HP 8590 EM-Series EMC Analyzer

Calibration Guide

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Compliance

This instrument has been designed and tested in accordance with IEC Publication 348, 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.

Safety Notes

The following safety notes are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument.

WARNING **Warning 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 note until the indicated conditions are fully understood and met.**

CAUTION Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to or destruction of the instrument. Do *not* proceed beyond a caution sign until the indicated conditions are fully understood and met.

General Safety Considerations

WARNING

- **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.**
- **If this instrument is not used as specified, the protection provided by the equipment may be impaired. This instrument must be used in a normal condition (in which all means for protection are intact) only.**
- **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.**

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.
- 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.
- Only clean the instrument cabinet using a damp cloth.

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.)

ISM1-A — This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.

CSA — The CSA mark is a registered trademark of the Canadian Standards Association.

Manual Conventions

(Front-Panel Key)	This represents a key physically located on the instrument.
Softkey	This indicates a "softkey," a key whose label is determined by the firmware of the instrument.
Screen Text	This indicates text displayed on the instrument's screen.

HP 8590 EM-Series EMC Analyzer Documentation Description

The following documents are provided with the HP 8590 EM-Series EMC Analyzer.

Verification Guide	provides information for verifying the instrument's performance, specifications and characteristics, and customer support.
User's Guide	describes instrument features and how to make measurements with your EMC analyzer.
Quick Reference Guide	provides menu maps, error messages, and key descriptions, remote programming codes, and other helpful charts and tables.

In This Book

This book helps you test the performance of the EMC analyzer. The first three chapters of this guide provide information for performing the performance verification tests. The next six chapters provide specifications and characteristics for the six EMC analyzer products. The last chapter gives helpful information when your require support.

Chapter 1	contains information on which performance verification tests that you will perform and lists the equipment required to perform these tests.
Chapter 2	contains the performance verification tests to ensure your EMC analyzer is operating properly.
Chapter 3	contains the test records for your use when performing the performance verification tests.
Chapter 4	provides the specifications and characteristics for the HP 8591EM EMC analyzer.
Chapter 5	provides the specifications and characteristics for the HP 8593EM EMC analyzer.
Chapter 6	provides the specifications and characteristics for the HP 8594EM EMC analyzer.

Chapter 7 provides the specifications and characteristics for the HP 8595EM EMC analyzer.

Chapter 8 provides the specifications and characteristics for the HP 8596EM EMC analyzer.

Chapter 9 provides the characteristics for the EMC analyzer with the RF filter section.

Chapter 10 contains information for providing customer support to you if you have a problem with your EMC analyzer.

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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 called out in this chapter.

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

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 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.

Performance Verification Test Tables

The tables on the following pages list the performance tests in chapter 2. 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. Note that some of the tests are used for both calibration and operation verification (marked with $\boxed{\bullet}$).

Table 1-1. HP 8591EM Performance Verification Tests

Performance Test Name	Calibration for Instrument Option:			
	Std[1]	004	010	101
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	⊡	⊡	⊡	⊡
10. Residual FM	•	•	•	•
12. Sweep Time Accuracy	•	•	•	•
13. Scale Fidelity	⊡	⊡	⊡	⊡
14. Reference Level Accuracy	⊡	⊡	⊡	⊡
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties	⊡	⊡	⊡	⊡
17. Resolution (IF) Bandwidth Accuracy	•	•	•	•
18. Calibrator Amplitude Accuracy	⊡	⊡	⊡	⊡
19. Frequency Response	⊡	⊡	⊡	⊡
24. Other Input Related Spurious Responses	•	•	•	•
29. Spurious Response[2]	⊡	⊡	⊡	⊡
34. Gain Compression	•	•	•	•
39. Displayed Average Noise Level	⊡	⊡	⊡	⊡
44. Residual Responses	•	•	•	•
47. Fast Time Domain Sweeps				•
49. Absolute Amplitude, Vernier, and Power Sweep Accuracy			•	
52. Tracking Generator Level Flatness			•	
54. Harmonic Spurious Outputs			•	
56. Non-Harmonic Spurious Outputs			•	
58. Tracking Generator Feedthrough			•	
62. CISPR Pulse Response	•	•	•	•

1 Use this column for all other options *not* listed in this table.

2 "Part 2: Third Order Intermodulation Distortion, 50 MHz" is not required for operation verification.

Table 1-2. HP 8593EM Performance Verification Tests

Performance Verification Test Name	Calibration for Instrument Option:					
	Std[1]	004	010	026	027	101
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	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
6. Noise Sidebands	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
7. System Related Sidebands	•	•	•	•	•	•
9. Frequency Span Readout Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
11. Residual FM	•	•	•	•	•	•
12. Sweep Time Accuracy	•	•	•	•	•	•
13. Scale Fidelity	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
15. Reference Level Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
17. Resolution (IF) Bandwidth Accuracy	•	•	•	•	•	•
18. Calibrator Amplitude Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
20. Frequency Response	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
25. Other Input Related Spurious Responses	•	•	•	•	•	•
30. Spurious Response[2]	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
35. Gain Compression	•	•	•	•	•	•
40. Displayed Average Noise Level	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
46. Residual Responses	•	•	•	•	•	•
48. Fast Time Domain Sweeps						•
50. Absolute Amplitude Accuracy			•			
51. Power Sweep Range			•			
53. Tracking Generator Level Flatness			•			
55. Harmonic Spurious Outputs			•			
57. Non-Harmonic Spurious Outputs			•			
60. Tracking Generator Feedthrough			•			
61. Tracking Generator LO Feedthrough Amplitude			•			
62. CISPR Pulse Response	•	•	•	•		

1 Use this column for all other options *not* listed in this table.

2 "Part 2: Third Order Intermodulation Distortion, 50 MHz" is not required for operation verification.

Table 1-3. HP 8594EM Performance Verification Tests

Performance Verification Test Name	Calibration for Instrument Option:			
	Std[1]	004	010	101
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	⊡	⊡	⊡	⊡
11. Residual FM	•	•	•	•
12. Sweep Time Accuracy	•	•	•	•
13. Scale Fidelity	⊡	⊡	⊡	⊡
15. Reference Level Accuracy	⊡	⊡	⊡	⊡
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties	⊡	⊡	⊡	⊡
17. Resolution (IF) Bandwidth Accuracy	•	•	•	•
18. Calibrator Amplitude Accuracy	⊡	⊡	⊡	⊡
21. Frequency Response	⊡	⊡	⊡	⊡
26. Other Input Related Spurious Responses	•	•	•	•
31. Spurious Response[2]	⊡	⊡	⊡	⊡
36. Gain Compression	•	•	•	•
41. Displayed Average Noise Level	⊡	⊡	⊡	⊡
45. Residual Responses	•	•	•	•
48. Fast Time Domain Sweeps				•
50. Absolute Amplitude Accuracy			•	
51. Power Sweep Range			•	
53. Tracking Generator Level Flatness			•	
55. Harmonic Spurious Outputs			•	
57. Non-Harmonic Spurious Outputs			•	
59. Tracking Generator Feedthrough			•	
61. Tracking Generator LO Feedthrough Amplitude			•	
62. CISPR Pulse Response	•	•	•	•

1 Use this column for all other options *not* listed in this table.

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

Table 1-4. HP 8595EM Performance Verification Tests

Performance Verification Test Name	Calibration for Instrument Option:			
	Std[1]	004	010	101
1. 10 MHz Reference Output Accuracy	•		•	•
2. 10 MHz Precision Frequency Reference Output Accuracy		•		
5. Frequency Readout and Marker Count Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
6. Noise Sidebands	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
7. System Related Sidebands	•	•	•	•
9. Frequency Span Readout Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
11. Residual FM	•	•	•	•
12. Sweep Time Accuracy	•	•	•	•
13. Scale Fidelity	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
15. Reference Level Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
17. Resolution (IF) Bandwidth Accuracy	•	•	•	•
18. Calibrator Amplitude Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
22. Frequency Response	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
27. Other Input Related Spurious Responses	•	•	•	•
32. Spurious Response[2]	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
37. Gain Compression	•	•	•	•
42. Displayed Average Noise Level	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
46. Residual Responses	•	•	•	•
48. Fast Time Domain Sweeps				•
50. Absolute Amplitude Accuracy			•	
51. Power Sweep Range			•	
53. Tracking Generator Level Flatness			•	
55. Harmonic Spurious Outputs			•	
57. Non-Harmonic Spurious Outputs			•	
60. Tracking Generator Feedthrough			•	
61. Tracking Generator LO Feedthrough Amplitude			•	
62. CISPR Pulse Response	•	•	•	•

1 Use this column for all other options *not* listed in this table.

2 "Third Order Intermodulation Distortion" is not required for operation verification.

Table 1-5. HP 8596EM Performance Verification Tests

Performance Verification Test Name	Calibration for Instrument Option:			
	Std[1]	004	010	101
1. 10 MHz Reference Output Accuracy	•		•	•
2. 10 MHz Precision Frequency Reference Output Accuracy		•		
3. Comb Generator Frequency Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
5. Frequency Readout and Marker Count Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
6. Noise Sidebands	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
7. System Related Sidebands	•	•	•	•
9. Frequency Span Readout Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
11. Residual FM	•	•	•	•
12. Sweep Time Accuracy	•	•	•	•
13. Scale Fidelity	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
15. Reference Level Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
17. Resolution (IF) Bandwidth Accuracy	•	•	•	•
18. Calibrator Amplitude Accuracy	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
23. Frequency Response	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
28. Other Input Related Spurious Responses	•	•	•	•
33. Spurious Response[2]	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
38. Gain Compression	•	•	•	•
43. Displayed Average Noise Level	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$	$\boxed{\bullet}$
46. Residual Responses	•	•	•	•
48. Fast Time Domain Sweeps				•
50. Absolute Amplitude Accuracy			•	
51. Power Sweep Range			•	
53. Tracking Generator Level Flatness			•	
55. Harmonic Spurious Outputs			•	
57. Non-Harmonic Spurious Outputs			•	
60. Tracking Generator Feedthrough			•	
61. Tracking Generator LO Feedthrough Amplitude			•	
62. CISPR Pulse Response	•	•	•	•

1 Use this column for all other options *not* listed in this table.

2 “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 the front of this guide *before* you begin verifying performance of the EMC 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 *HP 8590 EM-Series EMC Analyzer 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

Tables 1-6 through 1-9 list the recommended test equipment for the performance tests. Any equipment that meets the critical specifications given in the table can be substituted for the recommended model.

Recording the test results

Performance verification test records, for each EMC analyzer, are provided in the chapter following the tests.

Each test result is identified as a *TR Entry* in the performance tests 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 the "Customer Support" chapter 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 1-6. Recommended Test Equipment

Equipment	Critical Specifications for Equipment Substitution	Recommended Model
Digital Voltmeter	Input Resistance: $\geq$10 megohms Accuracy: $\pm$10 mV on 100 V range	HP 3456A
Frequency Counter[1]	Frequency: 10 MHz Resolution: $\pm$0.002 Hz External Timebase	HP 5334A/B
Frequency Standard	Frequency: 10 MHz Timebase Accy (Aging): $<1 \times 10^{-9}$/day	HP 5061B
Measuring Receiver	Compatible with Power Sensors dB Relative Mode Resolution: 0.01 dB Reference Accuracy: $\pm$1.2%	HP 8902A
Microwave Frequency Counter	Frequency Range: 9 MHz to 7 GHz Timebase Accy (Aging): $<5 \times 10^{-10}$/day	HP 5343A
Power Meter	Power Range: Calibrated in dBm and dB relative to reference power -70 dBm to $+44$ dBm, sensor dependent	HP 436A
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)	HP 8482A
Power Sensor[2]	Frequency Range: 1 MHz to 2 GHz Maximum SWR: 1.18 (600 kHz to 2.0 GHz) 75 Ω	HP 8483A
Power Sensor, Low Power	Frequency Range: 300 MHz Amplitude Range: -20 dBm to -70 dBm Maximum SWR: 1.1 (300 MHz)	HP 8484A

1 Precision Frequency Reference only

2 HP 8591EM only

Table 1-6. Recommended Test Equipment (continued)

Equipment	Critical Specifications for Equipment Substitution	Recommended Model
Power Sensor[1]	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)	HP 8485A
Pulse Generator	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	HP 8161A
Pulse Generator[2]	Frequency: 100 Hz Duty Cycle: 50% Output: TTL	HP 8116A
Signal Generator	Frequency Range: 1 MHz to 1000 MHz Amplitude Range: −35 to +16 dBm SSB Noise: <−120 dBc/Hz at 20 kHz offset	HP 8640B, Option 002 or HP 8642A
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	HP 8566A/B
Synthesized Sweeper[3]	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	HP 8340A/B or HP 83630A
Synthesizer/Function Generator	Frequency Range: 0.1 Hz to 500 Hz Frequency Accuracy: ±0.02% Waveform: Triangle	HP 3325B
Synthesizer/Level Generator	Frequency Range: 1 kHz to 80 MHz Amplitude Range: +12 to −85 dBm Flatness: ±0.15 dB Attenuator Accuracy: ±0.09 dB	HP 3335A

1 Not for HP 8591EM

2 HP 8591EM only

3 For HP 8591EM, HP 8593EM Option 026 or Option 027, HP 8594EM, HP 8595EM, and HP 8596EM

Table 1-7. Recommended Accessories

Equipment	Critical Specifications for Accessory Substitution	Recommended Model
Attenuator, 3 dB	Type N (m to f) Attenuation: 3 dB Frequency: dc to 12.4 GHz	HP 8491A Option 003
Attenuator, 10 dB	Type N (m to f) Frequency: 300 MHz	HP 8491A Option 010
Attenuator, 1 dB Step	Attenuation Range: 0 to 12 dB Frequency Range: 50 MHz Connectors: BNC female	HP 355C
Attenuator, 10 dB Step	Attenuation Range: 0 to 30 dB Frequency Range: 50 MHz Connectors: BNC female	HP 355D
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)	HP 8721A
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
Low Pass Filter, 50 MHz	Cutoff Frequency: 50 MHz Rejection at 80 MHz: >50 dB	0955-0306
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
Low Pass Filter, 4.4 GHz	Cutoff Frequency: 4.4 GHz Rejection at 5.5 GHz: >40 dB	HP 11689A

Table 1-7. Recommended Accessories (continued)

Equipment	Critical Specifications for Accessory Substitution	Recommended Model
Modulator Teletech SC35B	Frequency 50 MHz ON/OFF RATIO >70 dB Switching Speed 2 ns Insertion Loss: 5 dB	0955-0533
Power Splitter[1]	Frequency Range: 50 kHz to 1.8 GHz Insertion Loss: 6 dB (nominal) Output Tracking: <0.25 dB Equivalent Output SWR: <1.22:1	HP 11667A
Power Splitter[2]	Frequency Range: 50 kHz to 22 GHz Insertion Loss: 6 dB (nominal) Output Tracking: <0.25 dB Equivalent Output SWR: <1.22:1	HP 11667B
Termination, 50 Ω	Impedance: 50 Ω (nominal) *(2 required for Option 010)*	HP 908A
Termination[3]		HP 909D

1 HP 8591EM and HP 8593EM

2 HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

3 HP 8595EM and HP 8596EM only

Table 1-8. Recommended Adapters

Equipment	Critical Specifications for Accessory Substitution	Recommended Model
Adapter	APC 3.5 (f) to APC 3.5 (f) *(2 required)*	5061-5311
Adapter[1]	BNC (f) to dual banana plug	1251-1277
Adapter	BNC (f) to SMA (m)	1250-1200
Adapter	BNC (m) to BNC (m)	1250-0216
Adapter	BNC tee (m) (f) (f)	1250-0781
Adapter	Type N (f) to APC 3.5 (f)	1250-1745
Adapter	Type N (f) to APC 3.5 (m)	1250-1750
Adapter	Type N (m) to APC 3.5 (m)	1250-1743
Adapter[2]	Type N (m) to APC 3.5 (f)	1250-1744
Adapter[3]	Type N (f) to BNC (f)	1250-1474
Adapter	Type N (f) to BNC (m) *(2 required)*	1250-1477
Adapter	Type N (m) to BNC (f) *(4 required)*	1250-1476
Adapter	Type N (m) to BNC (m) *(2 required)*	1250-1473
Adapter	Type N (f) to Type N (f)	1250-1472
Adapter[3]	Type N (m) to Type N (m)	1250-1475

1 HP 8591EM only

2 HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM only

3 HP 8591EM, HP 8594EM, HP 8595EM, and HP 8596EM only

Table 1-9. Recommended Cables

Equipment	Critical Specifications for Cable Substitution	Recommended Model
Cable[1]	Cal Comb Connectors: SMA (m) both ends	08592-60061
Cable[1]	Connectors: SMA (m) both ends Length: 61 cm (18 in)	8120-1578
Cable[2]	Frequency Range: 10 MHz to 26.5 GHz Maximum SWR: $<$1.4 at 26.5 GHz Length: $\geq$91 cm (36 in) Connectors: APC 3.5 (m) both ends Maximum Insertion Loss 2 dB *(2 required)*	8120-4921
Cable	Type N, 183 cm (72 in)	HP 11500A
Cable	Type N, 62 cm (24 in)	HP 11500B/C
Cable	Type N, 152 cm (60 in)	HP 11500D
Cable	Frequency Range: dc to 1 GHz Length: $\geq$91 cm (36 in) Connectors: BNC (m) both ends *(2 required)*	HP 10503A
Cable	Frequency Range: dc to 310 MHz Length: 23 cm (9 in) Connectors: BNC (m) both ends	HP 10502A

1 For HP 8593EM only

2 For HP 8593EM Option 026 or 027, or HP 8594EM, HP 8595EM, or HP 8596EM only

2

Performance Verification Tests

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

CAUTION All performance verification tests (except test 62. CISPR Pulse Response) must be performed with the EMC analyzer set in the *spectrum analyzer mode*.
To set the EMC analyzer to the spectrum analyzer mode, press:

(MODE)

SPECTRUM ANALYZER

Performance verification test 62. CISPR Pulse Response must be performed with the EMC analyzer set in the *EMC analyzer mode*.
To set the analyzer to the EMC analyzer mode, press:

(MODE)

EMC ANALYZER

1. 10 MHz Reference Output Accuracy, HP 8590 EM-Series

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

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 Reference, HP 8590 EM-Series".

Equipment Required

Microwave frequency counter
Frequency standard
Cable, BNC, 122 cm (48 in) (2 required)

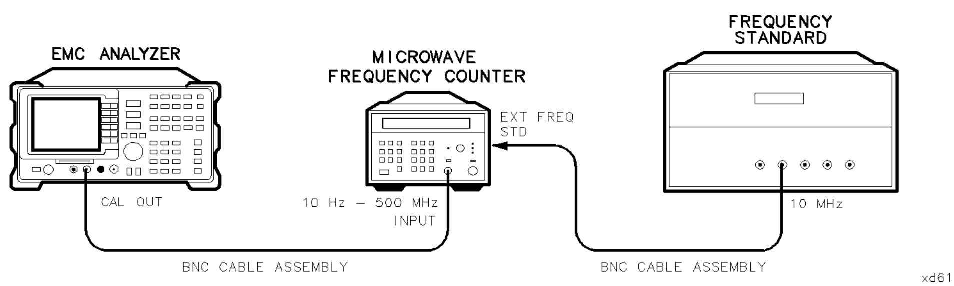

Figure 2-1. 10 MHz Reference Output Accuracy Test Setup

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 EMC 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 EMC analyzer in the 10 MHz Reference Accuracy Worksheet 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 EMC 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 the 10 MHz Reference Accuracy Worksheet 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 EMC 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 the 10 MHz Reference Accuracy Worksheet as **Counter Reading 3**.

