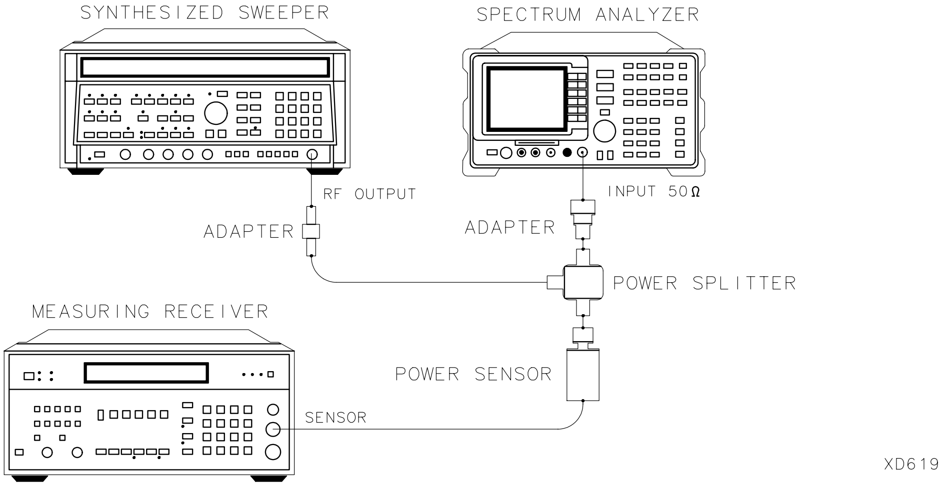
   CW .... 2000 MHz

   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



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 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**

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 you 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	
	GHz	MHz	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	24	24042.8[*]	________	−50
Option 026	21.0	24642.8[*]	________	−50
or	21.0	11839.3[†]	________	−55
027 Only	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.

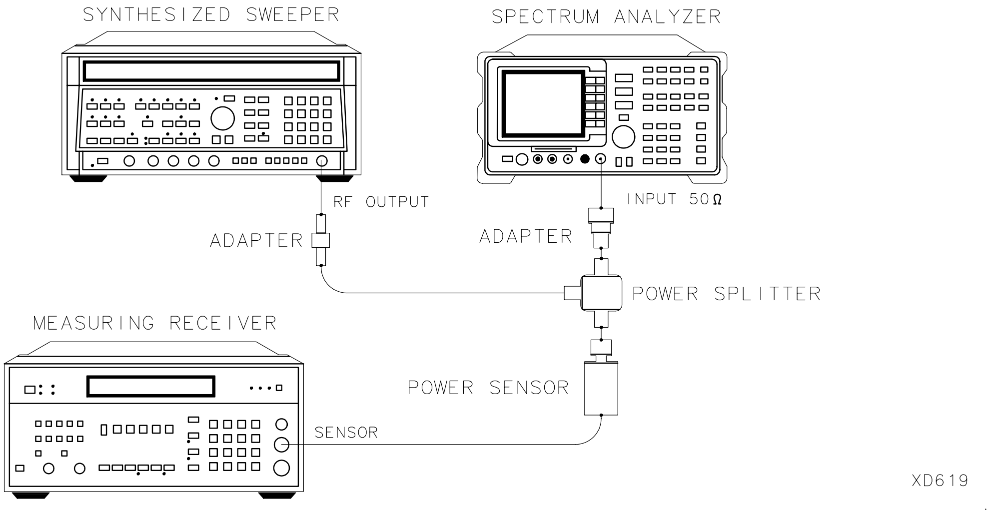
2. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

   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**



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**

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:

   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 a –20 dBm reading on the measuring receiver.

   d. Press **SGL SWP** and wait for completion of a new sweep.

   e. 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.

Table 2-49 Other Input Related Spurious Worksheet

Spectrum Analyzer Center Frequency GHz	Synthesized Sweeper CW Frequency MHz	MKR ∆ 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

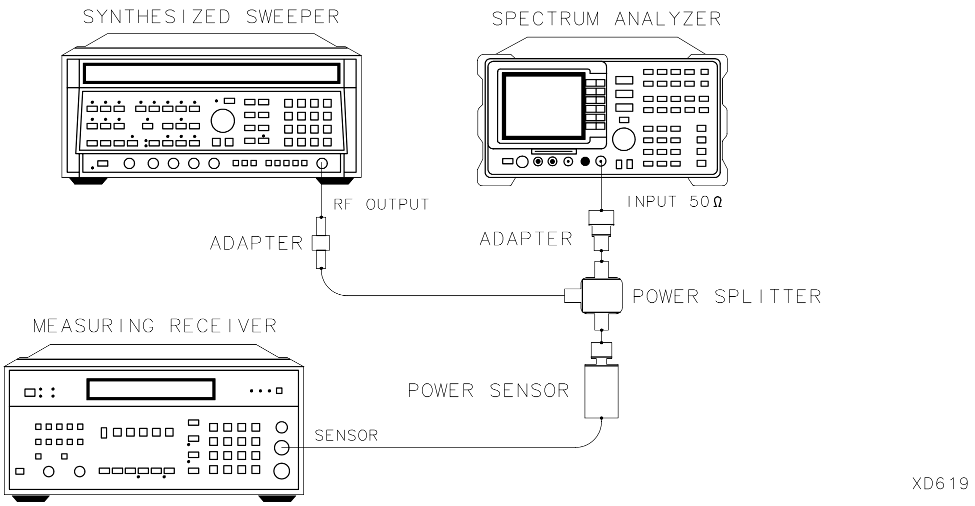
1. Zero and calibrate the measuring receiver and 50 MHz to 6.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Press INSTRUMENT PRESET on the synthesized sweeper and 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**



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 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**

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:
   1. Set the synthesized sweeper to the listed CW frequency.
   2. Enter the appropriate power sensor CAL Factor into the measuring receiver.
   3. Set the synthesized sweeper power level for −20 dBm reading on the measuring receiver.
   4. Press **SGL SWP** and wait for the completion of a new sweep.
   5. 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

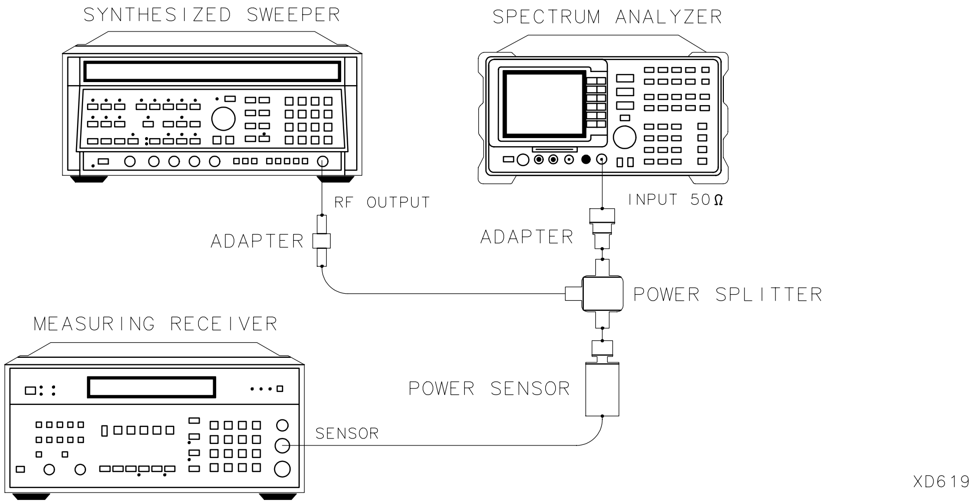
1. Zero and calibrate the measuring receiver and 50 MHz to 12.8 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Press INSTRUMENT PRESET on the synthesized sweeper and 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



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 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**

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	Synthesized Sweeper CW Frequency	MKR Δ Amplitude	
	GHz	MHz	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

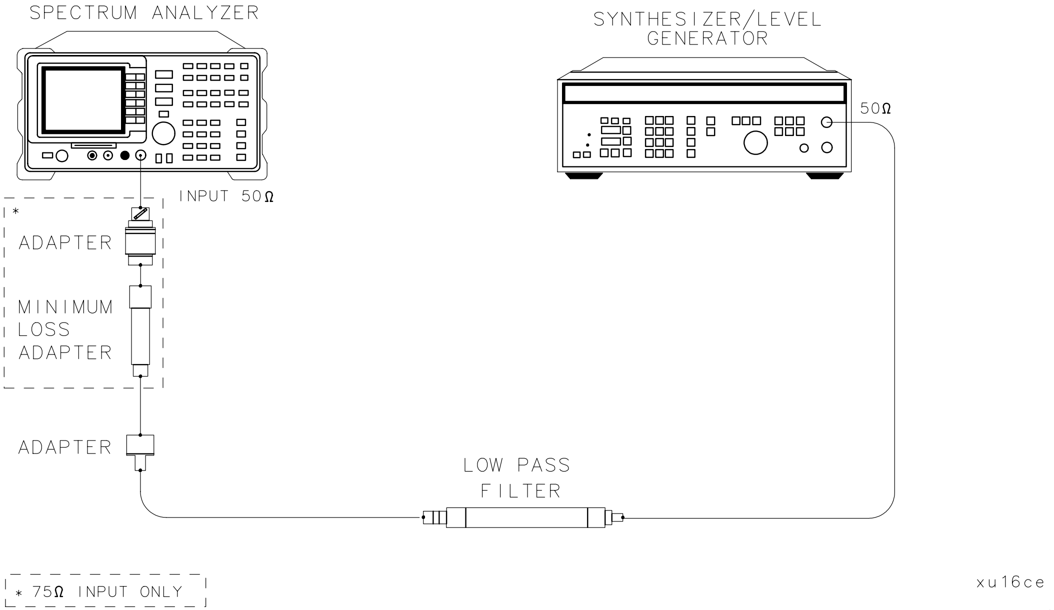
   AMPLITUDE .... –10 dBm

   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 ∆

   FREQUENCY.

8. Press the ⇑ (step-up key) on the spectrum analyzer to step to the second harmonic (at 60 MHz). Press **PEAK SEARCH**. Record the MKR ∆ 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.

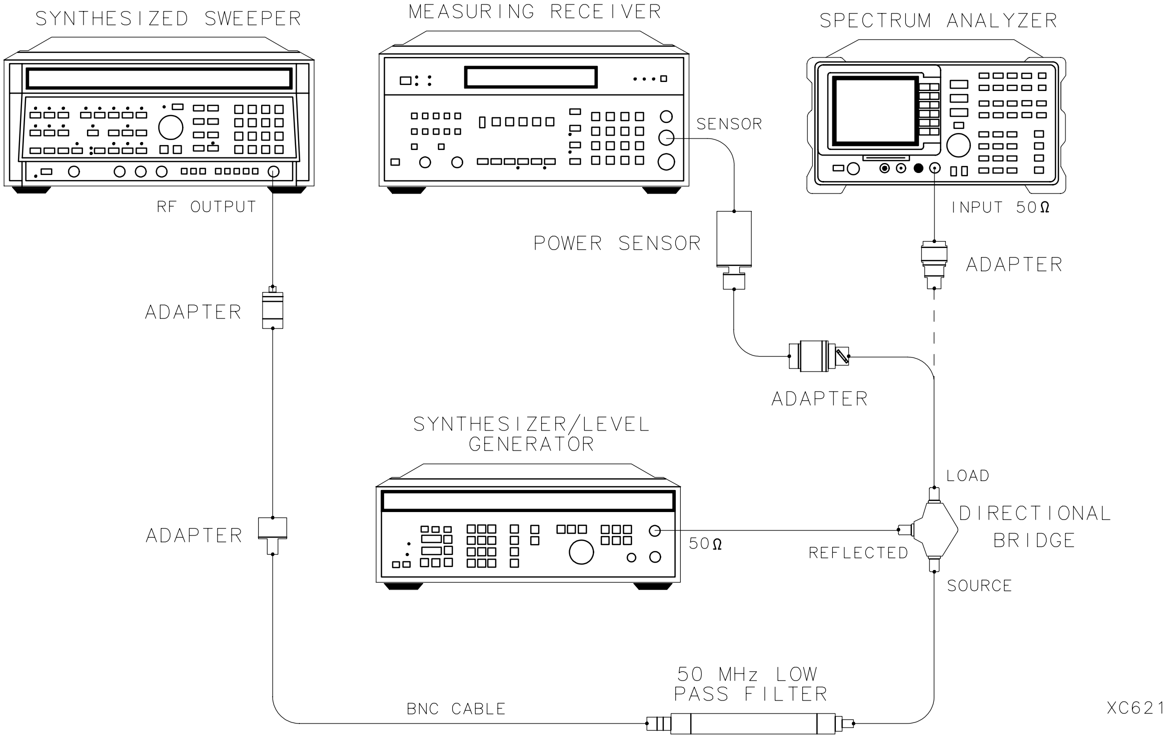
   75 Ω input only: Use a 75 Ω power sensor.

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 dBm ±0.05 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:

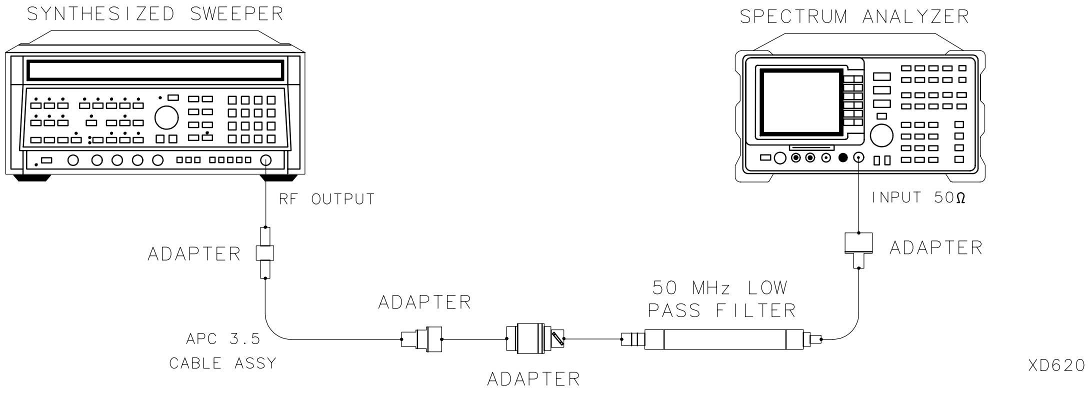
   CW .... 30 MHz

   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 ∆

   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 ∆ 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 ∆ 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 ±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 dBm – (–6.45 dBm) = –0.60 dB.

FRE = PMR (2.8 GHz) – 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:

    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 2-52.

       Distortion-limited Specification = –60 dBc + FRE

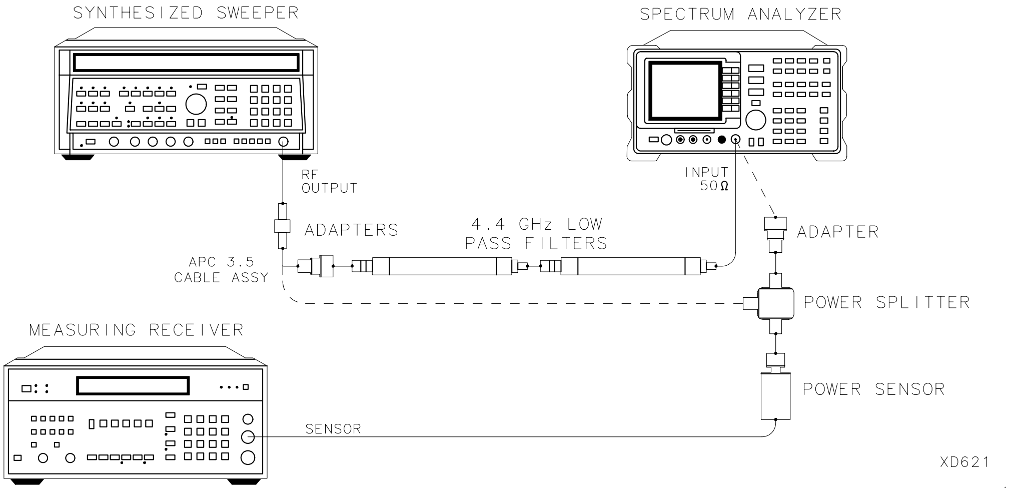
    b. Subtract –40 dBm (reference level setting) from Noise Level at 5.6 GHz, then record in Table 2-52.

       Noise-limited Specification = Noise Level (5.6 GHz) + 40 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 2-46 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 ±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.

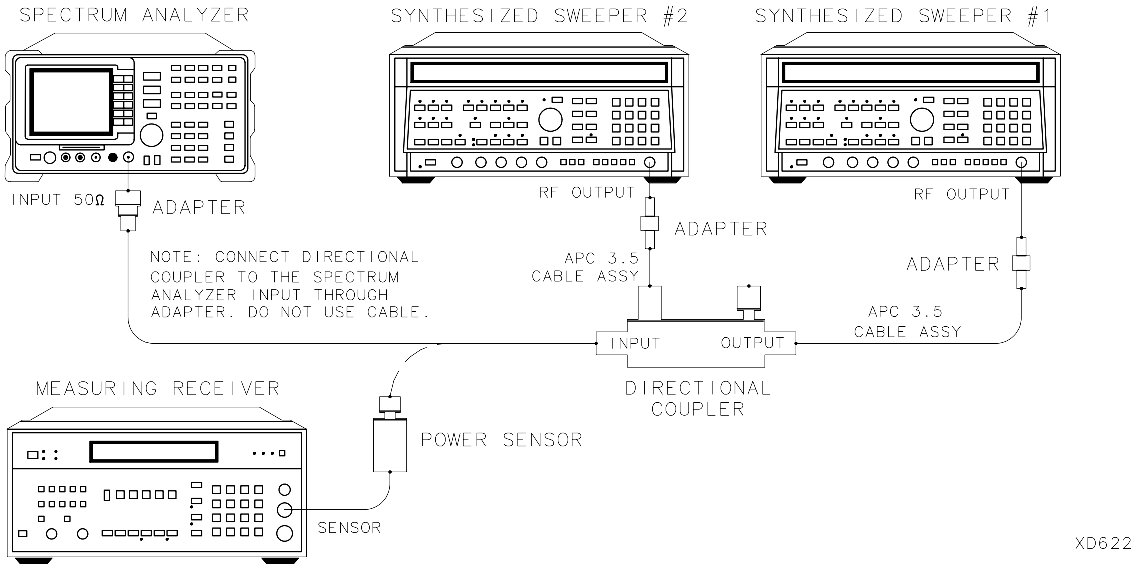
The Marker Amplitude Reading should be more negative than the Specification previously recorded as TR Entry 2 of the performance verification test record.

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 dBm ±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).

    Option 026 only: Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω.

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, ⇑ (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:

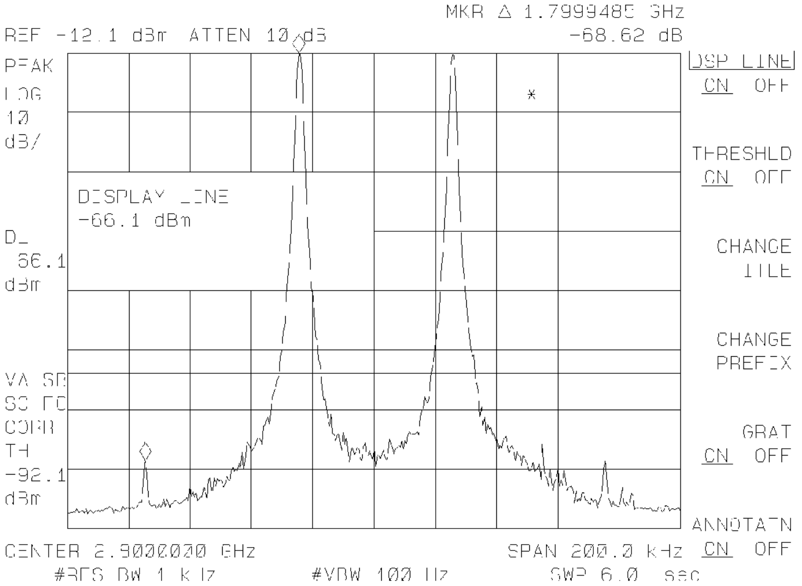
    PEAK SEARCH, **MARKER Δ**

    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 2-48.

Figure 2-48 Third Order Intermodulation Distortion



50. 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 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:

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 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, 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 ±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, ⇑ (step-up key)

    PEAK SEARCH

    MKR →, **MARKER** → **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** ∆ 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

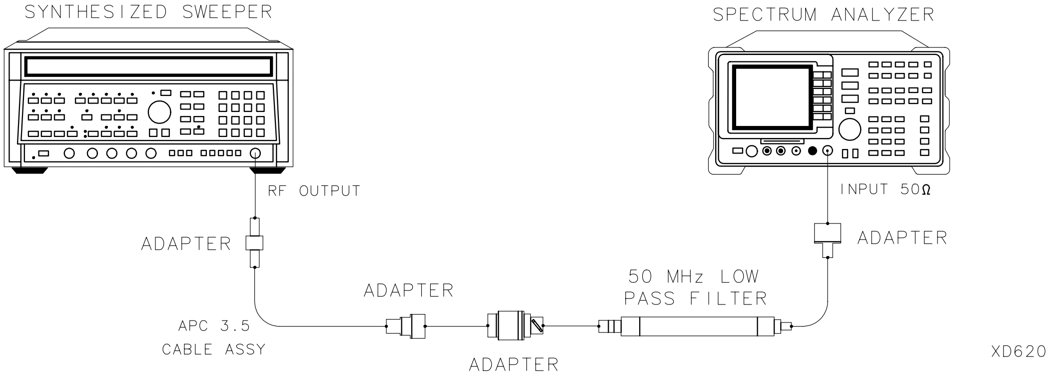
1. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

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 ∆

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. 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.

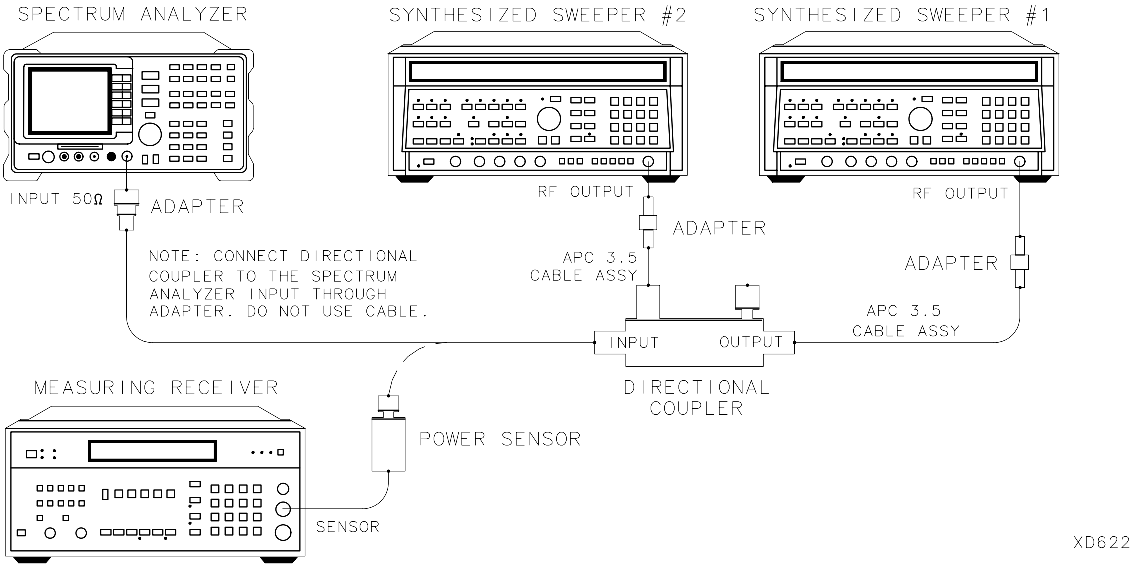
NOTE The Maximum MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of where the marker position is when the **PEAK SEARCH**, **MARKER** Δ function was invoked in step 6.

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 dBm ±0.05 dB.

14. 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).

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, ⇑ (step-up key)

    PEAK SEARCH

    MKR →, **MARKER** → **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**

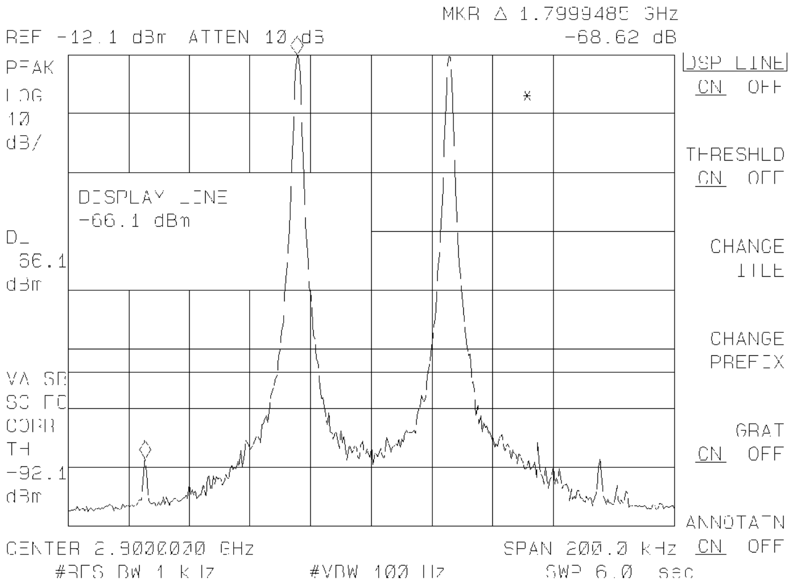
    PEAK SEARCH, **MARKER** ∆

    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:

a. On the spectrum analyzer, press **MKR →**, **More 1 of 2**, **PEAK MENU**.

b. Repeatedly press **PEAK SEARCH** until the active marker is on the desired distortion product.

c. 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

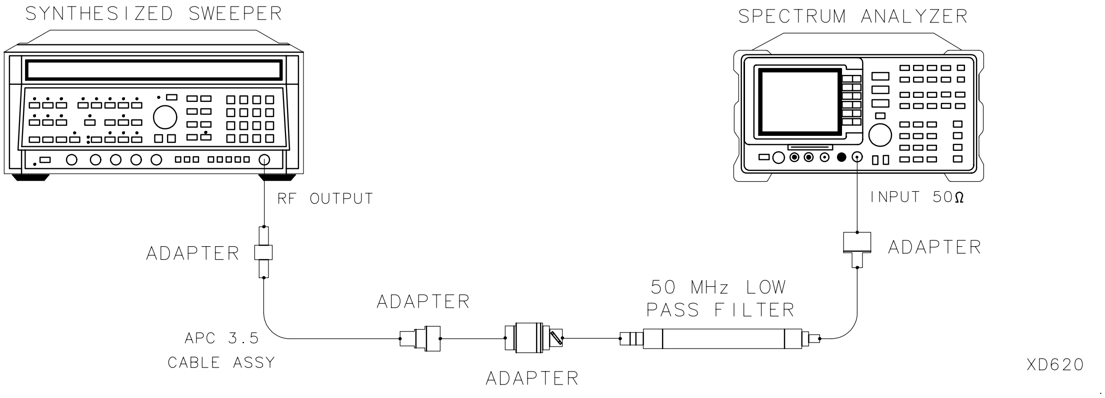
1. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

   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 ⇑ (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:

    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 2-53.

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 ±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.

    FRE = PMR (2.8 GHz) – 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:

    FRE = –7.05 dBm – (–6.45 dBm) = –0.60 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.

       Distortion-limited Specification = –60 dBc + FRE

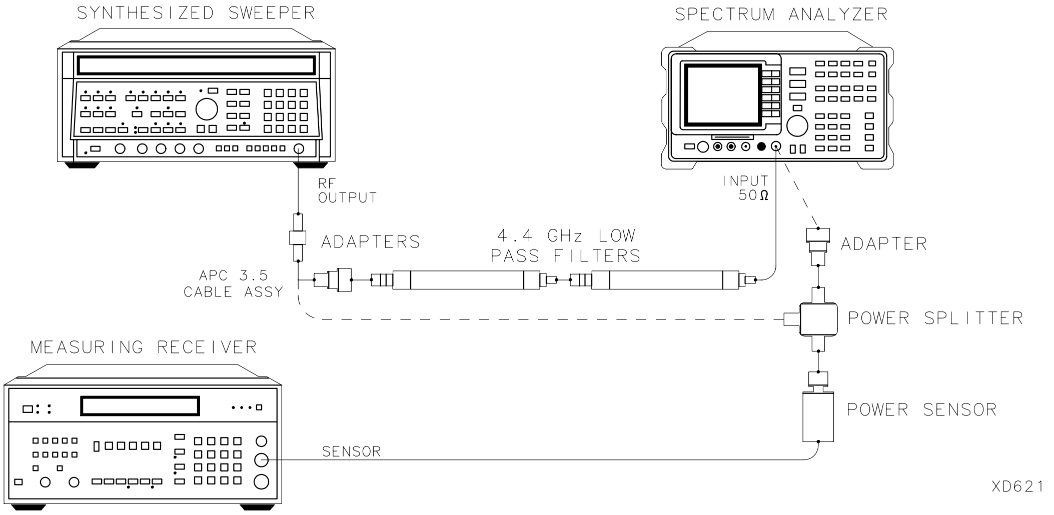
    b. Subtract –40 dBm (reference level setting) from Noise Level at 5.6 GHz, then record in Table 2-53.

       Noise-limited Specification = Noise Level (5.6 GHz) + 40 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 ∆

    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.

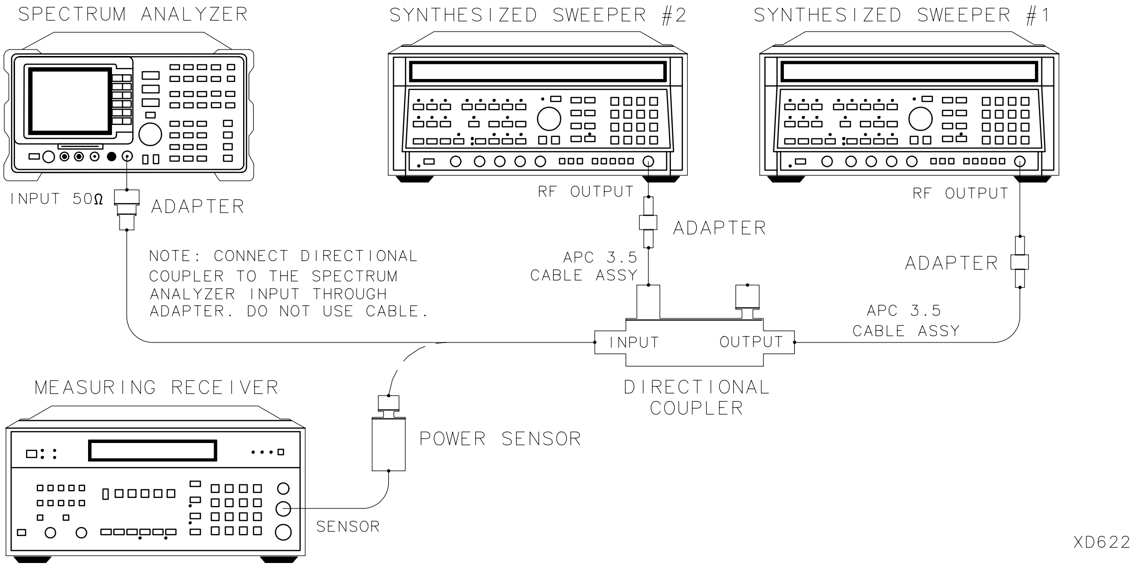
The Marker Amplitude Reading should be more negative than the Specification previously recorded as TR Entry 2 of the performance verification test record.

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



NOTE: CONNECT DIRECTIONAL COUPLER TO THE SPECTRUM ANALYZER INPUT THROUGH ADAPTER. DO NOT USE CABLE.

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 ±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:

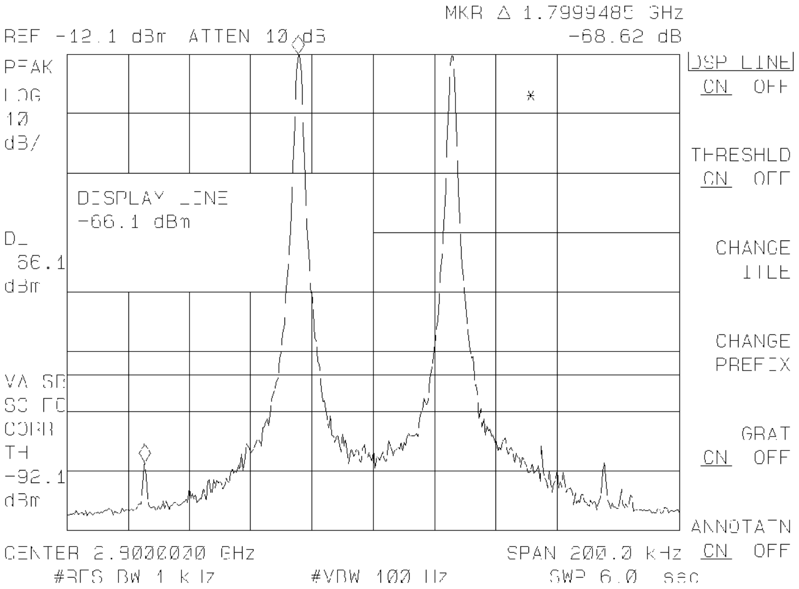
    PEAK SEARCH, **MARKER** ∆

    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:

a. On the spectrum analyzer, press **MKR →**, **More 1of 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 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:

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 →**, **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 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 ±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, ⇑ (step-up key)

    PEAK SEARCH

    MKR →, **MARKER** → **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** →, **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** →, **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

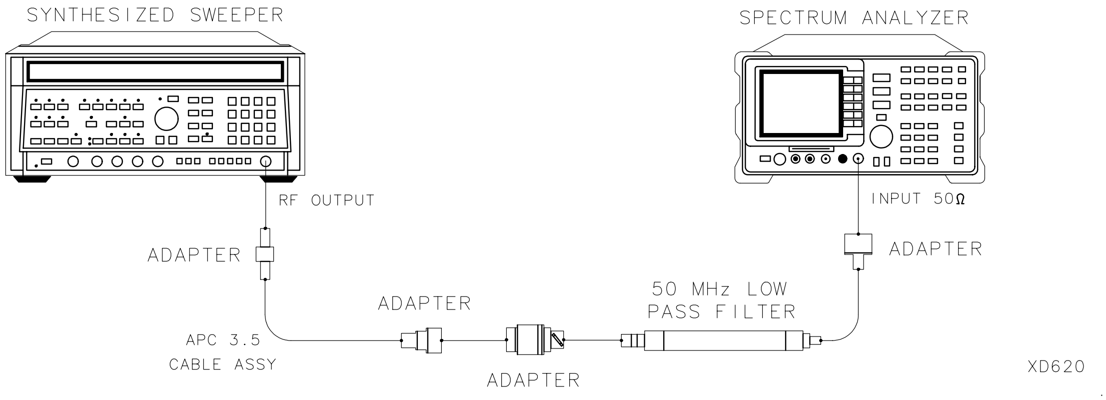
1. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

   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 ⇑ (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 ±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.

    FRE = PMR (2.8 GHz) – 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:

    FRE = –7.05 dBm – (–6.45 dBm) = –0.60 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.

       Distortion-limited Specification = –60 dBc + FRE

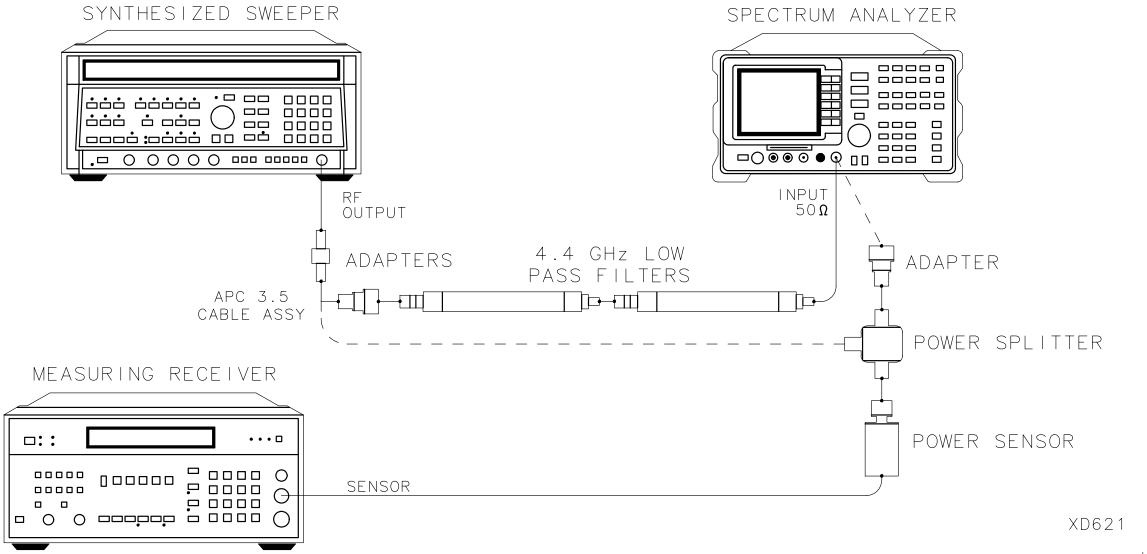
    b. Subtract –40 dBm (reference level setting) from Noise Level at 5.6 GHz, then record in Table 2-54.