1. 10 MHz Reference Output Accuracy, HP 8590 EM-Series

10 MHz Reference Accuracy Worksheet

Description	Measurement
Counter Reading 1	______________Hz
Timebase DAC Setting	______________
Counter Reading 2	______________Hz
Counter Reading 3	______________Hz

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 frequency difference with the greatest absolute value by two and record the value as **TR Entry 1** of the performance verification test record. The settability should be less than ±150 Hz.
    d. Press (PRESET) on the EMC analyzer. The timebase DAC will be reset automatically to the value recorded in step 5.

2. 10 MHz Precision Frequency Reference Output Accuracy, HP 8590 EM-Series Option 004

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

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 EMC analyzer has been allowed to cool for at least 60 minutes, the EMC 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 for
Option 004, HP 8590 EM-Series".

Equipment Required

Frequency counter
Frequency standard
Cable, BNC, 122 cm (48 in) *(two required)*

Procedure

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

1. Allow the EMC 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 EMC analyzer LINE switch on. Record the Power On Time below.

Power On Time ________

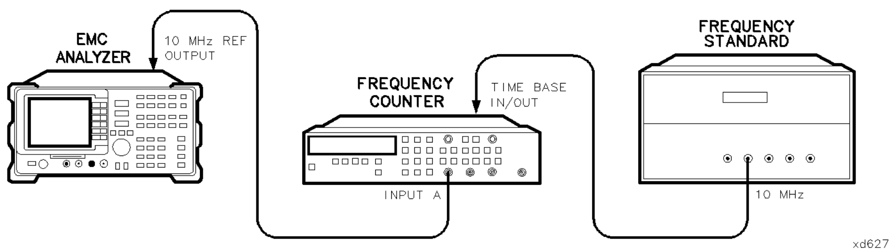

Figure 2-2.
10 MHz Precision Frequency Reference Output Accuracy Test Setup

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. Record the frequency counter reading in the 10 MHz Reference Accuracy Worksheet 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 10 MHz Reference Accuracy Worksheet 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 the 10 MHz Reference Accuracy Worksheet as **Counter Reading 3** with 0.001 Hz resolution.

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.

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

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.

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

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

3. Comb Generator Frequency Accuracy, HP 8593EM and HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A 100 MHz signal from a synthesized source and the output from a comb generator are applied to the input of the EMC 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 the "Comb Generator, HP 8593EM and HP 8596EM" adjustment.

Equipment Required

Synthesized sweeper
Power splitter
Cable, APC 3.5 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)

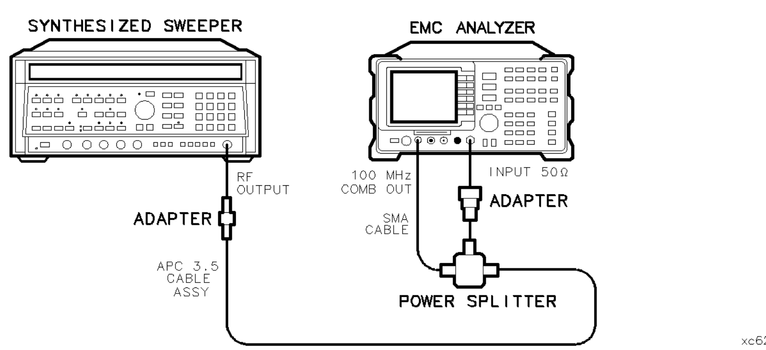

Figure 2-3. Comb Generator Frequency Accuracy Test Setup

3. Comb Generator Frequency Accuracy, HP 8593EM and HP 8596EM

Procedure

1. Connect the equipment as shown in Figure 2-3.

   Option 026 only: Omit the Type N to APC 3.5 mm adapter.

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 EMC analyzer, then wait for preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 100 (MHz)
   (AUX/USER) COMB GEN ON OFF (ON)
   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL 117 (dBμV)
   (BW) IF BW AUTO MAN (MAN) 10 (kHz)
   (MKR $\rightarrow$) MKR $\rightarrow$ HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 100 (kHz)

4. Press (AMPLITUDE) and adjust the reference-level setting until the signal peak is 10 dB below the reference level.

5. Set the synthesized sweeper RF on. Adjust the synthesized sweeper power level until the two signals are the same amplitude.

6. Set SCALE LOG LIN (LOG) to 2 dB on the EMC analyzer.

7. If necessary, readjust the synthesized sweeper power level until the two signals are the same amplitude.

8. 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.

9. 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.

10. Record the synthesized sweeper CW frequency setting as **TR Entry 1** of the performance verification test record. The frequency should be between 99.993 MHz and 100.007 MHz.

4. Frequency Readout and Marker Count Accuracy, HP 8591EM and HP 8594EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode.*

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

Equipment Required

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

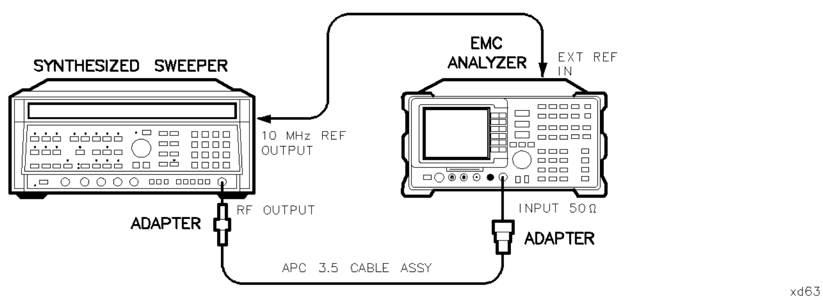

Figure 2-4.
Frequency Readout Accuracy Test Setup, HP 8591EM and HP 8594EM

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 performing "Part 2: Marker Count Accuracy."

4. Frequency Readout and Marker Count Accuracy, HP 8591EM and HP 8594EM

Part 1: Frequency Readout Accuracy

1. Connect the equipment as shown in Figure 2-4. Remember to connect the 10 MHz REF OUT of the synthesized sweeper to the EXT REF IN of the EMC analyzer.
2. Perform the following steps to set up the equipment:
   - Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

     CW .... 1.5 GHz
     POWER LEVEL .... −10 dBm

   - On the EMC analyzer, press (PRESET), wait for the preset routine to finish, then press (FREQUENCY) 1.5 (GHz).
3. Set the EMC analyzer to measure the frequency readout accuracy by pressing the following keys:

   (SPAN) 20 (MHz)
   (MKR →) MARKER → HIGH
4. Record the MKR frequency reading as **TR Entry 1** in the performance verification test record. The reading should be within the limits shown in Table 2-1.
5. Change to the next EMC analyzer span setting listed in Table 2-1.
6. Repeat steps 3 through 5 for each EMC analyzer span setting/TR entry listed in Table 2-1.

Table 2-1. Frequency Readout Accuracy

EMC Analyzer	MKR Reading		
Span (MHz)	**Min. (MHz)**	**TR Entry**	**Max. (MHz)**
20	1.49918	**1**	1.50082
10	1.49958	**2**	1.50042
1	1.499968	**3**	1.500032

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

   (BW) IF BW AUTO MAN (MAN) 300 (Hz)

(SPAN) 20 (kHz)

8. Press (MKR →) MARKER → HIGH on the EMC 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. 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 EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer to measure the marker count accuracy by pressing the following keys:

   (FREQUENCY) 1.5 (GHz)
   (SPAN) 20 (MHz)
   (BW) IF BW AUTO MAN (MAN) 300 (kHz)
   (MKR) More 1 of 3 MK COUNT ON OFF (ON)
   More 2 of 3 CNT RES AUTO MAN (MAN) 100 (Hz)

2. Press (MKR →) MARKER → HIGH, then wait for a count to 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 EMC analyzer settings by pressing the following keys:

   (SPAN) 1 (MHz)
   (MKR) More 1 of 3 More 2 of 3 CNT RES AUTO MAN (MAN) 10 (Hz)

5. Press (MKR →) MARKER → HIGH, then wait for a count to be taken (it may take several seconds).
6. Record the CNTR frequency reading as **TR Entry 6** of the performance verification test record. The reading should be within the limits of 1.49999989 GHz and 1.50000011 GHz.
7. Set the EMC analyzer by pressing the following keys:

   (BW) IF BW AUTO MAN (MAN) 300 (Hz)
   (SPAN) 20 (kHz)

8. Press (MKR →) MARKER → HIGH on the EMC analyzer.
9. Record the MKR frequency reading as **TR Entry 7** of the performance verification test record. The reading should be within the limits of 1.49999989 GHz and 1.50000011 GHz.

10. Set the EMC analyzer by pressing the following keys:

    (BW) IF BW AUTO MAN (MAN) 30 (Hz)
    (SPAN) 2 (kHz)

11. Press (MKR →) MARKER → HIGH (MKR) More 1 of 3 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** of the Performance verification Test Record. The reading should be within the limits of 1.49999989 and 1.50000011.

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

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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

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)

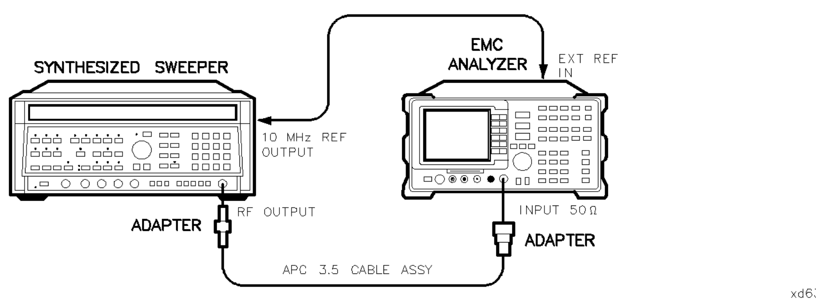

Figure 2-5.
Frequency Readout Accuracy Test Setup, HP 8593EM, HP 8595EM, and HP 8596EM

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 performing "Part 2: Marker Count Accuracy."

Part 1: Frequency Readout Accuracy

1. Connect the equipment as shown in Figure 2-5. Remember to connect the 10 MHz REF OUT of the synthesized sweeper to the EXT REF IN of the EMC analyzer.

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

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

   CW .... 1.5 GHz
   POWER LEVEL .... −10 dBm

3. Press (PRESET) on the EMC analyzer, wait for the preset routine to finish, then press (FREQUENCY) 1.5 (GHz).

4. On the EMC analyzer, press the following keys to measure the frequency readout accuracy:

   (SPAN) 20 (MHz)
   (MKR →) MARKER → HIGH

5. Record the MKR frequency reading as **TR Entry 1** in the performance verification test record as indicated in Table 2-2. The reading should be within the limits shown.

6. Change to the next EMC analyzer span setting listed in Table 2-2.

7. Repeat steps 4 through 6 for the EMC analyzer 10 MHz and 1 MHz span settings as listed in Table 2-2.

8. Change the synthesized sweeper CW frequency and the EMC analyzer center frequency and span as required by Table 2-2 and repeat steps 4 through 7.

5. **Frequency Readout and Marker Count Accuracy, HP 8593EM, HP 8595EM, and HP 8596EM**

Table 2-2. Frequency Readout Accuracy

Synthesized Sweeper CW Frequency (MHz)	EMC Analyzer Span (MHz)	EMC Analyzer Center Frequency (GHz)	Minimum Frequency (GHz)	TR Entry Frequency (GHz)	Maximum Frequency (GHz)
1500	20	1.5	1.49918	**1**	1.50082
1500	10	1.5	1.49958	**2**	1.50042
1500	1	1.5	1.499968	**3**	1.500032
4000	20	4.0	3.99918	**4**	4.00082
4000	10	4.0	3.99958	**5**	4.00042
4000	1	4.0	3.999968	**6**	4.000032
Stop here for HP 8595EM.					
9000	20	9.0	8.99918	**7**	9.00082
9000	10	9.0	8.99958	**8**	9.00042
9000	1	9.0	8.999968	**9**	9.000032
Stop here for HP 8596EM.					
16000	20	16.0	15.99918	**10**	16.00082
16000	10	16.0	15.99958	**11**	16.00042
16000	1	16.0	15.999968	**12**	16.000032
21000	20	21.0	20.99918	**13**	21.00082
21000	10	21.0	20.99958	**14**	21.00042
21000	1	21.0	20.999968	**15**	21.000032

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

    (FREQUENCY) 1.5 (GHz)
    (BW) 300 (Hz)
    (SPAN) 20 (kHz)

11. Press (MKR →) MARKER → HIGH on the EMC analyzer.

12. 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: Frequency Readout Accuracy" is now complete. 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 EMC analyzer, then wait for the preset routine to finish.
2. Set the EMC analyzer to measure the marker count accuracy by pressing the following keys:

   (FREQUENCY) 1.5 (GHz)
   (SPAN) 20 (MHz)
   (BW) IF BW AUTO MAN (MAN) 300 (kHz)
   (MKR) More 1 of 3 MK COUNT ON OFF (ON)
   More 2 of 3 CNT RES AUTO MAN (MAN) 100 (Hz)

3. Press (MKR →) MARKER → HIGH, then wait for a count to 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 2-3.

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

Table 2-3. Marker Count Accuracy

Synthesized Sweeper CW Frequency	EMC Analyzer Center Frequency	EMC Analyzer Span	EMC Analyzer Counter Resolution	CNT MKR Frequency		
(MHz)	(GHz)	(MHz)	(Hz)	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 HP 8595EM, stop here.						
9000	9.0	20	100	8.9999979	**21**	9.0000021
9000	9.0	1	10	8.999999979	**22**	9.00000021
If HP 8596EM, 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

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

   (SPAN) 1 (MHz)
   (MKR) `More 1 of 3` `MK COUNT ON OFF` (ON)
   `More 2 of 3` `CNT RES AUTO MAN` (MAN) 10 (Hz)

6. Press (MKR →) `MARKER → HIGH`, then wait for a count to 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 2-3.
8. Set the synthesized sweeper CW frequency to the next frequency as required by Table 2-3.
9. Repeat steps 2 through 8 for each of the remaining EMC analyzer settings listed in Table 2-3.

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

    (FREQUENCY) 1.5 (GHz)
    (BW) IF BW AUTO MAN (MAN) 300 (Hz)
    (SPAN) 20 (kHz)

12. Press (MKR →) MARKER → HIGH on the EMC analyzer.
13. 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.
14. Set the EMC analyzer by pressing the following keys:

    (BW) IF BW AUTO MAN (MAN) 30 (Hz)
    (SPAN) 2 (kHz)

15. Press (MKR →) MARKER → HIGH (MKR) More 1 of 3 MK TRACK ON OFF (ON), then wait until the count is completed (it may take several seconds).
16. Record the MKR reading as **TR Entry 28** of the Performance verification Test Record. The reading should be within the limits of 1.49999989 and 1.50000011.

6. Noise Sidebands, HP 8590 EM-Series

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A 500 MHz CW signal is applied to the input of the EMC 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.

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)

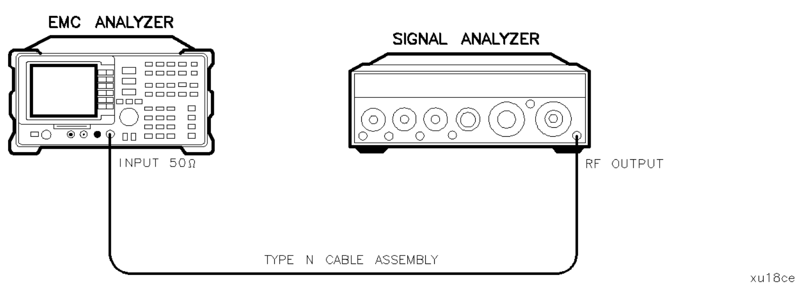

Figure 2-6. Noise Sidebands Test Setup

Procedure

This performance verification 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.

6. Noise Sidebands, HP 8590 EM-Series

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. Perform the following steps to set up the equipment:
   - Set the signal generator controls as follows:

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

   - Connect the equipment as shown in Figure 2-6.
   - Press (PRESET) on the EMC analyzer, wait for the preset routine to finish, then press (FREQUENCY) 500 (MHz).
2. Press the following EMC analyzer keys to measure the carrier amplitude.

   (SPAN) 10 (MHz)
   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 200 (kHz)
   (BW) 1 (kHz)
   AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
   (SGL SWP)

   Wait for the completion of a sweep, then press (MKR →) MARKER → HIGH.

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the **Carrier Amplitude**.
3. Press the following EMC analyzer keys to measure the noise sideband level at +10 kHz:

   More 1 of 3 More 2 of 3
   MARKER Δ 10 (kHz)
   (MKR) MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the **Noise Sideband Level at +10 kHz**.

4. Press the following EMC analyzer keys to measure the noise sideband level at −10 kHz:

   (MKR →) MARKER → HIGH

   More 1 of 3 More 2 of 3

   MARKER Δ −10 (kHz)

   (MKR) MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the **Noise Sideband Level at −10 kHz**.

5. Record the more positive value, either Noise Sideband Level at +10 kHz or Noise Sideband Level at −10 kHz from the Noise Sideband Worksheet as the **Maximum Noise Sideband Level at ±10 kHz**.

6. Calculate the Noise Sideband Suppression at 10 kHz by subtracting the Carrier Amplitude from the Maximum Noise Sideband Level at ±10 kHz. Use the equation below.

   Noise Sideband Suppression = Maximum Noise Sideband Level − Carrier Amplitude

7. 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 2: Noise Sideband Suppression at 20 kHz

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

   (MKR) MARKER Δ 20 (kHz)

   MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the **Noise Sideband Level at +20 kHz**.

2. Press the following EMC analyzer keys to measure the noise sideband level at −20 kHz:

   (MKR →) MARKER → HIGH

   More 1 of 3 More 2 of 3

   MARKER Δ −20 (kHz)

(MKR) MARKER NORMAL

Record the MKR amplitude reading in the Noise Sideband Worksheet as the **Noise Sideband Level at −20 kHz**.

3. Record the more positive value, either Noise Sideband Level at +20 kHz or Noise Sideband Level at −20 kHz from the Noise Sideband Worksheet as the **Maximum Noise Sideband Level at ±20 kHz**.
4. Calculate the Noise Sideband Suppression at 20 kHz by subtracting the Carrier Amplitude from the Maximum Noise Sideband Level at ±20 kHz. Use the equation below.

   Noise Sideband Suppression = Maximum Noise Sideband Level − Carrier Amplitude
5. 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 3: Noise Sideband Suppression at 30 kHz

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

   (MKR) MARKER Δ 30 (kHz)

   MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the **Noise Sideband Level at +30 kHz**.
2. Press the following EMC analyzer keys to measure the noise sideband level at −30 kHz:

   (MKR →) MARKER → HIGH

   More 1 of 3 More 2 of 3

   MARKER Δ −30 (kHz)

   (MKR) MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the **Noise Sideband Level at −30 kHz**.
3. Record the more positive value, either Noise Sideband Level at +30 kHz or Noise Sideband Level at −30 kHz from the Noise Sideband Worksheet as the **Maximum Noise Sideband Level at ±30 kHz**.

4. Calculate the Noise Sideband Suppression at 30 kHz by subtracting the Carrier Amplitude from the Maximum Noise Sideband Level at ±30 kHz. Use the equation below.

   Noise Sideband Suppression = Maximum Noise Sideband Level − Carrier Amplitude

5. Record the Noise Sideband Suppression at 30 kHz in the performance verification test record as **TR Entry 3**. The suppression should be ≤−75 dBc.

Noise Sideband Worksheet

Description	Measurement
Carrier Amplitude	________ dBμV
Noise Sideband Level at +10 kHz	________ dBμV
Noise Sideband Level at −10 kHz	________ dBμV
Maximum Noise Sideband Level at ±10 kHz	________ dBμV
Noise Sideband Level at +20 kHz	________ dBμV
Noise Sideband Level at −20 kHz	________ dBμV
Maximum Noise Sideband Level at ±20 kHz	________ dBμV
Noise Sideband Level at +30 kHz	________ dBμV
Noise Sideband Level at −30 kHz	________ dBμV
Maximum Noise Sideband Level at ±30 kHz	________ dBμV

Note that the IF bandwidth is normalized to 1 Hz as follows:

1 Hz noise-power = (noise-power in dBc) - (10 × log[IF BW])

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

7. System Related Sidebands, HP 8590 EM-Series

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A 500 MHz CW signal is applied to the input of the EMC 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)

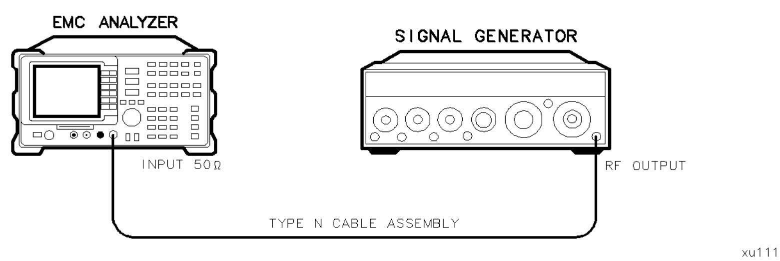

Figure 2-7. System Related Sidebands Test Setup

Procedure

1. Set the signal generator controls as follows:

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

7. **System Related Sidebands, HP 8590 EM-Series**

RF .... ON

2. Connect the equipment as shown in Figure 2-7.

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

3. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer to measure the system related sideband above the signal by pressing the following keys:

   (FREQUENCY) 500 (MHz)
   (SPAN) 10 (MHz)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 200 (kHz)
   (BW) 1 (kHz)
   AVG BW AUTO MAN (MAN) 30 (Hz)

4. Allow the EMC analyzer to stabilize for approximately 1 minute, then press the following keys:

   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
   (FREQUENCY) CF STEP AUTO MAN (MAN) 130 (kHz)
   (SGL SWP)

5. Wait for the completion of the sweep, then press the following EMC analyzer keys:

   (MKR →) MKR → HIGH
   More 1 of 3 More 2 of 3 MARKER Δ.
   (FREQUENCY)
   (⇑) (step-up key)

6. Measure the system related sideband above the signal by pressing (SGL SWP) on the EMC analyzer. Wait for the completion of a new sweep, then press (MKR →) MKR → HIGH.

7. 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 dBc.

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

   (⇓) (step-down key)
   (⇓) (step-down key)

9. Measure the system related sideband below the signal by pressing (SGL SWP). Wait for the completion of a new sweep, then press (MKR →) MKR → HIGH.

   Record the Marker-Δ Amplitude as **TR Entry 2** of the performance verification test record.

   The system related sideband below the signal should be > 65 dBc.

8. Frequency Span Readout Accuracy, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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

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)

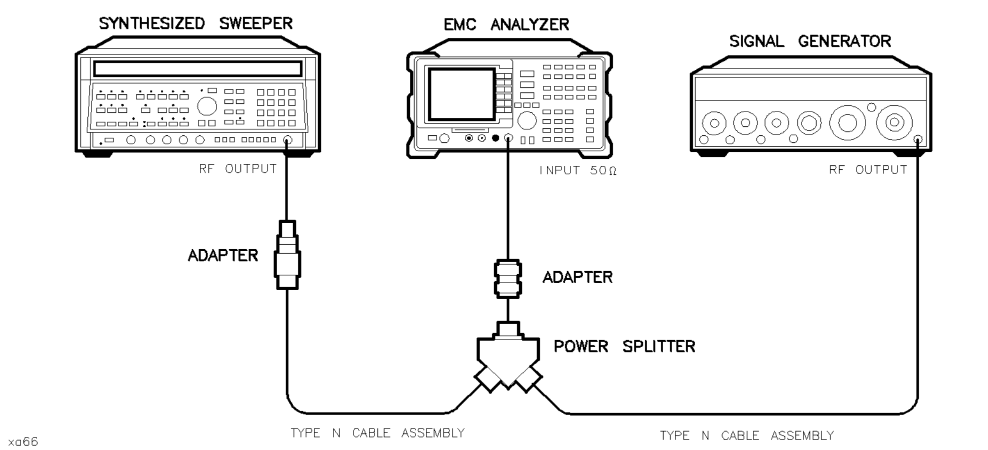

Figure 2-8.
1800 MHz Frequency Span Readout Accuracy Test Setup, HP 8591EM

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 performing "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 2-8. Note that the power splitter is used as a combiner.
2. Press (PRESET) on the EMC 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 EMC 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 EMC analyzer, press (SGL SWP). Wait for the completion of a new sweep, then press the following keys:

   (MKR →) MARKER → HIGH
   More 1 of 3 More 2 of 3 MARKER Δ
   More 3 of 3 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 `More 1 of 3` `More 2 of 3` `MARKER Δ`, then continue pressing `More 3 of 3` `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 Δ reading should be between 1446 MHz and 1554 MHz.

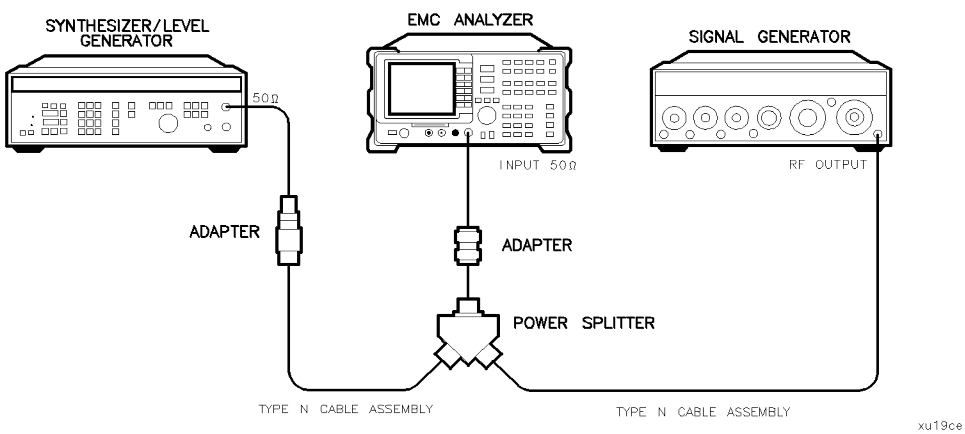

Figure 2-9.
10.1 MHz to 10 kHz Frequency Span Readout Accuracy Test Setup, HP 8591EM

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.

1. Connect the equipment as shown in Figure 2-9. Note that the power splitter is used as a combiner.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC 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 EMC analyzer center frequency to center the two signals on the display.

6. On the EMC analyzer, press (SGL SWP). Wait for the completion of a new sweep, then press the following keys:

   (MKR →) MARKER → HIGH
   More 1 of 3 More 2 of 3 MARKER Δ
   More 3 of 3 NEXT PEAK

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

7. Record the MKR-Δ frequency reading in the performance verification test record as **TR Entry 2**. The MKR-Δ frequency reading should be within the limits shown.

8. Press (MKR), More 1 of 3, then MARKER ALL OFF on the EMC analyzer.

9. Change the equipment to the next settings listed in Table 2-4.

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

    (MKR →) MARKER → HIGH
    More 1 of 3 More 2 of 3 MARKER Δ
    More 3 of 3 NEXT PEAK

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

12. Repeat steps 8 through 11 for the remaining EMC analyzer span settings through **TR Entry 6** (refer to Table 2-4).

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

    (MKR) More 1 of 3 MARKER ALL OFF
    (BW) 30 (Hz)

14. Change to the next EMC analyzer span setting listed in Table 2-4 (**TR Entry 7**). Be sure to set the synthesized sweeper CW and synthesizer/level generator frequencies as shown in the table.

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

    (MKR →) MARKER → HIGH
    More 1 of 3 More 2 of 3 MARKER Δ
    More 3 of 3 NEXT PEAK

16. Record the MKR-Δ frequency reading in **TR Entry 7** of the performance verification test record.

17. Repeat steps 15 and 16 for the 300 Hz EMC analyzer span setting.

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

Table 2-4. Frequency Span Readout Accuracy

EMC Analyzer Span Setting	Synthesizer/Level Generator Frequency	Synthesized Sweeper Frequency	MKR-Δ Reading		
	MHz	MHz	Minimum	TR Entry	Maximum
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
1.00 kHz	69.9996	70.0004	0.78 kHz	7	0.82 kHz
300.00 Hz[1]	69.99988	70.00012	225.00 Hz	—	255.00 Hz

1 This is not an EMC 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, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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

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, APC 3.5, 91 cm (36 in)
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)

9. Frequency Span Readout Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

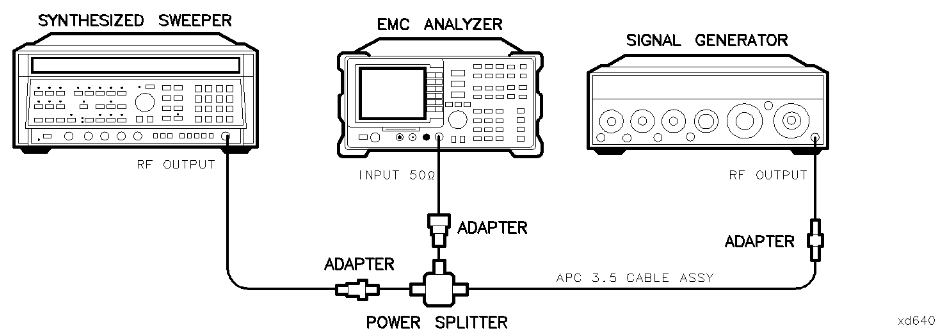

Figure 2-10.
1800 MHz Frequency Span Readout Accuracy Test Setup
HP 8593EM, HP 8595EM, and HP 8596EM

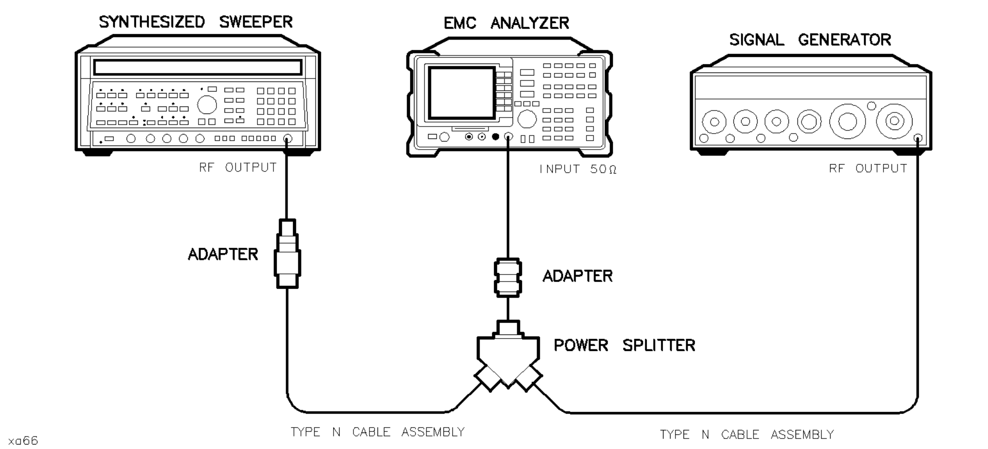

Figure 2-11. Frequency Span Readout Test Setup, HP 8594EM

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 performing “Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy.”

9. Frequency Span Readout Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

Part 1: 1800 MHz Frequency Span Readout Accuracy

1. Connect the equipment as shown in Figure 2-10 (Figure 2-11 for HP 8594EM).

   Note that the power splitter is used as a combiner.

2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC 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 EMC 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 EMC analyzer, press (SGL SWP).

   Wait for the completion of a new sweep, then press:

   (MKR →) MARKER → HIGH
   More 1 of 3 More 2 of 3 MARKER Δ
   More 3 of 3 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 More 1 of 3 More 2 of 3 MARKER Δ More 3 of 3, then continue pressing NEXT PK RIGHT until the marker Δ is 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.

9. Frequency Span Readout Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

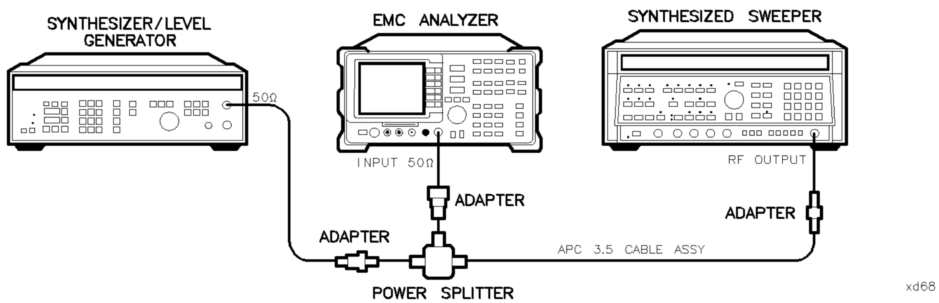

Figure 2-12.
10.1 MHz to 10 kHz Frequency Span Readout Accuracy Test Setup, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

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.

1. Connect the equipment as shown in Figure 2-12. Note that the Power Splitter is used as a combiner.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC 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 EMC analyzer center frequency to center the two signals on the display.
6. On the EMC analyzer, press (SGL SWP). Wait for the completion of a new sweep, then press the following keys:

(MKR →) MARKER → HIGH

More 1 of 3 More 2 of 3 MARKER Δ

More 3 of 3 NEXT PEAK

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

7. Record the MKR-Δ frequency reading in the performance verification test record as **TR Entry 2**. The MKR-Δ frequency reading should be within the limits shown.
8. Press (MKR), More 1 of 3 , MARKER ALL OFF on the EMC analyzer.
9. Change the equipment to the next settings listed in Table 2-5.
10. On the EMC analyzer, press (SGL SWP). Wait for the completion of a new sweep, then press the following keys:

    (MKR →) MARKER → HIGH

    More 1 of 3 More 2 of 3 MARKER Δ

    More 3 of 3 NEXT PEAK

11. Record the MKR-Δ frequency reading in the performance verification test record.
12. Repeat steps 8 through 11 for the remaining EMC analyzer span settings through **TR Entry 6** (refer to Table 2-5).
13. Set the EMC analyzer to measure the frequency span accuracy at 1 kHz by pressing the following keys:

    (MKR) More 1 of 3 MARKER ALL OFF
    (BW) 30 (Hz)

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

14. Change to the next EMC analyzer span setting listed in Table 2-5 (**TR Entry 7**). Be sure to set the synthesized sweeper CW and synthesizer/level generator frequencies as shown in the table.
15. On the EMC analyzer, press (SGL SWP). Wait for the completion of a new sweep, then press the following keys:

    (MKR →) MARKER → HIGH

More 1 of 3 More 2 of 3 MARKER Δ

More 3 of 3 NEXT PEAK

16. Record the MKR-Δ frequency reading in **TR Entry 7** of the performance verification test record.
17. Repeat steps 15 and 16 for the 300 Hz EMC analyzer span setting.
18. Verify that the 300 Hz span setting is within 225 Hz to 255 Hz.

Table 2-5. Frequency Span Readout Accuracy

EMC 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
1.00 kHz	69.9996	70.0004	0.78 kHz	**7**	0.82 kHz
300.00 Hz[1]	69.99988	70.00012	225.00 Hz	—	255.00 Hz

1 This is not an EMC 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, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

This test measures the inherent short-term instability of the EMC 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 hertz per decibel (Hz/dB) and then measures the signal amplitude variation caused by the residual FM. Multiplying these two values yields the residual FM in hertz. The narrow bandwidth test uses 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)

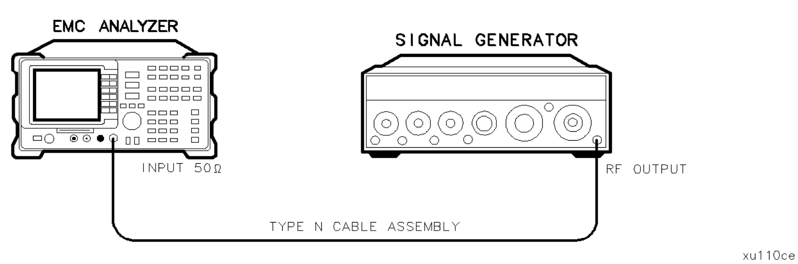

Figure 2-13. Residual FM Test Setup, HP 8591EM

Procedure

This performance test consists of two parts:

Part 1: Residual FM
Part 2: Narrow Bandwidth Residual FM

Part 1: Residual FM

Determining the IF Filter Slope

1. Connect the equipment as shown in Figure 2-13.
2. Set the signal generator controls as follows:

   FREQUENCY .... 500 MHz
   CW OUTPUT .... −10 dBm

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

   (FREQUENCY) 500 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) 98 (dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) 1 (kHz)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (kHz)

4. Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

   (MKR →) More 1 of 3 MARKER →REF LVL
   (MKR) MARKER 1 ON OFF (OFF)
   (SGL SWP)
   (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ

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

   (SPAN) 5 (kHz)
   (BW) AVG BW AUTO MAN (MAN) 30 (Hz)

5. Rotate the EMC analyzer knob counterclockwise until the MKR-Δ amplitude reads −1 dB ±0.1 dB. Press (MKR), MARKER Δ. Rotate the knob counterclockwise until the MKR-Δ amplitude reads −4 dB ±0.1 dB.