       Noise-limited Specification = Noise Level at 5.6 GHz + 40 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 ±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.

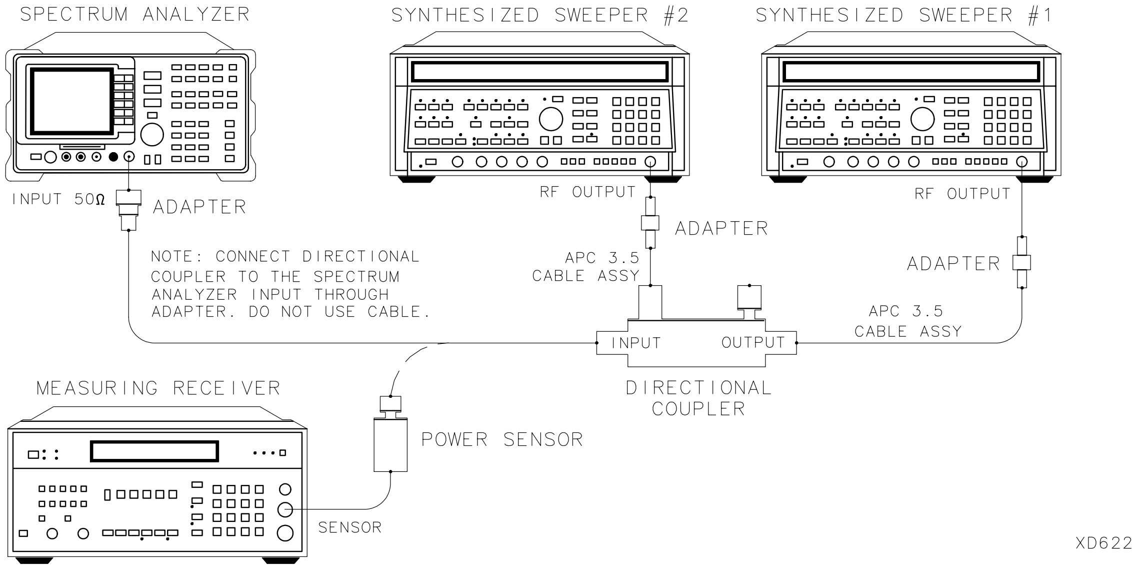
    The Marker Amplitude Reading should be more negative than the Specification previously recorded as TR Entry 2 of the performance verification test record.

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 ±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:

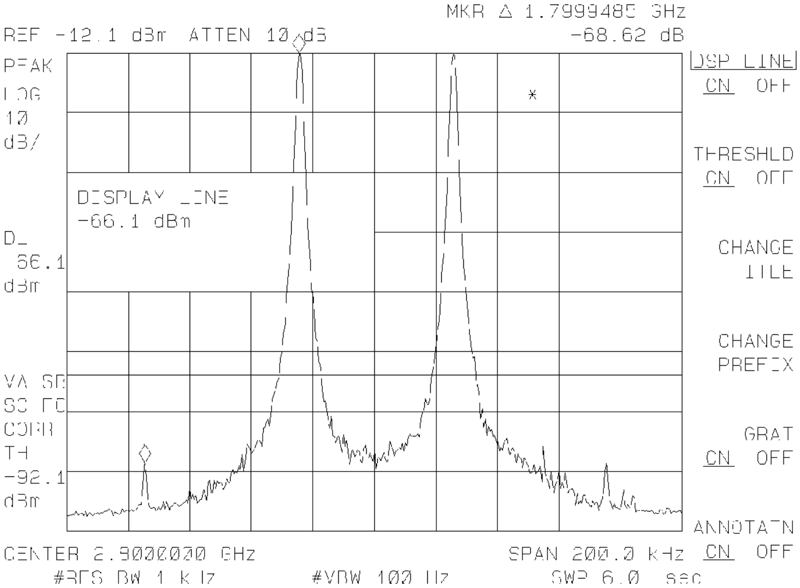
PEAK SEARCH, MARKER Δ

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:

a. On the spectrum analyzer, press **MKR →**, **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 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:

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 →**, **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 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**

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 ±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, ⇑ (step-up key)

    PEAK SEARCH

    MKR →, **MARKER** → **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** →, **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** →, **More 1of 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

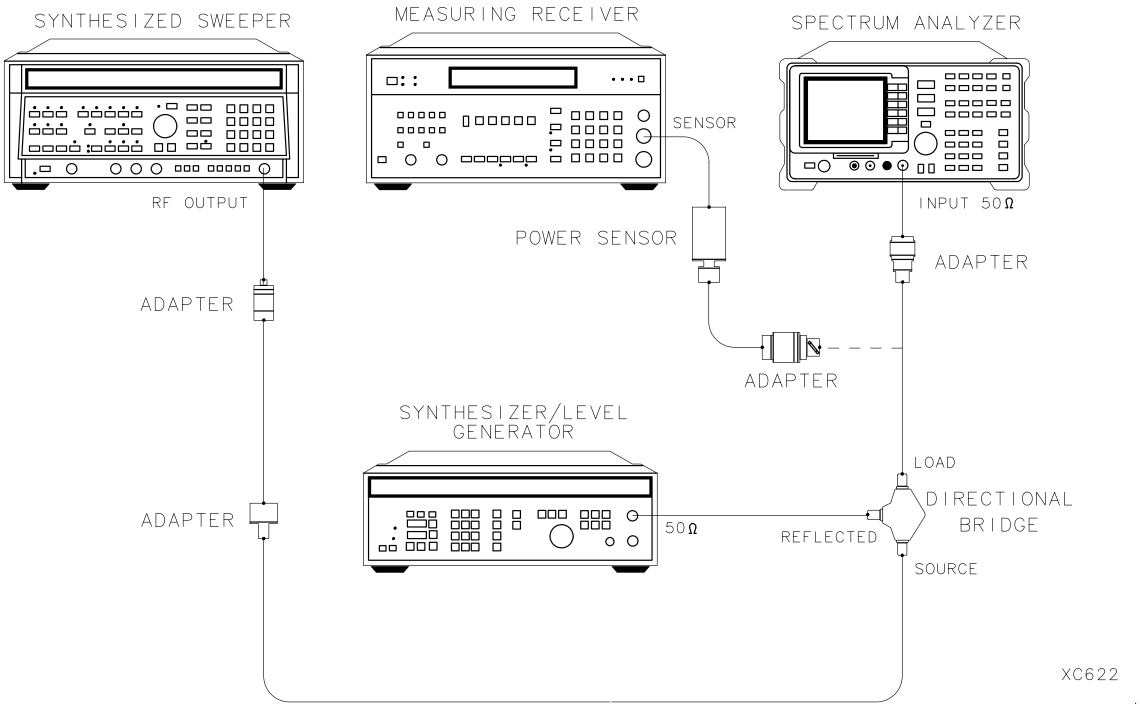
1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.

   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

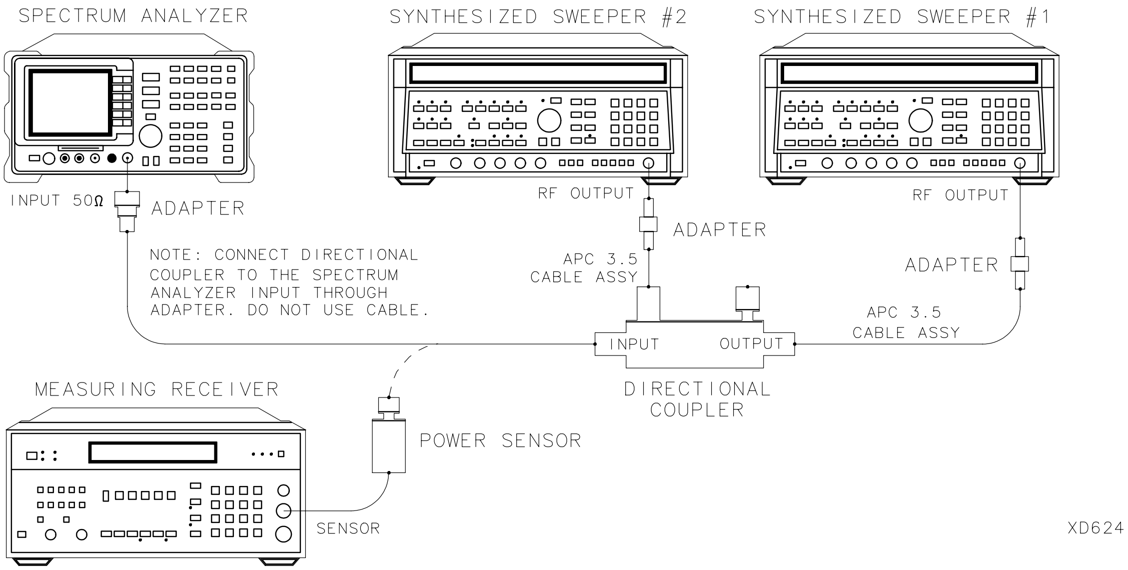
Directional coupler

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)

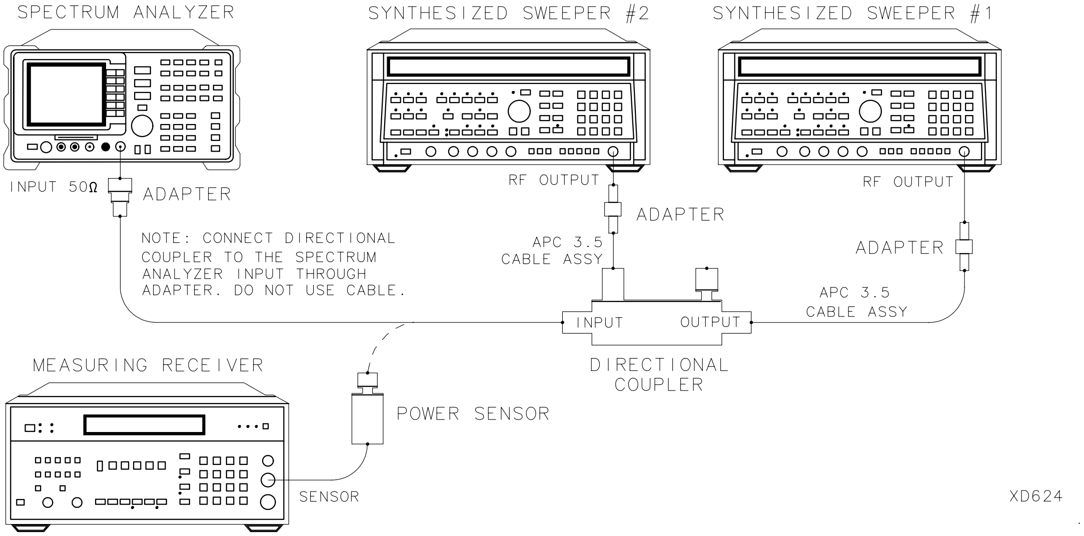
Adapter, APC 3.5 (f) to APC 3.5 (f) *(2 required)*

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)

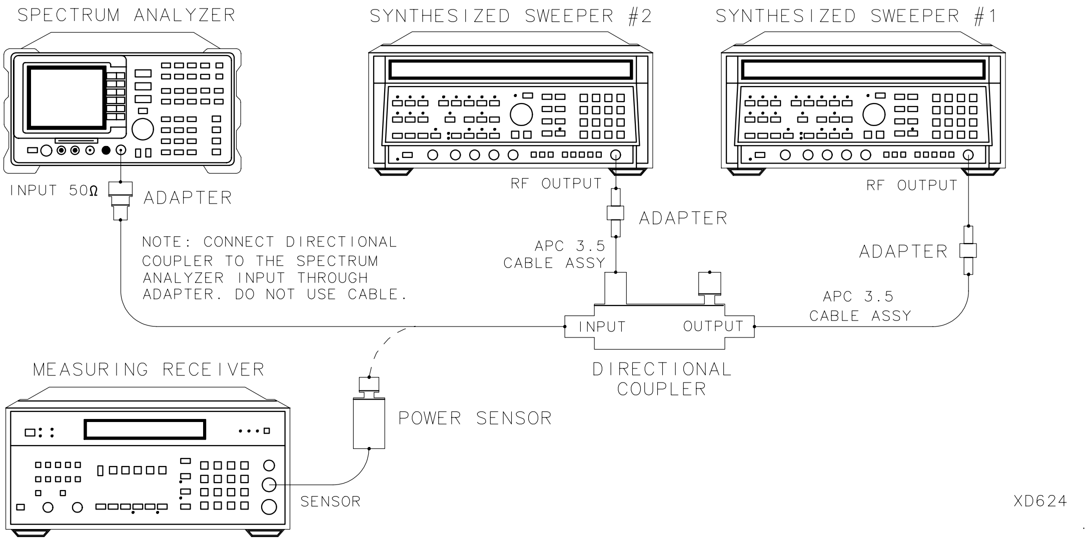
Adapter, APC 3.5 (f) to APC 3.5 (f) *(2 required)*

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)

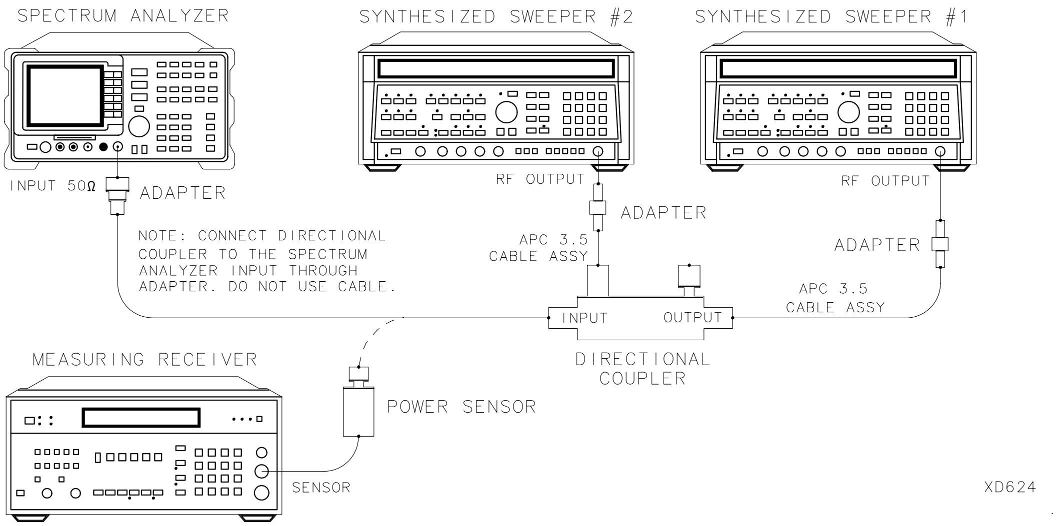
Adapter, APC 3.5 (f) to APC 3.5 (f) *(2 required)*

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)

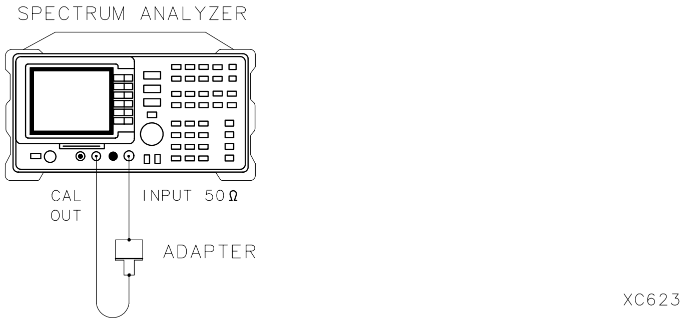
Adapter, Type N (f) to BNC (m) 75 Ω

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



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**

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)

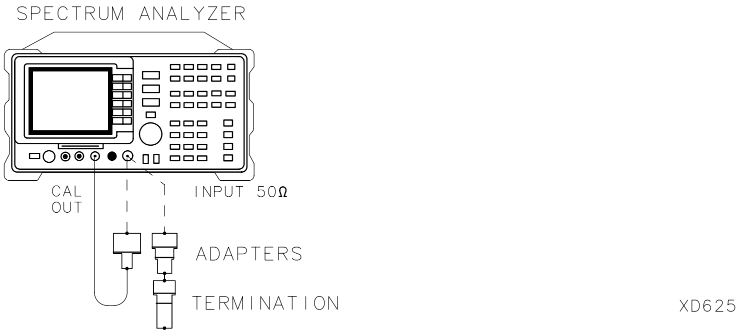
Cable, cal comb

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



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 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 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

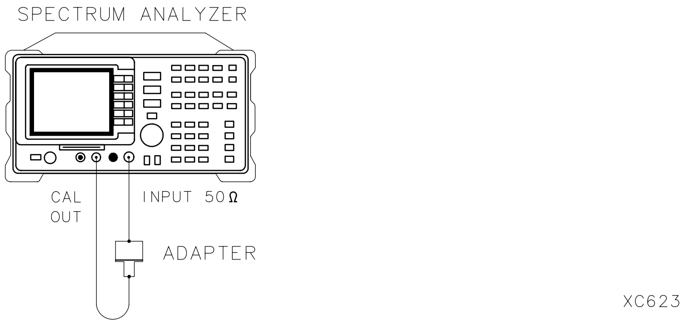
Cable, BNC, 23 cm (9 in)

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**



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 dBm – (–20.21 dBm) = +0.21 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, 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

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

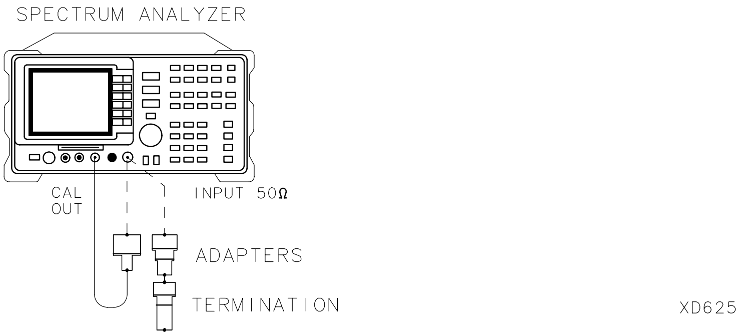
Adapter, Type N (m) to BNC (f)

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 dBm – (–20.21 dBm) = +0.21 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

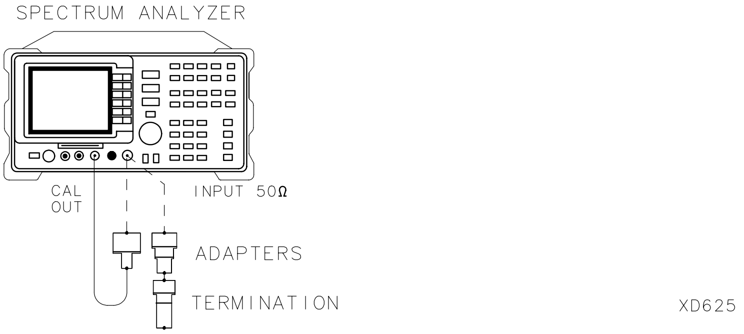
Adapter, Type N (m) to BNC (f)

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 dBm – (–20.21 dBm) = +0.21 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)

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)

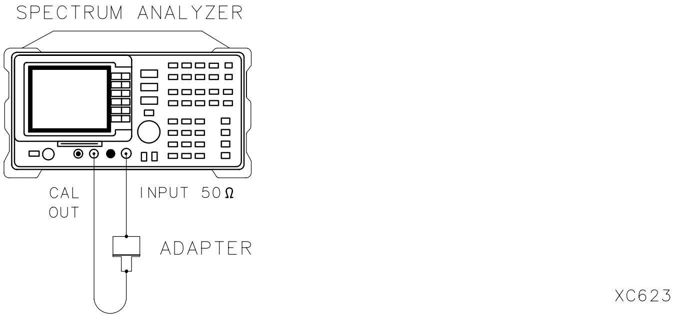
Adapter, Type N (f) to BNC (m) 75 Ω

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



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**

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.

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)

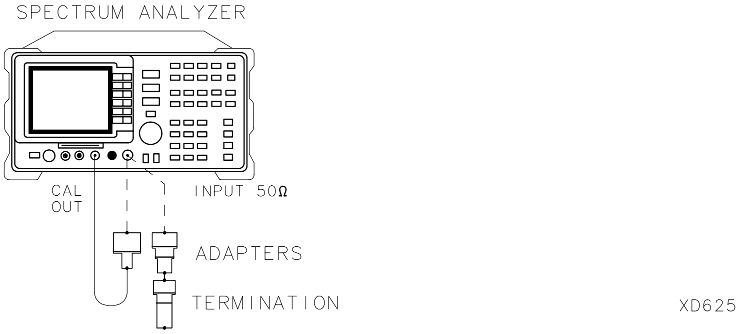
Cable, cal comb

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



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 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 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)

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

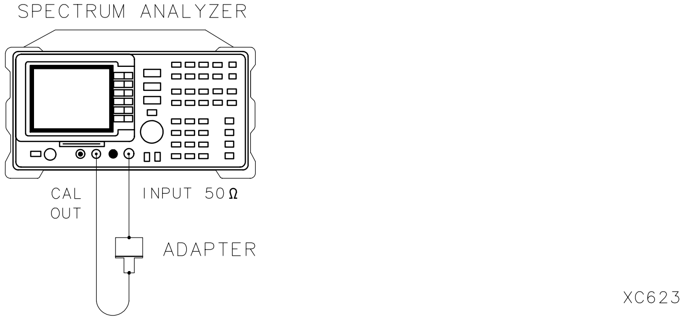
Cable, BNC, 23 cm (9 in)

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



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 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

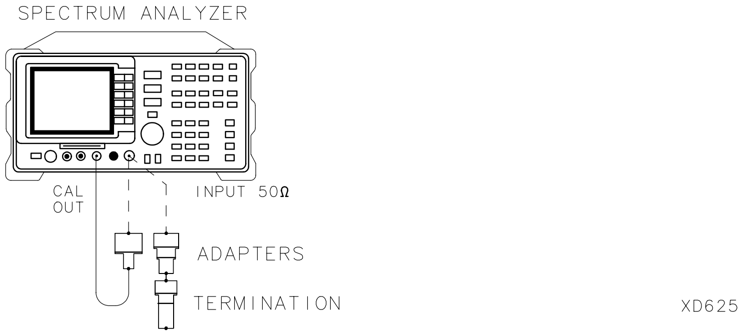
Adapter, Type N (m) to BNC (f)

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 dBm – (–20.21 dBm) = +0.21 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

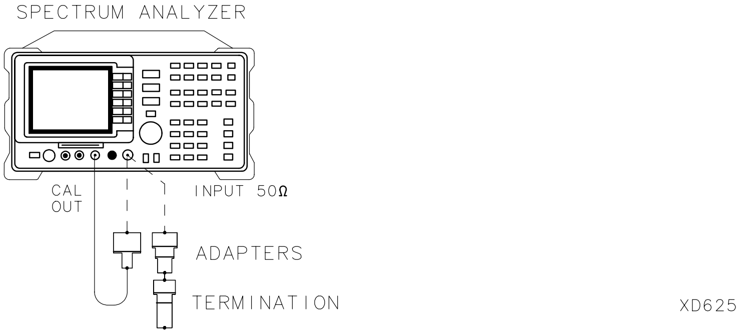
Adapter, Type N (m) to BNC (f)

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 dBm – (–20.21 dBm) = +0.21 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

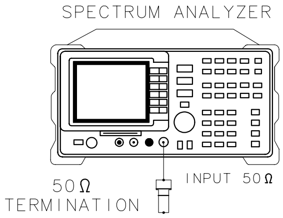
Procedure

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**, ⇑ (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

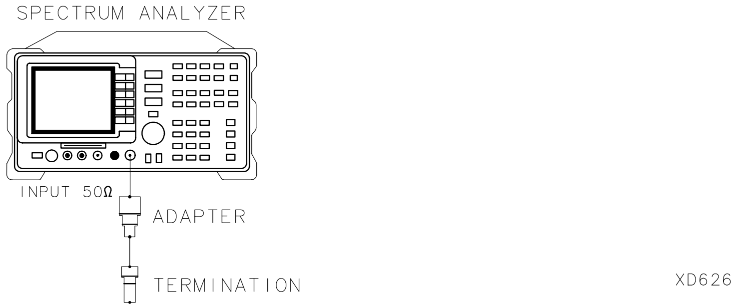
Adapter, APC 3.5 (f) to APC (f)

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**, ⇑ (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**, ⇑ (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

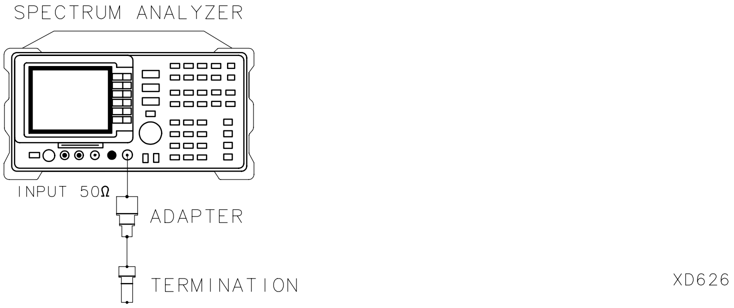
Adapter, Type N (m) to APC 3.5 (f)

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**



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).

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**, ⇑ (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

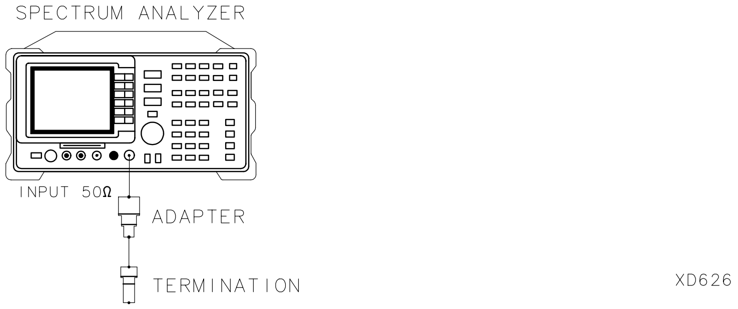
Adapter, Type N (m) to APC 3.5 (f)

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**



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**, ⇑ (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**, ⇑ (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

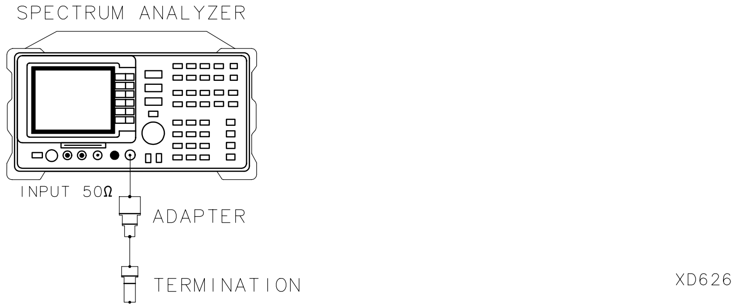
Adapter, Type N (m) to APC 3.5 (f)

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



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**, ⇑ (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**, ⇑ (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

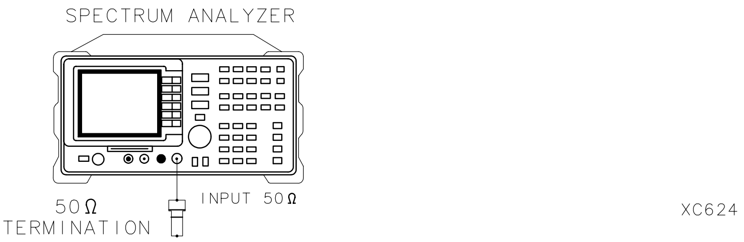
Procedure

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**



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** ∆

   SPAN, 10, **MHz**

   SGL SWP

   PEAK SEARCH

8. Record the marker-∆ 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 ⇑ (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, the 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

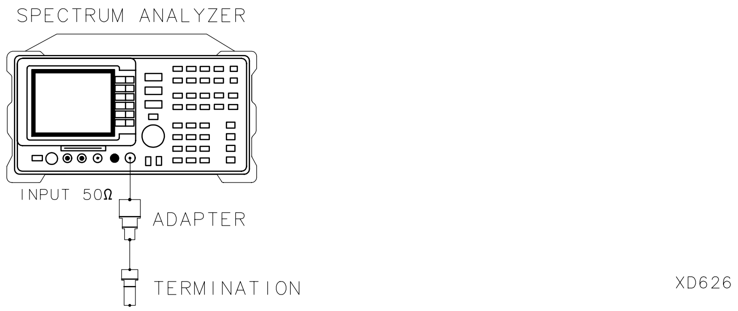
Adapter, Type N (m) to APC 3.5 (f)

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



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, ATTEN 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 ⇑ (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, the press the following keys:

PRESET

AMPLITUDE, –60, **dBm**, **ATTEN 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

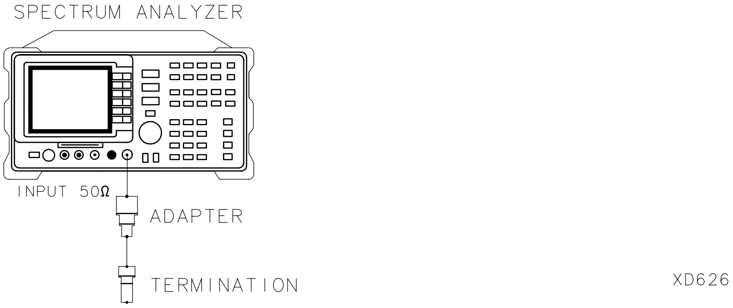
Adapter, APC 3.5 (f) to APC 3.5 (f)

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**



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**], **ATTEN 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**, ⇑ (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, the press the following keys:

PRESET

AMPLITUDE, –60, **dBm**, **ATTEN 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

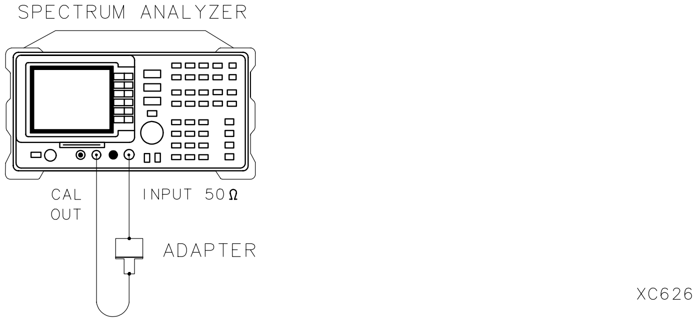
Procedure

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



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

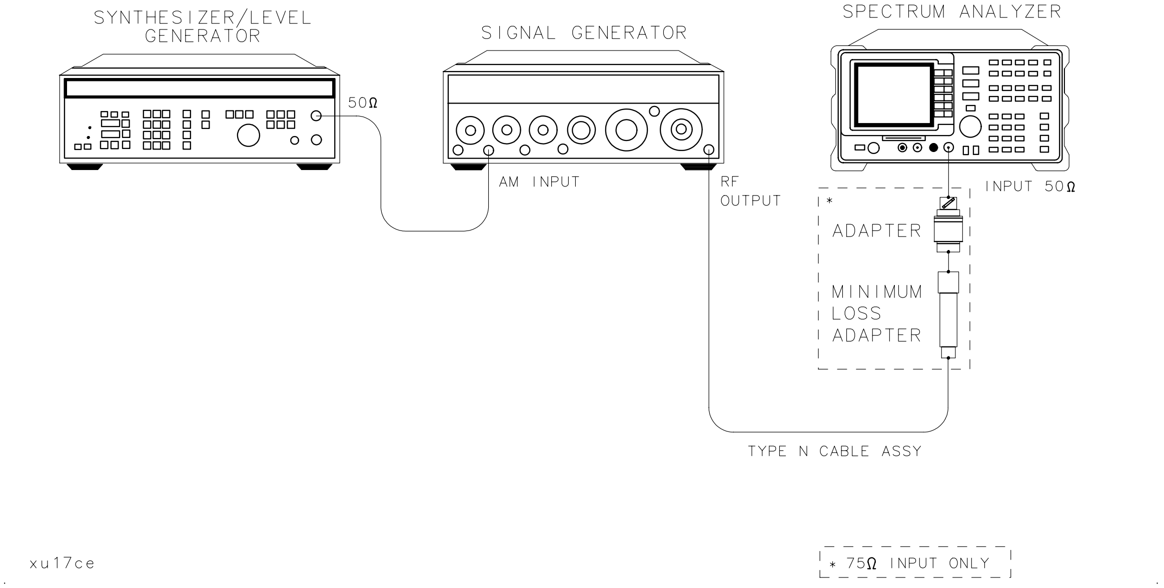
   MKR, **MARKER Δ**

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)

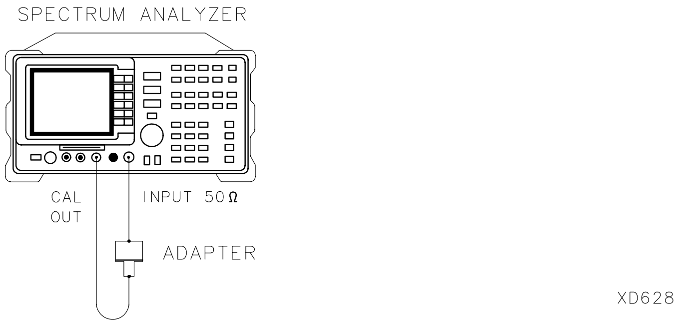
Procedure

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



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

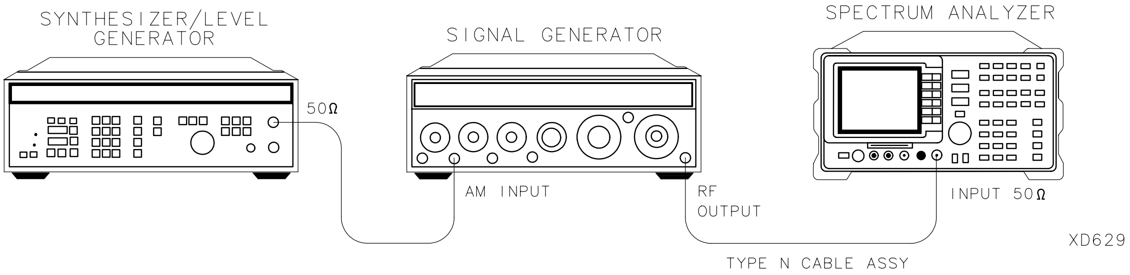
3. Set the sweep time to 18 ms. Press **SGL SWP** and read the MKR Δ amplitude. Record the marker-Δ reading as TR Entry 1 of the performance verification test record. The amplitude should be within 1.007X and 0.993X.

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.

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 μs	**(4)**______________
100 μs	100 kHz	78 μs	**(5)**______________
20 μs	500 kHz	15.6 μs	**(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

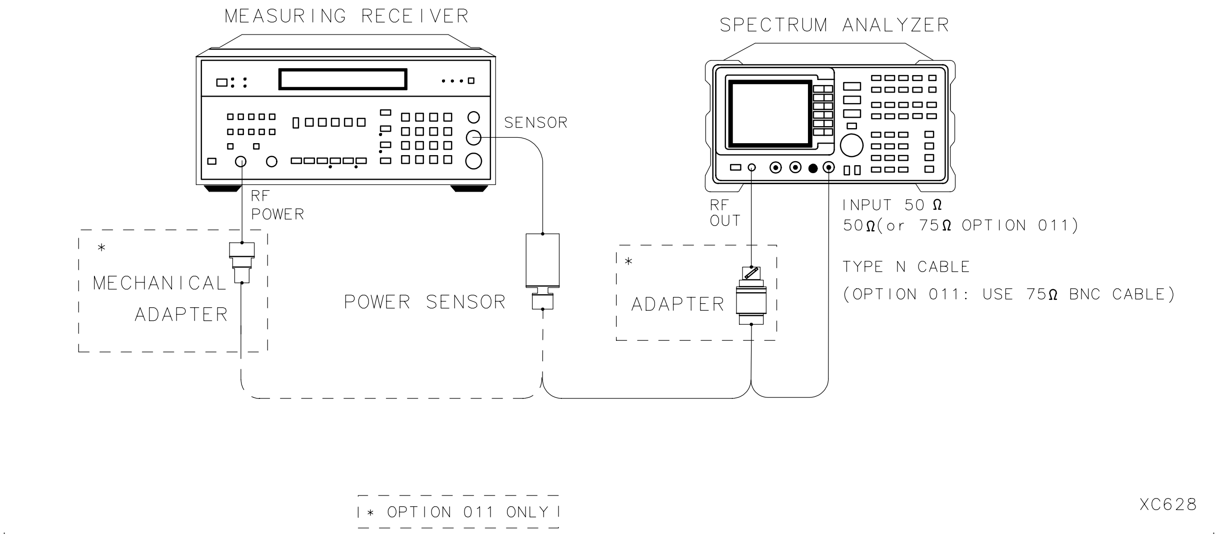
Adapter, mechanical, Type N, 50 Ω (m) to 75 Ω (f)

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.