10. Residual FM, HP 8591EM

6. Divide the MKR-Δ frequency in hertz by the MKR-Δ amplitude in dB to obtain the slope of the IF 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 EMC analyzer, press:

   (MKR) More 1 of 3 MARKER ALL OFF

   (MKR →) MKR → HIGH

   More 1 of 3 More 2 of 3 MARKER Δ

8. Rotate the knob counterclockwise until the MKR-Δ amplitude reads −3 dB ±0.1 dB.

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

   (MKR) MARKER NORMAL

   (MKR →) MARKER →CF

   (SGL SWP)

   (BW) AVG BW AUTO MAN (MAN) 1 (kHz)

   (SPAN) 0 (Hz)

   (SWEEP/TRIG) 100 (ms)

   (SGL SWP)

Note The displayed trace should be about three divisions below the reference level. If it is not, press (SWEEP/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 EMC analyzer, press (MKR →), MORE 1 of 3, 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 1** of the performance verification test record. The residual FM should be less than 250 Hz.

Continue with "Part 2: Narrow Bandwidth Residual FM."

Part 2: Narrow Bandwidth Residual FM

The following procedure is an additional test for testing the residual FM of EMC analyzers in narrow bandwidths. Perform "Part 1: Residual FM" before performing this procedure.

Determining the IF Filter Slope

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

   (FREQUENCY) 500 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) 98 (dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 300 (Hz)

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

   (MKR →) More 1 of 3 MARKER →REF LVL
   (MKR) MARKER 1 ON OFF (OFF)
   (BW) 30 (Hz)
   (SGL SWP)

3. Wait for the completion of a new sweep on the EMC analyzer, then press:

   (MKR →) MKR → HIGH
   More 1 of 3 More 2 of 3 MARKER Δ

4. Rotate the EMC 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.

5. Divide the MKR-Δ frequency (in hertz) by the MKR-Δ amplitude (in dB) to obtain the slope of the IF 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:

10. Residual FM, HP 8591EM

Slope ________ Hz/dB

Measuring the Residual FM

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

   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

   (MKR) MARKER 1 ON OFF (OFF)

   (SPAN) ZERO SPAN

   (SWEEP/TRIG) SWP TIME AUTO MAN (MAN) 300 (ms)

   (FREQUENCY)

7. Rotate the EMC analyzer knob until the displayed trace is approximately 3 divisions below the reference level, then press (SGL SWEEP).

8. On the EMC analyzer, press (MKR →), More 1 of 3, MARKER →PK-PK. Read the MKR-Δ amplitude, take its absolute value, and record the result as the Deviation.

   Deviation _________ dB

9. Calculate the Residual FM by multiplying the Slope recorded in step 5 by the Deviation recorded in step 8.

   Record this value as **TR Entry 2** of the performance verification test record. The residual FM should be less than 30 Hz.

The "Residual FM" performance test is now complete.

11. Residual FM, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

This test measures the inherent short-term instability of the EMC 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 hertz per decibel (Hz/dB) and then measures the signal amplitude variation caused by the residual FM. Multiplying these two values yields the residual FM in hertz. The narrow bandwidth test uses 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: Narrow Bandwidth Residual FM

11. Residual FM, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

Part 1: Residual FM

Determining the IF Filter Slope

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

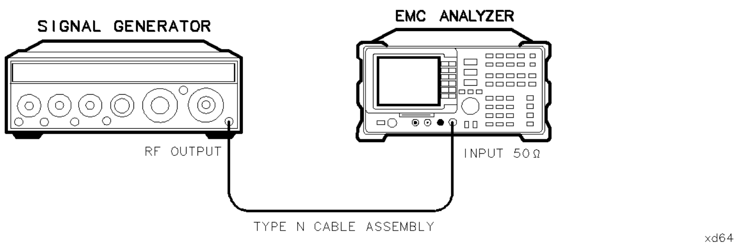

Figure 2-14.
Residual FM Test Setup,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

2. Set the signal generator controls as follows:

   FREQUENCY .... 500 MHz
   CW OUTPUT .... −10 dBm

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

   (FREQUENCY) 500 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) 98 (dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) 1 (kHz)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (kHz)

4. Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

(MKR →) More 1 of 3 MARKER →REF LVL

(MKR) MARKER 1 ON OFF (OFF)

(SGL SWP)

(MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ

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

(SPAN) 5 (kHz)

(BW) AVG BW AUTO MAN (MAN) 30 (Hz)

5. Rotate the EMC analyzer knob counterclockwise until the MKR-Δ amplitude reads −1 dB ±0.1 dB. Press (MKR) MARKER Δ. Rotate the knob counterclockwise until the MKR-Δ amplitude reads −4 dB ±0.1 dB.
6. Divide the MKR-Δ frequency (in hertz) by the MKR-Δ amplitude (in dB) to obtain the slope of the IF 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 EMC analyzer, press:

   (MKR) More 1 of 3 MARKER ALL OFF

   (MKR →) MKR → HIGH

   More 1 of 3 More 2 of 3 MARKER Δ

8. Rotate the knob counterclockwise until the MKR-Δ amplitude reads −3 dB ±0.1 dB.

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

   (MKR) MARKER NORMAL

   (MKR →) MARKER →CF

   (SGL SWP)
   (BW) 1 (kHz)
   (SPAN) 0 (Hz)
   (SWEEP/TRIG) 100 (ms)
   (SGL SWP)

Note The displayed trace should be about three divisions below the reference level. If it is not, press (SWEEP/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 EMC analyzer, press (MKR →), More 1 of 3 , 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 1** of the performance verification test record. The residual FM should be less than 250 Hz.

Continue with “Part 2: Narrow Bandwidth Residual FM.”

Part 2: Narrow Bandwidth Residual FM

The following procedure is an additional test for testing the residual FM of EMC analyzers in Narrow bandwidths. Perform "Part 1: Residual FM" before performing this procedure.

Determining the IF Filter Slope

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

   (FREQUENCY) 500 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) 98 (dBμV)
   `SCALE LOG LIN` (LOG) 1 (dB)
   (MKR →) `MKR → HIGH`
   (MKR) `More 1 of 3` `MK TRACK ON OFF` (ON)
   (SPAN) 300 (Hz)

2. Wait for the `AUTO ZOOM` message to disappear, then press the following EMC analyzer keys:

   (MKR →) `More 1 of 3` `MARKER →REF LVL`
   (MKR) `MARKER 1 ON OFF` (OFF)
   (BW) 30 (Hz)
   (SGL SWP)

3. Wait for the completion of a new sweep, then press:

   (MKR →) `MKR → HIGH`
   `More 1 of 3` `More 2 of 3` `MARKER Δ`

4. Rotate the EMC 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.

5. Divide the MKR-Δ frequency (in hertz) by the MKR-Δ amplitude (in dB) to obtain the slope of the IF 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:

11. Residual FM, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

Slope __________ Hz/dB

Measuring the Residual FM

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

   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

   (MKR) MARKER 1 ON OFF (OFF)

   (SPAN) ZERO SPAN

   (SWEEP/TRIG) SWP TIME AUTO MAN (MAN) 300 (ms)

   (FREQUENCY)

7. Rotate the EMC analyzer knob until the displayed trace is approximately 3 divisions below the reference level, then press (SGL SWEEP).

8. On the EMC analyzer, press (MKR →), More 1 of 3, MARKER →PK-PK. Read the MKR-Δ amplitude, take its absolute value, and record the result as the Deviation.

   Deviation __________ dB

9. Calculate the Residual FM by multiplying the Slope recorded in step 5 by the Deviation recorded in step 8.

   Record this value as **TR Entry 2** of the performance verification test record. The residual FM should be less than 30 Hz.

The "Residual FM" performance verification test is now complete.

12. Sweep Time Accuracy, HP 8590 EM-Series

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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

If you are testing an EMC analyzer equipped with Option 101 or Option 301, also perform the "Fast Time Domain Sweeps" test for the specific EMC analyzer model.

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)

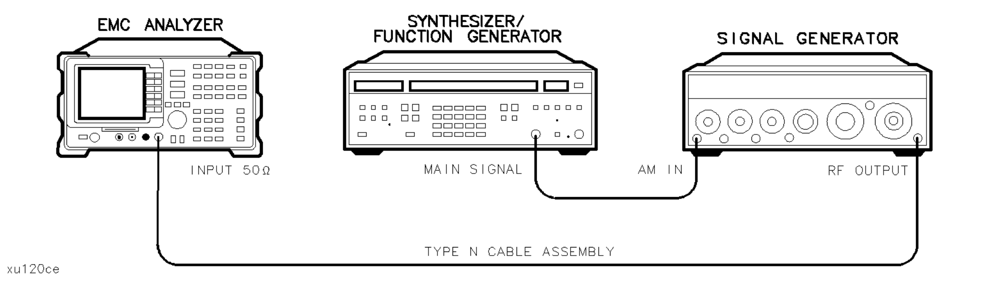

Figure 2-15. Sweep Time Accuracy Test Setup

Procedure

1. Set the signal generator to output a 500 MHz, −10 dBm, CW signal. Set the AM and FM controls to off.
2. Set the synthesizer/function generator to output a 500 Hz, +5 dBm triangle waveform signal.
3. Connect the equipment as shown in Figure 2-15.
4. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 500 (MHz)
   (SPAN) 10 (MHz)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)

5. Wait for the AUTO ZOOM routine to finish, then press the following EMC 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 EMC analyzer, press (SWEEP/TRIG) Trigger VIDEO, then adjust the video trigger so that the EMC analyzer is sweeping.
9. On the EMC analyzer, press (SGL SWP). After the completion of the sweep, press (MKR →) MKR → HIGH. If necessary, press NEXT PK LEFT until the marker is on the left-most signal. This is the "marked signal."
10. Press More 1 of 3 More 2 of 3 MARKER DELTA More 3 of 3 and then press NEXT PK RIGHT eight times so the marker delta is on the eighth signal peak from the "marked signal."

    Record the marker Δ reading as **TR Entry 1** in the performance verification test record.

11. Change the EMC analyzer's sweep time setting and the synthesizer/function generator's frequency for the next TR entry listed in Table 2-6. Then repeat steps 9 and 10 for the TR entry.

Table 2-6. Sweep Time Accuracy

EMC 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, HP 8590 EM-Series

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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.

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, Type BNC (m) to BNC (m)

Additional Equipment for Option 026

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

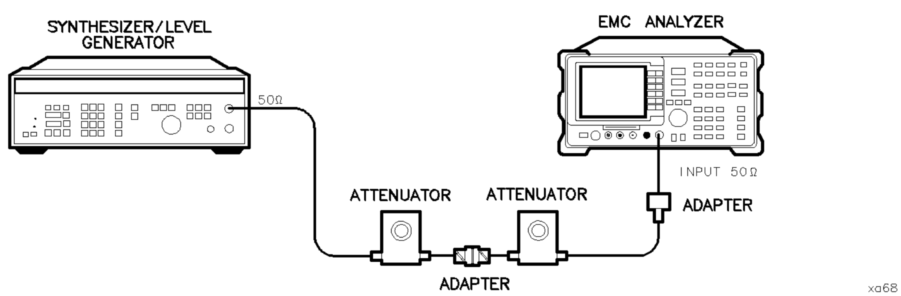

Figure 2-16. Scale Fidelity Test Setup

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 2-16. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

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

   (FREQUENCY) 50 (MHz)
   (SPAN) 10 (MHz)
   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)

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

   (BW)
   IF BW AUTO MAN (MAN) 3 (kHz)
   AVG BW AUTO MAN (MAN) 30 (Hz)

4. If necessary, adjust the 1 dB step attenuator attenuation until the MKR amplitude reads between 106 dBμV and 107 dBμV.

5. On the synthesizer/level generator, press AMPLITUDE and use the increment keys to adjust the amplitude until the EMC analyzer MKR amplitude reads 107 dBμV $\pm$0.05 dB.

   It may be necessary to decrease the resolution of the amplitude increment of the synthesizer/level generator to 0.01 dB to obtain a MKR reading of 107 dBμV $\pm$0.05 dB.

6. On the EMC analyzer, press MKR →, MARKER → HIGH, More 1 of 3, More 2 of 3, and 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 2-7.
9. Record the Actual MKR Δ amplitude reading in the performance verification test record as indicated by Table 2-7. 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 2-7.
11. For each Actual MKR Δ reading recorded in Table 2-7, 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 by Table 2-7. The incremental error should not exceed 0.4 dB/4 dB.

13. Scale Fidelity, HP 8590 EM-Series

Table 2-7. 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)	TR Entry
+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

12. Press the following EMC analyzer keys:

    (BW) IF BW AUTO MAN (MAN) 300 (Hz)
    (SPAN) 10 (kHz)

13. Repeat steps 4 through 11 for the narrow IF bandwidths. Record the results as indicated by Table 2-8.

    The scale fidelity in log mode is complete for EMC analyzers. Continue with step 14.

Table 2-8.
Cumulative and Incremental Error, Log Mode for Narrow Bandwidths

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)	TR Entry
+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

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 EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

    (AMPLITUDE) SCALE LOG LIN (LIN)
    More 1 of 3 Amptd Units Volts
    (FREQUENCY) 50 (MHz)
    (SPAN) 10 (MHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 50 (kHz)

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

    (BW)
    IF BW AUTO MAN (MAN) 3 (kHz)
    AVG BW AUTO MAN (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 EMC analyzer MKR amplitude reads 223.6 mV ±0.4 mV.

19. On the EMC analyzer, press (MKR →), MARKER → HIGH, (MKR), More 1 of 3, 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 2-9.

22. Record the MKR amplitude reading in the performance verification test record as indicated in Table 2-9. 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 2-9.

Table 2-9. 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

24. Press the following EMC analyzer keys:

    (BW) IF BW AUTO MAN (MAN) 300 (Hz)
    (SPAN) 10 (kHz)

25. Repeat steps 17 through 22 for the narrow IF bandwidths. Record the results as indicated in Table 2-10.

    The scale fidelity in linear mode is complete. Continue with step 26.

Table 2-10.
Scale Fidelity, Linear Mode for Narrow Bandwidths

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**	82.88

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 EMC analyzer, press (PRESET), then wait for the preset routine to finish.
29. Set the EMC analyzer by pressing the following keys:

    (FREQUENCY) 50 (MHz)
    (SPAN) 10 (MHz)
    (BW) 300 (kHz)
    (MKR →) MARKER → HIGH
    More 1 of 3 MARKER →REF LVL
    More 2 of 3 More 3 of 3 MARKER → HIGH

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

    Log Mode Amplitude Reading__________ dBμV

31. Press (AMPLITUDE) SCALE LOG LIN (LIN) to change the scale to linear.
32. Press (MKR →), MARKER → HIGH, then record the peak marker amplitude reading in linear mode.

    Linear Mode Amplitude Reading__________ dBμV

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 EMC analyzer, press the following keys:

    More 1 of 3 MARKER →REF LVL

    More 2 of 3 More 3 of 3 MARKER → HIGH

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

    Linear Mode Amplitude Reading________ dBμV

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

    (AMPLITUDE) SCALE LOG LIN (LOG)

    (MKR →) MARKER → HIGH

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

    Log Mode Amplitude Reading________ dBμV

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.

41. Press the following EMC analyzer keys:

    (AMPLITUDE) SCALE LOG LIN (LOG)

    (BW) IF BW AUTO MAN (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**.

14. Reference Level Accuracy, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A 50 MHz CW signal is applied to the INPUT 50 Ω of the EMC 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 EMC 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 17 dBμV (with 10 dB attenuation) since lower reference levels are a function of the EMC analyzer microprocessor manipulating the trace data. There is no error associated with the trace data manipulation.

Equipment Required

Synthesizer/level generator
Attenuator, 1 dB steps
Attenuator, 10 dB steps
Cable, BNC 122 cm (48 in) *(two required)*
Adapter, Type N (m) to BNC (f)
Adapter, BNC (m) to BNC (m)

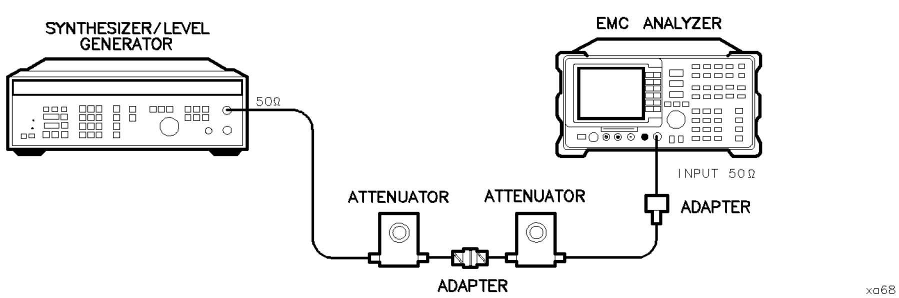

Figure 2-17. Reference Level Accuracy Test Setup, HP 8591EM

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 2-17. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

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

   (FREQUENCY) 50 (MHz)
   (SPAN) 10 (MHz)
   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)
   (AMPLITUDE) 87 (+dBμV) SCALE LOG LIN (LOG) 1 (dB)
   (BW) 3 (kHz) AVG BW AUTO MAN (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 EMC analyzer, press the following keys:

   (SGL SWP)
   (MKR →) MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ

6. Set the synthesizer/level generator amplitude and EMC analyzer reference level according to Table 2-11. At each setting, press (SGL SWP) on the EMC analyzer.

7. Record the MKR Δ amplitude reading in the performance verification test record as indicated in Table 2-11. The MKR Δ reading should be within the limits shown.

14. **Reference Level Accuracy, HP 8591EM**

Table 2-11. Reference Level Accuracy, Log Mode

Synthesizer/Level Generator Amplitude	EMC Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBμV)	Min.	TR Entry	Max.
−10	87	0 (Ref)	0 (Ref)	0 (Ref)
0	97	−0.4	**1**	+0.4
+10	107	−0.5	**2**	+0.5
−20	77	−0.4	**3**	+0.4
−30	67	−0.5	**4**	+0.5
−40	57	−0.8	**5**	+0.8
−50	47	−1.0	**6**	+1.0
−60	37	−1.1	**7**	+1.1
−70	27	−1.2	**8**	+1.2
−80	17	−1.3	**9**	+1.3

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 EMC analyzer controls as follows:

    (AMPLITUDE) 87 (+dBμV)
    SCALE LOG LIN (LIN)
    (AMPLITUDE) More 1 of 3 Amptd Units dBμV
    (SWEEP/TRIG) SWEEP CONT SGL (CONT)
    (MKR) More 1 of 3 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 EMC analyzer, press the following keys:

    (SGL SWP)
    (MKR →) MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ

(MKR) More 1 of 3 MK TRACK ON OFF (OFF)

13. Set the synthesizer/level generator amplitude and EMC analyzer reference level according to Table 2-12. At each setting, press (SGL SWP) on the EMC analyzer.

14. Record the MKR Δ amplitude reading in Table 2-12. The MKR Δ reading should be within the limits shown.

Table 2-12. Reference Level Accuracy, Linear Mode

Synthesizer/Level Generator Amplitude	EMC Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBμV)	Min.	TR Entry	Max.
−10	87	0 (Ref)	0 (Ref)	0 (Ref)
0	97	−0.4	**10**	+0.4
+10	107	−0.5	**11**	+0.5
−20	77	−0.4	**12**	+0.4
−30	67	−0.5	**13**	+0.5
−40	57	−0.8	**14**	+0.8
−50	47	−1.0	**15**	+1.0
−60	37	−1.1	**16**	+1.1
−70	27	−1.2	**17**	+1.2
−80	17	−1.3	**18**	+1.3

Narrow Bandwidths

15. Press the following EMC analyzer keys:

(AMPLITUDE) 87 (+dBμV) SCALE LOG LIN (LOG) 1 (dB)
(BW) IF BW AUTO MAN (MAN) 300 (Hz)
(SPAN) 10 (kHz)
(SWEEP/TRIG) SWEEP CONT SGL (CONT)

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

17. Repeat steps 4 through 6, using Table 2-13 for the narrow IF bandwidths.

18. Record the MKR Δ amplitude reading in the performance verification test record as indicated in Table 2-13. The MKR Δ reading should be within the limits shown.

Table 2-13. Reference Level Accuracy, Log Mode for Narrow IF Bandwidths

Synthesizer/Level Generator Amplitude	EMC Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBμV)	Min.	TR Entry	Max.
−10	87	0 (Ref)	0 (Ref)	0 (Ref)
0	97	−0.4	**19**	+0.4
+10	107	−0.5	**20**	+0.5
−20	77	−0.4	**21**	+0.4
−30	67	−0.5	**22**	+0.5
−40	57	−0.8	**23**	+0.8
−50	47	−1.1	**24**	+1.1
−60	37	−1.2	**25**	+1.2
−70	27	−1.3	**26**	+1.3
−80	17	−1.4	**27**	+1.4

19. Repeat steps 8 through 13, using Table 2-14 for the narrow IF bandwidths.

20. Record the MKR Δ amplitude reading in the performance verification test record as indicated in Table 2-14. The MKR Δ reading should be within the limits shown.

Table 2-14. Reference Level Accuracy, Linear Mode for Narrow IF Bandwidths

Synthesizer/Level Generator Amplitude	EMC Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBμV)	Min.	TR Entry	Max.
−10	87	0 (Ref)	0 (Ref)	0 (Ref)
0	97	−0.4	**28**	+0.4
+10	107	−0.5	**29**	+0.5
−20	77	−0.4	**30**	+0.4
−30	67	−0.5	**31**	+0.5
−40	57	−0.8	**32**	+0.8
−50	47	−1.1	**33**	+1.1
−60	37	−1.2	**34**	+1.2
−70	27	−1.3	**35**	+1.3
−80	17	−1.4	**36**	+1.4

15. Reference Level Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A 50 MHz CW signal is applied to the INPUT 50 Ω of the EMC 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 EMC 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 17 dbμV (with 10 dB attenuation) since lower reference levels are a function of the EMC analyzer microprocessor manipulating the trace data. There is no error associated with the trace data manipulation.

Equipment Required

Synthesizer/level generator
Attenuator, 1 dB steps
Attenuator, 10 dB steps
Cable, BNC 122 cm (48 in) *(two 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)

15. Reference Level Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

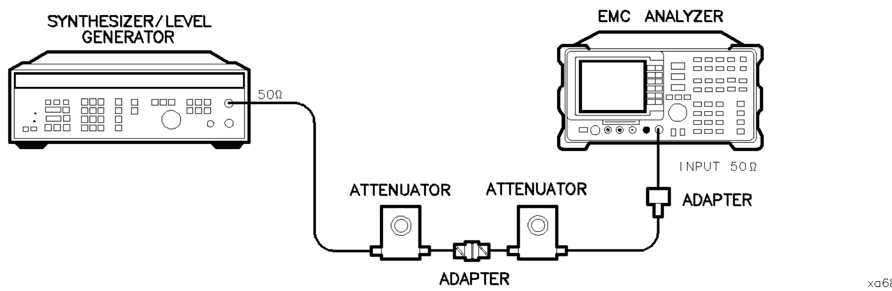

Figure 2-18.
Reference Level Accuracy Test Setup,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

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 2-18. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

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

   (FREQUENCY) 50 (MHz)
   (SPAN) 10 (MHz)
   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)
   (AMPLITUDE) 87 (+dBμV) SCALE LOG LIN (LOG) 1 (dB)
   (BW) 3 (kHz) AVG BW AUTO MAN (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 EMC analyzer, press the following keys:

   SGL SWP
   MKR → MARKER → HIGH
   More 1 of 3 More 2 of 3 MARKER Δ

6. Set the synthesizer/level generator amplitude and EMC analyzer reference level according to Table 2-15.
7. At each setting, press SGL SWP on the EMC analyzer.
8. Record the MKR Δ amplitude reading in the performance verification test record as indicated in Table 2-15. The MKR Δ reading should be within the limits shown.
9. Repeat steps 6 through 8 for each entry in Table 2-15.

Table 2-15. Reference Level Accuracy, Log Mode

Synthesizer/Level Generator Amplitude	EMC Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBμV)	Min.	TR Entry	Max.
−10	87	0 (Ref)	0 (Ref)	0 (Ref)
0	97	−0.4	**1**	+0.4
+10	107	−0.5	**2**	+0.5
−20	77	−0.4	**3**	+0.4
−30	67	−0.5	**4**	+0.5
−40	57	−0.8	**5**	+0.8
−50	47	−1.0	**6**	+1.0
−60	37	−1.1	**7**	+1.1
−70	27	−1.2	**8**	+1.2
−80	17	−1.3	**9**	+1.3

Linear Scale

10. Set the synthesizer/level generator amplitude to −10 dBm.
11. Set the 1 dB step attenuator to 0 dB attenuation.
12. Set the EMC analyzer controls as follows:

    (AMPLITUDE) 87 (+dBμV)
    SCALE LOG LIN (LIN)
    (AMPLITUDE) More 1 of 3 Amptd Units (+dBμV)
    (SWEEP/TRIG) SWEEP CONT SGL (CONT)
    (MKR) More 1 of 3 MARKER ALL OFF

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

    (SGL SWP)
    (MKR →) MARKER → HIGH
    More 1 of 3 More 2 of 3 MARKER Δ

15. Set the synthesizer/level generator amplitude and EMC analyzer reference level according to Table 2-16.
16. At each setting, press (SGL SWP) on the EMC analyzer.
17. Record the MKR Δ amplitude reading in the performance verification test record as indicated in Table 2-16. The MKR Δ reading should be within the limits shown.
18. Repeat steps 15 through 17 for each entry in Table 2-16.

15. **Reference Level Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM**

Table 2-16. Reference Level Accuracy, Linear Mode

Synthesizer/Level Generator Amplitude	EMC Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBμV)	Min.	TR Entry	Max.
−10	87	0 (Ref)	0 (Ref)	0 (Ref)
0	97	−0.4	**10**	+0.4
+10	107	−0.5	**11**	+0.5
−20	77	−0.4	**12**	+0.4
−30	67	−0.5	**13**	+0.5
−40	57	−0.8	**14**	+0.8
−50	47	−1.0	**15**	+1.0
−60	37	−1.1	**16**	+1.1
−70	27	−1.2	**17**	+1.2
−80	17	−1.3	**18**	+1.3

Narrow Bandwidths

19. Press the following EMC analyzer keys:

    (AMPLITUDE) 87 (+dBμV) SCALE LOG LIN (LOG) 1 (dB)
    (BW) IF BW AUTO MAN (MAN) 300 (Hz)
    (SPAN) 10 (kHz)
    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

20. Set the synthesizer/level generator to −10 dBm.
21. Set the 1 dB step attenuator to place the signal peak one to two dB (one to two divisions) below the reference level.
22. On the EMC analyzer, press the following keys:

    (SGL SWP)
    (MKR →) MARKER → HIGH
    More 1 of 3 More 2 of 3 MARKER Δ

23. Set the synthesizer/level generator amplitude and EMC analyzer reference level according to Table 2-17.
24. At each setting, press (SGL SWP) on the EMC analyzer.
25. Record the MKR Δ amplitude reading in the performance verification test record as indicated in Table 2-17. The MKR Δ reading should be within the limits shown.
26. Repeat steps 23 through 25 for each entry in Table 2-17.

Table 2-17. Reference Level Accuracy, Log Mode for Narrow Bandwidths

Synthesizer/Level Generator Amplitude	EMC Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBμV)	Min.	TR Entry	Max.
−10	87	0 (Ref)	0 (Ref)	0 (Ref)
0	97	−0.4	**19**	+0.4
+10	107	−0.5	**20**	+0.5
−20	77	−0.4	**21**	+0.4
−30	67	−0.5	**22**	+0.5
−40	57	−0.8	**23**	+0.8
−50	47	−1.1	**24**	+1.1
−60	37	−1.2	**25**	+1.2
−70	27	−1.3	**26**	+1.3
−80	17	−1.4	**27**	+1.4

27. Repeat steps 10 through 16 for the narrow bandwidths, using Table 2-18.
28. Record the MKR Δ amplitude reading in the performance verification test record as indicated in Table 2-18. The MKR Δ reading should be within the limits shown.

15. Reference Level Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

Table 2-18.
Reference Level Accuracy, Linear Mode for Narrow Bandwidths

Synthesizer/Level Generator Amplitude	EMC Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBμV)	Min.	TR Entry	Max.
−10	87	0 (Ref)	0 (Ref)	0 (Ref)
0	97	−0.4	**28**	+0.4
+10	107	−0.5	**29**	+0.5
−20	77	−0.4	**30**	+0.4
−30	67	−0.5	**31**	+0.5
−40	57	−0.8	**32**	+0.8
−50	47	−1.1	**33**	+1.1
−60	37	−1.2	**34**	+1.2
−70	27	−1.3	**35**	+1.3
−80	17	−1.4	**36**	+1.4

16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties, HP 8590 EM-Series

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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

To measure the resolution (IF) bandwidth switching uncertainty an amplitude reference is taken with the bandwidth set to 3 kHz using the marker-delta function. The 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.

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)

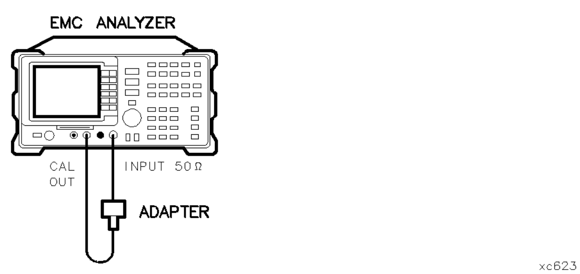

Figure 2-19. Uncertainty Test Setup

16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties,HP 8590 EM-Series

Absolute Amplitude Uncertainty

1. Connect the CAL OUT to the EMC analyzer input using the BNC cable and adapter, as shown in Figure 2-19.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer controls by pressing the following keys:

   (SPAN) 10 (MHz)
   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (FREQUENCY) 300 (MHz)
   (SPAN) 50 (kHz)
   (BW) 3 (kHz)
   AVG BW AUTO MAN (MAN) 300 (Hz)
   (AMPLITUDE) 87 (+dBμV)
   SCALE LOG LIN (LIN)
   (For HP 8594EM, HP 8595EM, and HP 8596EM only)
   More 1 of 3 More 2 of 3 COUPLE AC DC (DC)

3. Press (MKR →), MARKER → HIGH, then record the marker reading in **TR Entry 1** of the performance verification test record.

   The marker reading should be within 86.85 and 87.15 dBμV.

Resolution (IF) Bandwidth Switching Uncertainty

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

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)
   (AMPLITUDE) 87 (+dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) 3 (kHz)
   AVG BW AUTO MAN (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:

   (MKR →) MARKER → HIGH

   More 1 of 3 More 2 of 3 MARKER Δ

   (MKR) More 1 of 3 MK TRACK ON OFF (ON)

6. Set the EMC analyzer resolution (IF) bandwidth and span according to Table 2-19.

Table 2-19.
Resolution (IF) Bandwidth Switching Uncertainty

EMC Analyzer		MKR Δ TRK Amplitude Reading		
IF 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

7. Press (MKR →), MARKER → HIGH, then record the MKR Δ TRK amplitude reading in the performance verification test record as indicated in Table 2-19.

   The amplitude reading should be within the limits shown.

8. Repeat steps 6 through 7 for each of the remaining bandwidth and span settings listed in Table 2-19.

9. Press the following EMC analyzer keys:

(SPAN) 50 (kHz)
(BW) 3 (kHz)
(MKR →) MARKER → HIGH
More 1 of 3 More 2 of 3 MARKER Δ
(MKR) More 1 of 3 MK TRACK ON OFF (ON)

10. Set the bandwidth and span according to Table 2-20.
11. Press (MKR →), MARKER → HIGH, 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.
12. Repeat steps 10 through 11 for each of the remaining bandwidth and span settings listed in Table 2-20.

Table 2-20.
Resolution (IF) Bandwidth Switching Uncertainty for Narrow Bandwidths

EMC Analyzer		MKR Δ TRK Amplitude Reading		
IF 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

Note that it is normal for the 200 Hz bandwidth shape to have a dip in the center of the response.

17. Resolution (IF) Bandwidth Accuracy, HP 8590 EM-Series

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The output of a synthesizer/level generator is connected to the input of the EMC 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.

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)

17. Resolution (IF) Bandwidth Accuracy, HP 8590 EM-Series

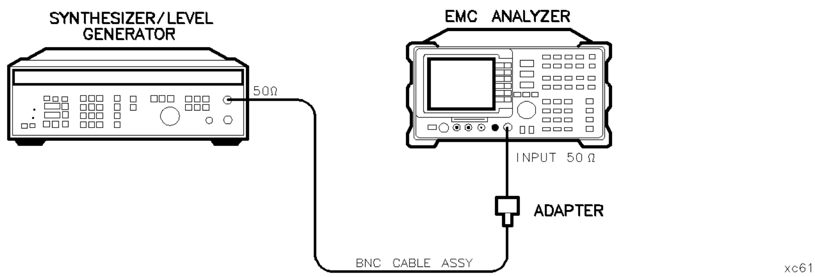

Figure 2-20. Resolution (IF) Bandwidth Accuracy Test Setup

Procedure

1. Connect the equipment as shown in Figure 2-20.

3 dB Bandwidths

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

   AMPLITUDE .... 0 dBm
   AMPTD INCR .... 3 dB
   FREQUENCY .... 50 MHz

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

   (FREQUENCY) 50 (MHz)
   (SPAN) ZERO SPAN
   (BW) 3 (MHz)
   AVG BW AUTO MAN (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 EMC analyzer, press (MKR).
6. Adjust the frequency of the synthesizer/level generator for a maximum marker reading.

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

Adjust the synthesizer/level generator amplitude to place the peak of the signal at or below the top graticule.

7. On the synthesizer/level generator, press AMPLITUDE and INCR ⇩ (step-down key).
8. Press MARKER Δ on the EMC 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 2-21.
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 2-21.
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 2-21.
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 2-21.

RES BW Accuracy = Upper Frequency − Lower Frequency

17. Resolution (IF) Bandwidth Accuracy, HP 8590 EM-Series

Table 2-21. 3 dB Resolution (IF) Bandwidth Accuracy

EMC Analyzer RES BW	Column 1 Synthesizer Lower Frequency	Column 2 Synthesizer Upper Frequency	TR Entry
3 MHz	__________	__________	**1**
300 kHz	__________	__________	**2**
100 kHz	__________	__________	**3**
30 kHz	__________	__________	**4**
10 kHz	__________	__________	**5**
3 kHz	__________	__________	**6**
1 kHz	__________	__________	**7**

6 dB EMI Bandwidths

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

    (BW) `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 Δ` on the EMC 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 2-22.

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 2-22.
27. Adjust the synthesizer/level generator frequency for maximum marker amplitude.
28. Repeat steps 18 through 26 for the 120 kHz EMI bandwidth ((BW) 120 kHz EMI BW) and the 1 MHz EMI bandwidth ((BW) 1 (MHz)).
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 2-22.

    RES BW Accuracy = Upper Frequency − Lower Frequency

Table 2-22. EMI Resolution (IF) Bandwidth Accuracy

EMC Analyzer RES BW	Column 1 Synthesizer Lower Frequency	Column 2 Synthesizer Upper Frequency	TR Entry
9 kHz	________	________	**8**
120 kHz	________	________	**9**
1 MHz	________	________	**10**

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

    (FREQUENCY) 50 (MHz)
    (SPAN) 1 (MHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 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)

17. **Resolution (IF) Bandwidth Accuracy, HP 8590 EM-Series**

(AUX/USER) More 1 of 3 3 dB POINTS

(AMPLITUDE) SCALE LOG LIN (LOG) 1 (dB)
(BW) 300 (Hz)

31. Set the EMC analyzer bandwidth and span according to Table 2-23.
32. Press (SGL SWP). Record the −3 dB POINTS: readout in the performance verification test record as indicated in Table 2-23.
33. Repeat steps 31 through 32 for each of the bandwidth settings listed in Table 2-23.

Table 2-23.
Resolution (IF) Bandwidth Accuracy for Narrow Bandwidths

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

6 dB EMI 200 Hz Bandwidths

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

34. Press the following EMC analyzer keys:

(AUX/USER) More 1 of 3 6 dB POINTS

(BW) 200 Hz EMI BW

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

18. Calibrator Amplitude Accuracy, HP 8590 EM-Series

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

This test measures the accuracy of the EMC 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 Frequency Reference Accuracy test to verify the CAL OUT frequency.

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

Procedure

This performance verification 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

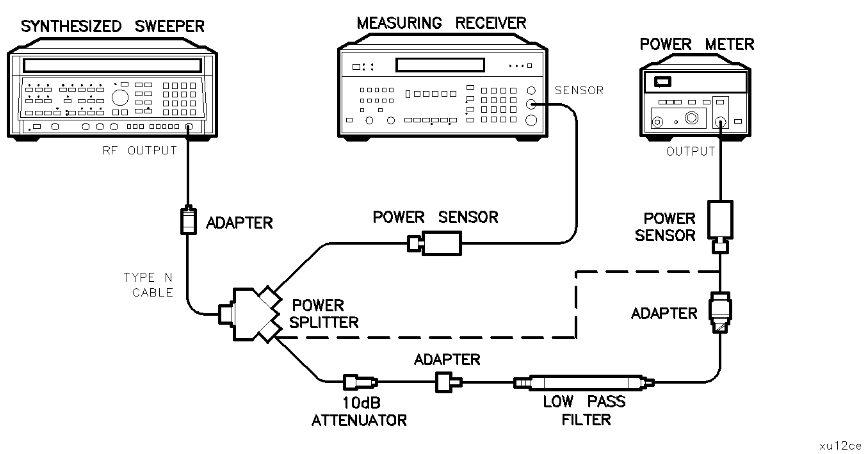

Figure 2-21. LPF Characterization

4. Connect the equipment as shown in Figure 2-21. 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 2-21.
8. Record the measuring receiver reading in dB in the worksheet as the Mismatch Error. This is the relative error due to mismatch.
9. Record the power meter reading in dB in the worksheet as the Uncorrected Insertion Loss. This is the relative uncorrected insertion loss of the LPF, attenuator and adapters.
10. Subtract the Mismatch Error (step 8) from the Uncorrected Insertion Loss (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.