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.

   Absolute Vernier Accuracy = MPL – SRC POWER – 10 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.

   Absolute Vernier Accuracy = MPL – SRC POWER + 38.76 dB

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	Vernier Accuracy
Opt 011, dBmV	Opt 010, dBm	(dB)	(dB)
+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

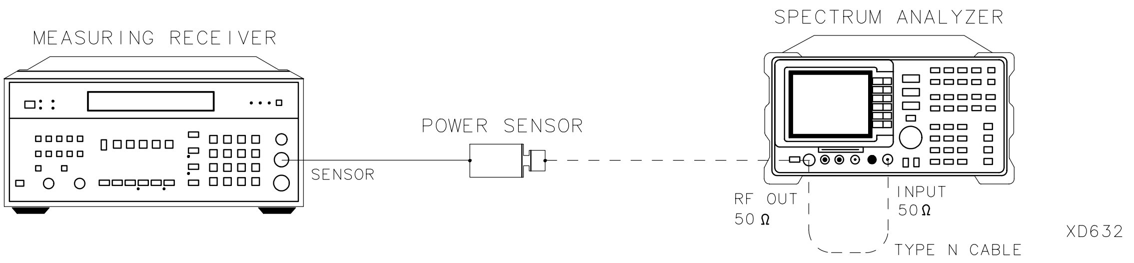
Power sensor, 100 kHz to 2.9 GHz

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.

    Absolute Vernier Accuracy = MPL – SRC POWER – 20 dBm

    For example, if SRC POWER is –21 dBm and the Measured Power Level is –0.9 dBm, the Absolute Vernier Accuracy is:

    Absolute Vernier Accuracy = (–0.9) – (–21) – 20 = 0.1 dBm

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

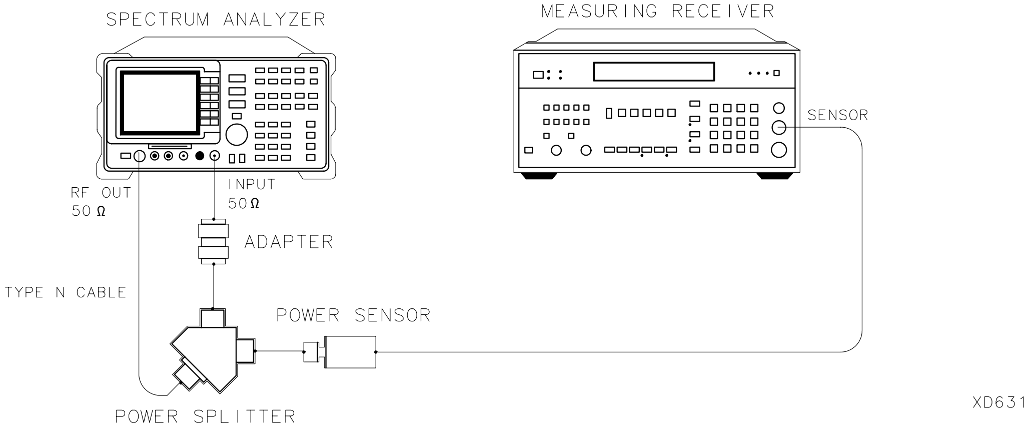
Cable, Type N, 62 cm (24 in)

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 ΔMKR should read 0 dB ±0.1 dB. If it does not, press **SRC PWR ON OFF** (ON), and adjust the power level until the marker reads 0 dB ±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 ΔMKR reads –1 dB ±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.

    Power Sweep Range = Stop Power Level – 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

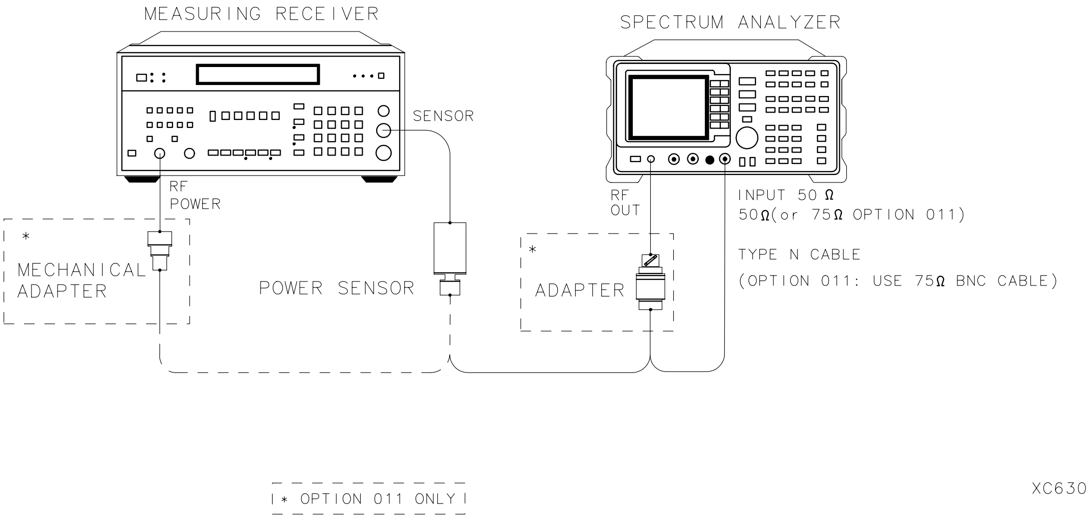
Adapter, mechanical, Type N, 50 Ω (m) to 75 Ω (f)

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.

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 ⇑ (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.		

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:

$$\mathrm{dBm} = 10_{\mathrm{LOG}}\left(\frac{\frac{E^2}{R}}{1\mathrm{mW}}\right)$$

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)

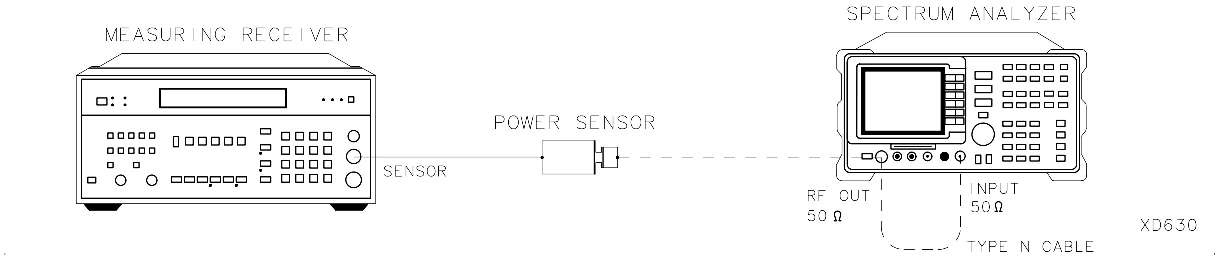
Adapter, Type N tee, (m) (f) (f)

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.

9. Set the spectrum analyzer center frequency to 100 kHz. Press **SGL SWP**.

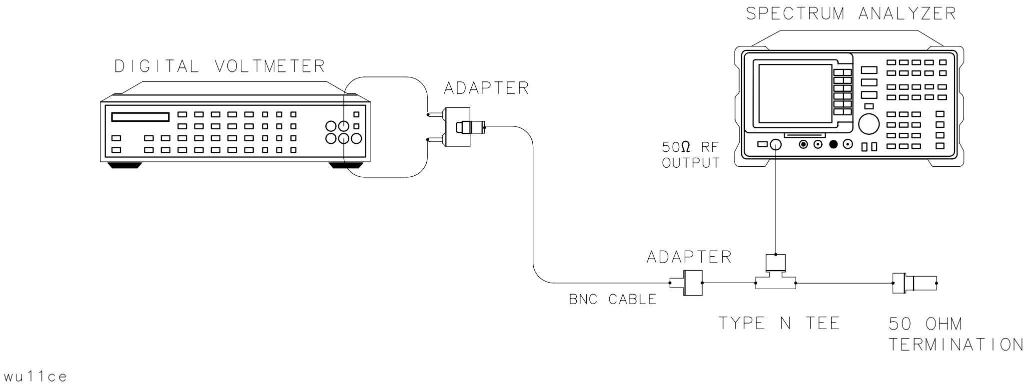
10. Enter the appropriate power sensor Cal Factor into the measuring receiver as indicated in Table 2-83.

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 ⇑ (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



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.

 (DVM) – (Power Meter) = DVM Offset

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.

    (DVM) + (DVM Offset) = 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

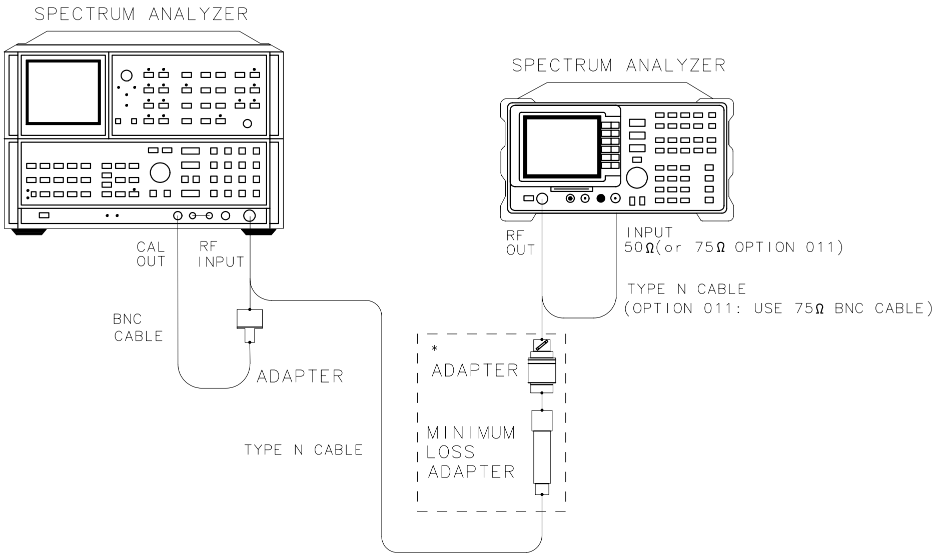
Adapter, Type N (f) to BNC (m), 75 Ω

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.

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.

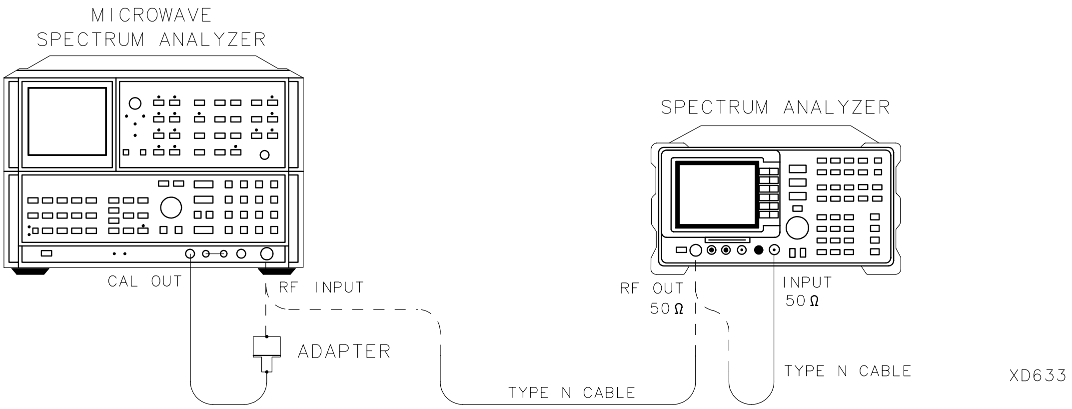
   c. Press RECALL, 9. Adjust FREQ ZERO for a maximum amplitude response.

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

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 FREQUENCY ....300 kHz
   SPAN .... 20 kHz
   REFERENCE LEVEL .... +5 dBm
   RES BW ....1 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 ⇑ (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 ⇑ (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

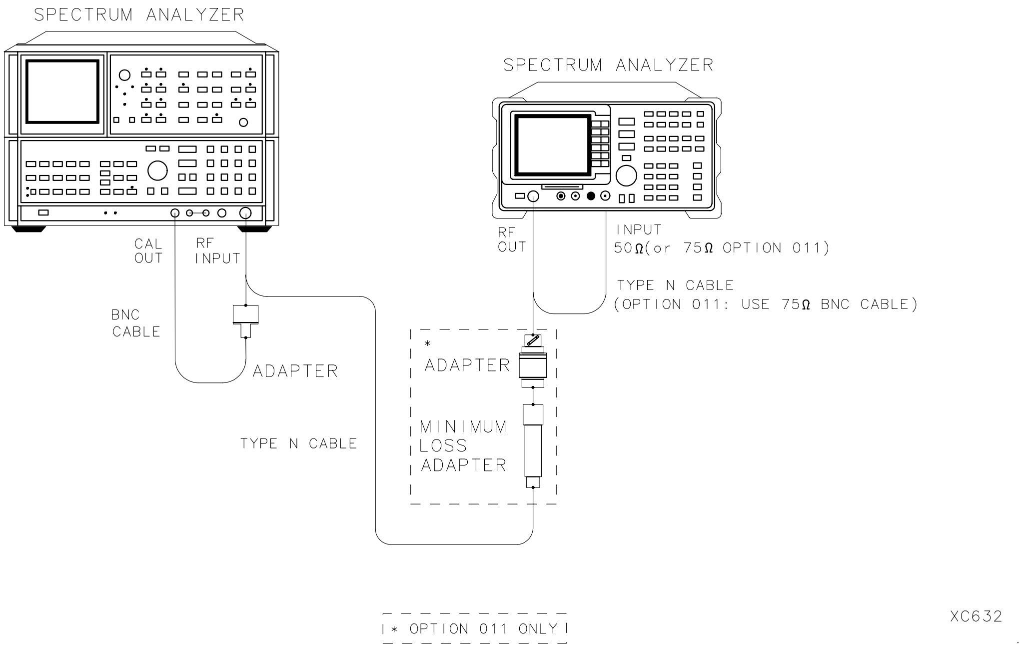
Adapter, Type N (f) to BNC (m), 75 Ω

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).

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 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.

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.

Non-Harmonic AMP = Marker AMP – 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	__________

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)

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.

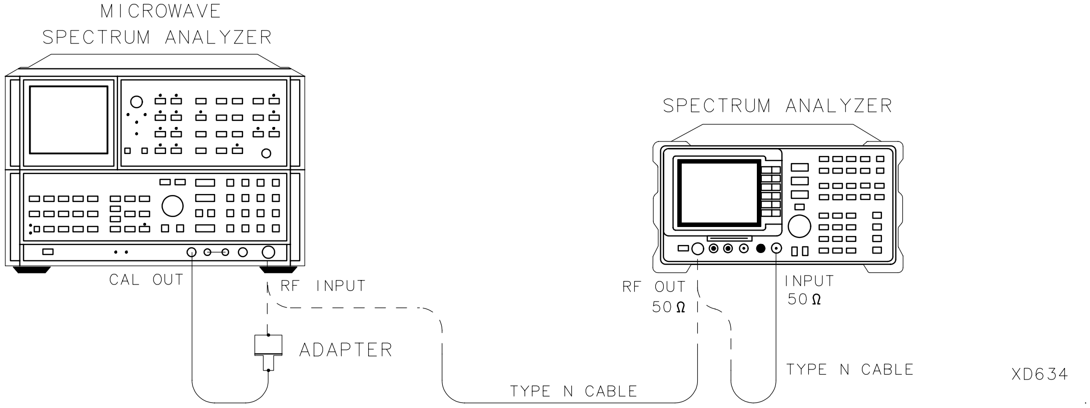
   c. Press RECALL, 9. Adjust FREQ ZERO for a maximum amplitude response.

   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 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.

    Non-Harmonic Amp = Mkr Amp – 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.

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

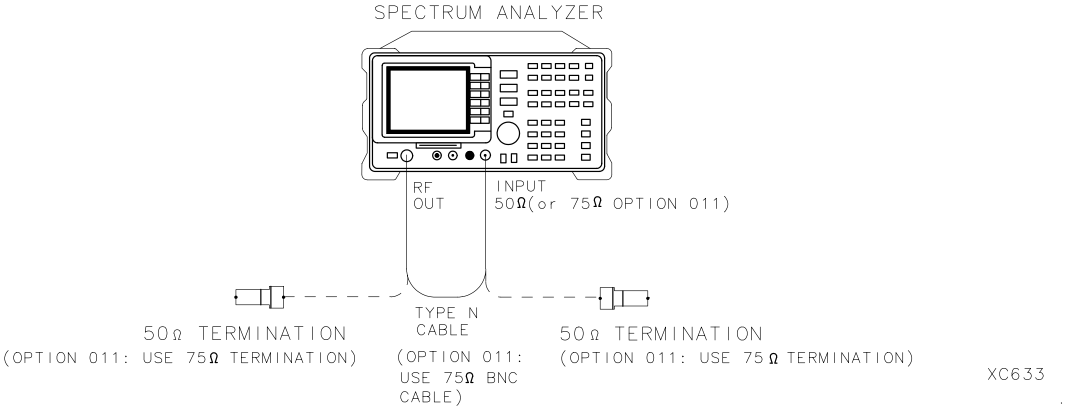
Adapter, Type N (f) to BNC (m), 75 Ω *(2 required)*

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 dBm – (–20.21 dBm) = +0.21 dB

   Example for 75 Ω input:

   If the marker reads 26.4 dBmV, enter +2.35 dB

   28.75 dBmV – 26.4 dBmV = 2.35 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).

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)

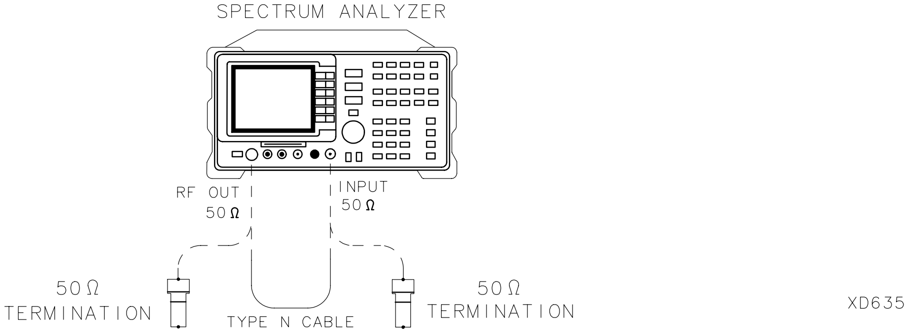
Cable, BNC, 23 cm (9 in)

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 dBm – (–20.21 dBm) = +0.21 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 Ω *(two required)*

Cable, Type N, 62 cm (24 in)

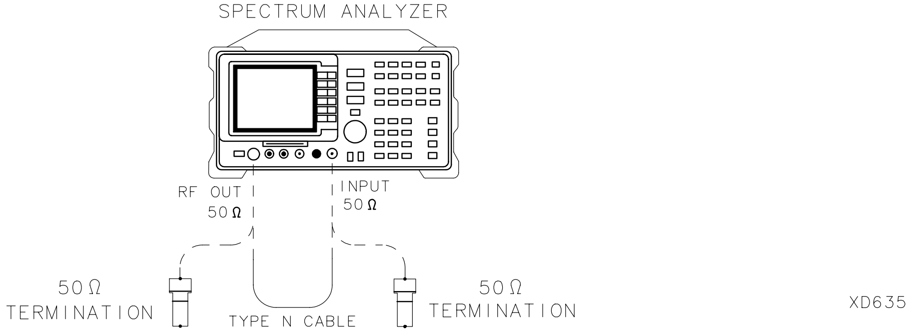
Cable, BNC, 23 cm (9 in)

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

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω 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 dBm – (–20.21 dBm) = +0.21 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)

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.

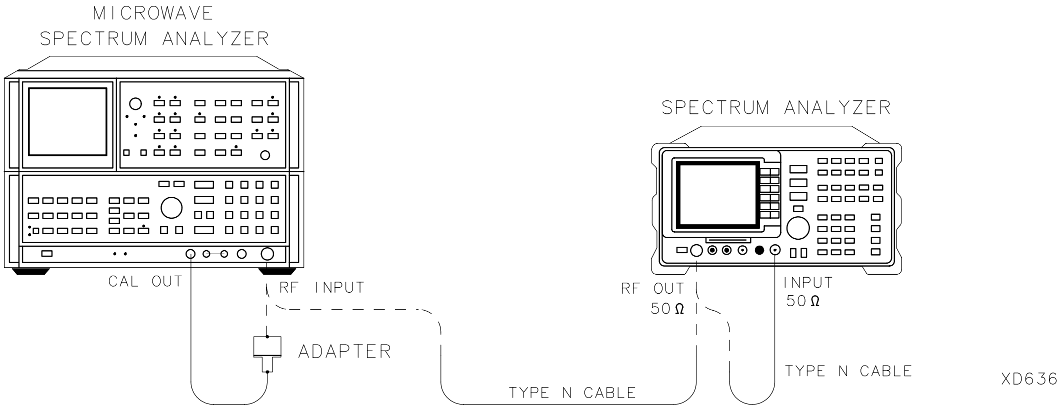
   c. Press RECALL, 9. Adjust FREQ ZERO for a maximum amplitude response.

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.

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)

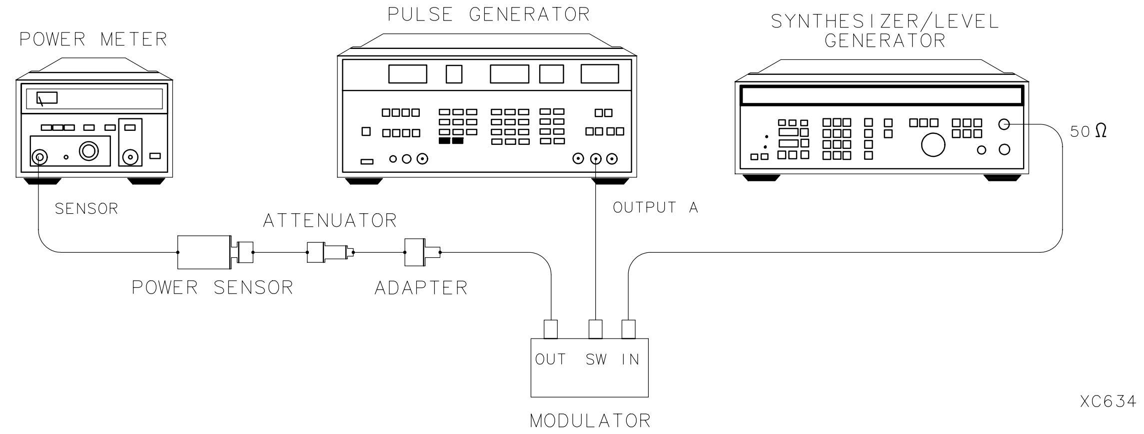
Procedure

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:

   LEE ....3 ns

   TRE ....3 ns

   HIL ....+2 V

   LOL ....+1.8 V

   DEL ....0 ns

   Output Mode: Enabled

   Channel A ....50 Ω

   Channel A ....NORM

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:

   MODE ....dBm

   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:

   Required Amplitude = Ref Amp at 50 MHz + Amp Offset

   Note that the reference amplitude is the same for the 9 kHz,120 kHz, and 200 Hz filters.

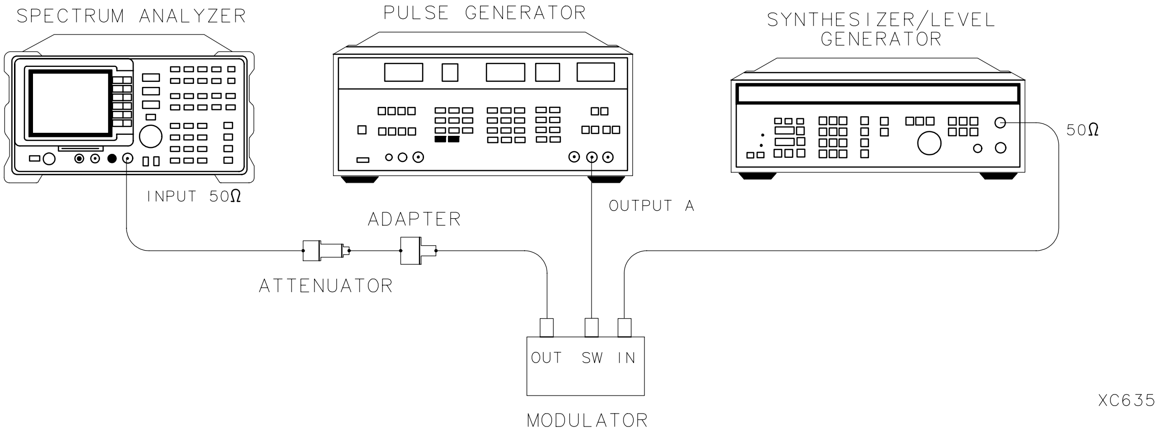
9. Enter the calculated 200 Hz, 9 kHz and 120 kHz Required Amplitude values in Table 2-95.

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** ∆

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 µs

    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:

PER ....10 ms

WID ....167 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:

    PER ....40 ms
    WID..0.1 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 (dBμV)	Reference (dBμV)	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 (dBμV)**	**Reference (dBμV)**	**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 µs of jitter due to the 1 µs 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)*

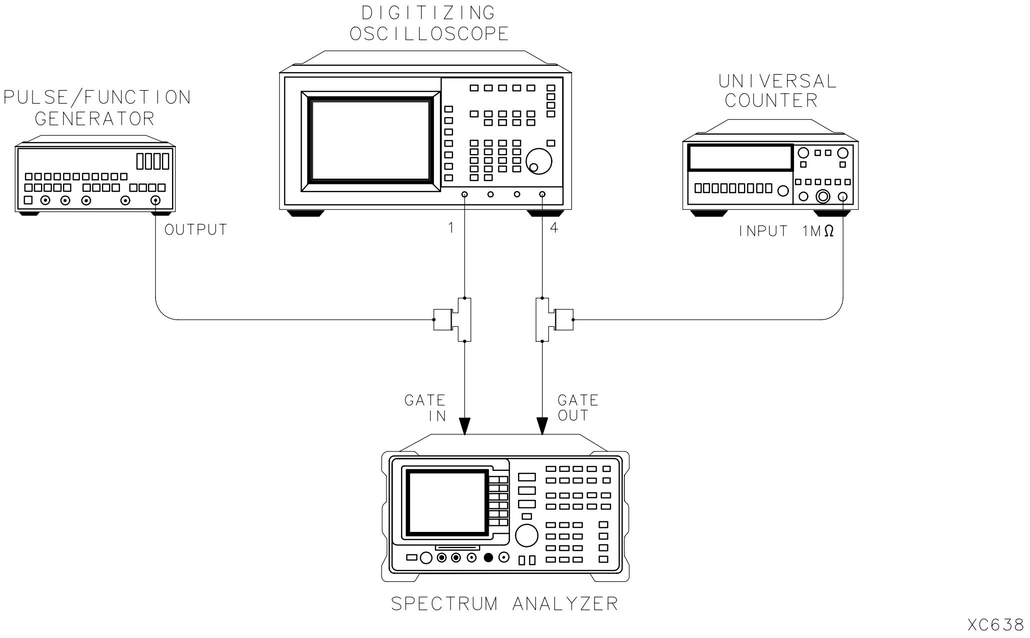
Adapter, BNC tee (m) (f) (f) *(2 required)*

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**



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 ηs/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:

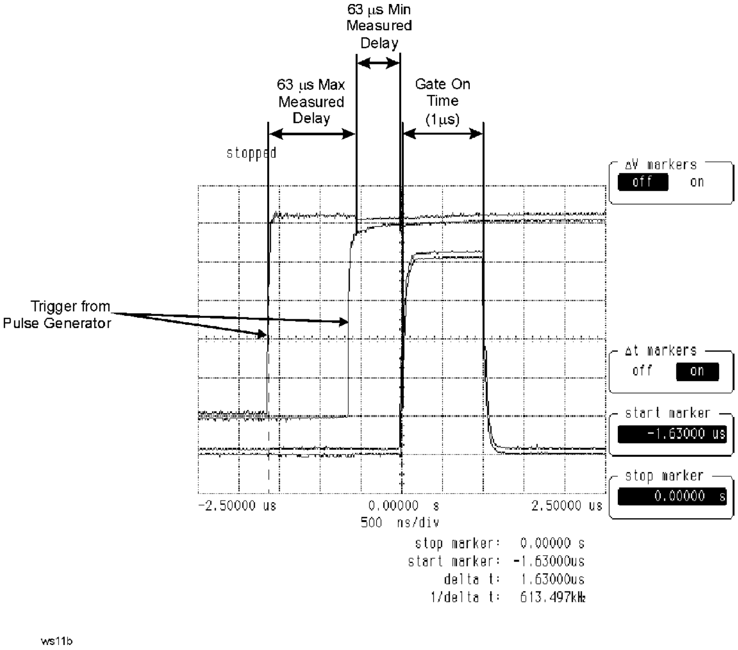
   ∆t ∆V

   - **∆t markers off on** highlight **on**
   - **stop marker** 0 µs

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



stop marker: 0.00000 s
start marker: -1.63000us
delta t: 1.63000us
1/delta t: 613.497kHz

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 μs Gate Length value in TR Entry 3 of the performance verification test record. The 1μs gate length minimum width should be greater than 800 ηs and maximum width should be less than 1200 ηs.

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 → 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)

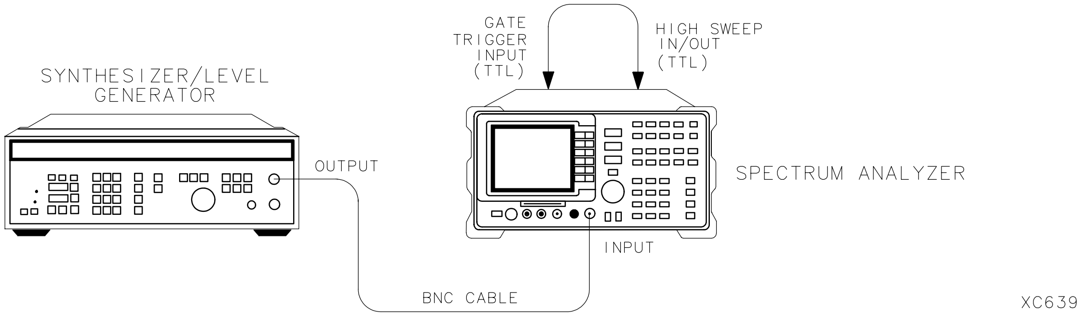
Procedure

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



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 ⇑ or ⇓ key on the synthesizer/level generator to adjust the output amplitude for a spectrum analyzer MKR Δ reading of 0.0 ±0.05 dB.

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 ⇑ or ⇓ 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 1.8 µs 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

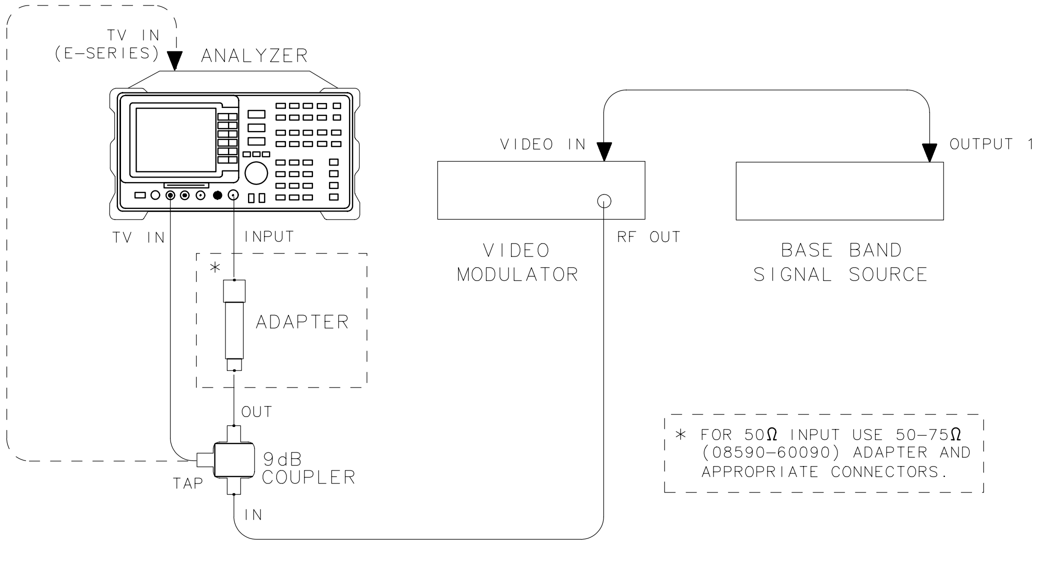
If the analyzer has not been self calibrated today, perform the self calibration procedure in Chapter 1.

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



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.

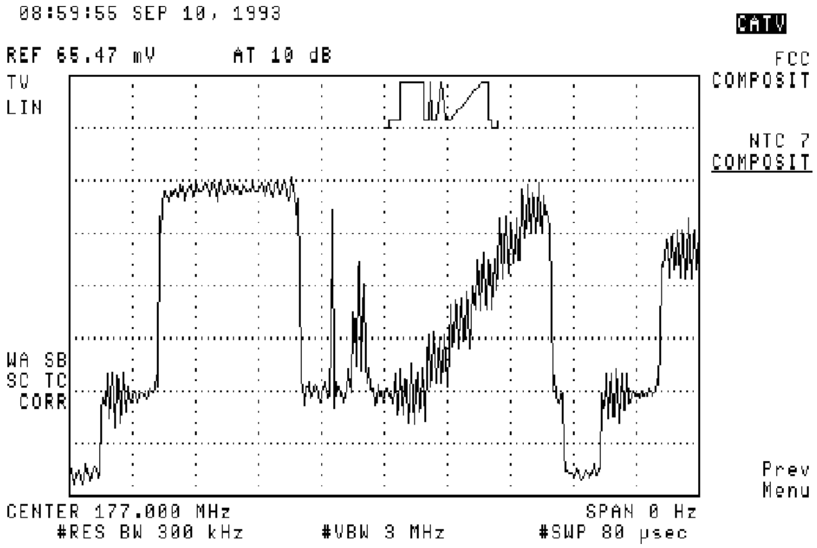
   FCC COMPOSIT, to select the FCC composite test signal.