18. Calibrator Amplitude Accuracy, HP 8590 EM-Series

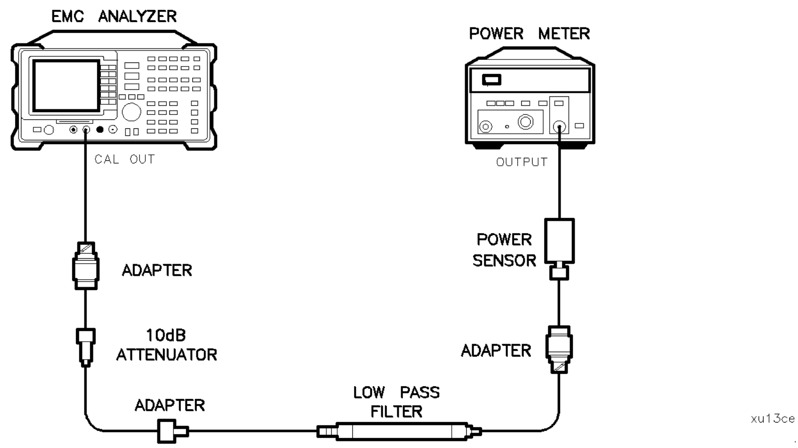

Figure 2-22. Calibrator Amplitude Accuracy Test Setup

11. Connect the equipment as shown in Figure 2-22. The EMC 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.

12. On the power meter, press the dBm mode key. Record the Power Meter Reading in dBm in the worksheet as the Power Meter Reading.

13. Subtract the Corrected Insertion Loss (step 10) from the Power Meter Reading (step 12).

    CAL OUT Power = Power Meter Reading − Corrected Insertion Loss

    Example: If the Corrected Insertion Loss is −10.0 dB, and the power meter reading is −30 dB, then (−30 dB) − (−10.0 dB) = −20 dB

14. Record this value as **TR Entry 1** of the performance verification test record as the CAL OUT power. The CAL OUT should be −20 dBm ±0.4 dB.

18. Calibrator Amplitude Accuracy, HP 8590 EM-Series

Calibrator Amplitude Accuracy Worksheet

Description	Measurement
Mismatch Error	_______________dB
Uncorrected Insertion Loss	_______________dB
Corrected Insertion Loss	_______________dB
Power Meter Reading	_______________dBm

19. Frequency Response, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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

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)
Adapter, Type N (m) to BNC (f)
Cable, BNC, 122 cm (48 in)
Cable, Type N, 183 cm (72 in)

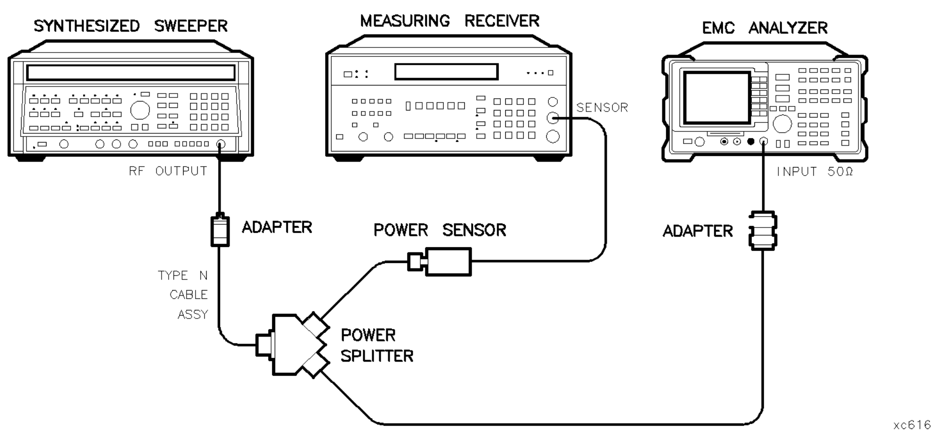

Figure 2-23. Frequency Response Test Setup, ≥50 MHz, HP 8591EM

Frequency Response, ≥50 MHz

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 2-23.
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 EMC analyzer, press (PRESET) and wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   CF STEP AUTO MAN (MAN) 50 (MHz)
   (SPAN) 5 (MHz)
   (AMPLITUDE) 97 (+dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) 1 (MHz)
   AVG BW AUTO MAN (MAN) 3 (kHz)
   (MKR →) MARKER → HIGH

19. Frequency Response, HP 8591EM

(MKR) More 1 of 3 MK TRACK ON OFF (ON)

5. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of 93 dBμV $\pm$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 EMC analyzer.
9. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$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 column 2 of Table 2-24 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 EMC analyzer.
13. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$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 column 2 of Table 2-24 as the Error Relative to 300 MHz at 100 MHz.
15. On the synthesized sweeper, press CW, and (⇑) (step-up key), then on the EMC analyzer, press (FREQUENCY), and (⇑) (step-up key).
16. Record the negative of the power ratio displayed on the measuring receiver in column 2 of Table 2-24.
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 2-24.

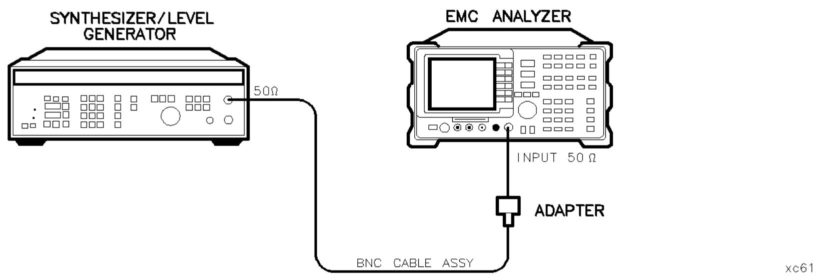

Figure 2-24. Frequency Response Test Setup, <50 MHz, HP 8591EM

Frequency Response, ≤50 MHz

18. Using a cable, connect the synthesizer/level generator directly to the INPUT 50 Ω. Refer to Figure 2-24.

    Set the synthesizer/level generator controls as follows:

    FREQUENCY .... 50 MHz
    AMPLITUDE .... −15 dBm
    AMPTD INCR .... 0.05 dB

19. On the EMC analyzer, press the following keys:

    (FREQUENCY) 50 (MHz)
    (SPAN) 10 (MHz)
    (BW) 3 (kHz) AVG BW AUTO MAN (MAN) 10 (kHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 100 (kHz)

    Wait for the AUTO ZOOM routine to finish.

20. Adjust the synthesizer/level generator amplitude until the MKR-TRK reads 93 dBμV. This corresponds to the amplitude at 50 MHz recorded in step 11. Record the synthesizer/level generator amplitude in column 2 of Table 2-25 for Synthesizer/Level Generator Amplitude at 50 MHz.

21. On the EMC analyzer, press (MKR →) MARKER → HIGH, More 1 of 3 More 2 of 3 MARKER Δ.

22. Set the EMC analyzer and the synthesizer/level generator to the next frequency settings listed in Table 2-25.
23. At each frequency, adjust the synthesizer/level generator amplitude for a MKR-Δ-TRK amplitude reading of 0.00 ±0.05 dB.
24. Record the synthesizer/level generator amplitude setting in column 2 of Table 2-25 as the synthesizer/level generator amplitude.
25. Repeat steps 22 through 24 for each frequency setting listed in Table 2-25.
26. For each of the frequencies in Table 2-25, subtract the Synthesizer/Level Generator Amplitude (column 2) from the Synthesizer/Level Generator Amplitude at 50 MHz recorded in step 19. Record the result as the Response Relative to 50 MHz (column 3) of Table 2-25.
27. Add to each of the Response Relative to 50 MHz entries in Table 2-25 the Error Relative to 300 MHz at 50 MHz recorded in step 11. Record the results as the Response Relative to 300 MHz (column 4) in Table 2-25.

Test Results

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

1. Enter the most positive number from Table 2-25, column 4:

   __________ dB

2. Enter the most positive number from Table 2-24, column 2:

   __________ dB

3. Record the more positive of numbers from steps 1 and 2 in **TR Entry 1** of the performance verification test record.
4. Enter the most negative number from Table 2-25, column 4:

   __________ dB

5. Enter the most negative number from Table 2-24, column 2:

   __________ dB

6. Record the more negative of numbers from steps 4 and 5 in **TR Entry 2** of the performance verification test record.
7. Subtract the results of step 6 from the results of step 3. Record this value in **TR Entry 3** of the performance verification test record.

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 2-24. Frequency Response Errors Worksheet

Column 1 EMC Analyzer Frequency (MHz)	Column 2 Error Relative to 300 MHz (dB)	Column 3 CAL FACTOR Frequency (GHz)	Column 1 EMC Analyzer Frequency (MHz)	Column 2 Error Relative to 300 MHz (dB)	Column 3 CAL FACTOR Frequency (GHz)
50	____________	0.03	950	____________	1.0
100	____________	0.1	1000	____________	1.0
150	____________	0.1	1050	____________	1.0
200	____________	0.3	1100	____________	1.0
250	____________	0.3	1150	____________	1.0
300 (Ref)	____________	0.3	1200	____________	1.0
350	____________	0.3	1250	____________	1.0
400	____________	0.3	1300	____________	1.0
450	____________	0.3	1350	____________	1.0
500	____________	0.3	1400	____________	1.0
550	____________	1.0	1450	____________	1.0
600	____________	1.0	1500	____________	1.0
650	____________	1.0	1550	____________	2.0
700	____________	1.0	1600	____________	2.0
750	____________	1.0	1650	____________	2.0
800	____________	1.0	1700	____________	2.0
850	____________	1.0	1750	____________	2.0
900	____________	1.0	1800	____________	2.0

19. Frequency Response, HP 8591EM

Table 2-25. Frequency Response, ≤50 MHz Worksheet

Column 1 EMC Analyzer Frequency	Column 2 Synthesizer/Level Generator Amplitude (dBm)	Column 3 Response Relative to 50 MHz	Column 4 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, HP 8593EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the EMC 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).

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, Type BNC (f) to SMA (m)
Cable, BNC, 122 cm (48 in)
Cable, APC 3.5, 91 cm (36 in)

20. Frequency Response, HP 8593EM

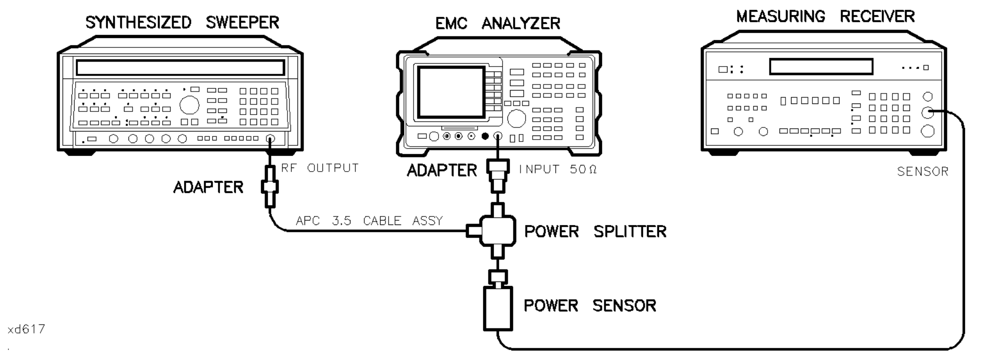

Figure 2-25. Frequency Response Test Setup, ≥50 MHz, HP 8593EM

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 2-25.
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 EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the following analyzer keys:

   (FREQUENCY) More 1 of 2 Band Lock 0-2.9 Gz BAND 0
   (FREQUENCY) 300 (MHz)
   CF STEP AUTO MAN (MAN) 100 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL 97 (+dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) IF BW AUTO MAN (MAN) 1 (MHz)
   AVG BW AUTO MAN (MAN) 10 (kHz)

5. On the EMC analyzer, press (MKR →) MARKER → HIGH, (MKR), More 1 of 3, and MK TRACK ON OFF (ON).
6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of 93 dBμV ±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. On the EMC analyzer, press (FREQUENCY) 50 (MHz).
10. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV ±0.1 dB.
11. Record the negative of the power ratio displayed on the measuring receiver in column 2 of Table 2-26 as the Measuring Receiver Reading at 50 MHz.
12. Set the synthesized sweeper CW FREQUENCY to 100 MHz.
13. On the EMC analyzer, press (FREQUENCY) 100 (MHz).
14. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV ±0.1 dB.
15. Record the negative of the power ratio displayed on the measuring receiver in Table 2-26 as the Measuring Receiver Reading.
16. On the synthesized sweeper, press (CW), and (⇑) (step up) key and on the EMC analyzer, press (FREQUENCY), (⇑) (step up) key to step through the remaining frequencies listed in Table 2-26.
17. At each new frequency repeat steps 13 through 15, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-26.

Frequency Response, Band 1

18. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 2.75-6.5 BAND 1
    (FREQUENCY) 2.75 (GHz)
    (SPAN) 10 (MHz)
    (BW) IF BW AUTO MAN (MAN) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

19. Set the synthesized sweeper CW to 2.75 GHz.
20. On the EMC analyzer, press (AMPLITUDE), More 1 of 3, and PRESEL PEAK.
21. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$0.1 dB.
22. Record the negative of the power ratio displayed on the measuring receiver in Table 2-27, column 2.
23. Set the synthesized sweeper CW and the EMC 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 EMC analyzer, press (FREQUENCY), (⇑) (step up) key to step through the remaining frequencies listed in Table 2-27.
25. At each new frequency repeat steps 19 through 21, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-27.

Frequency Response, Band 2

26. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 6.0-12.8 BAND 2
    (FREQUENCY) 6.0 (GHz)
    CF STEP AUTO MAN (MAN) 200 (MHz)
    (SPAN) 10 (MHz)
    (BW) IF BW AUTO MAN (MAN) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

27. Set the synthesized sweeper CW to 6.0 GHz.
28. On the EMC analyzer, press (AMPLITUDE), More 1 of 3, and PRESEL PEAK.
29. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$0.1 dB.
30. Record the negative of the power ratio displayed on the measuring receiver in Table 2-28, column 2.
31. On the synthesized sweeper, press (CW), and (⇑) (step up) key, then on the EMC analyzer, press (FREQUENCY), and (⇑) (step up) key to step through the remaining frequencies listed in Table 2-28.
32. At each new frequency repeat steps 28 through 30, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-28.

Frequency Response, Band 3

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

    (FREQUENCY) More 1 of 2 Band Lock 12.4-19. BAND 3
    (FREQUENCY) 12.4 (GHz)
    (SPAN) 10 (MHz)
    (BW) IF BW AUTO MAN (MAN) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

34. Set the synthesized sweeper CW to 12.4 GHz.
35. On the EMC analyzer, press (AMPLITUDE), More 1 of 3, and PRESEL PEAK.
36. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$0.1 dB.
37. Record the negative of the power ratio displayed on the measuring receiver in Table 2-29, column 2.
38. On the synthesized sweeper, press CW, and (⇑) (step up), then on the EMC analyzer, press (FREQUENCY), (⇑) (step up) to step through the remaining frequencies listed in Table 2-29.
39. At each new frequency repeat steps 35 through 37, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-29.

Frequency Response, Band 4

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

    (FREQUENCY) More 1 of 2 Band Lock 19.1-22 BAND 4
    (FREQUENCY) 19.1 (GHz)
    CF STEP AUTO MAN (MAN) 100 (MHz) (*For Option 026 or 027 only, press:* 200 (MHz))
    (SPAN) 5 (MHz)
    (BW) IF BW AUTO MAN (MAN) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

41. Set the synthesized sweeper CW to 19.1 GHz.
42. On the EMC analyzer, press (AMPLITUDE), More 1 of 3, and PRESEL PEAK.
43. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$0.1 dB.
44. Record the negative of the power ratio displayed on the measuring receiver in Table 2-30, column 2 (*Option 026 or 027 only:* use Table 2-31, column 2.)
45. On the synthesized sweeper, press CW, and (⇑) (step up) key, then on the EMC analyzer, press (FREQUENCY), (⇑) (step up) key to step through the remaining frequencies listed in Table 2-30.
46. At each new frequency repeat steps 42 through 44, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-30, column 2.

20. Frequency Response, HP 8593EM

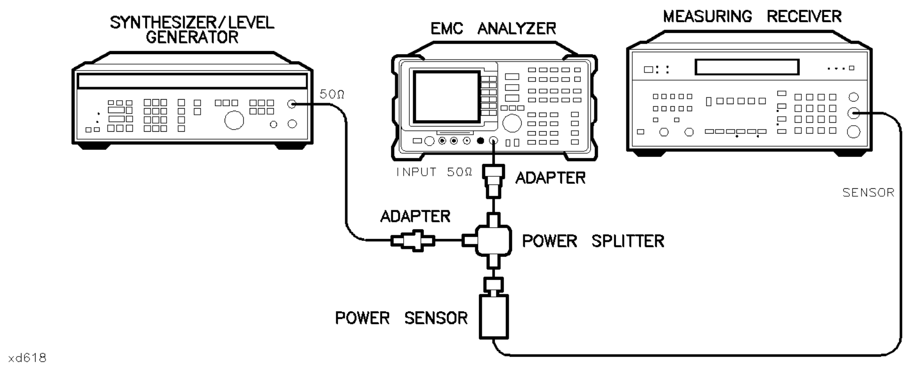

Figure 2-26. Frequency Response Test Setup, <50 MHz, HP 8593EM

Frequency Response, Band 0, <50 MHz

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

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

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

(MKR) More 1 of 3 MARKER ALL OFF
(FREQUENCY) More 1 of 2 Band Lock BND LOCK ON OFF (OFF)
(FREQUENCY) 50 (MHz)
(SPAN) 10 (MHz)
(MKR →) MARKER → HIGH
(MKR) More 1 of 3 MKR TRACK ON OFF (ON)
(SPAN) 100 (kHz)
(BW) IF BW AUTO MAN (MAN) 10 (kHz)

49. Connect the equipment as shown if Figure 2-26, with the power sensor connected to power splitter.

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

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

51. Adjust the synthesizer/level generator amplitude until the measuring receiver display reads the same value as recorded in step 11. Record the amplitude displayed on the synthesizer/level generator in column 2 of Table 2-32.
52. Replace the 50 MHz to 26.5 GHz power sensor with the 50 Ω termination.
53. On the EMC analyzer, press the following key:

    (MKR →) MARKER → HIGH

    More 1 of 3 More 2 of 3 MARKER Δ

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

54. Set the EMC analyzer center frequency and the synthesizer frequency to the frequencies listed in Table 2-32.
55. At each frequency, adjust the synthesizer/level generator amplitude for a MKR Δ-TRK amplitude reading of 0.00 dB ±0.05 dB. Record the amplitude displayed on the synthesizer/level generator in column 2 of Table 2-32 as the Synthesizer/Level Generator Amplitude.
56. For each of the frequencies in Table 2-32, subtract the Synthesizer/Level Generator Amplitude Reading (column 2) from the Synthesizer/Level Generator Amplitude Setting (50 MHz) recorded in step 51. Record the result as the Response Relative to 50 MHz (column 3) of Table 2-32.
57. Add to each of the Response Relative to 50 MHz entries in Table 2-32 the measuring receiver Reading for 50 MHz listed in Table 2-26. Record the results as the Response Relative to 300 MHz (column 4) in Table 2-32.

Test Results

Frequency Response, Band 0

1. Enter the most positive number from Table 2-32, column 4:

    _________ dB

2. Enter the most positive number from Table 2-26, column 2:

    _________ dB

20. Frequency Response, HP 8593EM

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 number from Table 2-32, column 4:

   _________ dB

5. Enter the most negative number from Table 2-26, column 2:

   _________ dB

6. Enter the more negative of numbers from step 4 and step 5 as **TR Entry 2** of the performance verification test record.

7. Subtract step 6 from step 3. Enter this value as **TR Entry 3** of the performance verification test record (relative flatness).

Frequency Response, Band 1

1. Enter the most positive number from Table 2-27, column 2, as **TR Entry 4** of the performance verification test record.
2. Enter the most negative number from Table 2-27, column 2, as **TR Entry 5** of the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as **TR Entry 6** of the performance verification test record.

Frequency Response, Band 2

1. Enter the most positive number from Table 2-28, column 2, as **TR Entry 7** of the performance verification test record.
2. Enter the most negative number from Table 2-28, column 2, as **TR Entry 8** of 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 number from Table 2-29, column 2, as **TR Entry 10** of the performance verification test record.
2. Enter the most negative number from Table 2-29, column 2, as **TR Entry 11** of 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" if the EMC analyzer is equipped with Option 026 or 027.

1. Enter the most positive number from Table 2-30, column 1, as **TR Entry 13** of the performance verification test record.
2. Enter the most negative number from Table 2-30, column 2, as **TR Entry 14** of 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 number from Table 2-31, column 2, as **TR Entry 13** of the performance verification test record.
2. Enter the most negative number from Table 2-31, column 2, as **TR Entry 14** of 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.

20. Frequency Response, HP 8593EM

Table 2-26. Frequency Response Band 0, ≥50 MHz

Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)
50	________	0.05	1500	________	2.0
100	________	0.05	1600	________	2.0
200	________	0.05	1700	________	2.0
300	________	0.05	1800	________	2.0
400	________	0.05	1900	________	2.0
500	________	0.05	2000	________	2.0
600	________	0.05	2100	________	2.0
700	________	0.05	2200	________	2.0
800	________	0.05	2300	________	2.0
900	________	0.05	2400	________	2.0
1000	________	0.05	2500	________	3.0
1100	________	2.0	2600	________	3.0
1200	________	2.0	2700	________	3.0
1300	________	2.0	2800	________	3.0
1400	________	2.0	2900	________	3.0

Table 2-27. Frequency Response Band 1

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)
2.75	__________	3.0	4.7	__________	5.0
2.8	__________	3.0	4.8	__________	5.0
2.9	__________	3.0	4.9	__________	5.0
3.0	__________	3.0	5.0	__________	5.0
3.1	__________	3.0	5.1	__________	5.0
3.2	__________	3.0	5.2	__________	5.0
3.3	__________	3.0	5.3	__________	5.0
3.4	__________	3.0	5.4	__________	5.0
3.5	__________	4.0	5.5	__________	6.0
3.6	__________	4.0	5.6	__________	6.0
3.7	__________	4.0	5.7	__________	6.0
3.8	__________	4.0	5.8	__________	6.0
3.9	__________	4.0	5.9	__________	6.0
4.0	__________	4.0	6.0	__________	6.0
4.1	__________	4.0	6.1	__________	6.0
4.2	__________	4.0	6.2	__________	6.0
4.3	__________	4.0	6.3	__________	6.0
4.4	__________	4.0	6.4	__________	6.0
4.5	__________	5.0	6.5	__________	6.0
4.6	__________	5.0			

20. Frequency Response, HP 8593EM

Table 2-28. Frequency Response Band 2

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)
6.0	________	6.0	9.6	________	10.0
6.2	________	6.0	9.8	________	10.0
6.4	________	6.0	10.0	________	10.0
6.6	________	7.0	10.2	________	10.0
6.8	________	7.0	10.4	________	10.0
7.0	________	7.0	10.6	________	11.0
7.2	________	7.0	10.8	________	11.0
7.4	________	7.0	11.0	________	11.0
7.6	________	8.0	11.2	________	11.0
7.8	________	8.0	11.4	________	11.0
8.0	________	8.0	11.6	________	12.0
8.2	________	8.0	11.8	________	12.0
8.4	________	8.0	12.0	________	12.0
8.6	________	9.0	12.2	________	12.0
8.8	________	9.0	12.4	________	12.0
9.0	________	9.0	12.6	________	13.0
9.2	________	9.0	12.8	________	13.0
9.4	________	9.0			

Table 2-29. Frequency Response Band 3

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)
12.4	______	12.0	16.0	______	16.0
12.6	______	13.0	16.2	______	16.0
12.8	______	13.0	16.4	______	16.0
13.0	______	13.0	16.6	______	17.0
13.2	______	13.0	16.8	______	17.0
13.4	______	13.0	17.0	______	17.0
13.6	______	14.0	17.2	______	17.0
13.8	______	14.0	17.4	______	17.0
14.0	______	14.0	17.6	______	18.0
14.2	______	14.0	17.8	______	18.0
14.4	______	14.0	18.0	______	18.0
14.6	______	15.0	18.2	______	18.0
14.8	______	15.0	18.4	______	18.0
15.0	______	15.0	18.6	______	19.0
15.2	______	15.0	18.8	______	19.0
15.4	______	15.0	19.0	______	19.0
15.6	______	16.0	19.2	______	19.0
15.8	______	16.0	19.4	______	19.0

20. Frequency Response, HP 8593EM

Table 2-30. Frequency Response Band 4

Column1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)
19.1	________	19.0	20.6	________	21.0
19.2	________	19.0	20.7	________	21.0
19.3	________	19.0	20.8	________	21.0
19.4	________	19.0	20.9	________	21.0
19.5	________	20.0	21.0	________	21.0
19.6	________	20.0	21.1	________	21.0
19.7	________	20.0	21.2	________	21.0
19.8	________	20.0	21.3	________	21.0
19.9	________	20.0	21.4	________	21.0
20.0	________	20.0	21.5	________	22.0
20.1	________	20.0	21.6	________	22.0
20.2	________	20.0	21.7	________	22.0
20.3	________	20.0	21.8	________	22.0
20.4	________	20.0	21.9	________	22.0
20.5	________	21.0	22.0	________	22.0

Table 2-31. Frequency Response Band 4, Option 026 or 027

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)
19.1	________	19.0	22.9	________	23.0
19.3	________	19.0	23.1	________	23.0
19.5	________	20.0	23.3	________	23.0
19.7	________	20.0	23.5	________	24.0
19.9	________	20.0	23.7	________	24.0
20.1	________	20.0	23.9	________	24.0
20.3	________	20.0	24.1	________	24.0
20.5	________	21.0	24.3	________	24.0
20.7	________	21.0	24.5	________	25.0
20.9	________	21.0	24.7	________	25.0
21.1	________	21.0	24.9	________	25.0
21.3	________	21.0	25.1	________	25.0
21.5	________	22.0	25.3	________	25.5
21.7	________	22.0	25.5	________	25.5
21.9	________	22.0	25.7	________	25.5
22.1	________	22.0	25.9	________	26.0
22.3	________	22.0	26.1	________	26.0
22.5	________	23.0	26.3	________	26.5
22.7	________	23.0	26.5	________	26.5

20. Frequency Response, HP 8593EM

Table 2-32. Frequency Response Band 0, <50 MHz

Column 1 EMC Analyzer Synthesizer/Level Generator Frequency	Column 2 Synthesizer/Level Generator Amplitude (dBm)	Column 3 Response Relative to 50 MHz	Column 4 Response Relative to 300 MHz
50 MHz	________	0 (Reference)	________
20 MHz	________	________	________
10 MHz	________	________	________
5 MHz	________	________	________
1 MHz	________	________	________
200 kHz	________	________	________
50 kHz	________	________	________

21. Frequency Response, HP 8594EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 EMC 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).

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)

21. Frequency Response, HP 8594EM

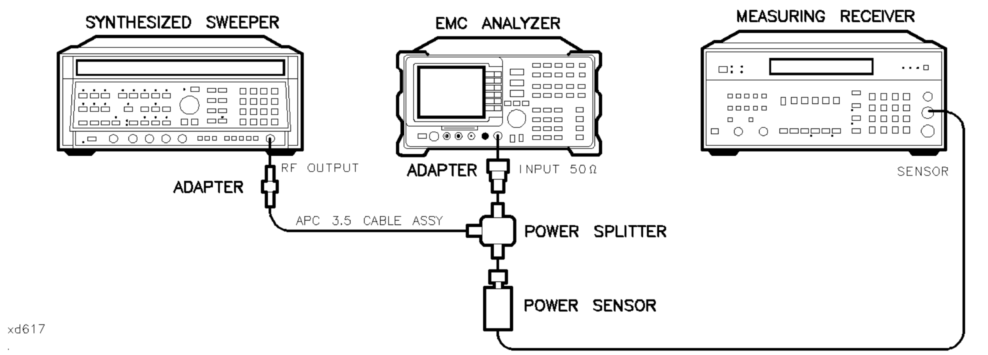

Figure 2-27. Frequency Response Test Setup, ≥50 MHz, HP 8594EM

Procedure

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 2-27.
3. Press (INSTR 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 EMC analyzer, press (PRESET). Wait for the preset to finish, then set the EMC analyzer controls by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   CF STEP AUTO MAN (MAN) 100 (MHz)
   (SPAN) 5 (MHz)
   (AMPLITUDE) 97 (+dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (AMPLITUDE) More 1 of 3 More 2 of 3 COUPLE AC DC (DC)
   (BW) 1 (MHz)
   AVG BW AUTO MAN (MAN) 10 (kHz)

5. On the EMC analyzer, press (MKR →) MARKER → HIGH, (MKR) MK TRACK ON OFF (ON).

6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of 93 dBμV $\pm$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 EMC analyzer.
10. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$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 2-33.

Measuring Receiver Reading at 50 MHz ________ dB

12. Set the synthesized sweeper CW to 100 MHz.
13. Press (FREQUENCY), 100 (MHz) on the EMC analyzer.
14. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$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 2-33 as the Measuring Receiver Reading at 100 MHz.
16. On the synthesized sweeper, press CW, and (⇧) (step up) key.

17. On the EMC analyzer, press (FREQUENCY), (⇑) (step up) key to step through the remaining frequencies listed in Table 2-33.

    At each new frequency repeat steps 14 through 16, entering the power sensor's Cal Factor into the measuring receiver as indicated in Table 2-33.

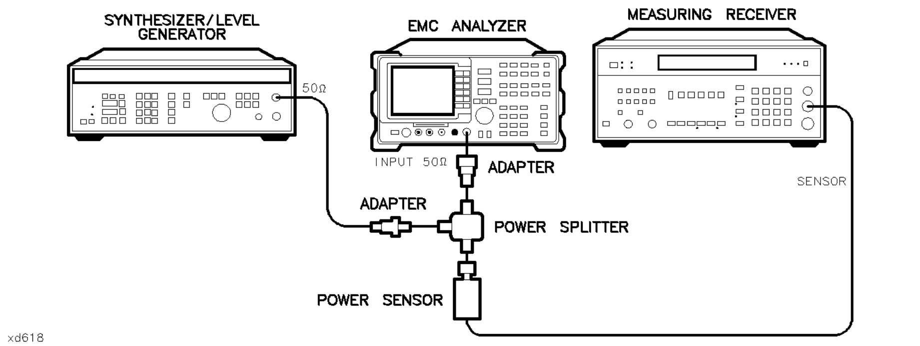

Figure 2-28. Frequency Response Test Setup, <50 MHz, HP 8594EM

18. Connect the equipment as shown in Figure 2-28, with the power sensor connected to power splitter.
19. Set the synthesizer/level generator controls as follows:

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

20. On the EMC analyzer, press (MKR), `More 1 of 3`, `MARKER ALL OFF`, then set the controls by pressing the following keys:

    (FREQUENCY) 50 (MHz)
    (SPAN) 100 (kHz)
    (BW) 10 (kHz)

21. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.
22. 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 2-34.

    Synthesizer/Level Generator Amplitude Setting (50 MHz) ________ dBm

23. Replace the power sensor with the 50 Ω termination.
24. Press the following EMC analyzer keys:

    (MKR →) MARKER → HIGH

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

    (MKR) MARKER Δ

25. Set the EMC analyzer center frequency and the synthesizer/level generator frequency to the frequencies listed in Table 2-34. At each frequency, adjust the synthesizer/level generator amplitude for a MKR Δ-TRK amplitude reading of 0.00 $\pm$0.05 dB. Record the synthesizer/level generator amplitude setting in Table 2-34 as the Synthesizer/Level Generator Amplitude.
26. For each of the frequencies in Table 2-34, subtract the Synthesizer/Level Generator Amplitude Reading (column 2) from the Synthesizer/Level Generator Amplitude Setting (50 MHz) recorded in step 20. Record the result as the Response Relative to 50 MHz (column 3) of Table 2-34.
27. Add to each of the Response Relative to 50 MHz entries in Table 2-34 the Measuring Receiver Reading for 50 MHz listed in Table 2-33. Record the results as the Response Relative to 300 MHz (column 4) in Table 2-34.
28. Record the test results in the performance verification test record by performing the following steps:
    a. Enter the most positive number from Table 2-34, column 4:

       _________ dB

    b. Enter the most positive number from Table 2-33, column 2:

       _________ dB

    c. Enter the more positive of numbers from (a) and (b) as **TR Entry 1** of the performance verification test record. (Absolute referenced to 300 MHz.)

    d. Enter the most negative number from Table 2-34, column 4:

       _________ dB

    e. Enter the most negative number from Table 2-33, column 2:

       _________ dB

    f. Enter the more negative of numbers from (d) and (e) as **TR Entry 2** of the performance verification test record.

    g. Subtract (f) from (c), then enter this value as **TR Entry 3** of the performance verification test record. (Relative flatness.)

Table 2-33. Frequency Response, ≥50 MHz

Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)
50	______	0.05	1500	______	2.0
100	______	0.05	1600	______	2.0
200	______	0.05	1700	______	2.0
300	______	0.05	1800	______	2.0
400	______	0.05	1900	______	2.0
500	______	0.05	2000	______	2.0
600	______	0.05	2100	______	2.0
700	______	0.05	2200	______	2.0
800	______	0.05	2300	______	2.0
900	______	0.05	2400	______	2.0
1000	______	0.05	2500	______	3.0
1100	______	2.0	2600	______	3.0
1200	______	2.0	2700	______	3.0
1300	______	2.0	2800	______	3.0
1400	______	2.0	2900	______	3.0

21. Frequency Response, HP 8594EM

Table 2-34. Frequency Response, <50 MHz

Column 1 EMC Analyzer Synthesizer/Level Generator Frequency	Column 2 Synthesizer Level Generator Amplitude (dBm)	Column 3 Response Relative to 50 MHz	Column 4 Response Relative to 300 MHz
50 MHz	______	0 (Reference)	______
20 MHz	______	______	______
10 MHz	______	______	______
5 MHz	______	______	______
1 MHz	______	______	______
200 kHz	______	______	______
50 kHz	______	______	______

22. Frequency Response, HP 8595EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the EMC 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).

Equipment Required

Synthesized sweeper
Measuring receiver *(used as a power meter)*
Synthesizer/Level generator
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, Type BNC (f) to SMA (m)
Cable, BNC, 122 cm (48 in)
Cable, APC 3.5, 91 cm (36 in)

22. Frequency Response, HP 8595EM

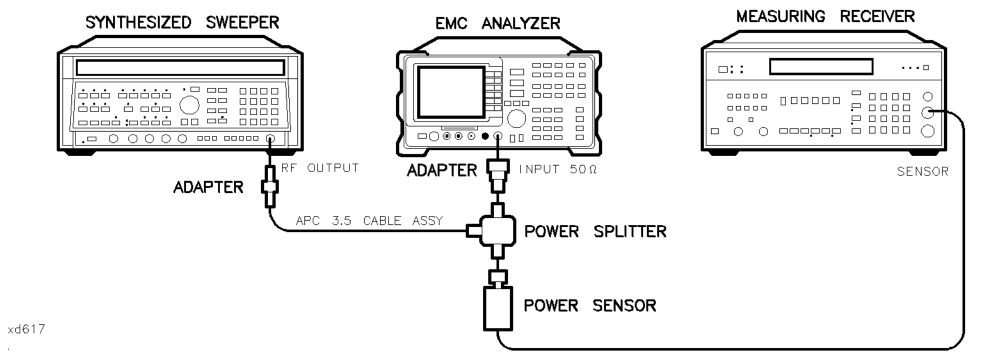

Figure 2-29. Frequency Response Test Setup, ≥50 MHz, HP 8595EM

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 2-29.
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 EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the following analyzer keys:

   (FREQUENCY) More 1 of 2 Band Lock 0-2.9 Gz BAND 0
   (FREQUENCY) 300 (MHz)
   CF STEP AUTO MAN (MAN) 100 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL 97 (+dBμV)
   (AMPLITUDE) More 1 of 3 More 2 of 3 COUPLE AC DC (DC)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) IF BW AUTO MAN (MAN) 1 (MHz)
   AVG BW AUTO MAN (MAN) 10 (kHz)

5. On the EMC analyzer, press MKR → MARKER → HIGH, MKR, More 1 of 3, and MK TRACK ON OFF (ON).
6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of 93 dBμV ±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 EMC analyzer CENTER FREQUENCY to 50 MHz.
10. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV ±0.1 dB.
11. Record the power ratio displayed on the measuring receiver below, then record the negative of this value in column 2 of Table 2-35 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 EMC analyzer CENTER FREQUENCY to 100 MHz.
14. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV ±0.1 dB.
15. Record the negative of the power ratio displayed on the measuring receiver in Table 2-35 as the measuring receiver Reading.
16. On the synthesized sweeper, press CW, and ⇑ (step up) key and on the EMC analyzer, press FREQUENCY, ⇑ (step up) key to step through the remaining frequencies listed in Table 2-35.
17. At each new frequency repeat steps 13 through 15, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-35.

Frequency Response, Band 1

18. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 2.75-6.5 BAND 1
    (FREQUENCY) 2.75 (GHz)
    (SPAN) 10 (MHz)
    (BW) IF BW AUTO MAN (MAN) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

19. Set the synthesized sweeper CW to 2.75 GHz.
20. On the EMC analyzer, press (AMPLITUDE), More 1 of 3, and PRESEL PEAK.
21. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$0.1 dB.
22. Record the negative of the power ratio displayed on the measuring receiver in Table 2-36, column 2.
23. Set the synthesized sweeper CW and the EMC 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 EMC analyzer, press (FREQUENCY), (⇑) (step up) key to step through the remaining frequencies listed in Table 2-36.
25. At each new frequency, repeat steps 20 through 22, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-36.