   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



08:59:55 SEP 10, 1993

REF 65.47 mV AT 10 dB

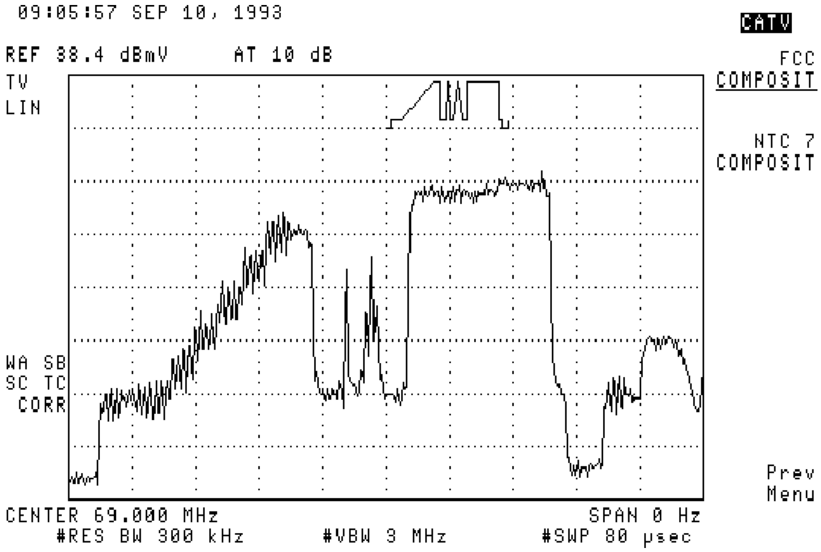
TV LIN

WA SB SC TC CORR

CENTER 177.000 MHz SPAN 0 Hz

#RES BW 300 kHz #VBW 3 MHz #SWP 80 µsec

Figure 2-108 FCC Composite



09:05:57 SEP 10, 1993

REF 38.4 dBmV AT 10 dB

TV LIN

WA SB SC TC CORR

CENTER 69.000 MHz SPAN 0 Hz

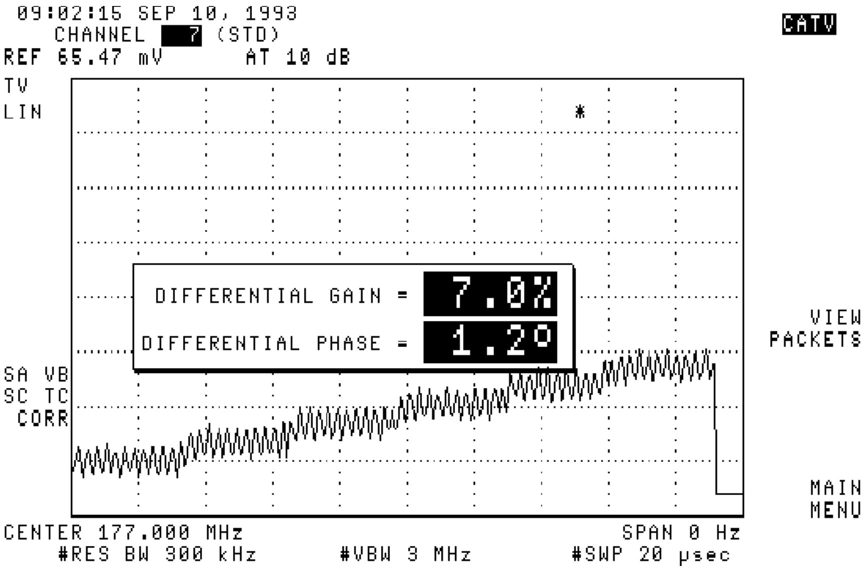
#RES BW 300 kHz #VBW 3 MHz #SWP 80 µsec

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



09:02:15 SEP 10, 1993
CHANNEL 7 (STD)
REF 65.47 mV AT 10 dB
DIFFERENTIAL GAIN = 7.0%
DIFFERENTIAL PHASE = 1.2°
CENTER 177.000 MHz SPAN 0 Hz
#RES BW 300 kHz #VBW 3 MHz #SWP 20 μsec

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.

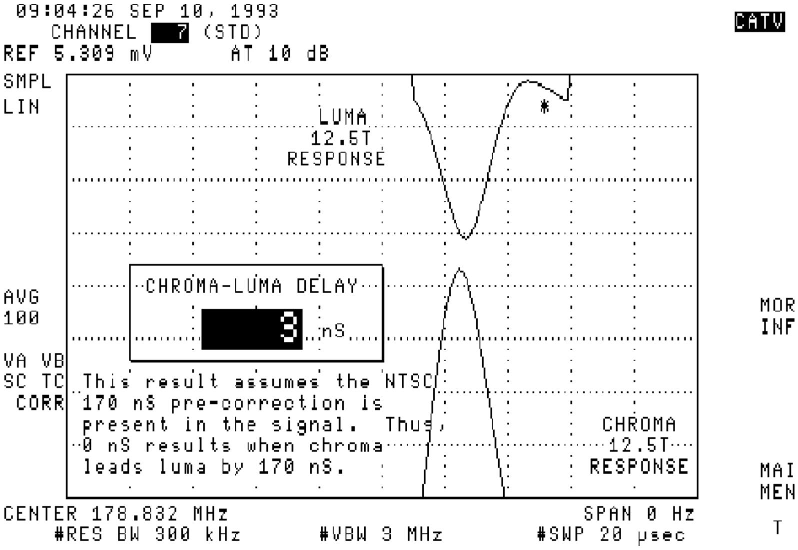
NOTE The ability to select from these three test signals will depend on the revision of your software.

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



CHROMA-LUMA DELAY
3 nS

This result assumes the NTSC 170 nS pre-correction is present in the signal. Thus, 0 nS results when chroma leads luma by 170 nS.

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

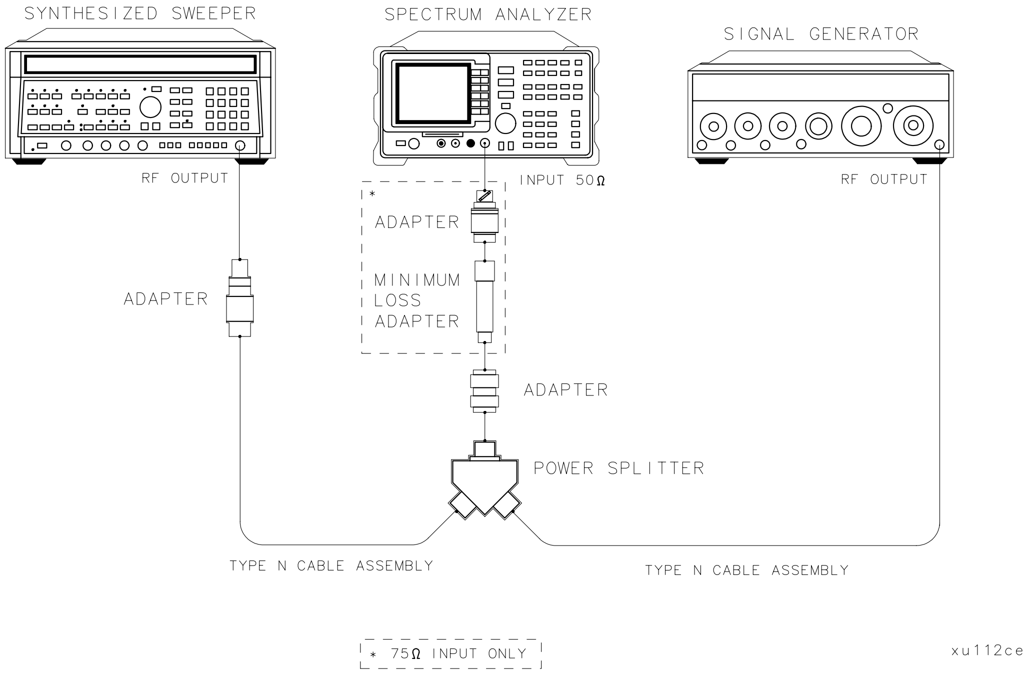
Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

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).

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 in the appropriate performance verification test record in Chapter 3.

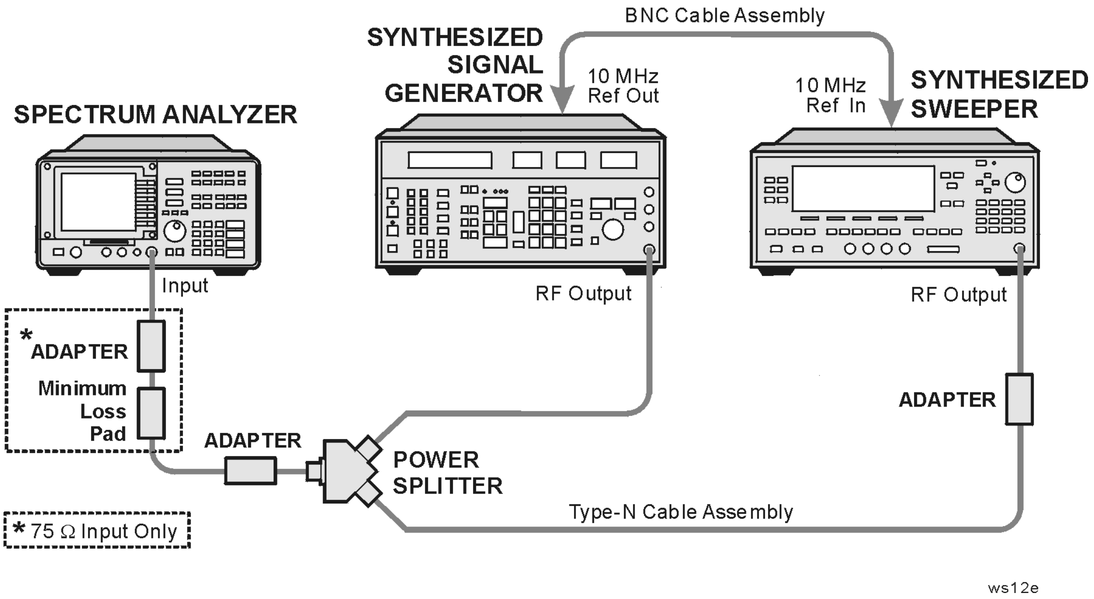
   The MKR reading should be within the 1446 MHz and 1554 MHz.

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.

1. 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



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 ∆, **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-∆ frequency reading in Table 2a-1. The MKR-∆ 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 ∆, **NEXT PEAK**

11. Record the MKR-∆ frequency reading in Table 2a-1. The MKR-∆ 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 ±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

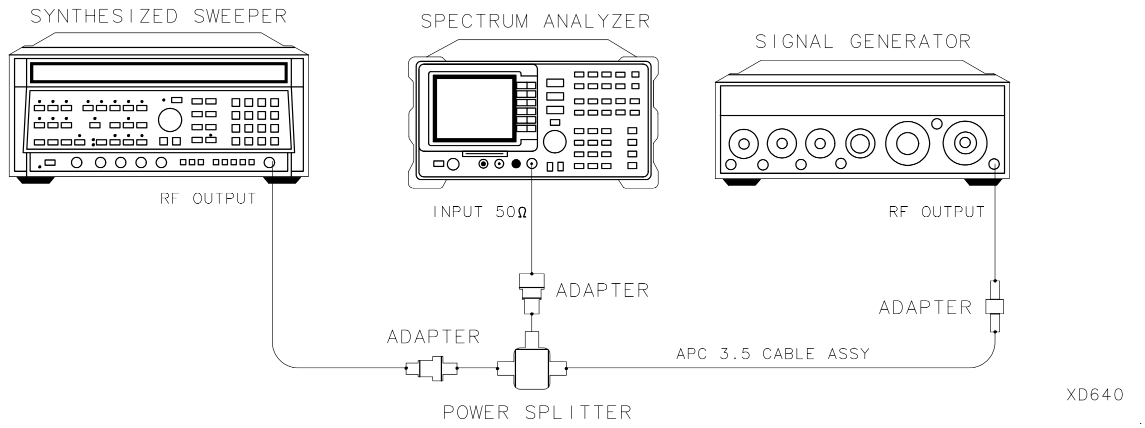
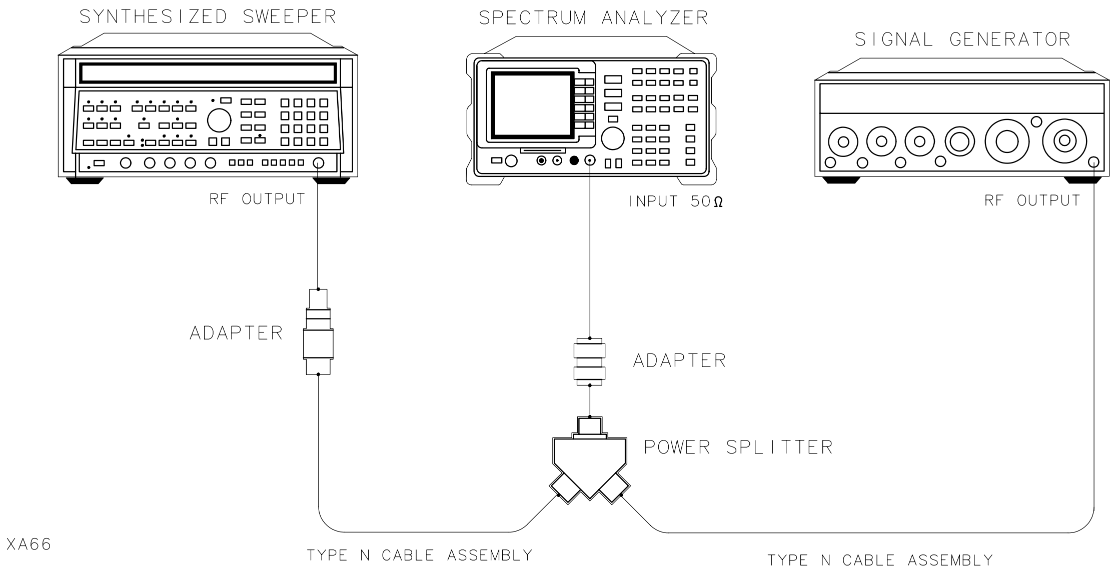


Figure 2a-4 For 8594E and 8594Q Only - Frequency Span Readout Test Setup



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**

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.

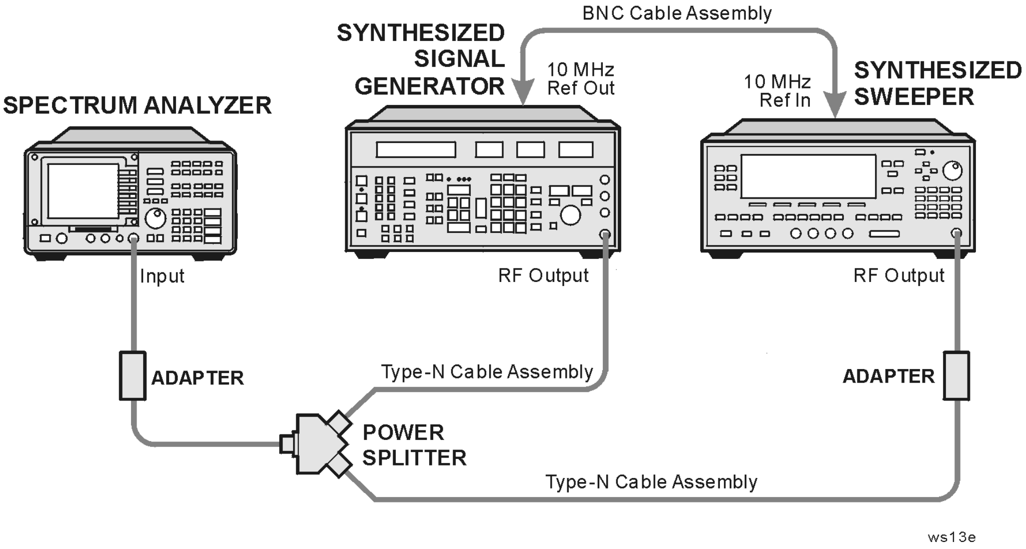
   The MKR reading should be within the 1446 MHz and 1554 MHz.

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

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
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 ±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

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:

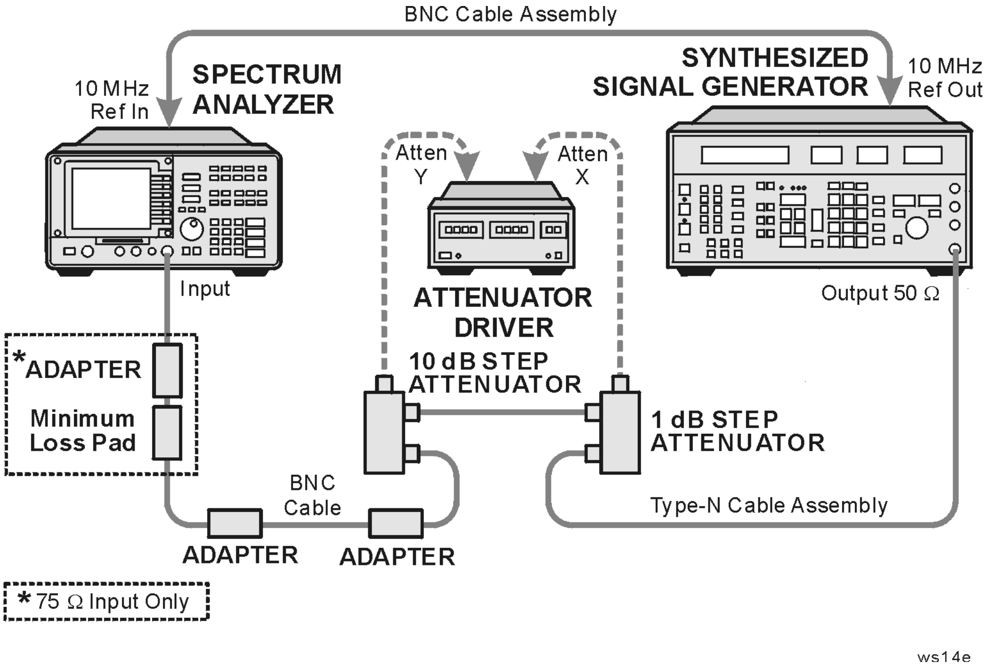
    Total Actual Attenuation = 5.998 dB + 30.012 dB = 36.01 dB

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



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**

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 anlayzer’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:

    CLFE = TAA (current) + Mkr Δ Reading – 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:

    ILFE = CLFE (current) – 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:

    ILFE (–20 dB) = (0.02 dB) – (–0.07 dB) = 0.09 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.”

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 ± 4 mV.

6. Do not adjust the synthesized signal generator’s amplitude after the 223.6 mV reference is established.

Calculate Ideal Marker Amplitude

Consider the Total Actual Attenuation at the 0 dB from REF LVL setting to be ATref, and the Total Actual Attenuation at any other dB from Ref Level setting to be ATmeas.

7. Calculate the Ideal Mkr Reading (IMR) for each dB from REF LVL in Table 2a-5 as follows:

   IMR = 1000 × SQRT[0.05 × 10((–ATmeas + ATref)/10)] 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:

   IMR = 1000 × SQRT[0.05 × 10((–ATmeas + ATref)/10)]

   = 1000 × SQRT[0.05 × 10((–7.982+0.012)/10)]

   = 89.3 mV

   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:

   LFE = 100 × (Actual Mkr Reading – 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:

   LFE = 100 × (85 – 89.3) / 223.6 = 1.92% 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 inChapter 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 inChapter 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.”

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.

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	TR Entry Cumulative Log Fidelity Error	TR Entry 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. Nominal Atten.	1 dB step Atten. Nominal Atten.	10 dB step Atten. Nominal Atten.	10 dB step Atten. Nominal Atten.	Total Actual Atten.	Mkr D Reading	TR Entry Cumulative Log Fidelity Error	TR Entry 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	________	________	________	**(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

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:

   Ref Atten Error = Actual Atten (40 dB) – 40 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:

   Atten Error = (Actual Atten – Nominal Atten) – 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:

   Atten Error = (50.08 dB – 50 dB) – 0.15 dB = –0.07 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

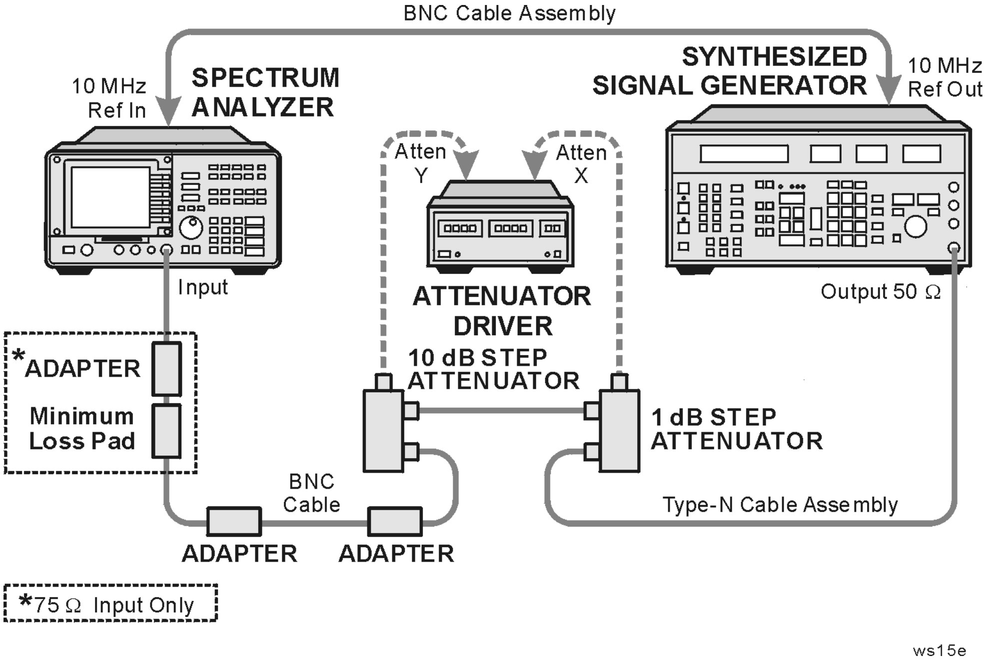
   AMPLITUDE .... –10 dBm

   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



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-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:

      MKR Δ Read + Atten Error = +0.17 dB + (–0.07 dB) = +0.10 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:

    a. Press **SGL SWP, PEAK SEARCH** on the spectrum analyzer.

    b. Record the MKR Δ amplitude reading as indicated in Table 2a-8.

    c. 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)	Spectrum Analyzer Reference 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)	Spectrum Analyzer Reference 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)	Spectrum Analyzer Reference 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)	Spectrum Analyzer Reference Level (dBm)	MKR Δ Reading (dB) Min.	MKR Δ Reading (dB) MKR Δ Reading	MKR Δ Reading (dB) Max.	TR Entry MKR Δ Reading + Atten Error
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:

   Ref Atten Error = Actual Atten (40 dB) – 40 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:

   Atten Error = (Actual Atten – Nominal Atten) – 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:

   Atten Error = (50.08 dB – 50 dB) – 0.15 dB = –0.07 dB

   Record the results in Table 2a-11, Table 2a-12, Table 2a-13, and Table 2a-14.

Log Scale

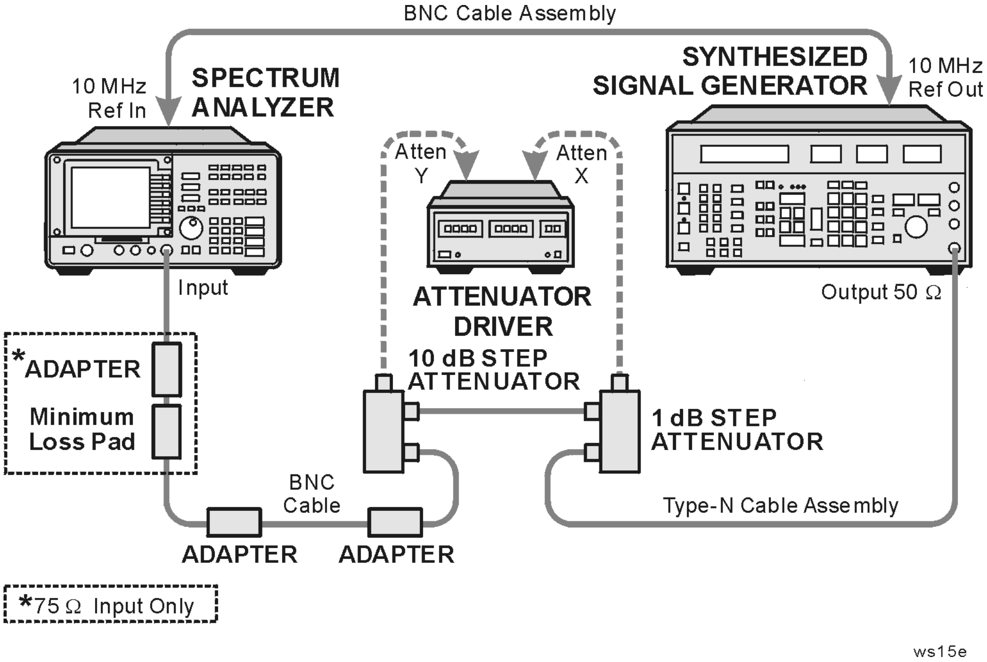
1. Set the synthesized signal generator controls as follows:

   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



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:

      MKR Δ Read + Atten Error = +0.17 dB + (–0.07 dB) = +0.10 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:

    a. Press **SGL SWP, PEAK SEARCH** on the spectrum analyzer.

    b. Record the MKR Δ amplitude reading as indicated in Table 2a-12.

    c. 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)	Spectrum Analyzer Reference 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)	Spectrum Analyzer Reference Level (dBm)	MKR Δ Reading (dB) Min.	MKR Δ Reading (dB) MKR Δ Reading	MKR Δ Reading (dB) Max.	TR Entry MKR Δ Reading + Atten Error
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)	Spectrum Analyzer Reference 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)	Spectrum Analyzer Reference Level (dBm)	MKR Δ Reading (dB) Min.	MKR Δ Reading (dB) MKR Δ Reading	MKR Δ Reading (dB) Max.	TR Entry MKR Δ Reading + Atten Error
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

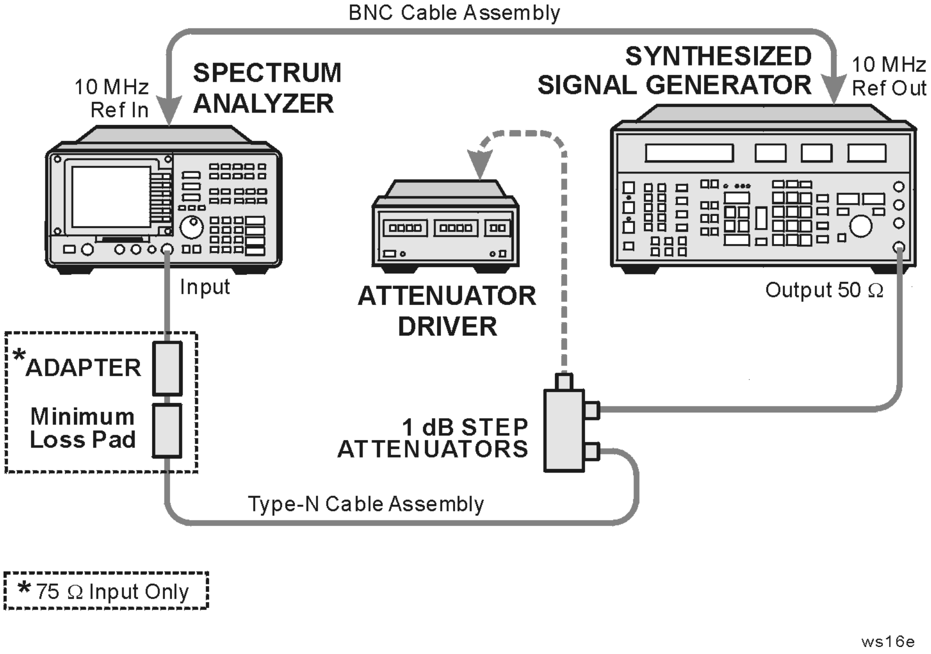
Pad, minimum loss

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



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 dBm ± 0.2 dB.
8. Press **Peak Search**, **Mkr** ∆ 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 ± 0.05 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 ± 0.05 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 dB Bandwidth = Upper Marker Freq. – 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 dB Bandwidth = Upper Marker Freq. – 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:

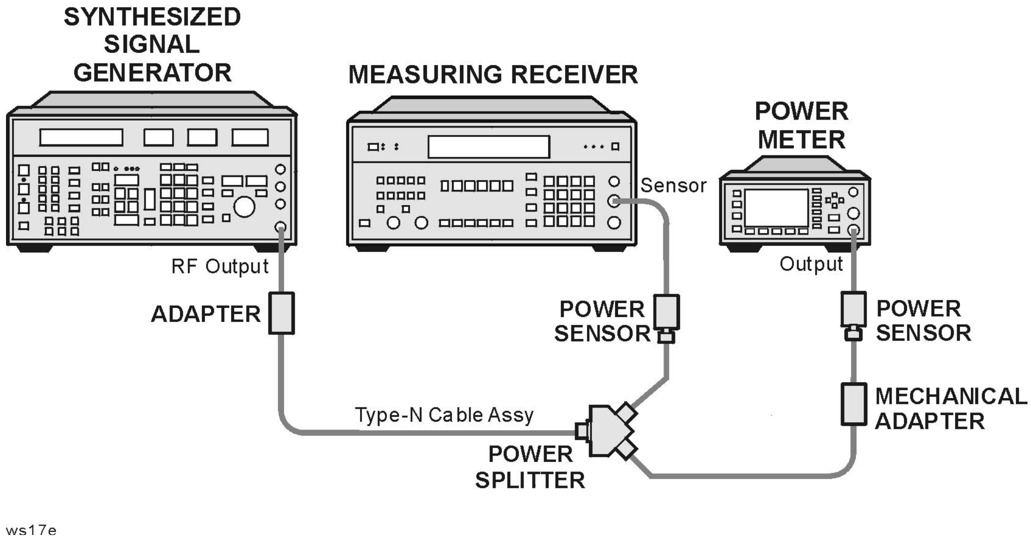
   CW .... 50 MHz

   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



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 ⇑ (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.

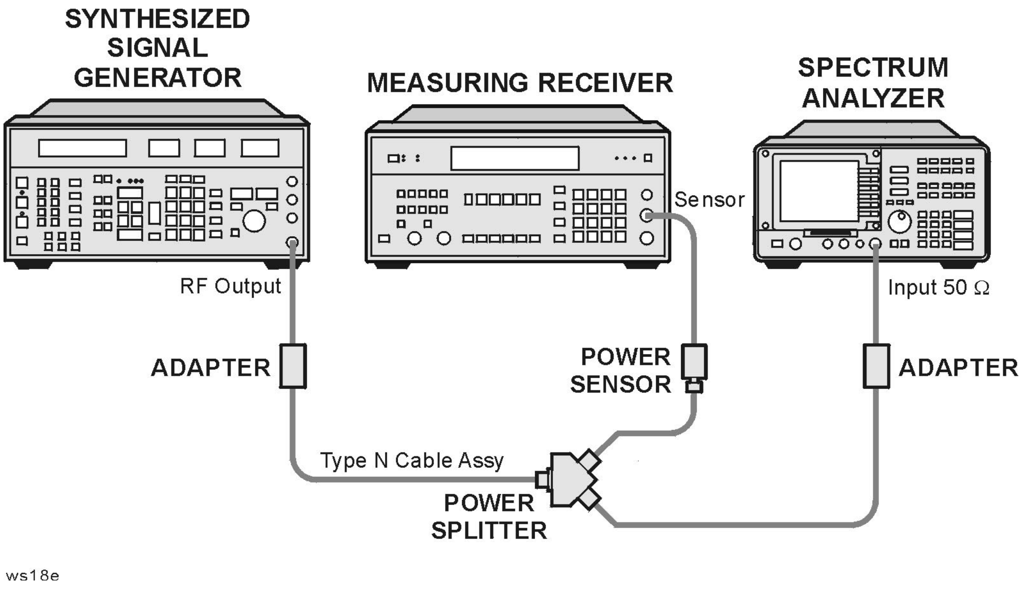
System characterization is now complete for 8591C spectrum analyzers and spectrum analyzers equipped with 75 Ω Input. Proceed to step 1 of “Frequency Response, ≥100 kHz.”

Frequency Response, ≥100 kHz

If you have an 8591C spectrum analyzer or if your spectrum analyzer is equipped with 75 Ω input, perform “System Characterization Procedure” before proceeding.

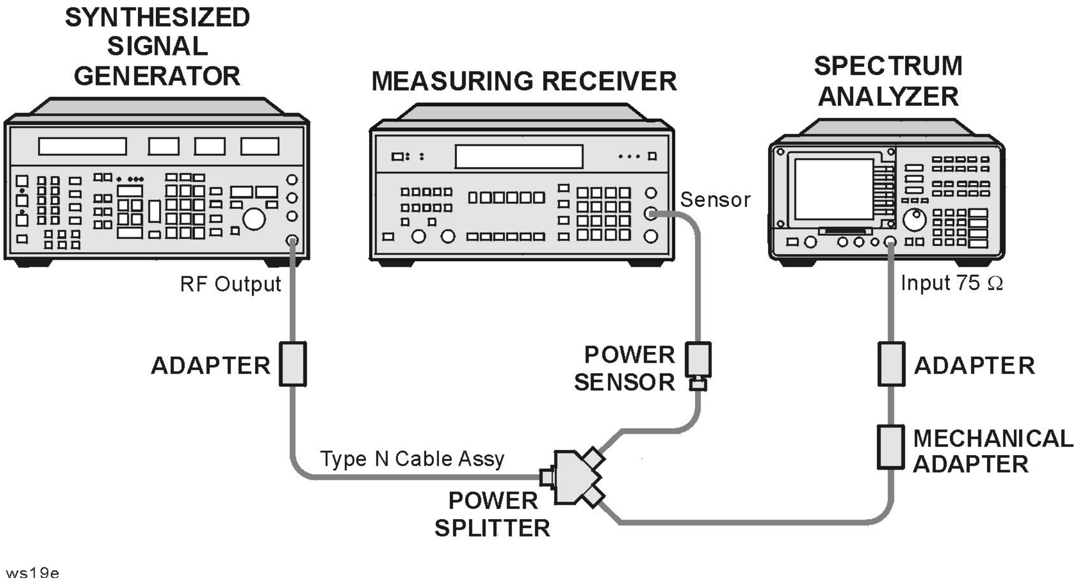
1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode as described in the measuring receiver operation manual.
2. If your spectrum analyzer is *not* an 8591C spectrum analyzer and is *not* equipped with 75 Ω input, connect the equipment as shown in Figure 2a-11. Otherwise, connect the equipment as shown in Figure 2-12.

Figure 2a-11 Frequency Response Test Setup, ≥100 kHz



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

Figure 2-12 Frequency Response Test Setup, ≥100 kHz, 8591C and 75 Ω Input



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)

5. Adjust the synthesized signal generator power level for a MKR-TRK amplitude reading of –14 dBm ±0.05 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 dBm ±0.05 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**, ⇑ (step-up key). Then, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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.

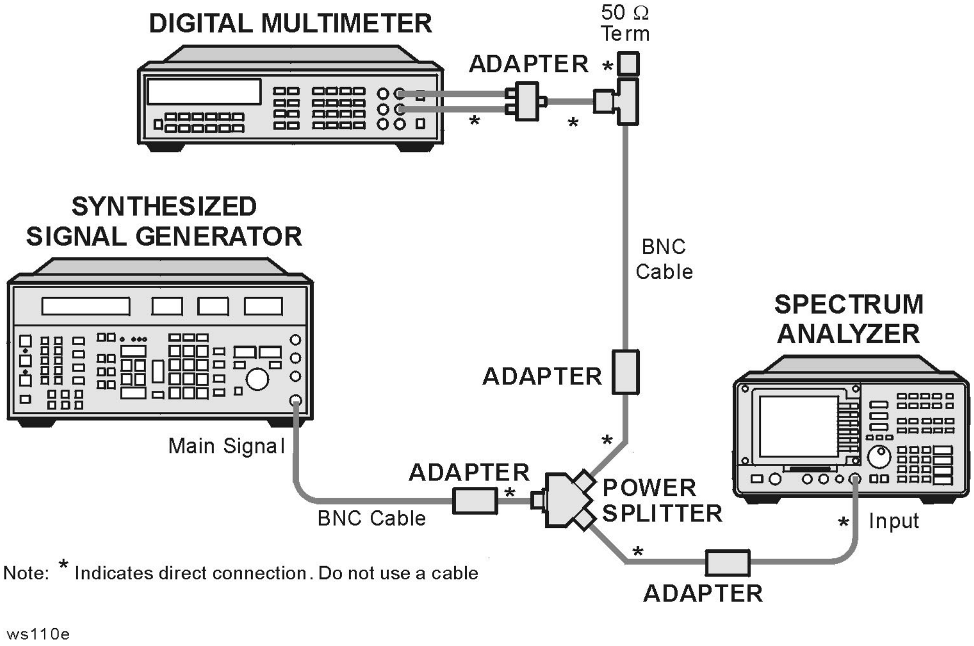
If your spectrum analyzer *is* equipped with 75 W input, continue with step 16. If you spectrum analyzer *is not* equipped with 75 W input, skip step 16 through step 17 and proceed to step 18.

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



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 the 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.

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 inTable 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)

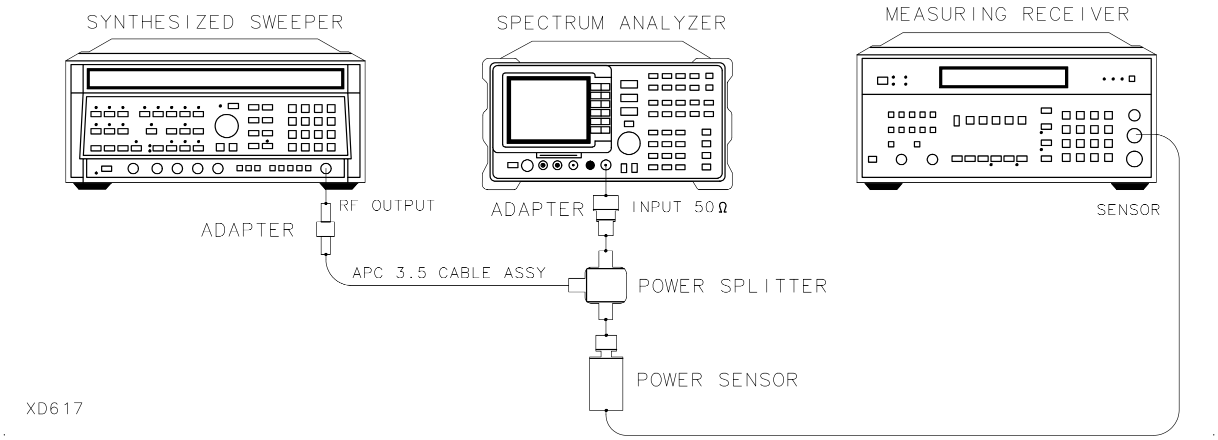
Dual banana plug to BNC (f)

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



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 dBm ± 0.1 dB.
6. Press RATIO on the measuring receiver.

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**, ⇑ (step up) and, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ± 0.1 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 dBm ±0.1 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**, ⇑ (step up) and, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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)

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 dBm ±0.1 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**, ⇑ (step up) and, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ±0.1 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**, ⇑ (step up) and, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ±0.1 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**, ⇑ (step up) and, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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)

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 dBm ±0.1 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.

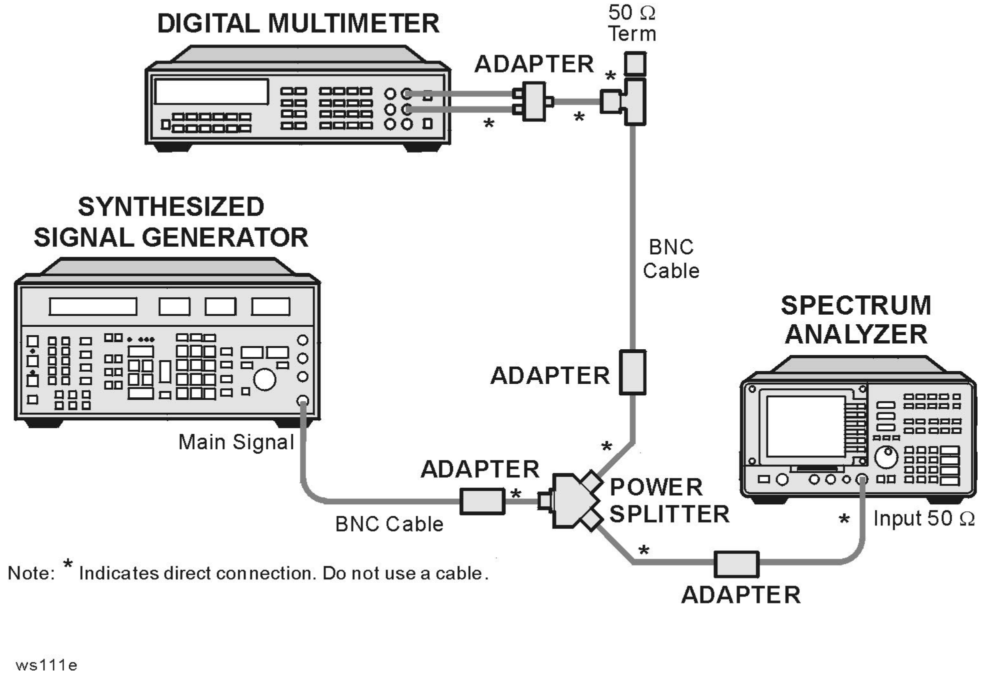
40.On the synthesized sweeper, press **CW**, ⇑ (step up) and, on the spectrum analyzer, press **FREQUENCY**, ⇑ (step up) to step through the remaining frequencies listed in Table 2a-25.

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



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 dBm ± 0.05 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.

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.

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)

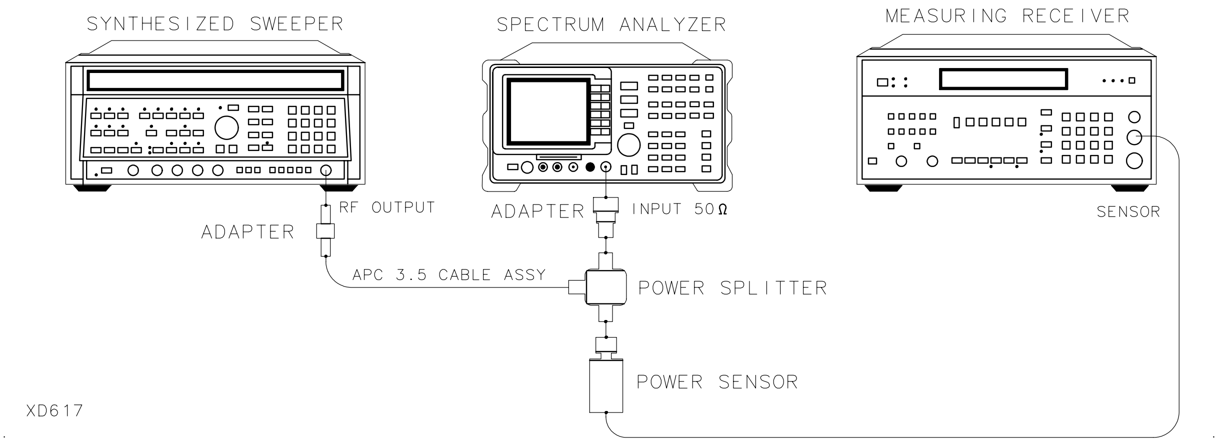
Cable, APC 3.5, 91 cm (36 in) *(2 required)*

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**

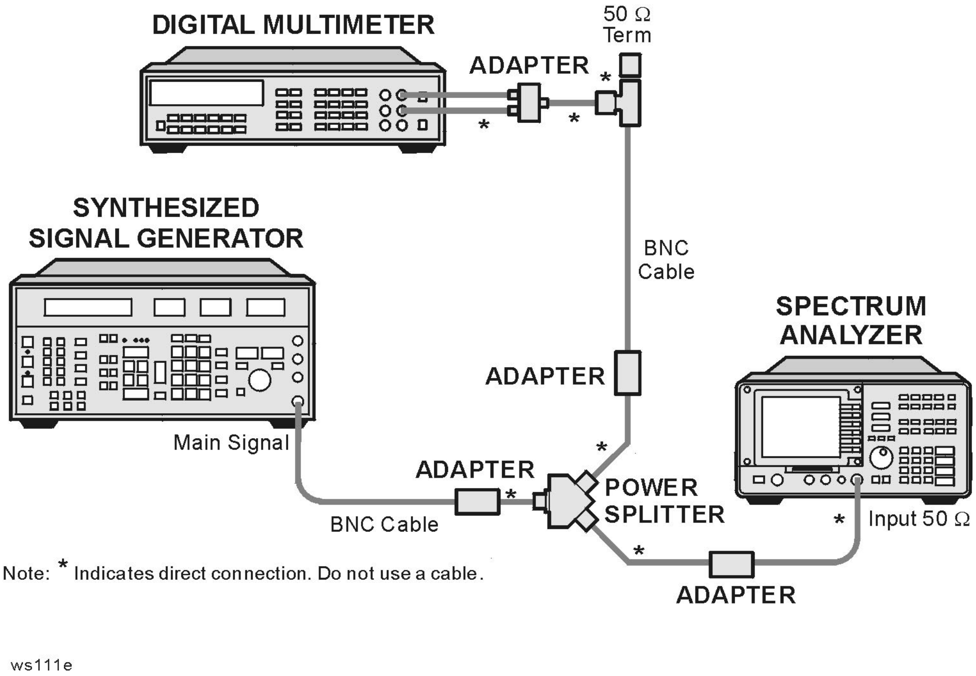
VID BW AUTO MAN, 10, **kHz**

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 dBm ±0.1 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 dBm ± 0.1 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 RatiodB
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 dBm ± 0.1 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 ⇑ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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



Note: * Indicates direct connection. Do not use a cable.

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 dBm ± 0.05 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.

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)

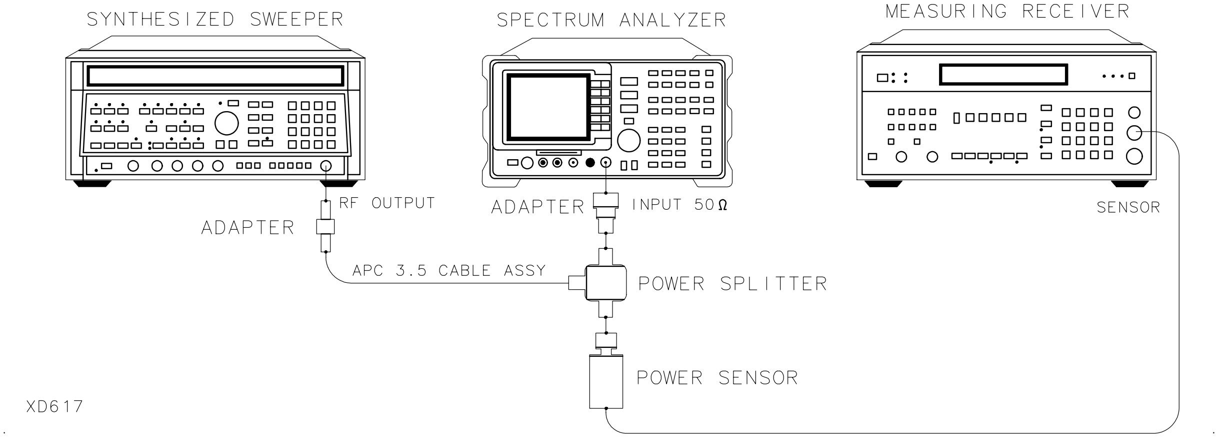
Dual banana plug to BNC (f)

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**

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 dBm ± 0.1 dB.
7. Press RATIO on the measuring receiver.

Frequency Response, Band 0, ≥ 10 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 dBm ± 0.1 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 RatiodB

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 dBm ± 0.1 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 dBm ± 0.1 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**.

28.Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of −14 dBm ±0.1 dB.

29.Record the negative of the power ratio displayed on the measuring receiver in Table 2a-30 as the Measuring Receiver Reading.

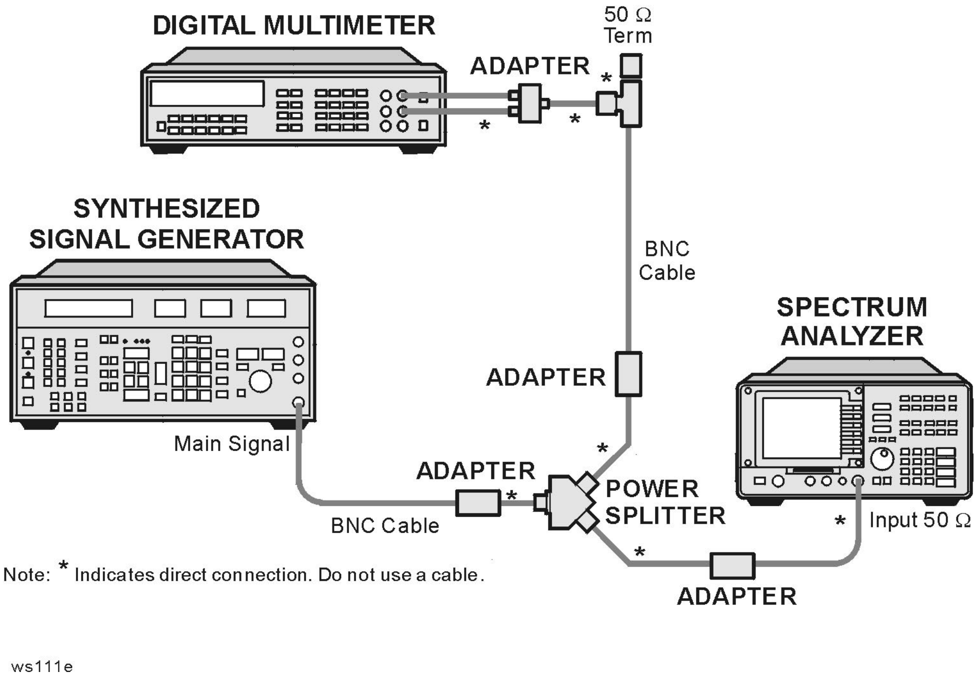
30.On the synthesized sweeper, press CW, ⇑ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, ⇑ (step up) to step through the remaining frequencies listed in Table 2a-30.

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



Note: * Indicates direct connection. Do not use a cable.

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 synthesize/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 dB ± 0.05 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.

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)

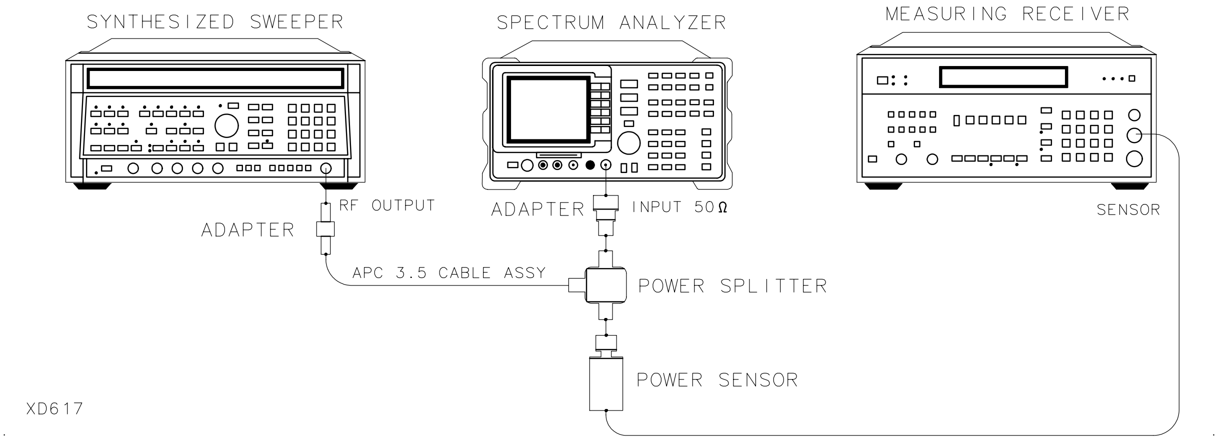
Cable, APC 3.5, 91 cm (36 in) *(2 required)*

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

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 dBm ±0.1 dB.
6. Press RATIO on the measuring receiver.

Frequency Response, Band 0, ≥ 10 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 dBm ± 0.1 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 RatiodB

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 dBm ± 0.1 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**, ⇑ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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 dBm ± 0.1 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 dBm ±0.1 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, ⇑ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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**.

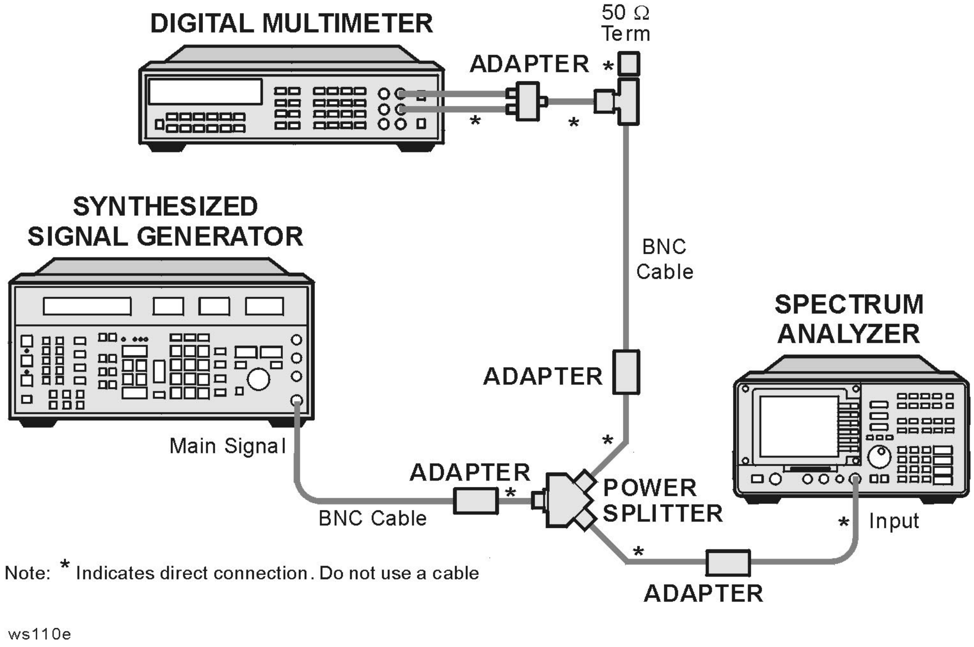
34.Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of –14 dBm ±0.1 dB.

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, ⇑ (step up). Then, on the spectrum analyzer, press **FREQUENCY**, ⇑ (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



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

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.

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

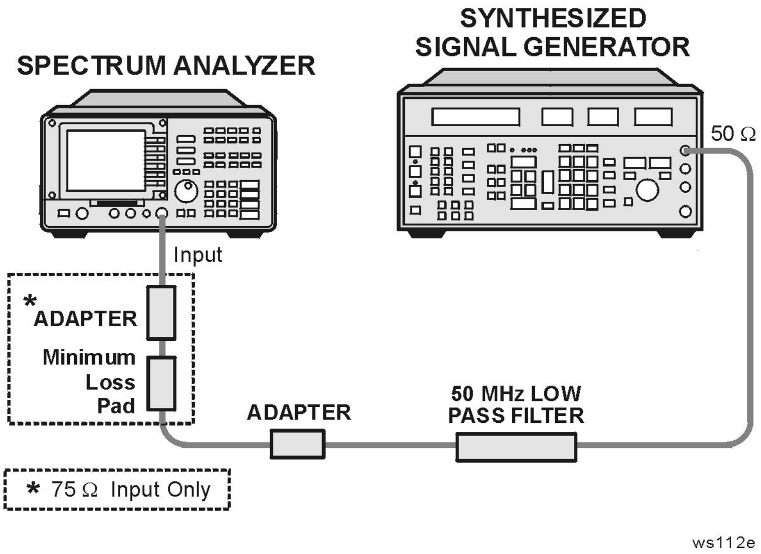
   AMPLITUDE .... –10 dBm

   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



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 ⇑ (step-up key) or the ⇓ (step-down key) until the spectrum analyzer marker read –10.0 dBm 0.1 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 ∆

   FREQUENCY.

8. Press the ⇑ (step-up key) on the spectrum analyzer to step to the second harmonic (at 60 MHz). Press **PEAK SEARCH**. Record the MKR ∆ 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.

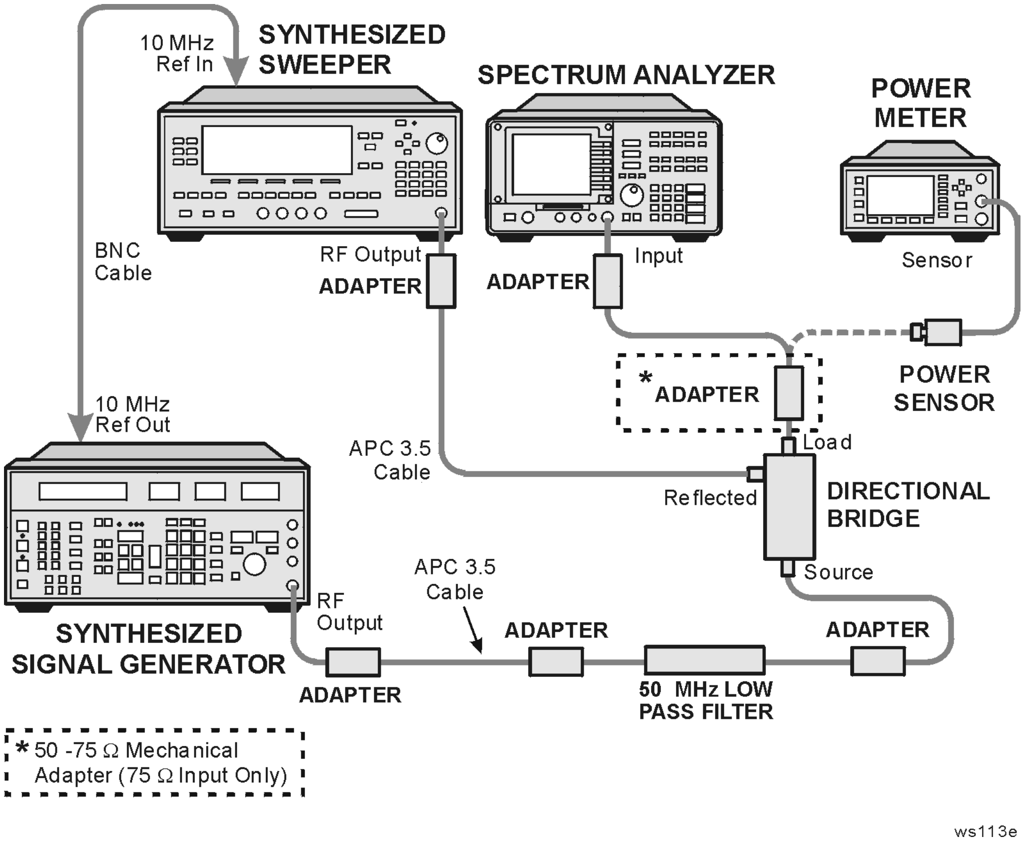
   75 Ω input only: Use a 75 Ω power sensor.

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



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 dBm ±0.05 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 →, **MARKER** →**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

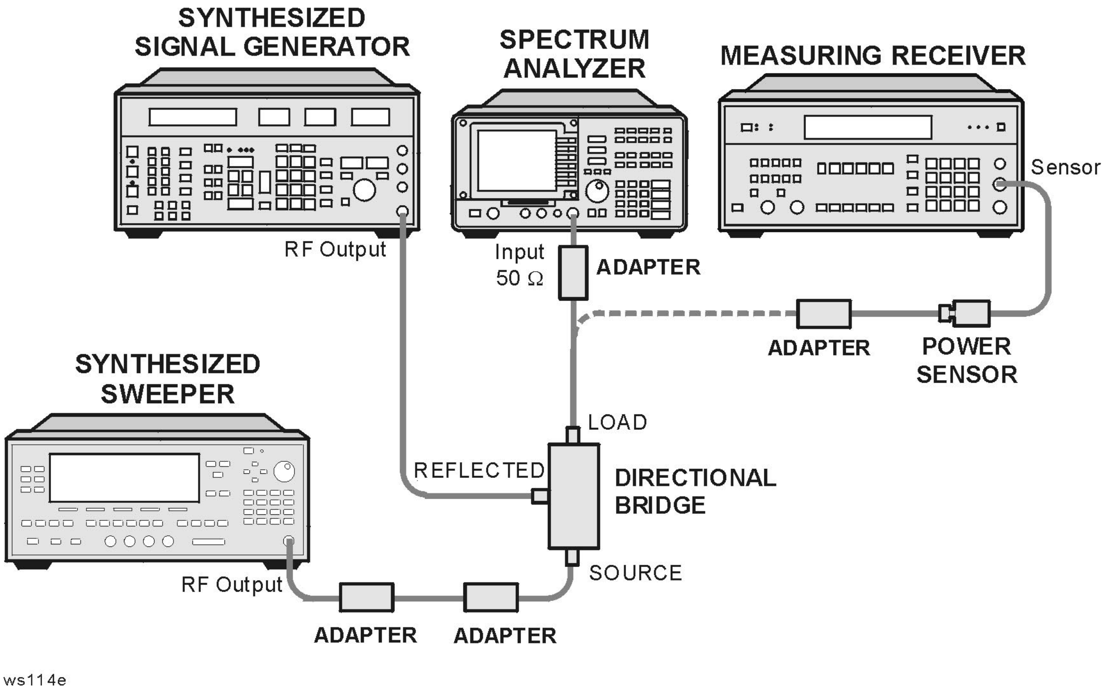
1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.

   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



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)

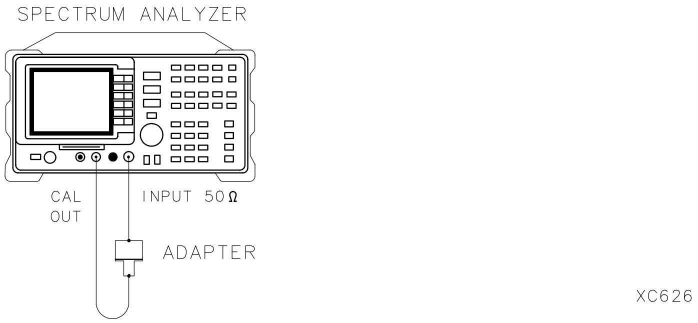
Procedure

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



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

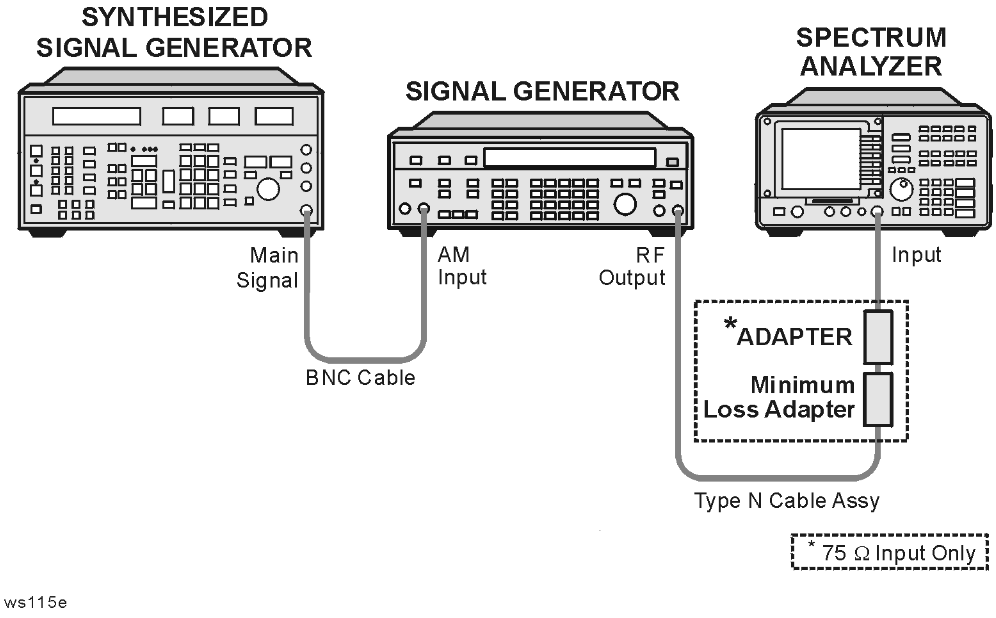
   MKR, **MARKER Δ**

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



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)

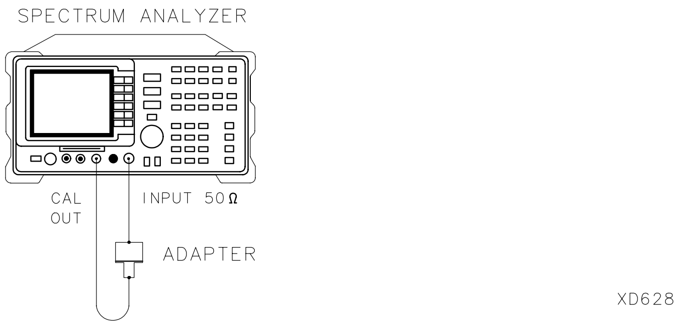
Procedure

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



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 ∆

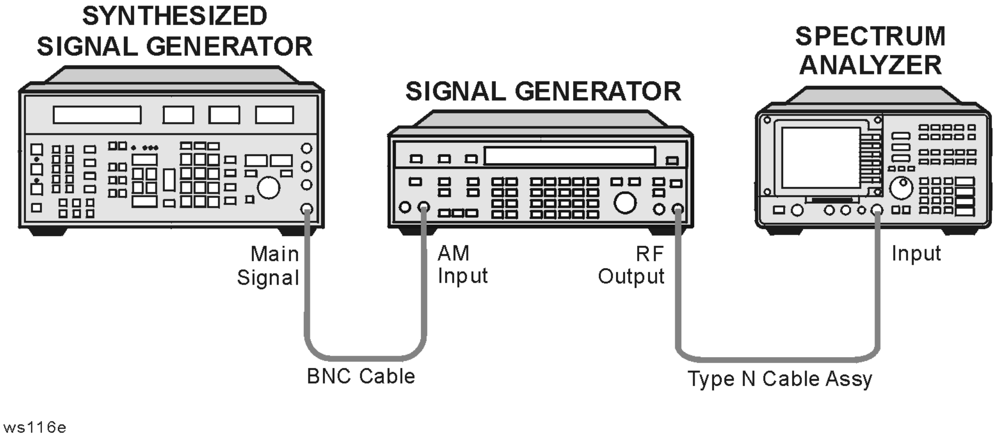
3. Set the sweep time to 18 ms. Press **SGL SWP** and read the MKR ∆ amplitude. Record the marker-∆ reading as TR Entry 1 in the appropriate performance verification test record in Chapter 3. The amplitude should be within 1.007X and 0.993X.

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



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 µs	**(4)**__________
100 µs	100 kHz	78 µs	**(5)**__________
20 µs	500 kHz	15.6 µs	**(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)*

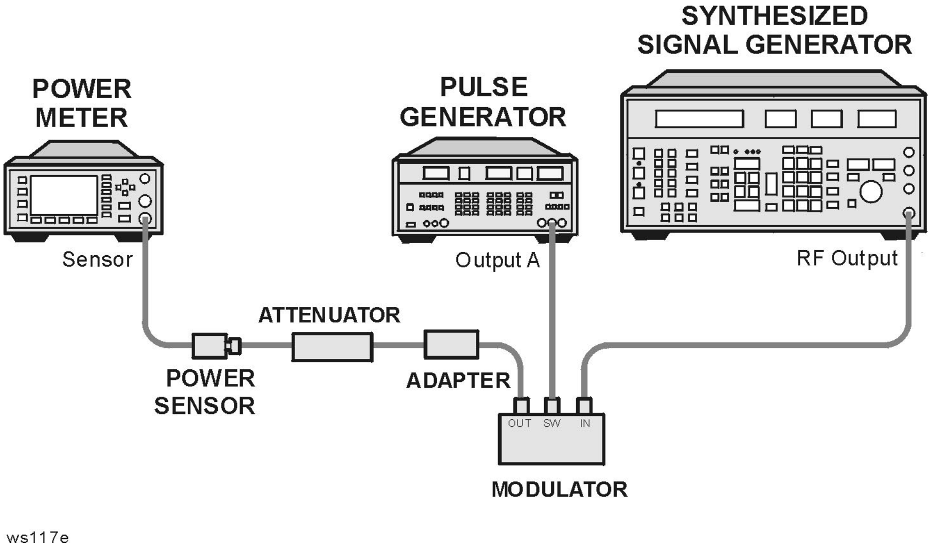
Procedure

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



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:

   LEE ....3 ns

   TRE ....3 ns

   HIL ....+2 V

   LOL ....+1.8 V

   DEL ....0 ns

   Output Mode: Enabled

   Channel A ....50 Ω

   Channel A ....NORM

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:

   MODE ....dBm

   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

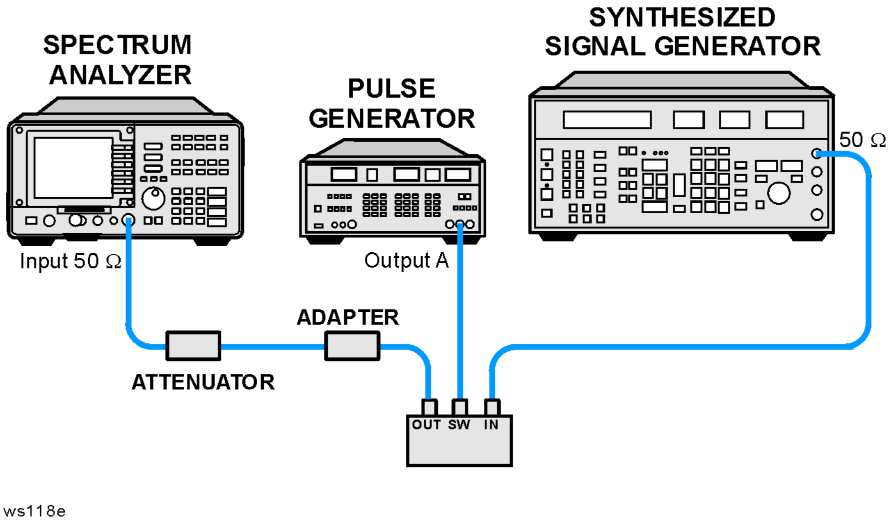
NOTE The reference amplitude is the same for the 200 Hz, 9 kHz, and 120 kHz filters.

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



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 ∆

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 μs

    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:

    Amp Error = Meas CW Amp – 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:

    Amp Error = Meas Pulse Level – 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:

Amp Error = Meas CW Amp – 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:

Amp Error = Meas Pulse Level – 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:

    PER ....40 ms

    WID...0.1 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.

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:

Amp Error = Meas CW Amp – 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:

Amp Error = Meas Pulse Level – 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)

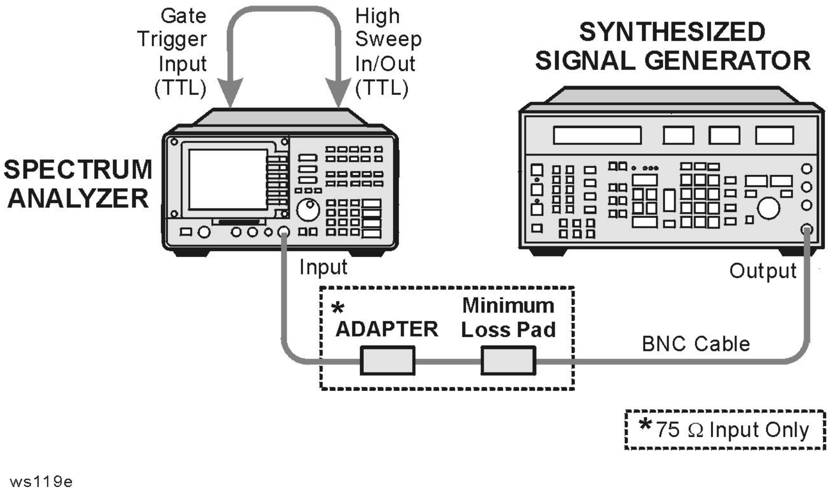
Procedure

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



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

5. Use the INCR ⇑ (step up) or the INCR ⇓ (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:

   GCIL = –5.0 – S/F Gen Reading = –5.0 – (–4.96) = –0.04 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 ⇑ (step up) key or the INCR ⇓ (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 Record[1]

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 ______________
Options ______________
Firmware Revision ______________

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	________	________	________
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: ____
____
____

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[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				
Option 704 only:	Frequency (MHz)			
Settability	−150 Hz	**(1)**________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Precision Frequency Reference Accuracy				
	Frequency (MHz)			
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)**________	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
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
Option 130 only:				
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	1.49999989	**(6)**________	1.50000011	±1.0 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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
4. Frequency Readout Accuracy and Marker Count Accuracy				
Option 130 only:				
(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	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
Option 130 only:				
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
Option 130 only:		**(2)** ________	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRΔ 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 3-2 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				
Option 130 only:				
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				
Option 130 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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 Uncertainty
	Min.	TR Entry	Max.	
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				
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
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
17. Resolution Bandwidth Accuracy				
Option 130 only:				
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
75 Ω input only:				
	+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
Option 130 only:		**(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				
Option 011 only:				
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				
Option 011 only:				
1 MHz to 1800 MHz		**(4)** ______	+1.75 dB	+0.18/–0.39 dB
Minimum Flatness				
Option 011 only:				
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 Uncertainty
	Min.	TR Entry	Max.	
64. Harmonic Spurious Outputs				
Option 011 only:				
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				
Option 011 only:				
Highest Non-Harmonic Response Amplitude		**(1)** ________	–30 dBc	+1.55/–1.80 dB
68. Tracking Generator Feedthrough				
Option 011 only:		**(1)** ________	–57.24 dBmV	+1.15/–1.24 dB
73. Gate Delay Accuracy and Gate Length Accuracy				
Option 107 only:				
Minimum Gate Delay	0.0 µs	**(1)** ________	2.0 µs	±0.011 µs
Maximum Gate Delay	0.0 µs	**(2)** ________	2.0 µs	±0.011 µs
1 µs Gate Length	0.8 µs	**(3)** ________	1.2 µs	±0.011 µs
65 ms Gate Length	64.99 ms	**(4)** ________	65.01 ms	±0.434 µs
74. Gate Card Insertion Loss				
Option 107 only:				
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

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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
75. TV Receiver, Video Tester				
Option 107 only:				
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 Record[1]

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: ____

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[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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
1. 10 MHz Reference Accuracy				
	Frequency (MHz)			
Settability	–150 Hz	**(1)**_________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Reference Accuracy for Option 004				
	Frequency (MHz)			
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)**_________	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
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
Option 130 only:				
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	1.49999989	**(6)**_________	1.50000011	±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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
4. Frequency Readout Accuracy and Marker Count Accuracy				
Option 130 only:				
(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	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	±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
Option 130 only:				
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 Uncertainty
	Min.	TR Entry	Max.	
10. Residual FM				
		(1) ________	250 Hz	±45.8 Hz
Option 130 only:		**(2)** ________	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRΔ 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				
Option 130 only:				
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				
Option 130 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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
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

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				
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
–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
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 3-4 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
Option 130 only:				
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
75 Ω input only:	+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 Uncertainty
	Min.	TR Entry	Max.	
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
Option 130 only:		**(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
Option 001 only:				
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
Option 001 only:				
1 MHz to 1.8 GHz		**(1)** ________	–38 dBmV	+1.09/–1.15 dB
57. Fast Time Domain Sweeps				
Option 101 only:				
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				
Option 010 or 011 only:				
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				
Option 010 only:				
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
Option 011 only:				
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				
Option 010 or 011 only:				
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				
Option 010 or 011 only:				
Highest Non-Harmonic Response Amplitude		**(1)** ________	–30 dBc	+1.55/–1.80 dB
68. Tracking Generator Feedthrough				
Option 010 only:		**(1)** ________	–106 dBm	+1.15/–1.24 dB
Option 011 only:		**(1)** ________	–57.24 dBmV	+1.15/–1.24 dB
72. CISPR Pulse Response				
Option 103 only:	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
Option 103 and 130 only:				
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				
Option 103 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
Options 103 and 130 only:	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	**(18)** ________	+5.0 dB	±0.24 dB
60	2.0 dB	**(19)** ________	4.0 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
73. Gate Delay Accuracy and Gate Length Accuracy				
Option 105 or 107 only:				
Minimum Gate Delay	0.0 μs	**(1)** ________	2.0 μs	±0.011 μs
Maximum Gate Delay	0.0 μs	**(2)** ________	2.0 μs	±0.011 μs
1 μs Gate Length	0.8 μs	**(3)** ________	1.2 μs	±0.011 μs
65 ms Gate Length	64.99 ms	**(4)** ________	65.01 ms	±0.434 μs
74. Gate Card Insertion Loss				
Option 105 or 107 only:				
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

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 Uncertainty
	Min.	TR Entry	Max.	
75. TV Receiver, Video Tester				
Option 107 only:				
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 Record[1]

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 ____________

Options ____________

Firmware Revision ____________

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)			
Signal Generator			
Microwave Spectrum Analyzer (Option 010)			
Synthesized Sweeper			
Synthesizer/Function Generator			
Synthesizer/Level Generator			
Universal Frequency Counter			
Video Modulator			

Notes/Comments: ____

____

____

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[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 Uncertainty
	Min.	TR Entry	Max.	
1. 10 MHz Reference Accuracy				
	Frequency Error			
Settability	−150 Hz	**(1)** __________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Reference Accuracy for Option 004				
	Frequency Error			
5 Minute Warmup Error	-1×10^{-7}	**(2)** __________	$+1 \times 10^{-7}$	$\pm 2.004 \times 10^{-9}$
30 Minute Warmup Error	-1×10^{-8}	**(2)** __________	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
3. Comb Generator Frequency Accuracy				
	Frequency (MHz)			
Comb Generator Frequency	99.993	**(1)** __________	100.007	±25 Hz
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
Option 130 only:				
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 3-6 8593E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies

Model 8593E **Report No.** ________________________

Serial No. ________________________ **Date** ________________________

Test Description	**Results Measured**			**Measurement Uncertainty**
	Min.	**TR Entry**	**Max.**	
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	1.99999989	**(20)**________	1.00000011	±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	8.99999989	**(22)**________	9.00000011	±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	15.99999989	**(24)**________	16.00000011	±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	20.99999989	**(26)**________	21.00000011	±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				
Option 130 only:				
(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	MKRΔ 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
Option 130 only:				
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 Uncertainty
	Min.	**TR Entry**	**Max.**	
11. Residual FM				
		(1) ________	250 Hz	±45.8 Hz
Option 130 only:		**(2)** ________	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRΔ 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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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				
Option 130 only:				
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				
Option 130 only:				
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
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
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				
−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
−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

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
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
−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
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 3-6 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
Option 130 only:				
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			**Report No.** ______________	
Serial 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
Option 130 only:		**(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
Option 026 or 027 only:				
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
Option 026 or 027 only:				
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				
Option 101 only:				
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			**Report No.** ________	
Serial No. ________			**Date** ________	
Test Description	**Results Measured**			**Measurement**
	Min.	**TR Entry**	**Max.**	**Uncertainty**
60. Absolute Amplitude Accuracy				
Option 010 only:				
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				
Option 010 only:				
Start Power Level		**(1)** ________		
Stop Power Level		**(2)** ________		
Power Sweep Range	9.0 dB	**(3)** ________		±0.03 dB
63. Tracking Generator Level Flatness				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
400 kHz to 2.9 GHz		**(1)** ________	–112 dBm	+1.59/–1.70 dB
71. Tracking Generator LO Feedthrough Amplitude				
Option 010 only:				
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				
Options 103 only:	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
Options 103 and 130 only:				
200 Hz EMI BW	–1.5 dB	**(3)** ________	+1.5 dB	±0.34 dB
Options 103 only:				
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 Uncertainty
	Min.	**TR Entry**	**Max.**	
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
Options 103 and 130 only:	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				
Option 105 or 107 only:				
Minimum Gate Delay	0.0 µs	**(1)** ________	2.0 µs	±0.011 µs
Maximum Gate Delay	0.0 µs	**(2)** ________	2.0 µs	±0.011 µs
1 µs Gate Length	0.8 µs	**(3)** ________	1.2 µs	±0.011 µs
65 ms Gate Length	64.99 ms	**(4)** ________	65.01 ms	±0.434 µs
74. Gate Card Insertion Loss				
Option 105 or 107 only:				
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
75. TV Receiver, Video Tester				
Option 107 only:				
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 Record[1]

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: ____

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[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 Uncertainty
	Min. -	**TR Entry**	**Max.**	
1. 10 MHz Reference Accuracy				
	Frequency Error			
Settability	−150 Hz	**(1)** ________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Reference Accuracy for Option 004				
	Frequency Error			
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)** ________	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
4. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (GHz)			
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	**(1)** ________	1.50082	±1.0 Hz
10 MHz	1.49968	**(2)** ________	1.50032	±1.0 Hz
1 MHz	1.4999680	**(3)** ________	1.500032	±1.0 Hz
Option 130 only:				
20 kHz	1.49999924	**(4)** ________	1.50000076	±1.0 Hz
Frequency = 1.5 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	1.4999989	**(5)** ________	1.5000011	±1.0 Hz
(CNT RES = 10 Hz) 1 MHz	1.49999989	**(6)** ________	1.50000011	±1.0 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**
4. Frequency Readout Accuracy and Marker Count Accuracy				
Option 130 only:				
(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	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
Option 130 only:				
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 Uncertainty
	Min. -	TR Entry	Max.	
11. Residual FM				
		(1) ________	250 Hz	±45.8 Hz
Option 130 only:		**(2)** ________	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRΔ 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				
Option 130 only:				
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				
Option 130 only:				
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 Uncertainty
	Min. -	TR Entry	Max.	
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 3-8 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
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

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 Uncertainty**
	Min. -	**TR Entry**	**Max.**	
15. Reference Level Accuracy				
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
–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
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
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
Option 130 only:				
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 Uncertainty
	Min. -	TR Entry	Max.	
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
Option 130 only:		(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				
Option 101 only:				
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				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
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 Uncertainty**
	Min. -	**TR Entry**	**Max.**	
69. Tracking Generator Feedthrough				
Option 010 only:				
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				
Option 010 only:				
400 kHz to 2.9 GHz		**(1)** ________	–112 dBm	+1.59/–1.70 dB
71. Tracking Generator LO Feedthrough Amplitude				
Option 010 only:				
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				
Options 103 only:	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
Options 103 and 130 only:				
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 Uncertainty**
	Min. -	**TR Entry**	**Max.**	
72. CISPR Pulse Response				
Options 103 only:				
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				
Options 103 and 130 only:	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
73. Gate Delay Accuracy and Gate Length Accuracy				
Option 105 or 107 only:				
Minimum Gate Delay	0.0 µs	**(1)** ________	2.0 µs	±0.011 µs
Maximum Gate Delay	0.0 µs	**(2)** ________	2.0 µs	±0.011 µs
1 µs Gate Length	0.8 µs	**(3)** ________	1.2 µs	±0.011 µs
65 ms Gate Length	64.99 ms	**(4)** ________	65.01 ms	±0.434 µs
74. Gate Card Insertion Loss				
Option 105 or 107 only:				
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

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				
Option 107 only:				
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 Record[1]

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: ____

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[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 Uncertainty
	Min.	TR Entry	Max.	
1. 10 MHz Reference Accuracy for Option 704				
	Frequency Error			
Settability	−150 Hz	**(1)** ________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Reference Accuracy for Option 190				
	Frequency Error			
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)** ________	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
4. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (GHz)			
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	**(1)** ________	1.50082	±1.0 Hz
10 MHz	1.49968	**(2)** ________	1.50032	±1.0 Hz
1 MHz	1.4999680	**(3)** ________	1.500032	±1.0 Hz
Option 130 only:				
20 kHz	1.49999924	**(4)** ________	1.50000076	
Marker Count Accuracy				
SPAN				
(CNT RES = 100 Hz) 20 MHz	1.4999989	**(5)** ________	1.5000011	±1.0 Hz
(CNT RES = 10 Hz) 1 MHz	1.49999989	**(6)** ________	1.50000011	±1.0 Hz

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 Uncertainty
	Min.	TR Entry	Max.	
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	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
11. Residual FM				
		(1) ________	250 Hz	±45.8 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRΔ 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	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 3-10 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 Uncertainty
	Min.	TR Entry	Max.	
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 Uncertainty
	Min.	**TR Entry**	**Max.**	
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]				
Option 190 only				
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]				
Option 190 only				
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 Record[1]

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: ____

____

____

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[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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
1. 10 MHz Reference Accuracy				
	Frequency Error			
Settability	−150 Hz	**(1)** ________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Reference Accuracy for Option 004				
	Frequency Error			
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)** ________	$+1 \times 10^{-8}$	$\pm 2.002 \times 10^{-9}$
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	1.49968	**(2)** ________	1.50032	±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	3.99968	**(5)** ________	4.00032	±1.0 Hz
1 MHz	3.9999680	**(6)** ________	4.000032	±1.0 Hz
Option 130 only:				
20 kHz	1.49999924	**(16)** ________	1.50000076	±1.0 Hz

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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
5. Frequency Readout Accuracy and Marker Count Accuracy				
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
Frequency = 4.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	3.9999989	**(19)** ________	4.0000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	+4.99999989	**(20)** ________	4.00000011	±1 Hz
Option 130 only:				
(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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
9. 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
Option 130 only:				
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
Option 130 only:		**(2)** ________	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME		MKRΔ 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 Uncertainty
	Min.	**TR Entry**	**Max.**	
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
Option 130 only:				
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
Option 130 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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
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 3-12 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				
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
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				
Option 130 only:				
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
Option 130 only:		**(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				
Option 101 only:				
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				
Option 010 only:				
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				
Option 010 only:				
Start Power Level		**(1)** ________		
Stop Power Level		**(2)** ________		
Power Sweep Range	9.0 dB	**(3)** ________		±0.03 dB
63. Tracking Generator Level Flatness				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
400 kHz to 2.9 GHz		**(1)** ______	–112 dBm	+1.59/–1.70 dB
71. Tracking Generator LO Feedthrough Amplitude				
Option 010 only:				
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				
Options 103 only:	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW		**(1)** ________		±0.44/–0.48 dB
120 kHz EMI BW		**(2)** ________		±0.80/–0.98 dB
Options 103 and 130 only:				
200 Hz EMI BW		**(3)** ________		
Options 103 only:				
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
Options 103 and 130 only:	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				
Option 105 or 107 only:				
Minimum Gate Delay	0.0 µs	**(1)** ________	2.0 µs	±0.011 µs
Maximum Gate Delay	0.0 µs	**(2)** ________	2.0 µs	±0.011 µs
1 µs Gate Length	0.8 µs	**(3)** ________	1.2 µs	±0.011 µs
65 ms Gate Length	64.99 ms	**(4)** ________	65.01 ms	±0.434 µs
74. Gate Card Insertion Loss				
Option 105 or 107 only:				
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
75. TV Receiver, Video Tester				
Option 107 only:				
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 Record[1]

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: ____

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[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				
	Frequency Error			
Settability	−150 Hz	**(1)** ________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Reference Accuracy for Option 004				
	Frequency Error			
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				
	Frequency (MHz)			
Comb Generator Frequency	99.993	**(1)** ________	100.007	±25 Hz
5. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy	Frequency (GHz)			
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	**(1)** ________	1.50082	±1.0 Hz
10 MHz	1.49968	**(2)** ________	1.50032	±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	3.99968	**(5)** ________	4.00032	±1.0 Hz
1 MHz	3.9999680	**(6)** ________	4.000032	±1.0 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 = 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
Option 130 only:				
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 Uncertainty
	Min.	TR Entry	Max.	
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	4.99999989	**(20)**________	4.00000011	±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	8.99999989	**(22)**________	9.00000011	±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	15.99999989	**(24)**________	16.00000011	±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	20.99999989	**(26)**________	21.00000011	±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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
5. Frequency Readout Accuracy and Marker Count Accuracy				
Option 130 only:				
(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	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
Option 130 only:				
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 Uncertainty
	Min.	**TR Entry**	**Max.**	
11. Residual FM				
		(1) ________	250 Hz	±45.8 Hz
Option 130 only:		**(2)** ________	30 Hz	±3.5 Hz
12. Sweep Time Accuracy				
SWEEP TIME	MKRΔ 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				
Option 130 only:				
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				
Option 130 only:				
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
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
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				
–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
–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

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
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
−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
Option 130 only:				
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
Option 130 only:		**(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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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				
Option 101 only:				
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 Uncertainty
	Min.	TR Entry	Max.	
60. Absolute Amplitude Accuracy				
Option 010 only:				
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				
Option 010 only:				
Start Power Level		**(1)** ________		
Stop Power Level		**(2)** ________		
Power Sweep Range	9.0 dB	**(3)** ________		±0.03 dB
63. Tracking Generator Level Flatness				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
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				
Option 010 only:				
400 kHz to 2.9 GHz		(1) ________	–110 dBm	+1.59/–1.70 dB
71. Tracking Generator LO Feedthrough Amplitude				
Option 010 only:				
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				
Options 103 only:	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW		**(1)** ________		±0.34 dB
120 kHz EMI BW		**(2)** ________		±0.50 dB
Options 103 and 130 only:				
200 Hz EMI BW		**(3)** ________		±0.34 dB
Options 103 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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
Options 103 and 130 only:	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 Uncertainty
	Min.	TR Entry	Max.	
73. Gate Delay Accuracy and Gate Length Accuracy				
Option 105 or 107 only:				
Minimum Gate Delay	0.0 µs	**(1)** ________	2.0 µs	±0.011 µs
Maximum Gate Delay	0.0 µs	**(2)** ________	2.0 µs	±0.011 µs
1 µs Gate Length	0.8 µs	**(3)** ________	1.2 µs	±0.011 µs
65 ms Gate Length	64.99 ms	**(4)** ________	65.01 ms	±0.434 µs
74. Gate Card Insertion Loss				
Option 105 or 107 only:				
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
75. TV Receiver, Video Tester				
Option 107 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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 Record[1]

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: ____
____
____

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[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 **Report No.** ________________________

Serial No. ________________________ **Date** ______________________________

Test Description	**Results Measured**			**Measurement Uncertainty**
	Min.	**TR Entry**	**Max.**	
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
Option 130 only:				
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 Uncertainty
	Min.	**TR Entry**	**Max.**	
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				
Option 130 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
13a. Scale Fidelity				
Option 130 only:				
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
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-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				
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

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				
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
–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
Option 130 only:				
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
Option 130 only:				
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
Option 130 only:		**(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				
Option 107 only:				
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 Record[1]

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			
Synthesized Signal Generator			
Universal Frequency Counter			
Video Modulator			

Notes/Comments: ____

____

____

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[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	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	±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
Option 130 only:				
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	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-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 Uncertainty
	Min.	TR Entry	Max.	
13a. Scale Fidelity				
Option 130 only:				
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				
Option 130 only:				
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
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 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 **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-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				
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

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				
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
–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
Option 130 only:				
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
Option 130 only:				
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
Option 130 only:		**(2)** ________	0.5 dB	+0.21/–0.22 dB
57a. Fast Time Domain Sweeps				
Option 101 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
72a. CISPR Pulse Response				
Option 103 only:	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
Option 103 and 130 only:				
200 Hz EMI BW	N/A	**(3)** ________	N/A	N/A
Option 103 only:				
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	+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
Options 103 and 130 only:	Amplitude Error			
Relative Level, Band A				
Repetition Frequency				
100	3.0 dB	**(18)** ________	+5.0 dB	±0.24 dB
60	2.0 dB	**(19)** ________	4.0 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-4 8591E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies

Model 8591E **Report No.** ______________________

Serial No. ______________________ **Date** ______________________

Test Description	**Results Measured**			**Measurement Uncertainty**
	Min.	**TR Entry**	**Max.**	
74a. Gate Card Insertion Loss				
Option 105 or 107 only:				
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 Record[1]

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 ________________________
Options ________________________
Firmware Revision ________________________

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)			
Signal Generator			
Microwave Spectrum Analyzer (Option 010)			
Synthesized Sweeper			
Synthesizer/Function Generator			
Synthesized Signal Generator			
Universal Frequency Counter			
Video Modulator			

Notes/Comments: ____
____
____

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[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	MKRΔ 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
Option 130 only:				
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	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-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				
Option 130 only:				
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 Uncertainty
	Min.	TR Entry	Max.	
13a. Scale Fidelity				
Option 130 only:				
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
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-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			**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-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				
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

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				
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
–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
Option 130 only:				
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
Option 130 only:				
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				
Option 101 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
72a. CISPR Pulse Response				
Option 103 only:	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
Options 103 and 130 only:				
200 Hz EMI BW	−1.5 dB	**(3)** ________	+1.5 dB	±0.34 dB
Option 103 only:				
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
Options 103 and 130 only:	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				
Option 105 or 107 only:				
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 Record[1]

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: ____

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[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
Option 130 only:				
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 Uncertainty
	Min. -	TR Entry	Max.	
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	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-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				
Option 130 only:				
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				
Option 130 only:				
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				
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

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				
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
–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-8 8594E Performance Verification Test Record Part 2 (Continued)

Agilent Technologies

Model 8594E **Report No.** ______________________

Serial No. ______________________ **Date** ______________________

Test Description	Results Measured			Measurement Uncertainty
	Min. -	TR Entry	Max.	
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
Option 130 only:				
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
Option 130 only:				
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				
Options 103 only:	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
Options 103 and 130 only:				
200 Hz EMI BW	−1.5 dB	**(3)** ________	+1.5 dB	±0.34 dB
Options 103 only:				
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 Uncertainty
	Min. -	TR Entry	Max.	
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
Options 103 and 130 only:	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				
Option 105 or 107 only:				
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 Record[1]

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: ____
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[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	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

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	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-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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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
Option 130 only:				
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
Option 130 only:				
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 Record[1]

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: ____

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[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
Option 130 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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				
Option 130 only:				
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				
Option 130 only:				
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				
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

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 Uncertainty
	Min.	TR Entry	Max.	
15a. Reference Level Accuracy				
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
−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
Option 130 only:				
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
Option 130 only:				
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				
Option 101 only:				
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				
Options 103 only:	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW		**(1)** ________		±0.44/–0.48 dB
120 kHz EMI BW		**(2)** ________		±0.80/–0.98 dB
Options 103 and 130 only:				
200 Hz EMI BW		**(3)** ________		
Options 103 only:				
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
Options 103 and 130 only:	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				
Option 105 or 107 only:				
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 Record[1]

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: ____

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[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	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
Option 130 only:				
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 Uncertainty
	Min.	TR Entry	Max.	
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
13a. Scale Fidelity				
Option 130 only:				
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				
Option 130 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
15a. Reference Level Accuracy				
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

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				
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
–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
Option 130 only:				
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
Option 130 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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				
Option 101 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
72a. CISPR Pulse Response				
Options 103 only:	Amplitude Error			
Measured Amplitude				
9 kHz EMI BW		**(1)** ________		±0.34 dB
120 kHz EMI BW		**(2)** ________		±0.50 dB
Options 103 and 130 only:				
200 Hz EMI BW		**(3)** ________		±0.34 dB
Options 103 only:				
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 Uncertainty**
	Min.	**TR Entry**	**Max.**	
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
Options 103 and 130 only:	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				
Option 105 or 107 only:				
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

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	0 °C to +50 °C
Storage	–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)	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

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	$\pm(1.2 \text{ x } 10^{-7} \times$ carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±117 Hz
@325.25 MHz (Ch. 41)	±149 Hz
@643.25 MHz (Ch. 94)	±187 Hz

Option 704 Frequency Reference*	
Resolution	1 kHz
Accuracy	$\pm(7.5 \text{ x } 10^{-6} \times$ carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±524 Hz
@325.25 MHz (Ch. 41)	±2.55 kHz
@643.25 MHz (Ch. 94)	±4.93 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	$\pm 1 \times 10^{-7}$/year
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Reference *(Option 704)*	
Aging	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Frequency Readout Accuracy	
(Start, Stop, Center, Marker)	±(frequency readout × frequency reference error* + span accuracy + 1% of span + 20% of RBW + 100 Hz)[‡]

* frequency reference error = (aging rate × 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 ≤ Reference Level + 10 dB.

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
1 kHz RBW		**75 Ω**
400 kHz to 1 MHz		N/A
1 MHz to 1.5 GHz		≤–63 dBmV
1.5 GHz to 1.8 GHz		≤–61 dBmV
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	(Input terminated and 0 dB attenuation)	
		75 Ω
1 MHz to 1.8 GHz		<–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 *(Option 130)*	±(0.7 dB + 0.01 × dB from –20 dBm)

** See “Amplitude Range.”

Frequency Response	(10 dB input attenuation)	
	Absolute§	**Relative Flatness**†
1 MHz 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	
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 *(Option 130)*	±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

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 *(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	
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	
75 Ω *(Option 011)*	<–57.24 dBmV

Time Gated Spectrum Analysis Specifications (Option 105 or Option 107)

GATE DELAY	
Range	1 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(1 µs + (0.01% × GATE DELAY Readout))[†]
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(0.2 µs +(0.01% × GATE LENGTH Readout))
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 µs	±0.8 dB
≥ 2 µs	±0.5 dB
Linear Scale	
< 2 µs	±1.0% of REFERENCE LEVEL
≥ 2 µs	±0.7% of REFERENCE LEVEL

[†] Up to 1 µs jitter due to 1 µs 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)

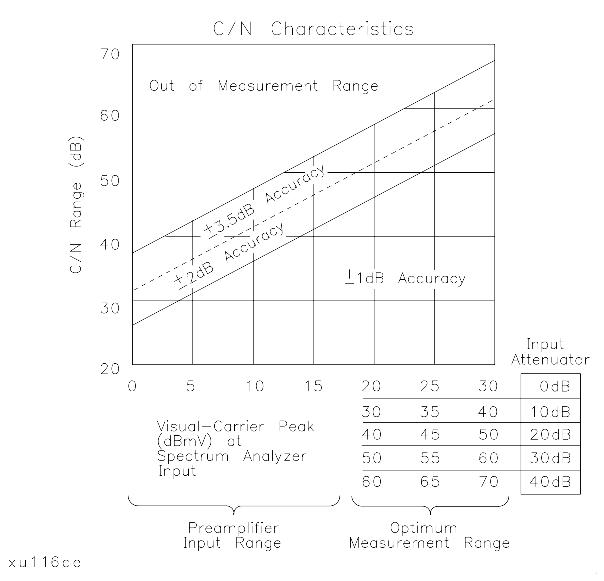
Non-interfering color	(requires FCC composite, NTC-7, or CCIR 17 and CCIR 330 test signal)
Differential Gain Accuracy	6% 50 averages (default)
Differential Phase Accuracy	4° 50 averages (default)
Chroma-luminance Delay Inequality Accuracy	±45 ns
Frequency Range	50 MHz to 850 MHz
Amplitude Range	+10 dBmV 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

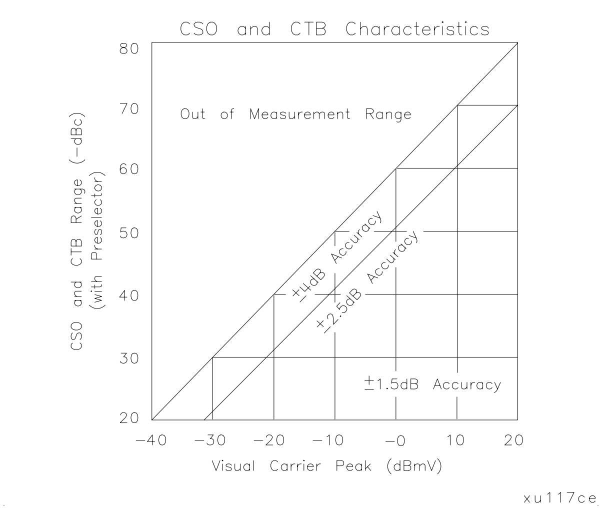
Non-Interfering Tests with Gate On*	
C/N and CSO	See graphs for accuracy
(quiet line must be selected)	
In-channel Frequency Response Accuracy	±0.5 dB within channel
* A preamplifier and preselector filter may be required to achieve specifications.	

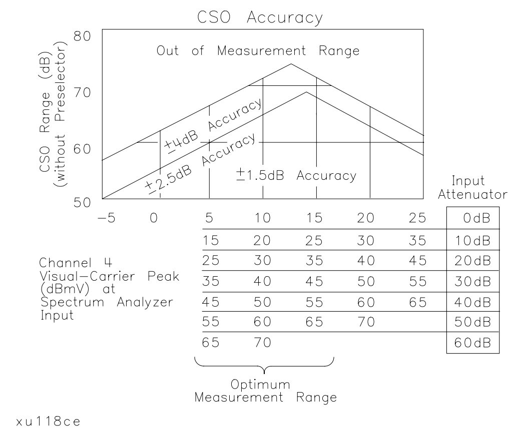
Cable TV Measurement Characteristics

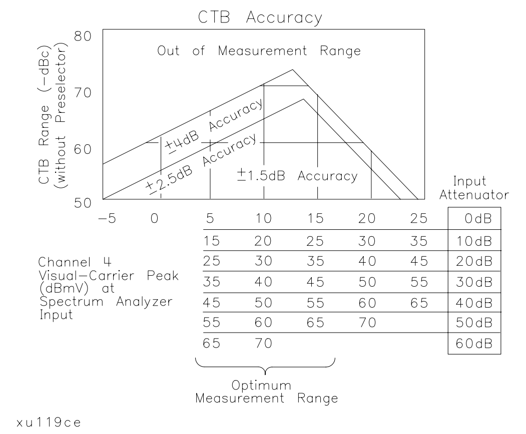
Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	±2.0% for C/N > 40 dB

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	Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.
Range	60 dB, usable to 65 dB
Resolution	0.1 dB
Accuracy	±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 ±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	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

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.”

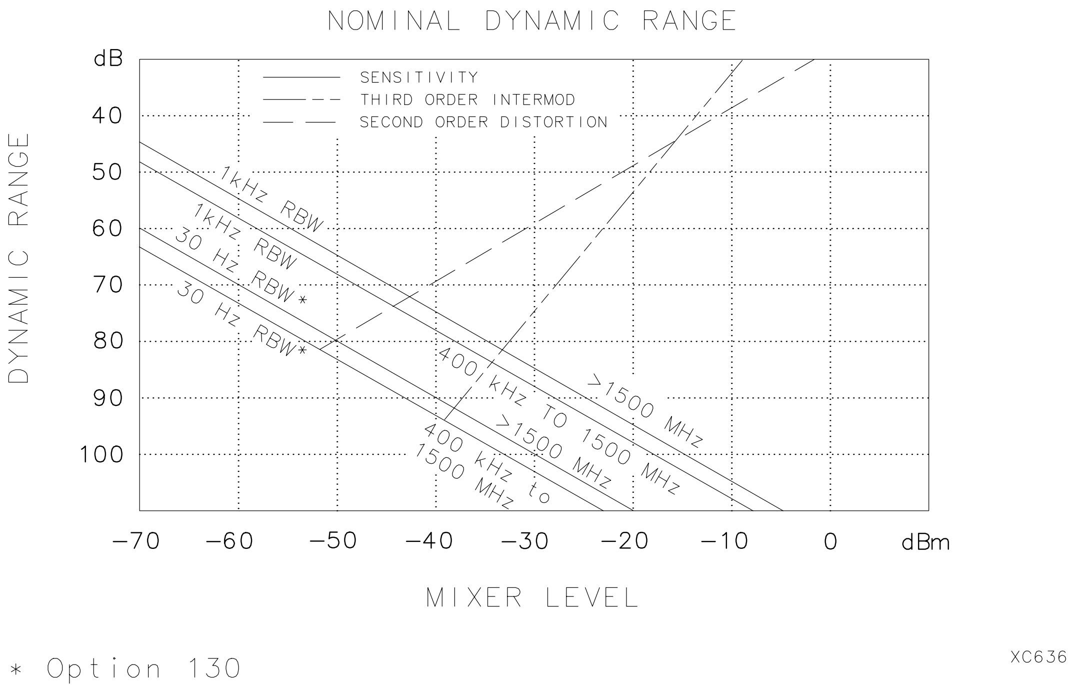
Input Attenuator Repeatability	
300 MHz	±0.03 dB
1.8 GHz	±1.0 dB

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

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 ± selected resolution bandwidth and 321.4 MHz ± 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	**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	<–20 dBc
Nonharmonic	<–40 dBc
2121.4 MHz Feedthrough *(Option 011)*	<+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	2.5:1
10 dB Attenuator	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	BNC female
Impedance	75 Ω nominal

RF OUT *(Option 010, 011)*	
Connector *(Option 011)*	75 Ω BNC female
Impedance *(Option 011)*	75 Ω nominal
Maximum Safe Reverse Level *(Option 011)*	+69 dBmV (0.1 W), 100 Vdc

TV IN *(Option 107)*	
Connector	75 Ω BNC female
Impedance	75 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 *(Option 102 or 103)*	
Connector	1/8 inch monaural jack

EXT ALC INPUT *(Option 011)*	
Impedance	1 MΩ
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.

EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (TTL).

GATE TRIGGER INPUT *(Option 105 or 107)*	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT *(Option 105 or 107)*	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

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 *(Option 041)*	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 *(Option 043)*	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 *(Option 107)*	
Connector	BNC female
Output	Baseband video output from TV Receiver

TV TRIG OUT *(Options 101 and 102)*	
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

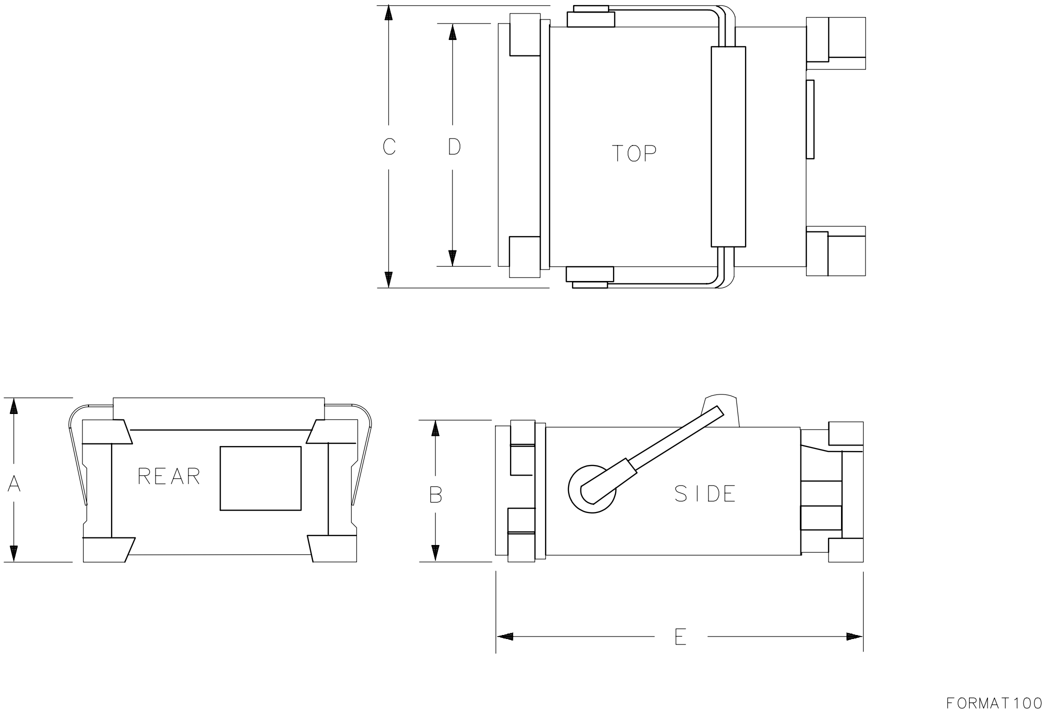
Pin #	Function	Current	“Logic” Mode	“Serial Bit” Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7†	–15 Vdc ±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) 

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	
	9 kHz to 1.8 GHz
75 Ω *(Option 001)*	1 MHz to 1.8 GHz

Frequency Reference	
Aging	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference *(Option 004)*	
Aging	$\pm 1 \times 10^{-7}$/year
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy	
(Start, Stop, Center, Marker)	±(frequency readout × frequency reference error* + span accuracy + 1% of span + 20% of RBW + 100 Hz)[‡]

* frequency reference error = (aging rate × 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 ≤ Reference Level + 10 dB.	

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
1 kHz RBW	**50 Ω**	**75 Ω** *(Option 001)*
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	N/A
1 MHz to 1.8 GHz	<–90 dBm	<–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 *(Option 130)*	±(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 *(Option 001)*	+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 *(Option 130)*	±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	$\pm(7.5 \text{ x } 10^{-6} \times$ carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±524 Hz
@325.25 MHz (Ch. 41)	±2.55 kHz
@643.25 MHz (Ch. 94)	±4.93 kHz
* Will not meet FCC frequency accuracy requirements.	

Precision Frequency Reference *(Option 004)*	
Resolution	100 Hz
Accuracy	$\pm(1.2 \text{ x } 10^{-7} \times$ carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±117 Hz
@325.25 MHz (Ch. 41)	±149 Hz
@643.25 MHz (Ch. 94)	±187 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 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 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**		
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 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(1 µs + (0.01% × GATE DELAY Readout))[†]
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(0.2 µs +(0.01% × GATE LENGTH Readout))
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 µs	±0.8 dB
≥ 2 µs	±0.5 dB
Linear Scale	
< 2 µs	±1.0% of REFERENCE LEVEL
≥ 2 µs	±0.7% of REFERENCE LEVEL

[†] Up to 1 µs jitter due to 1 µs 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	See graphs for accuracy
(quiet line must be selected)	
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	$\pm 1.0 \times 10^{-7}$/day

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.

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 ±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

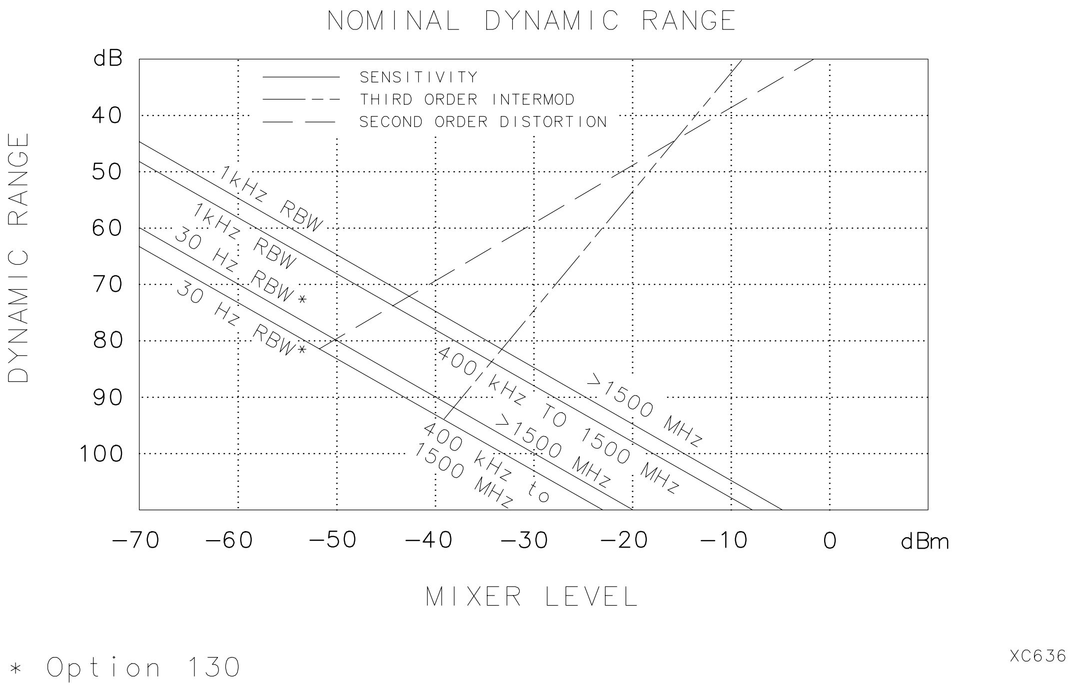
Demod Tune Listen	Internal speaker, rear panel earphone jack and front-panel volume control. Adjustable squelch control mutes the audio signal to the speaker/earphone jack based on the level of the demodulated signal above 22 kHz. An uncalibrated demodulated signal is available on the AUX VIDEO OUT connector at the rear panel.

Input Attenuation Uncertainty*	
Attenuator Setting	
0 dB	±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

RF Input SWR	(Attenuator setting 10 to 60 dB) 1.35:1

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 ± selected resolution bandwidth and 321.4 MHz ± 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	±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

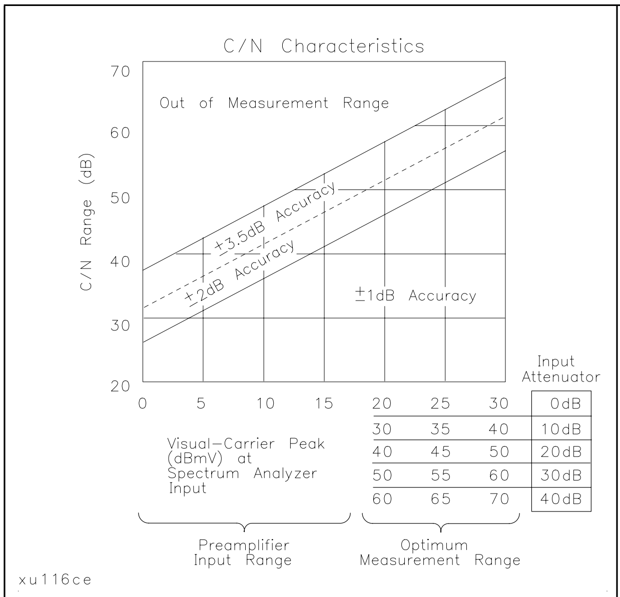
† Referenced to midpoint between highest and lowest frequency response deviations.

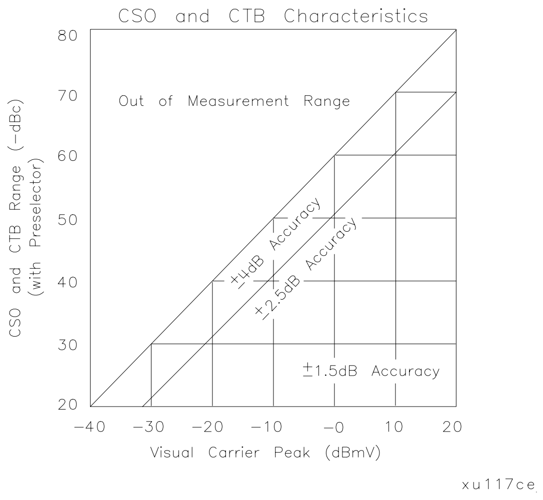
[§] Referenced to 300 MHz CAL OUT.

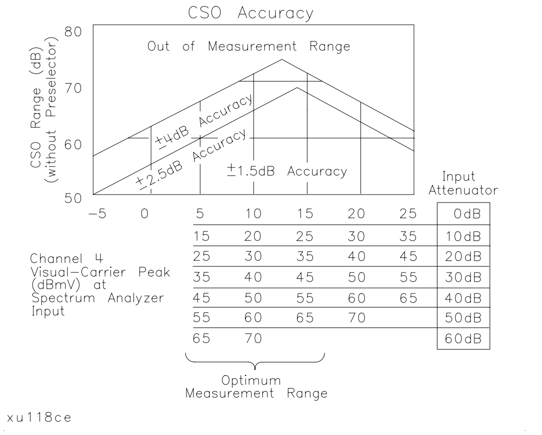
Cable TV Measurement Characteristics

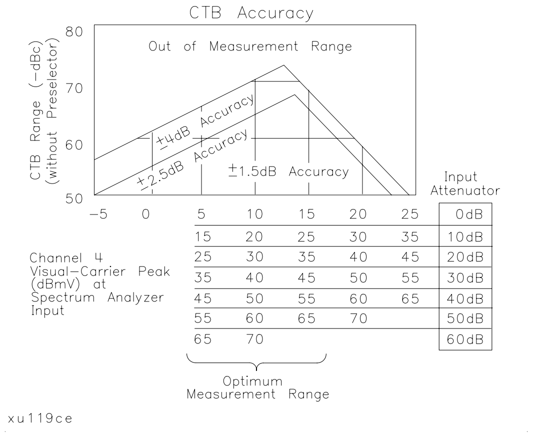
Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	±2.0% for C/N > 40 dB

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	Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.
Range	60 dB, usable to 65 dB
Resolution	0.1 dB
Accuracy	±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 *(Option 102 or 103)*	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 *(Options 101 and 102)*	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 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 *(Option 010)*	
dBm output	
75 Ω *(Option 011)*	
+42.8 dBmV, output	
Harmonic	<–20 dBc
Nonharmonic	<–40 dBc
2121.4 MHz Feedthrough	
(Option 010)	<–45 dBm
(Option 011)	<+3.8 dBmV

RF Power-Off Residuals	
100 kHz to 1.8 GHz *(Option 010)*	<–115 dBm
1 MHz to 1.8 GHz *(Option 011)*	<–66.2 dBmV

Output Attenuator	
Repeatability	±0.2 dB

Output VSWR	
0 dB Attenuator	2.5:1
10 dB Attenuator	1.6:1

Dynamic Range (difference between maximum power out and tracking generator feedthrough)	
100 kHz to 1.8 GHz *(Option 010)*	>106 dB
1 MHz to 1.8 GHz *(Option 011)*	>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	Type N female
Impedance	50 Ω nominal
INPUT 75Ω *(Option 001)*	
Connector	BNC female
Impedance	75 Ω nominal

RF OUT *(Option 010, 011)*	
Connector	
(Option 010)	Type N female
(Option 011)	75 Ω BNC female
Impedance	
(Option 010)	50 Ω nominal
(Option 011)	75 Ω nominal
Maximum Safe Reverse Level	
(Option 010)	+20 dBm (0.1 W), 25 Vdc
(Option 011)	+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 MΩ
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.

EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (TTL).

GATE TRIGGER INPUT *(Option 105 or 107)*	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT *(Option 105 or 107)*	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

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 *(Option 041)*	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 *(Option 043)*	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 *(Option 107)*	
Connector	75 Ω BNC female
Impedance	75 Ω nominal

TV MON OUTPUT *(Option 107)*	
Connector	BNC female
Output	Baseband video output from TV Receiver

TV TRIG OUT *(Options 101 and 102)*	
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

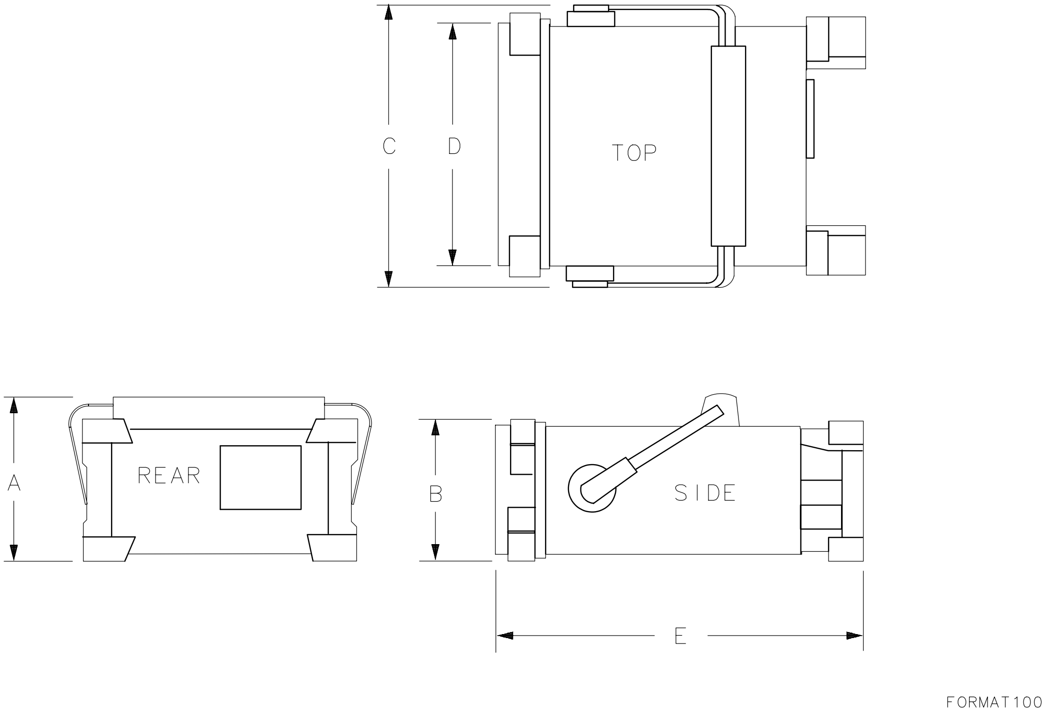
A 8 in (200 mm)

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)



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
	(Options 026 or 027)	9 kHz to 26.5 GHz
Band	**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	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference *(Option 004)*	
Aging	$\pm 1 \times 10^{-7}$/year
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy	
(Start, Stop, Center, Marker)	±(frequency readout × frequency reference error* + span accuracy + 1% of span + 20% of RBW + 100 Hz × N[††])[‡]

* frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy + temperature stability). See “Frequency Characteristics.”

[††] N = LO harmonic. See “Frequency Range.”

[‡] See “Drift” under “Stability” in Frequency Characteristics.

Marker Count Accuracy[†]	
Frequency Span ≤10 MHz × N[††]	±(marker frequency × frequency reference error* + counter resolution + 100 Hz × N[††])
Frequency Span >10 MHz × N[††]	±(marker frequency × frequency reference error* + counter resolution + 1 kHz × N[††])
Counter Resolution	
Frequency Span ≤ 10 MHz × N[††]	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz × N[††]	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.

[††] N = LO harmonic. See “Frequency Range.”

Frequency Span	
Range	0 Hz (zero span), (10 kHz × N[††]) to 19.25 GHz**
(Option 130)	0 Hz (zero span), (1 kHz × N[††]) to 19.25 GHz**
Resolution	Four digits or 20 Hz × N[††], whichever is greater.
Accuracy (single band spans)	
Span ≤10 MHz × N[††]	±2% of span[§]
Span >10 MHz × N[††]	±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 kHz × N[††], add an additional 10 Hz × N[††] 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 Log N[††]
>20 kHz offset from CW signal	≤–100 dBc/Hz + 20 Log N[††]
>30 kHz offset from CW signal	≤–105 dBc/Hz + 20 Log N[††]
Residual FM	
1 kHz RBW, 1 kHz VBW	≤(250 × N[††]) Hz pk-pk in 100 ms
30 Hz RBW, 30 Hz VBW *(Option 130)*	≤(30 × N[††]) Hz pk-pk in 300 ms
System-Related Sidebands	
>30 kHz offset from CW signal	≤–65 dBc + 20 Log N[††]

[††] N = LO harmonic. See “Frequency Range.”

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.”	

Comb Generator Frequency	100 MHz fundamental frequency
Accuracy	±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	–114 dBm to +30 dBm
(Option 130)	–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 µs 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 ≤ 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	<–70 dBc for –40 dBm tone at input mixer.*
> 2.75 GHz	<–100 dBc for –10 dBm tone at input mixer* (or below displayed average noise level).
Third Order Intermodulation Distortion	
>10 MHz	<–70 dBc for two –30 dBm tones at input mixer* and >50 kHz separation.
Other Input Related Spurious	
9 kHz to 18 GHz	<–65 dBc at ≥30 kHz offset, for –20 dBm tone at input mixer ≤18 GHz.
18 GHz to 22 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	(Input terminated and 0 dB attenuation)
150 kHz to 2.9 GHz (Band 0)	<–90 dBm
2.75 GHz to 6.5 GHz (Band 1)	<–90 dBm

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 *(Option 130)*	±(0.7 dB + 0.01 × dB from –20 dBm)

** See "Amplitude Range."

Frequency Response	(10 dB input attenuation)	
Preselector peaked in band > 0	**Absolute**§	**Relative Flatness**†
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 *(Options 026 and 027)*	±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 *(Option 130)*	±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	±(7.5 x 10^{-6} × carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±524 Hz
@325.25 MHz (Ch. 41)	±2.55 kHz
@643.25 MHz (Ch. 94)	±4.93 kHz
* Will not meet FCC frequency accuracy requirements.	

Precision Frequency Reference *(Option 004)*	
Resolution	100 Hz
Accuracy	±(1.2 x 10^{-7} × carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±117 Hz
@325.25 MHz (Ch. 41)	±149 Hz
@643.25 MHz (Ch. 94)	±187 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 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**		
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 μs to 65.535 ms
Resolution	1 μs
Accuracy	±(1 μs + (0.01% × GATE DELAY Readout))[†]
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 μs to 65.535 ms
Resolution	1 μs
Accuracy	±(0.2 μs +(0.01% × GATE LENGTH Readout))
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 μs	±0.8 dB
≥ 2 μs	±0.5 dB
Linear Scale	
< 2 μs	±1.0% of REFERENCE LEVEL
≥ 2 μs	±0.7% of REFERENCE LEVEL

[†] Up to 1 μs jitter due to 1 μs 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	See graphs for accuracy
(quiet line must be selected)	
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	$\pm 1.0 \times 10^{-7}$/day

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.

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.

[††] 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 ±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	**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

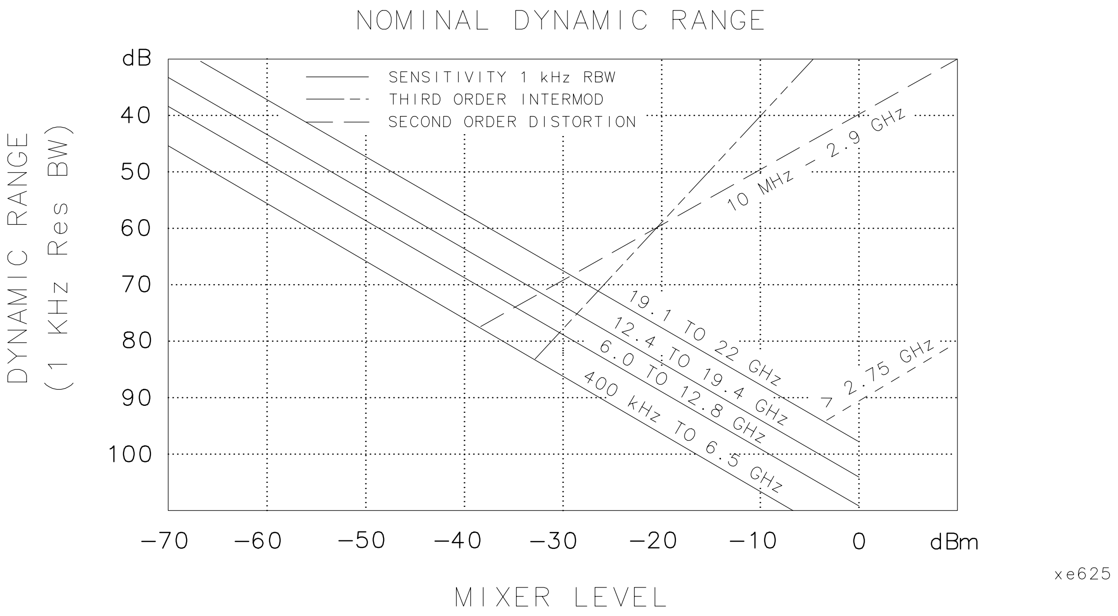
RF Input SWR	
10 dB attenuation	
Frequency	
300 MHz	1.15:1
10 dB to 70 dB attenuation	
Band	
9 kHz to 2.9 GHz	1.3:1
2.75 GHz to 6.5 GHz	1.5:1
6.0 GHz to 12.8 GHz	1.6:1
12.4 GHz to 19.4 GHz	2.0:1
19.1 GHz to 22.0 GHz	3.0:1

Unpeaked Frequency Response	(10 dB input attenuation)	
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
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

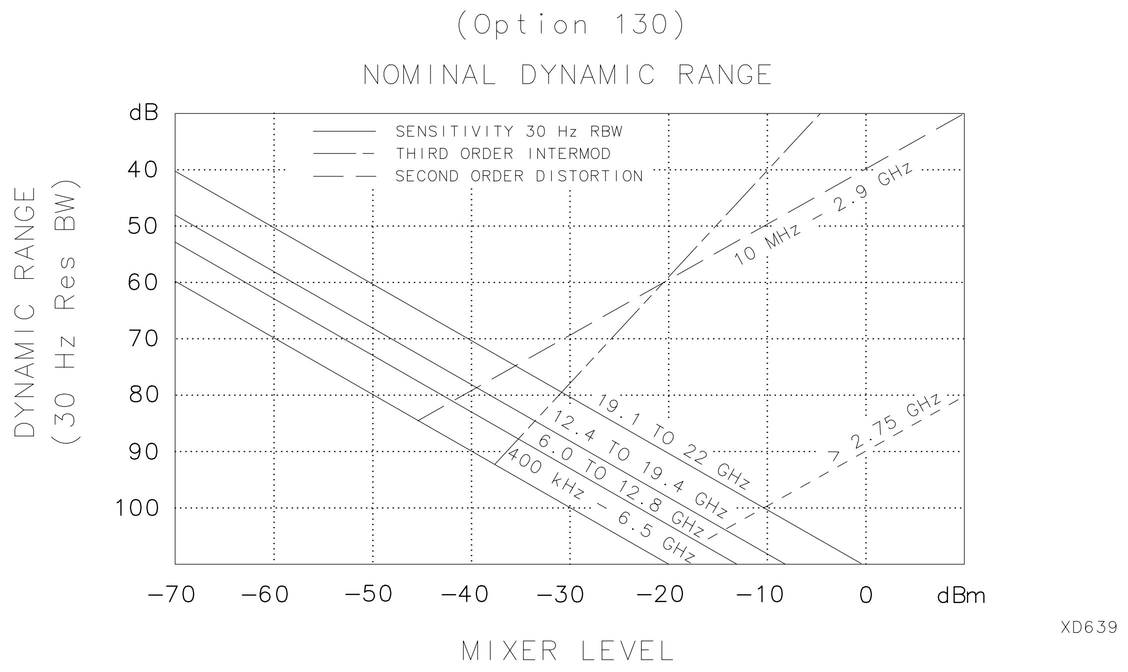
† Referenced to midpoint between highest and lowest frequency response deviations.

§ Referenced to 300 MHz CAL OUT.

DYNAMIC RANGE



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 ± selected resolution bandwidth and 321.4 MHz ± 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	**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 Preselector peaked in band > 0	(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 6.4 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 *(Option 026 or 027)*	±5.5 dB	±2.5 dB

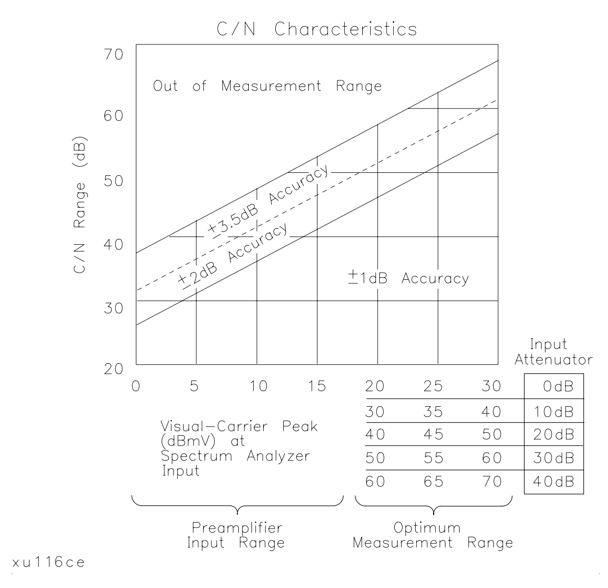
[†] Referenced to midpoint between highest and lowest frequency response deviations.

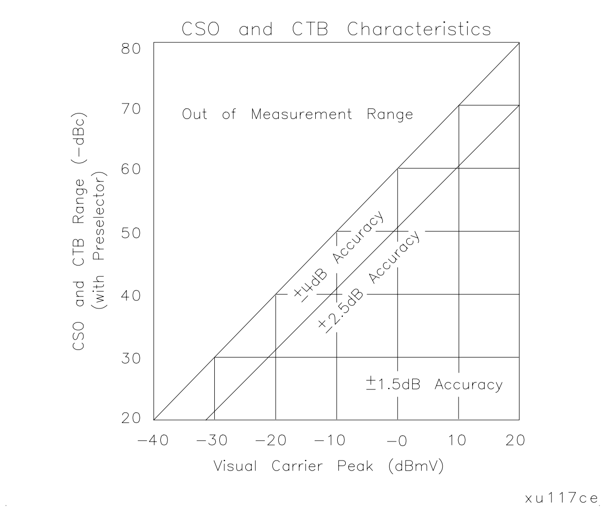
[§] Referenced to 300 MHz CAL OUT.

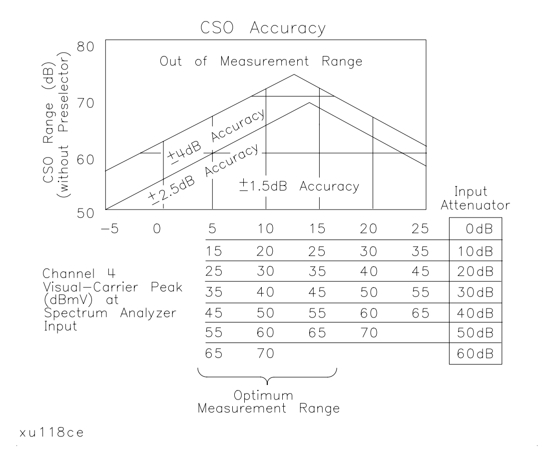
Cable TV Measurement Characteristics

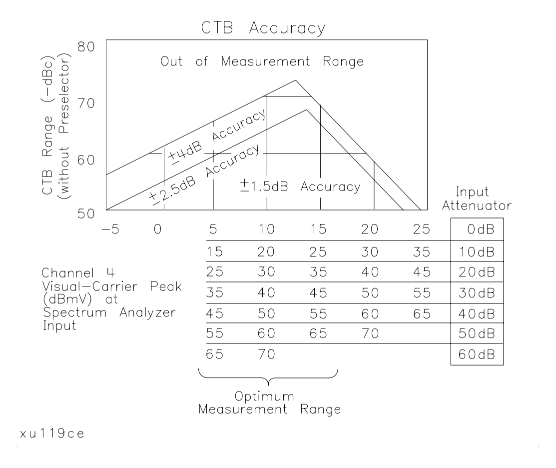
Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	±2.0% for C/N > 40 dB

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	Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.
Range	60 dB, usable to 65 dB
Resolution	0.1 dB
Accuracy	±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 *(Option 102 or 103)*	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 *(Options 101 and 102)*	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)	>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
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 *(Option 102 or 103)*	
Connector	1/8 inch monaural jack

EXT ALC INPUT *(Option 010)*	
Input Impedance	>10 kΩ
Polarity	Use with negative detector

EXT KEYBOARD *(Option 041 or 043)*	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 *(Option 105 or 107)*	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT *(Option 105 or 107)*	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

LO OUTPUT *(Option 009 or 010)*	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 *(Option 009)*	
Connector	BNC female
Impedance (dc coupled)	2 kΩ
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 *(Option 041)*	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 *(Option 043)*	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 *(Option 107)*	
Connector	75 Ω BNC female
Impedance	75 Ω nominal

TV MON OUTPUT *(Option 107)*	
Connector	BNC female
Output	Baseband video output from TV Receiver

TV TRIG OUT *(Options 101 and 102)*	
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

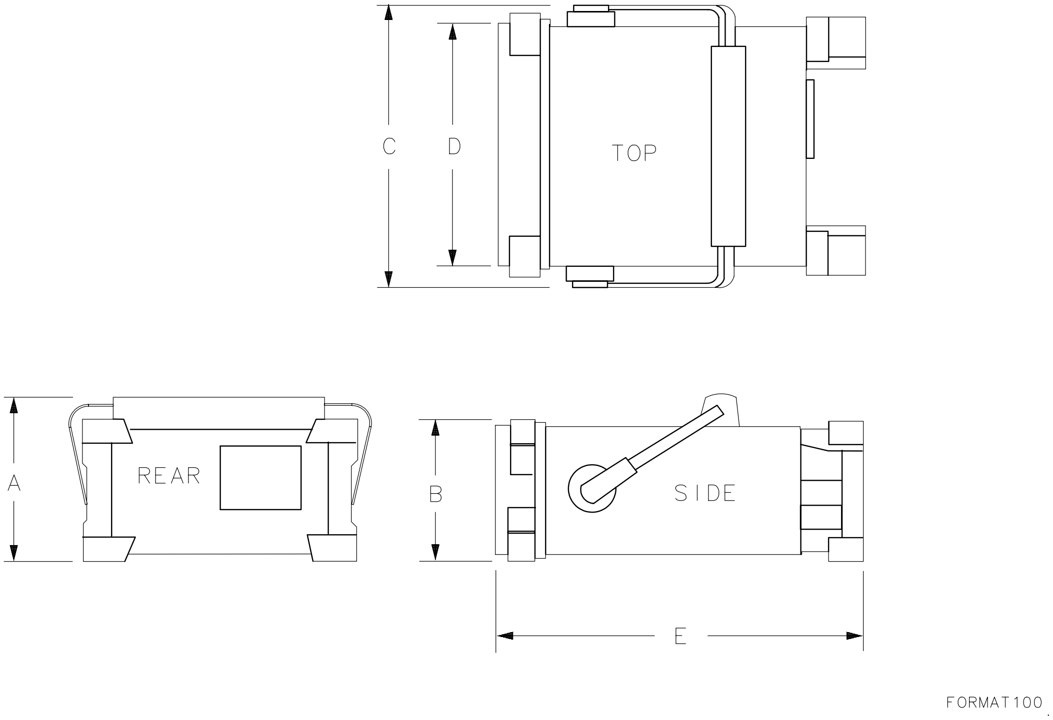
A 8 in (200 mm)

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)



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	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference *(Option 004)*	
Aging	$\pm 1 \times 10^{-7}$/year
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy	
(Start, Stop, Center, Marker)	±(frequency readout × frequency reference error* + span accuracy + 1% of span + 20% of RBW + 100 Hz)‡
* frequency reference error = (aging rate × 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 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	±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	–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 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). [‡] (Option 130) If RBW ≤ 300 Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes ≤ 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	<–70 dBc for –40 dBm tone at input mixer.*
Third Order Intermodulation Distortion	
>10 MHz	<–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 ≤2.9 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).	

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 2.9 GHz	<–90 dBm

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 **(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	(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 *(Option 130)*	±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	$\pm(7.5 \text{ x } 10^{-6} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	±524 Hz
@325.25 MHz (Ch. 41)	±2.55 kHz
@643.25 MHz (Ch. 94)	±4.93 kHz
* Will not meet FCC frequency accuracy requirements.	

Precision Frequency Reference (*Option 004)*	
Resolution	100 Hz
Accuracy	$\pm(1.2 \text{ x } 10^{-7} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	±117 Hz
@325.25 MHz (Ch. 41)	±149 Hz
@643.25 MHz (Ch. 94)	±187 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 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**		
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 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(1 µs + (0.01% × GATE DELAY Readout))[†]
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(0.2 µs +(0.01% × GATE LENGTH Readout))
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 µs	±0.8 dB
≥ 2 µs	±0.5 dB
Linear Scale	
< 2 µs	±1.0% of REFERENCE LEVEL
≥ 2 µs	±0.7% of REFERENCE LEVEL

[†] Up to 1 µs jitter due to 1 µs 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	See graphs for accuracy
(quiet line must be selected)	
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	±0.5×10^{-6}
Aging	±1.0×10^{-7}/day

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	±2.2×10^{-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 ±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	±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	0.7 dB
1 MHz to 100 MHz	0.05 dB
100 MHz to 2.9 GHz	0.05 dB + (0.06 × F)[†] dB

[†] F = frequency in GHz.

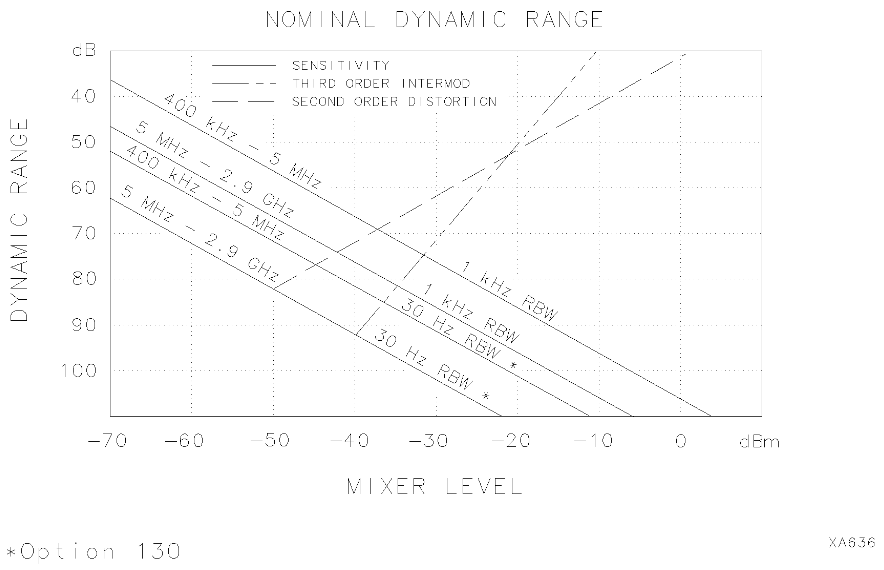
[‡] Referenced to dc coupled mode.

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		
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

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 ± selected resolution bandwidth and 321.4 MHz ± 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	±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	±1.5 dB

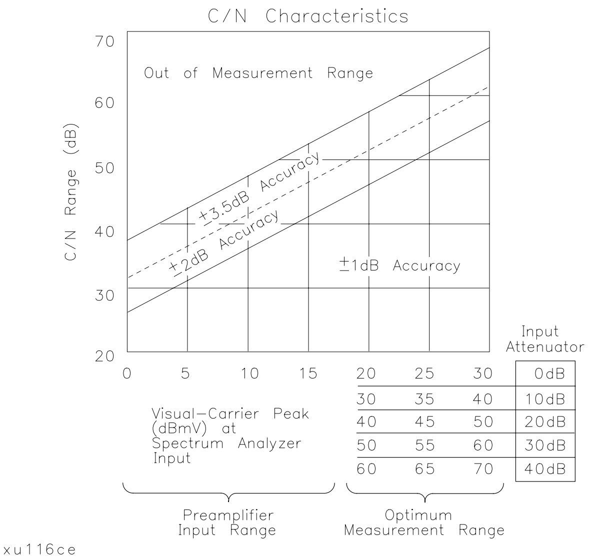
[†] Referenced to midpoint between highest and lowest frequency response deviations.

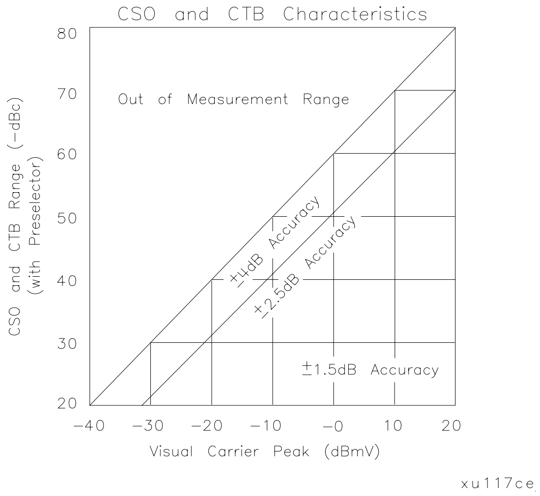
[§] Referenced to 300 MHz CAL OUT.

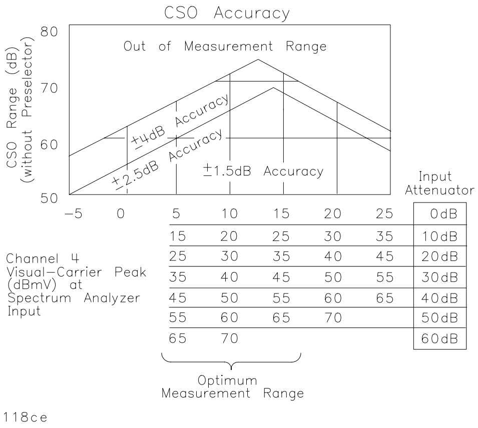
Cable TV Measurement Characteristics

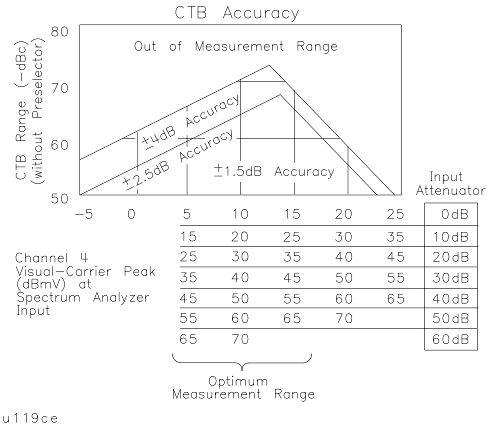
Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	±2.0% for C/N > 40 dB

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	Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.
Range	60 dB, usable to 65 dB
Resolution	0.1 dB
Accuracy	±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 *(Option 102 or 103)*	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 *(Options 101 and 102)*	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	>106 dB
Frequency ≥ 5 MHz	>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 *(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 *(Option 102 or 103)*	
Connector	1/8 inch monaural jack

EXT ALC INPUT *(Option 010)*	
Input Impedance	>10 kΩ
Polarity	Use with negative detector

EXT KEYBOARD *(Option 041 or 043)*	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 *(Option 105 or 107)*	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT *(Option 105 or 107)*	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

LO OUTPUT *(Option 009 or 010)*	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 *(Option 009)*	
Connector	BNC female
Impedance (dc coupled)	2 kΩ
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 *(Option 041)*	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 *(Option 043)*	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 *(Option 107)*	
Connector	75 Ω BNC female
Impedance	75 Ω nominal

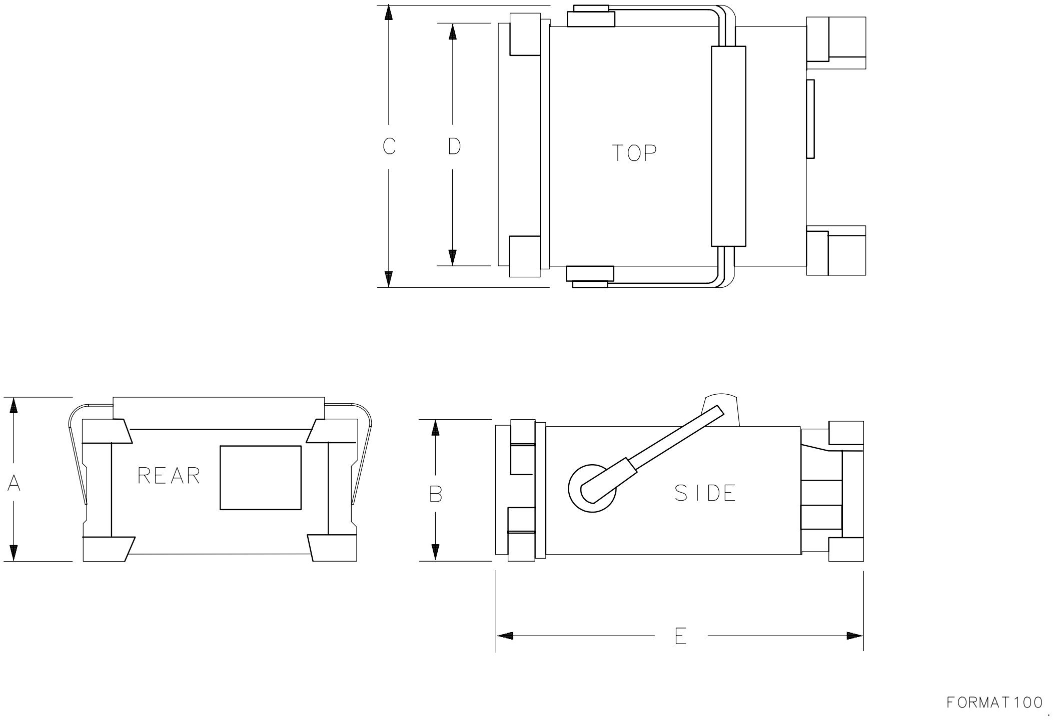
TV TRIG OUT *(Options 101 and 102)*	
Connector	BNC female
Amplitude	Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

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	
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)


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 50Ω < +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 *(Option 704)*	
Aging	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference *(Option 190)*	
Aging	$\pm 1 \times 10^{-7}$/year
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy	
(Start, Stop, Center, Marker)	±(frequency readout × frequency reference error* + span accuracy + 1% of span + 20% of RBW + 100 Hz)[‡]

* frequency reference error = (aging rate × 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	±(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 “Spectrum Analysis 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
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy	
Span ≤10 MHz	±2% of span
Span >10 MHz	±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 ±(freq. ref. error* × 300 MHz)
* frequency reference error = (aging rate × 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	<–70 dBc for –40 dBm tone at input mixer.*
Third Order Intermodulation Distortion	
>10 MHz	<–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 ≤2.9 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB) + Preamplifier Gain (dB).	

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 2.9 GHz	<–90 dBm

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

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	± (0.3 dB + 0.01 × dB from reference level)
1 kHz RBW	± (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

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 50Ω < +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 *(Option 704)*	
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$
Aging	$\pm 1.0 \times 10^{-7}$/day

Precision Frequency Reference *(Option 190)*	
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.

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 ±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

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 dB + (0.06 × F)[†] dB

[†] F = frequency in GHz.

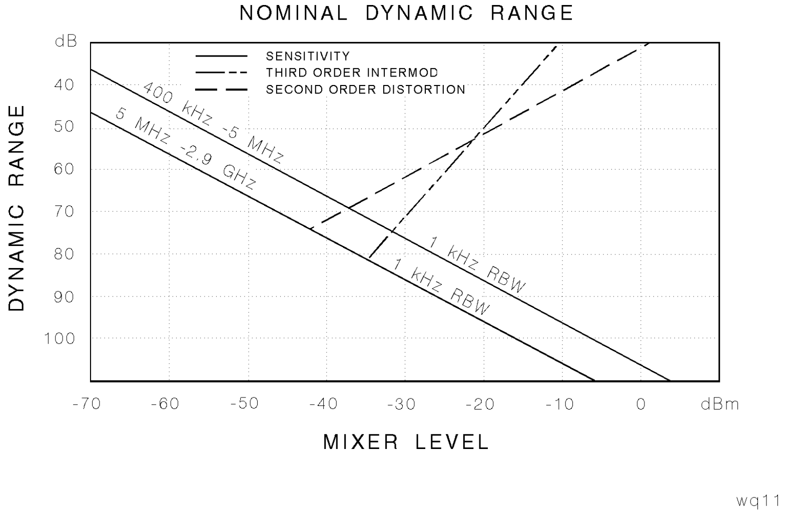
[‡] Referenced to dc coupled mode.

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		
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

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 ± selected resolution bandwidth and 321.4 MHz ± 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, ±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.	

PROBE POWER	
Voltage/Current	+15 Vdc, ±7% at 150 mA max. –12.6 Vdc ±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 *(Option 041 or 043)*	Interface compatible with part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.

EXT KEYBOARD	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).

Digital Video Outputs	
Parallel Data Output *(Option 195)*	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 *(Option 195)*	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.

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	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 *(Option 043)*	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

AUX INTERFACE

Connector Type: 9 Pin Subminiature "D"

Connector Pinout

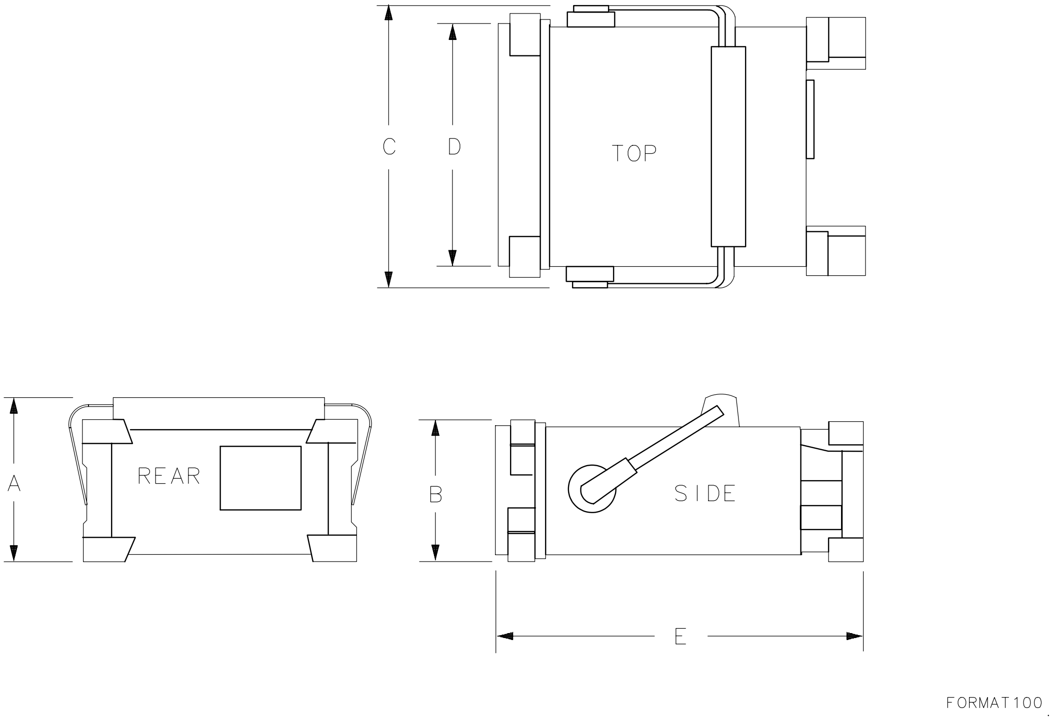
Pin #	Function	Current	"Logic" Mode	"Serial Bit" Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7†	–15 Vdc ±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)

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)


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 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 6.5 GHz
ac Coupled	100 kHz to 6.5 GHz

Frequency Reference	
Aging	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference (Option 004)	
Aging	$\pm 1 \times 10^{-7}$/year
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy	
(Start, Stop, Center, Marker)	±(frequency readout × frequency reference error* + span accuracy + 1% of span + 20% of RBW + 100 Hz)[‡]

* frequency reference error = (aging rate × 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 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	±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	–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 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). [‡] (Option 130) If RBW ≤ 300 Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes ≤ 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

Spurious Responses	
Second Harmonic Distortion	
>10 MHz	<–70 dBc for –40 dBm tone at input mixer.*
>2.75 GHz	<–100 dBc for –10 dBm tone at input mixer* (or below displayed average noise level).
Third Order Intermodulation Distortion	
>10 MHz	<–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 ≤6.5 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).	

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 6.5 GHz	<–90 dBm

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	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	±(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
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	(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 ***(**Option 130**)***	±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	$\pm(7.5 \text{ x } 10^{-6} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	±524 Hz
@325.25 MHz (Ch. 41)	±2.55 kHz
@643.25 MHz (Ch. 94)	±4.93 kHz
* Will not meet FCC frequency accuracy requirements.	

Precision Frequency Reference *(Option 004)*	
Resolution	100 Hz
Accuracy	$\pm(1.2 \text{ x } 10^{-7} \times \text{carrier frequency} + 110 \text{ Hz})$
@55.25 MHz (Ch. 2)	±117 Hz
@325.25 MHz (Ch. 41)	±149 Hz
@643.25 MHz (Ch. 94)	±187 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 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**		
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 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(1 µs + (0.01% × GATE DELAY Readout))[†]
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(0.2 µs +(0.01% × GATE LENGTH Readout))
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 µs	±0.8 dB
≥ 2 µs	±0.5 dB
Linear Scale	
< 2 µs	±1.0% of REFERENCE LEVEL
≥ 2 µs	±0.7% of REFERENCE LEVEL

[†] Up to 1 µs jitter due to 1 µs 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	See graphs for accuracy
(quiet line must be selected)	
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	$\pm 1.0 \times 10^{-7}$/day

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.

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 ±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

Input Attenuator Repeatability	±0.05 dB

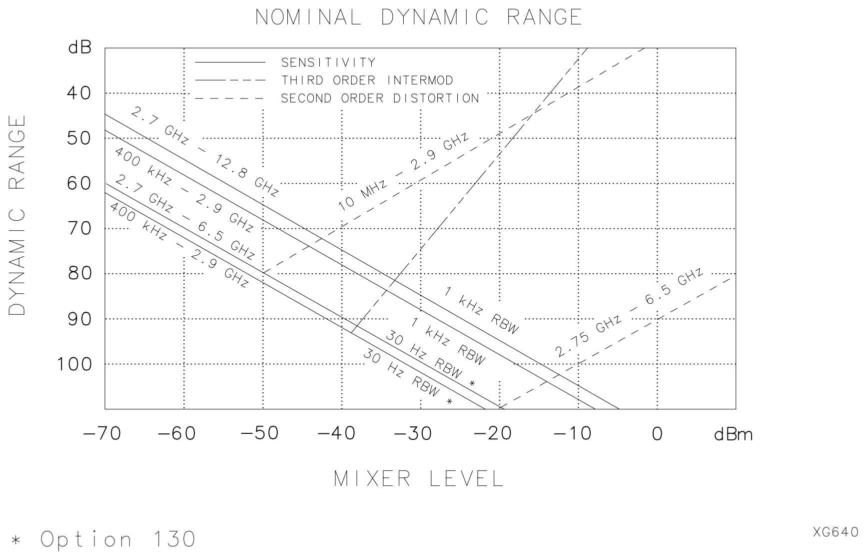
RF Input SWR		
10 dB attenuation	**dc Coupled**	**ac Coupled**
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
100 kHz to 300 kHz	1.3:1	2.3:1
300 kHz to 1 MHz	1.3:1	1.4:1
1 MHz to 2.9 GHz	1.3:1	1.3:1
2.9 GHz to 6.5 GHz	1.5:1	1.6:1

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



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 ± selected resolution bandwidth and 321.4 MHz ± 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	**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	±1.5 dB
2.75 GHz to 6.5 GHz (preselector peaked)	±2.5 dB	±2.0 dB

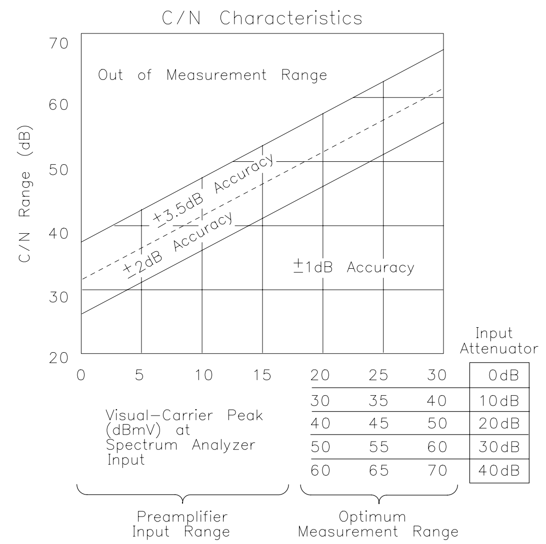
[†] Referenced to midpoint between highest and lowest frequency response deviations.

[§] 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	±2.0% for C/N > 40 dB

FM Deviation	Peak reading of FM deviation
Range	±100 kHz
Resolution	100 Hz
Accuracy	±1.5 kHz



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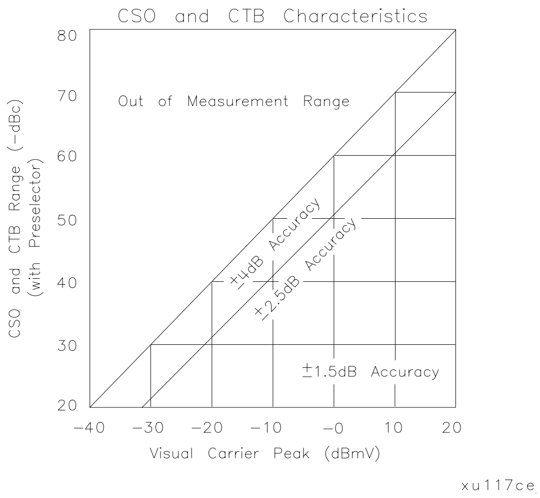

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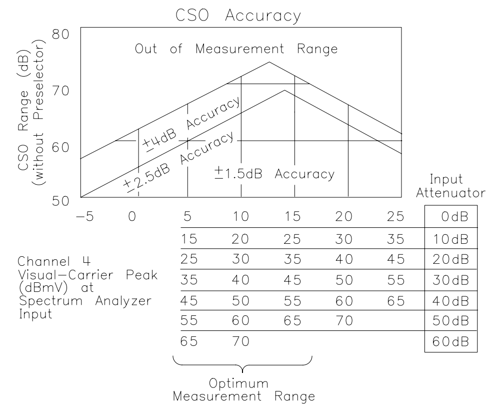

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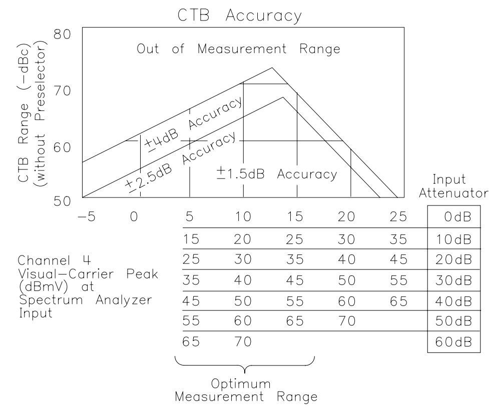

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C/N, CSO, and CTB Measurements

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	Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.
Range	60 dB, usable to 65 dB
Resolution	0.1 dB
Accuracy	±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 *(Option 102 or 103)*	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 *(Options 101 and 102)*	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)	>109 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 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, ±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)*	
Input Impedance	>10 kΩ
Polarity	Use with negative detector

EXT KEYBOARD *(Option 041 or 043)*	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 *(Option 105 or 107)*	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT *(Option 105 or 107)*	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

LO OUTPUT *(Option 009 or 010)*	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 *(Option 009)*	
Connector	BNC female
Impedance (dc coupled)	2 kΩ
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 *(Option 041)*	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 *(Option 043)*	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 *(Option 107)*	
Connector	75 Ω BNC female
Impedance	75 Ω nominal

TV TRIG OUT *(Options 101 and 102)*	
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)

DIMENSIONS

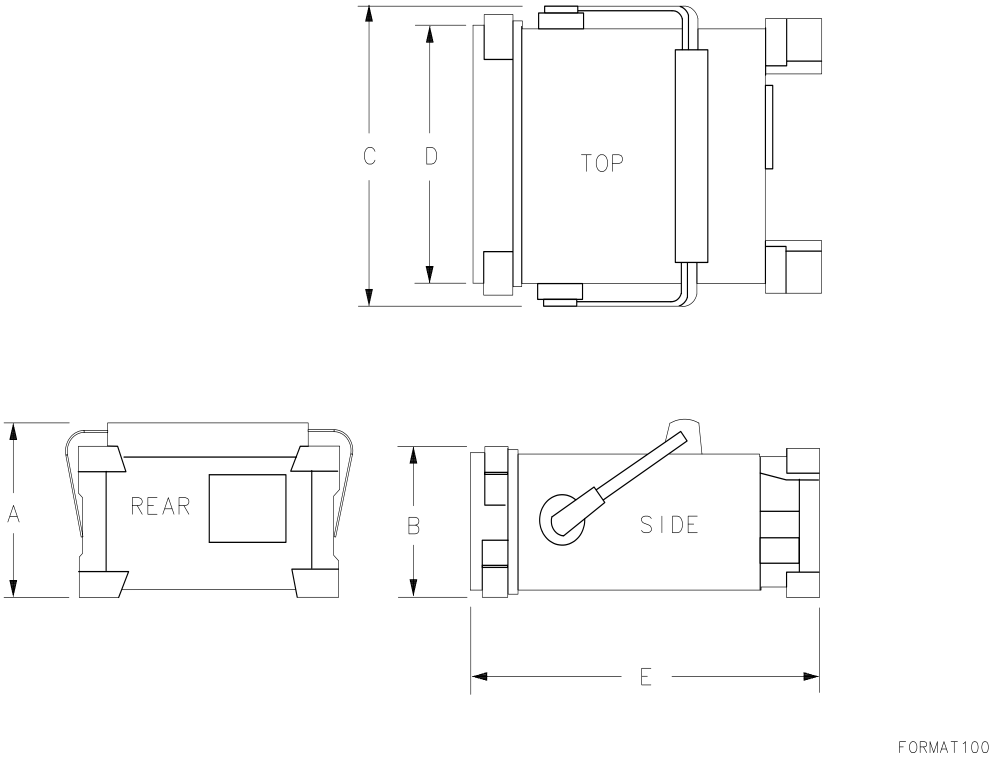
A 8 in (200 mm)

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)



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	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Precision Frequency Reference *(Option 004)*	
Aging	$\pm 1 \times 10^{-7}$/year
Settability	$\pm 2.2 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$

Frequency Readout Accuracy	
(Start, Stop, Center, Marker)	±(frequency readout × frequency reference error[*] + span accuracy + 1% of span + 20% of RBW + 100 Hz × N[††])[‡]

[*] frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy + temperature stability). See “Frequency Characteristics.”

[††] N = LO harmonic. See “Frequency Range.”

[‡] See “Drift” under “Stability” in Frequency Characteristics.

Marker Count Accuracy[†]	
Frequency Span ≤10 MHz × N[††]	±(marker frequency × frequency reference error[*] + counter resolution + 100 Hz × N[††])
Frequency Span >10 MHz × N[††]	±(marker frequency × frequency reference error[*] + counter resolution + 1 kHz × N[††])
Counter Resolution	
Frequency Span ≤ 10 MHz × N[††]	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz × N[††]	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.

[††] N = LO harmonic. See “Frequency Range.”

Frequency Span	
Range	0 Hz (zero span), (10 kHz × N[††]) kHz to 12.8 GHz
(Option 130)	0 Hz (zero span), (1 kHz × N[††]) to 12.8 GHz
Resolution	Four digits or 20 Hz × N[††], whichever is greater.
Accuracy (single band spans)	
Span ≤10 MHz × N[††]	±2% of span[§]
Span >10 MHz × N[††]	±3% of span

[††] N = LO harmonic. See “Frequency Range.”

[§] *(Option 130)* For spans < 10 kHz × N[††], add an additional 10 Hz × N[††] 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 Log N[††]
>20 kHz offset from CW signal	≤–100 dBc/Hz + 20 Log N[††]
>30 kHz offset from CW signal	≤–105 dBc/Hz + 20 Log N[††]
Residual FM	
1 kHz RBW, 1 kHz VBW	≤(250 × N[††]) Hz pk-pk in 100 ms
30 Hz RBW, 30 Hz VBW *(Option 130)*	≤(30 × N[††]) Hz pk-pk in 300 ms
System-Related Sidebands	
>30 kHz offset from CW signal	≤–65 dBc + 20 Log N[††]

[††] N = LO harmonic. See “Frequency Range.”

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."	

Comb Generator Frequency	100 MHz fundamental frequency
Accuracy	±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 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). ‡ (Option 130) If RBW ≤ 300 Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes ≤ 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	<–70 dBc for –40 dBm tone at input mixer.*
>2.75 GHz	<–100 dBc for –10 dBm tone at input mixer*
	(or below displayed average noise level).
Third Order Intermodulation Distortion	
>10 MHz	<–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 ≤12.8 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuation (dB).	

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 2.9 GHz (Band 0)	<–90 dBm
2.75 GHz to 6.5 GHz (Band 1)	<–90 dBm

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 *(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
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 *(Option 130)*	±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	$\pm(7.5 \text{ x } 10^{-6} \times$ carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±524 Hz
@325.25 MHz (Ch. 41)	±2.55 kHz
@643.25 MHz (Ch. 94)	±4.93 kHz
* Will not meet FCC frequency accuracy requirements.	

Precision Frequency Reference (*Option 004*)	
Resolution	100 Hz
Accuracy	$\pm(1.2 \text{ x } 10^{-7} \times$ carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±117 Hz
@325.25 MHz (Ch. 41)	±149 Hz
@643.25 MHz (Ch. 94)	±187 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 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 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(1 µs + (0.01% × GATE DELAY Readout))[†]
(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)	
GATE LENGTH	
Range	1 µs to 65.535 ms
Resolution	1 µs
Accuracy	±(0.2 µs +(0.01% × GATE LENGTH Readout))
(From positive edge to negative edge of GATE OUTPUT)	
Additional Amplitude Error[§]	
Log Scale	
< 2 µs	±0.8 dB
≥ 2 µs	±0.5 dB
Linear Scale	
< 2 µs	±1.0% of REFERENCE LEVEL
≥ 2 µs	±0.7% of REFERENCE LEVEL

[†] Up to 1 µs jitter due to 1 µs 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	See graphs for accuracy
(quiet line must be selected)	
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	$\pm 1.0 \times 10^{-7}$/day

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.

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.

†† 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 ±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	±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
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

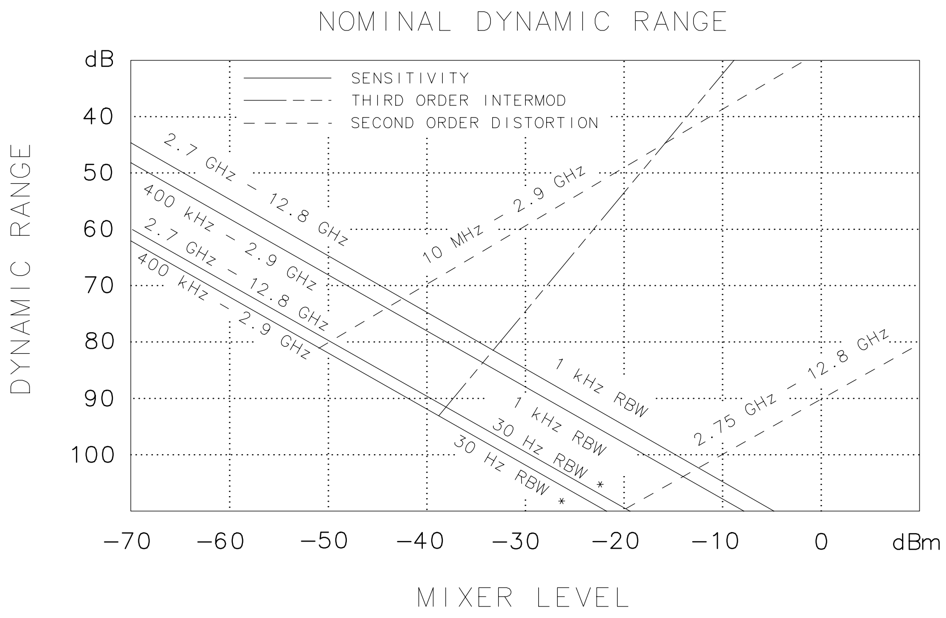
RF Input SWR		
10 dB attenuation	**dc Coupled**	**ac Coupled**
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
100 kHz to 300 kHz	1.3:1	2.3:1
300 kHz to 1 MHz	1.3:1	1.4:1
1 MHz to 2.9 GHz	1.3:1	1.3:1
2.9 GHz to 6.5 GHz	1.5:1	1.6:1
6.5 GHz to 12.8 GHz	1.6:1	1.9:1

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

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 ± selected resolution bandwidth and 321.4 MHz ± 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	**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	±1.5 dB
2.75 GHz to 6.5 GHz (preselector peaked)	±2.5 dB	±2.0 dB
6.0 GHz to 12.8 GHz (preselector peaked)	±3.0 dB	±2.5 dB

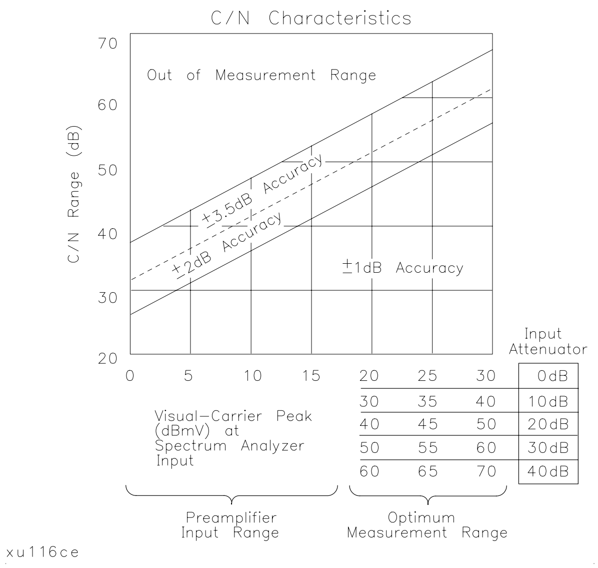
† Referenced to midpoint between highest and lowest frequency response deviations.

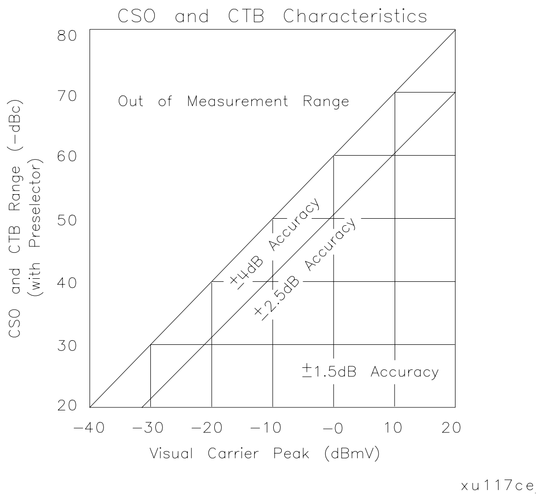
§ Referenced to 300 MHz CAL OUT.

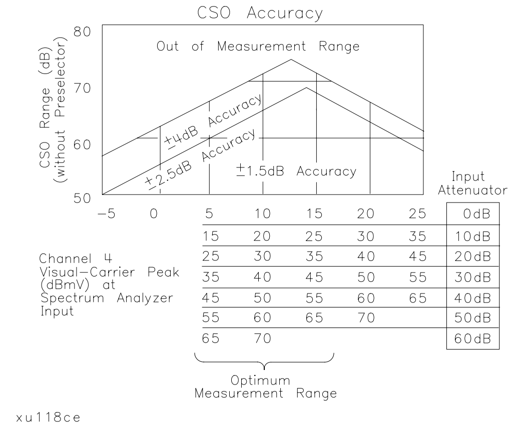
Cable TV Measurement Characteristics

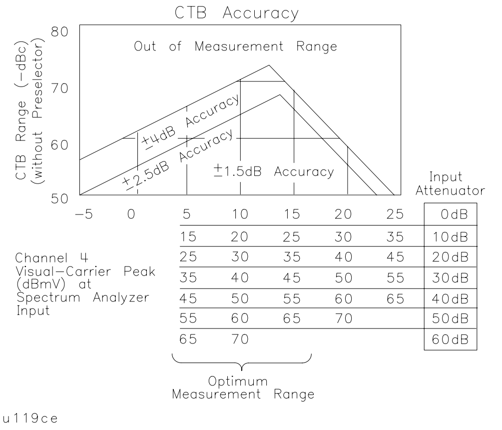
Depth of Modulation	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	±2.0% for C/N > 40 dB

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	Horizontal-line (15.7 kHz) related AM is measured on the unmodulated visual carrier.
Range	60 dB, usable to 65 dB
Resolution	0.1 dB
Accuracy	±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 *(Option 102 or 103*)	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 *(Options 101 and 102)*	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)	>109 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 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 *(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 *(Option 102 or 103)*	
Connector	1/8 inch monaural jack

EXT ALC INPUT *(Option 010)*	
Input Impedance	>10 kΩ
Polarity	Use with negative detector

EXT KEYBOARD *(Option 041 or 043)*	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 *(Option 105 or 107)*	
Connector	BNC female
Trigger Level	minimum pulse width >30 ns (TTL)
GATE OUTPUT *(Option 105 or 107)*	
Connector	BNC female
Output Level	High = gate on; Low = gate off (TTL)

LO OUTPUT *(Option 009 or 010)*	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 *(Option 009)*	
Connector	BNC female
Impedance (dc coupled)	2 kΩ
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 *(Option 041)*	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 *(Option 043)*	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 *(Option 107)*	
Connector	75 Ω BNC female
Impedance	75 Ω nominal

TV TRIG OUT *(Options 101 and 102)*	
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

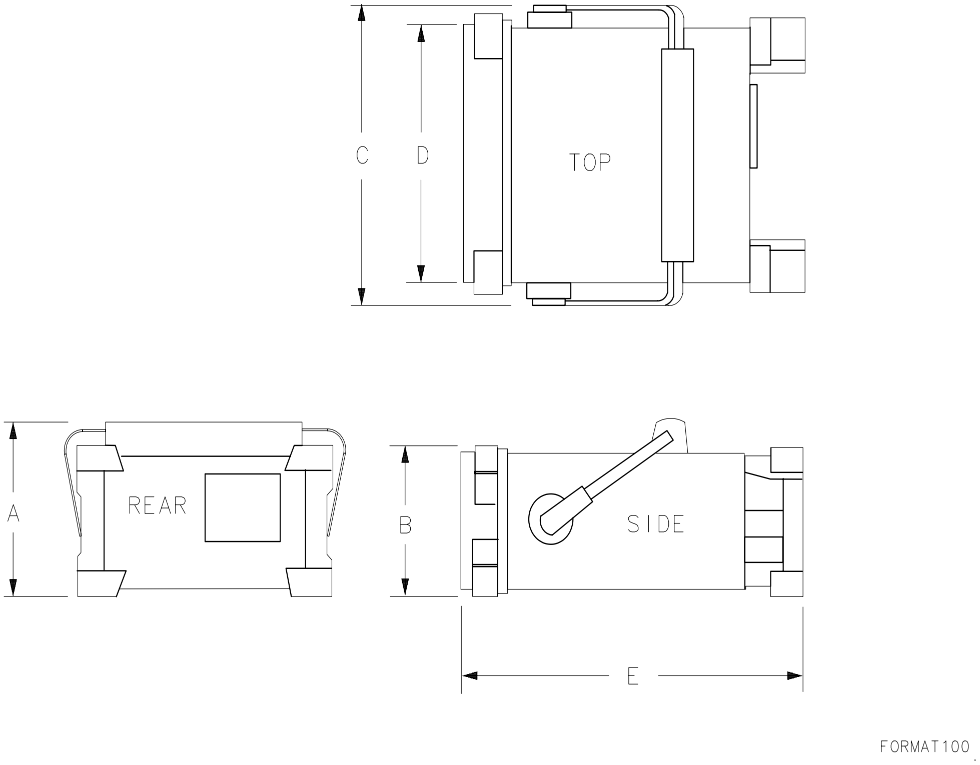
Pin #	Function	Current	“Logic” Mode	“Serial Bit” Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7[†]	–15 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	
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)



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	**Japan**	**New Zealand**	**Europe**
(tel) 1 800 452 4844	(tel) (+81) 426 56 7832 (fax) (+81) 426 56 7840	(tel) 0 800 738 378 (fax) (+64) 4 495 8950	(tel) (+31) 20 547 2323 (fax) (+31) 20 547 2390
Canada	**Latin America**	**Australia**	
(tel) 1 877 894 4414 (fax) (905) 282 6495	(tel) (305) 269 7500 (fax) (305) 269 7599	(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.

12 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

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.**

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.**

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).**

CAUTION *Before this instrument is switched on*, make sure its primary power circuitry has been adapted to the voltage of the ac power source.

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.

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.

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.

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.

Regulatory Information

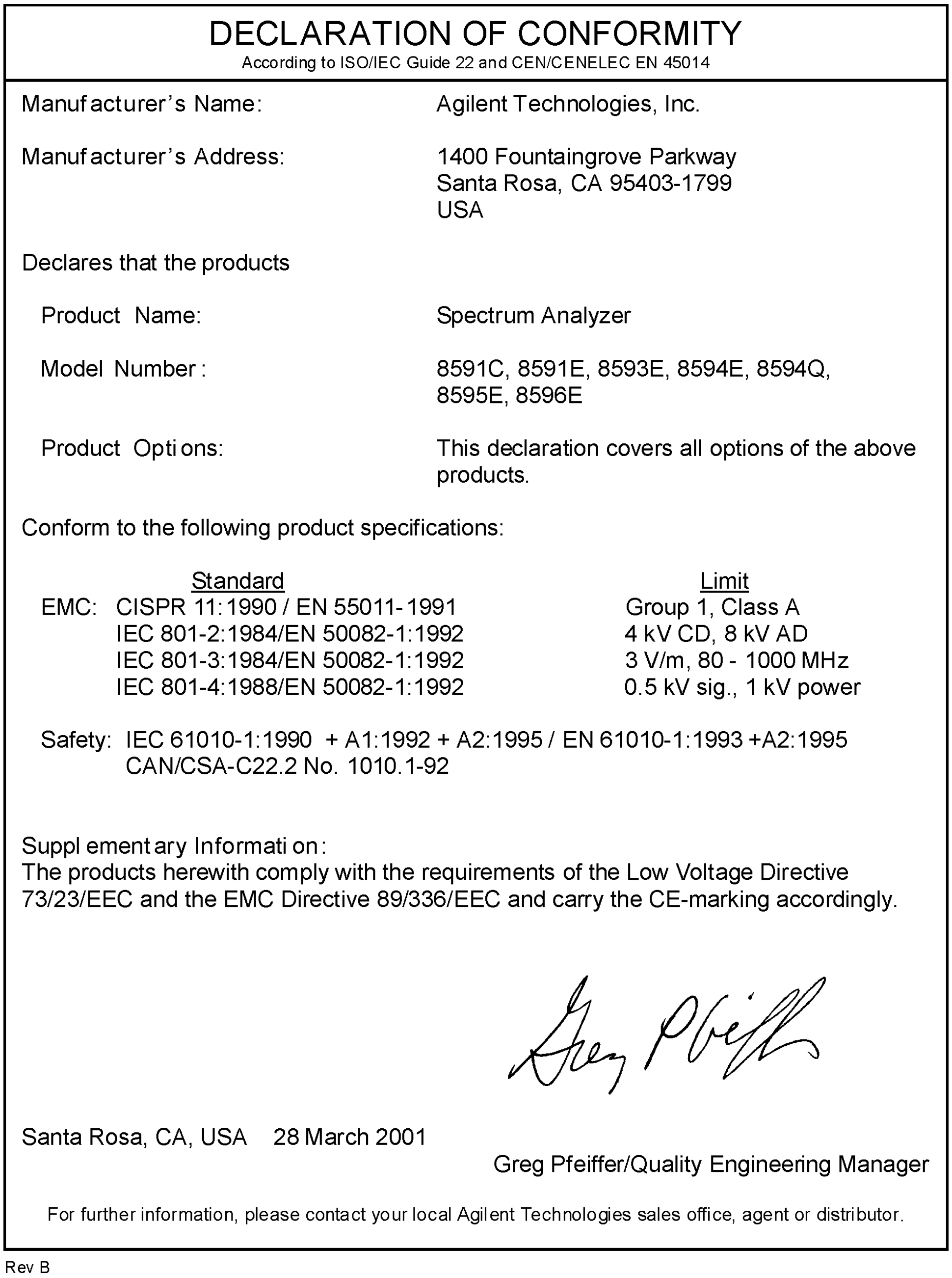
IEC Compliance

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.
CE	The CE mark is a registered trademark of the European Community. (If accompanied by a year, it is when the design was proven.)
CSA	The CSA mark is a registered trademark of the Canadian Standards Association.
ISM1-A	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:

	Standard	Limit
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

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.

Rev B