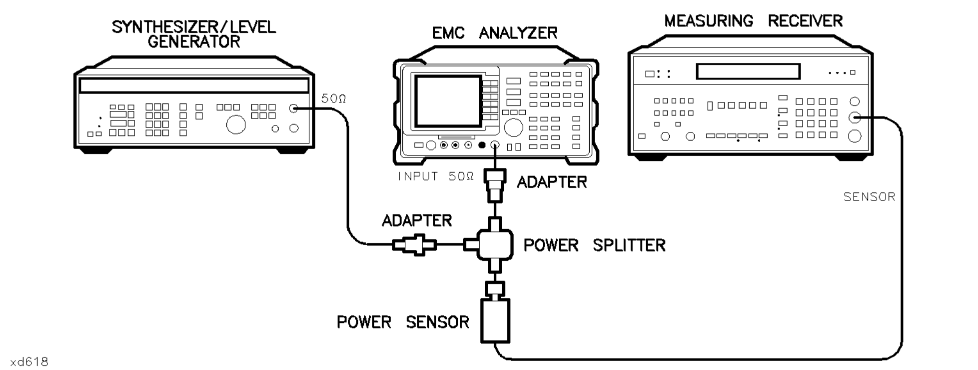

Figure 2-30. Frequency Response Test Setup, <50 MHz, HP 8595EM

Frequency Response, Band 0, <50 MHz

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

FREQUENCY	50 MHz
AMPLITUDE	−8 dBm
AMPTD INCR	0.05 dB

27. Connect the equipment as shown if Figure 2-30, with the power sensor connected to power splitter.
28. On the EMC analyzer, press the following keys:

(MKR) MARKER 1 ON OFF (OFF)

(FREQUENCY) More 1 of 2 Band Lock BND LOCK ON OFF (OFF)

(FREQUENCY) 50 (MHz)
(SPAN) 10 (MHz)
(MKR →) MARKER → HIGH

(MKR) More 1 of 3 MKR TRACK ON OFF (ON)
(SPAN) 100 (kHz)
(BW) IF BW AUTO MAN (MAN) 10 (kHz)

29. Enter the power sensor 50 MHz Cal Factor into the measuring receiver.
30. 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 in Table 2-37.

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

32. On the EMC analyzer, press the following key:

    (MKR →) MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

33. Set the EMC analyzer center frequency and the synthesizer frequency to the frequencies listed in Table 2-37.

34. 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 2-37 as the synthesizer/level generator Amplitude.

35. For each of the frequencies in Table 2-37, subtract the synthesizer/level generator Amplitude Reading (column 2) from the synthesizer/level generator Amplitude Setting (50 MHz) recorded in step 50. Record the result as the Response Relative to 50 MHz (column 3) of Table 2-37.

36. 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 2-35. Record the results as the Response Relative to 300 MHz (column 4) in Table 2-37.

Test Results

Frequency Response, Band 0

1. Enter the most positive number from Table 2-37, column 4:

   ________ dB

2. Enter the most positive number from Table 2-35, 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 number from Table 2-37, column 4:

   ________ dB

5. Enter the most negative number from Table 2-35, column 2:

   ________ dB

6. Enter the more negative of numbers from step 4 and step 5 as **TR Entry 2** of the performance verification test record.

7. Subtract step 6 from step 3. Enter this value as **TR Entry 3** of the performance verification test record (relative flatness).

Frequency Response, Band 1

1. Enter the most positive number from Table 2-36, column 2, as **TR Entry 4** of the performance verification test record.
2. Enter the most negative number from Table 2-36, column 2, as **TR Entry 5** of the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as **TR Entry 6** of the performance verification test record.

22. Frequency Response, HP 8595EM

Table 2-35. Frequency Response Band 0, ≥50 MHz

Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)
50	________	0.05	1500	________	2.0
100	________	0.05	1600	________	2.0
200	________	0.05	1700	________	2.0
300	________	0.05	1800	________	2.0
400	________	0.05	1900	________	2.0
500	________	0.05	2000	________	2.0
600	________	0.05	2100	________	2.0
700	________	0.05	2200	________	2.0
800	________	0.05	2300	________	2.0
900	________	0.05	2400	________	2.0
1000	________	0.05	2500	________	3.0
1100	________	2.0	2600	________	3.0
1200	________	2.0	2700	________	3.0
1300	________	2.0	2800	________	3.0
1400	________	2.0	2900	________	3.0

Table 2-36. Frequency Response Band 1

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)
2.75	________	3.0	4.7	________	5.0
2.8	________	3.0	4.8	________	5.0
2.9	________	3.0	4.9	________	5.0
3.0	________	3.0	5.0	________	5.0
3.1	________	3.0	5.1	________	5.0
3.2	________	3.0	5.2	________	5.0
3.3	________	3.0	5.3	________	5.0
3.4	________	3.0	5.4	________	5.0
3.5	________	4.0	5.5	________	6.0
3.6	________	4.0	5.6	________	6.0
3.7	________	4.0	5.7	________	6.0
3.8	________	4.0	5.8	________	6.0
3.9	________	4.0	5.9	________	6.0
4.0	________	4.0	6.0	________	6.0
4.1	________	4.0	6.1	________	6.0
4.2	________	4.0	6.2	________	6.0
4.3	________	4.0	6.3	________	6.0
4.4	________	4.0	6.4	________	6.0
4.5	________	5.0	6.5	________	6.0
4.6	________	5.0			

22. Frequency Response, HP 8595EM

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

Column 1 EMC Analyzer Synthesizer/Level Generator Frequency	Column 2 Synthesizer/Level Generator Amplitude (dBm)	Column 3 Response Relative to 50 MHz	Column 4 Response Relative to 300 MHz
50 MHz	________	0 (Reference)	________
20 MHz	________	________	________
10 MHz	________	________	________
5 MHz	________	________	________
1 MHz	________	________	________
200 kHz	________	________	________
50 kHz	________	________	________

23. Frequency Response, HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the EMC 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).

Equipment Required

Synthesized sweeper
Measuring receiver *(used as a power meter)*
Synthesizer/Level generator
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, Type BNC (f) to SMA (m)
Cable, BNC, 122 cm (48 in)
Cable, APC 3.5, 91 cm (36 in)

23. Frequency Response, HP 8596EM

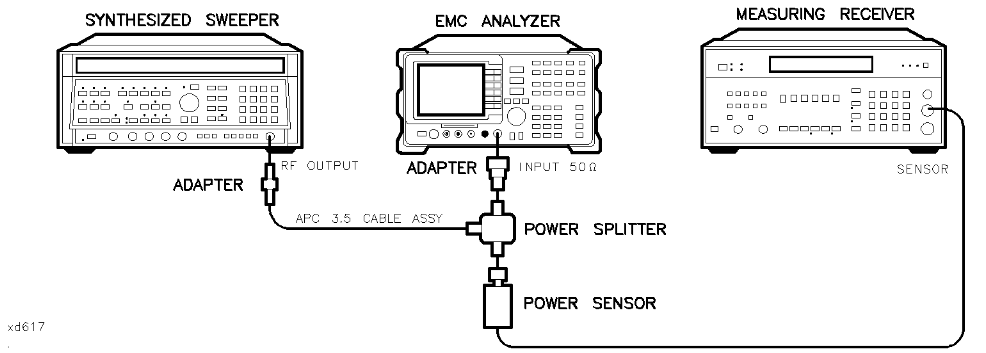

Figure 2-31. Frequency Response Test Setup, ≥50 MHz, HP 8596EM

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 2-31.
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 EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the following analyzer keys:

   (FREQUENCY) More 1 of 2 Band Lock 0-2.9 Gz BAND 0
   (FREQUENCY) 300 (MHz)
   CF STEP AUTO MAN (MAN) 100 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL 97 (+dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) IF BW AUTO MAN (MAN) 1 (MHz)
   AVG BW AUTO MAN (MAN) 10 (kHz)

5. On the EMC analyzer, press (MKR →) MARKER → HIGH, (MKR), More 1 of 3, and MK TRACK ON OFF (ON).
6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of 93 dBμV ±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 EMC analyzer CENTER FREQUENCY to 50 MHz.
10. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV ±0.1 dB.
11. Record the power ratio displayed on the measuring receiver below, then record the negative of this value in column 2 of 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 EMC analyzer CENTER FREQUENCY to 100 MHz.
14. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV ±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 EMC 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 EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 2.75-6.5 BAND 1
    (FREQUENCY) 2.75 (GHz)
    (SPAN) 10 (MHz)
    (BW) IF BW AUTO MAN (MAN) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

19. Set the synthesized sweeper CW to 2.75 GHz.
20. On the EMC analyzer, press (AMPLITUDE), More 1 of 3, and PRESEL PEAK.
21. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$0.1 dB.
22. Record the negative of the power ratio displayed on the measuring receiver in Table 2-39, column 2.
23. Set the synthesized sweeper CW and the EMC 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 EMC 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 2

26. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 6.0-12.8 BAND 2
    (FREQUENCY) 6.0 (GHz)
    CF STEP AUTO MAN (MAN) 200 (MHz)
    (SPAN) 10 (MHz)
    (BW) IF BW AUTO MAN (MAN) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

27. Set the synthesized sweeper CW to 6.0 GHz.
28. On the EMC analyzer, press (AMPLITUDE), More 1 of 3, and PRESEL PEAK.
29. Adjust the synthesized sweeper power level for an EMC analyzer MKR-TRK amplitude reading of 93 dBμV $\pm$0.1 dB.
30. Record the negative of the power ratio displayed on the measuring receiver in Table 2-40, column 2.
31. On the synthesized sweeper, press (CW), and (⇑) (step up) key, then on the EMC analyzer, press (FREQUENCY), and (⇑) (step up) key to step through the remaining frequencies listed in Table 2-40.
32. At each new frequency repeat steps 28 through 30, entering the power sensor Cal Factor into the measuring receiver as indicated in Table 2-40.

23. Frequency Response, HP 8596EM

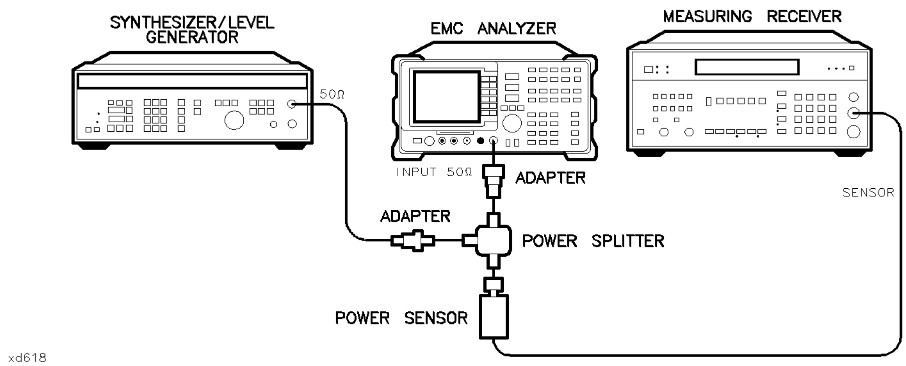

Figure 2-32. Frequency Response Test Setup, <50 MHz, HP 8596EM

Frequency Response, Band 0, <50 MHz

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

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

34. Connect the equipment as shown if Figure 2-32, with the power sensor connected to power splitter.

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

(MKR) MARKER 1 ON OFF (OFF)
(FREQUENCY) More 1 of 2 Band Lock BND LOCK ON OFF (OFF)
(FREQUENCY) 50 (MHz)
(SPAN) 10 (MHz)
(MKR →) MARKER → HIGH
(MKR) More 1 of 3 MKR TRACK ON OFF (ON)
(SPAN) 100 (kHz)
(BW) IF BW AUTO MAN (MAN) 10 (kHz)

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

37. 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 in Table 2-41.

38. Replace the 50 MHz to 12.8 GHz power sensor with the 50 Ω termination.

39. On the EMC analyzer, press the following key:

    (MKR →) MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

40. Set the EMC analyzer center frequency and the synthesizer frequency to the frequencies listed in Table 2-41.

41. 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 2-41 as the synthesizer/level generator Amplitude.

42. For each of the frequencies in Table 2-41, subtract the synthesizer/level generator Amplitude Reading (column 2) from the synthesizer/level generator Amplitude Setting (50 MHz) recorded in step 37. Record the result as the Response Relative to 50 MHz (column 3) of Table 2-41.

43. Add to each of the Response Relative to 50 MHz entries in Table 2-41 the measuring receiver Reading for 50 MHz listed in Table 2-38. Record the results as the Response Relative to 300 MHz (column 4) in Table 2-41.

Test Results

Frequency Response, Band 0

1. Enter the most positive number from Table 2-41, column 4:

   ________ dB

2. Enter the most positive number from Table 2-38, 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 number from Table 2-41, column 4:

23. Frequency Response, HP 8596EM

_________ dB

5. Enter the most negative number from Table 2-38, column 2:

   _________ dB

6. Enter the more negative of numbers from step 4 and step 5 as **TR Entry 2** of the performance verification test record.

7. Subtract step 6 from step 3. Enter this value as **TR Entry 3** of the performance verification test record (relative flatness).

Frequency Response, Band 1

1. Enter the most positive number from Table 2-39, column 2, as **TR Entry 4** of the performance verification test record.
2. Enter the most negative number from Table 2-39, column 2, as **TR Entry 5** of the performance verification test record.
3. Subtract step 2 from step 1. Enter this value as **TR Entry 6** of the performance verification test record.

Frequency Response, Band 2

1. Enter the most positive number from Table 2-40, column 2, as **TR Entry 7** of the performance verification test record.
2. Enter the most negative number from Table 2-40, column 2, as **TR Entry 8** of 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.

Table 2-38. Frequency Response Band 0, ≥50 MHz

Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)
50	________	0.05	1500	________	2.0
100	________	0.05	1600	________	2.0
200	________	0.05	1700	________	2.0
300	________	0.05	1800	________	2.0
400	________	0.05	1900	________	2.0
500	________	0.05	2000	________	2.0
600	________	0.05	2100	________	2.0
700	________	0.05	2200	________	2.0
800	________	0.05	2300	________	2.0
900	________	0.05	2400	________	2.0
1000	________	0.05	2500	________	3.0
1100	________	2.0	2600	________	3.0
1200	________	2.0	2700	________	3.0
1300	________	2.0	2800	________	3.0
1400	________	2.0	2900	________	3.0

23. Frequency Response, HP 8596EM

Table 2-39. Frequency Response Band 1

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)
2.75	________	3.0	4.7	________	5.0
2.8	________	3.0	4.8	________	5.0
2.9	________	3.0	4.9	________	5.0
3.0	________	3.0	5.0	________	5.0
3.1	________	3.0	5.1	________	5.0
3.2	________	3.0	5.2	________	5.0
3.3	________	3.0	5.3	________	5.0
3.4	________	3.0	5.4	________	5.0
3.5	________	4.0	5.5	________	6.0
3.6	________	4.0	5.6	________	6.0
3.7	________	4.0	5.7	________	6.0
3.8	________	4.0	5.8	________	6.0
3.9	________	4.0	5.9	________	6.0
4.0	________	4.0	6.0	________	6.0
4.1	________	4.0	6.1	________	6.0
4.2	________	4.0	6.2	________	6.0
4.3	________	4.0	6.3	________	6.0
4.4	________	4.0	6.4	________	6.0
4.5	________	5.0	6.5	________	6.0
4.6	________	5.0			

Table 2-40. Frequency Response Band 2

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)
6.0	________	6.0	9.6	________	10.0
6.2	________	6.0	9.8	________	10.0
6.4	________	6.0	10.0	________	10.0
6.6	________	7.0	10.2	________	10.0
6.8	________	7.0	10.4	________	10.0
7.0	________	7.0	10.6	________	11.0
7.2	________	7.0	10.8	________	11.0
7.4	________	7.0	11.0	________	11.0
7.6	________	8.0	11.2	________	11.0
7.8	________	8.0	11.4	________	11.0
8.0	________	8.0	11.6	________	12.0
8.2	________	8.0	11.8	________	12.0
8.4	________	8.0	12.0	________	12.0
8.6	________	9.0	12.2	________	12.0
8.8	________	9.0	12.4	________	12.0
9.0	________	9.0	12.6	________	13.0
9.2	________	9.0	12.8	________	13.0
9.4	________	9.0			

23. Frequency Response, HP 8596EM

Table 2-41. Frequency Response Band 0, <50 MHz

Column 1 EMC Analyzer Synthesizer/Level Generator Frequency	Column 2 Synthesizer/Level Generator Amplitude (dBm)	Column 3 Response Relative to 50 MHz	Column 4 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, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A synthesized source and the EMC analyzer are set to the same frequency and the amplitude of the source is set to −20 dBm (87 dBμV). A marker-amplitude reference is set on the EMC 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 EMC 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)

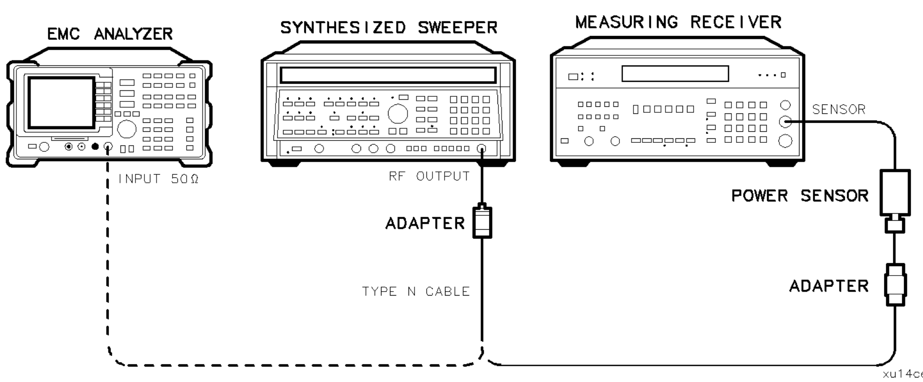

Figure 2-33.
Other Input Related Spurious Responses Test Setup, HP 8591EM

Procedure

1. Zero and calibrate the measuring receiver and 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.
2. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:

   CW .... 542.8 MHz
   POWER LEVEL .... −20 dBm

3. Connect the equipment as shown in Figure 2-33. Connect the output of the synthesized sweeper to the power sensor.
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 EMC analyzer as shown in Figure 2-33.
14. On the EMC analyzer, press (PRESET), then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

    (FREQUENCY) 500 (MHz)
    (SPAN) 10 (MHz)
    (AMPLITUDE) 97 (dBμV)

MKR → MKR → HIGH

MKR More 1 of 3 MK TRACK ON OFF (ON)

SPAN 200 kHz

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

MKR → MKR → HIGH

MKR → More 1 of 3 MARKER →REF LVL

MKR More 1 of 3 MK TRACK ON OFF (OFF)

MKR → MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ

AMPLITUDE ⇓ (step-down key)

SGL SWP

16. For each of the frequencies listed in Table 2-42, 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 EMC analyzer, press (MKR →) MKR → HIGH and record the marker-delta amplitude reading in Table 2-42 as the Actual MKR Δ Amplitude.

       The Actual MKR Δ Amplitude should be greater than the Minimum MKR Δ Amplitude listed in the table below.

       Note that the Minimum 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 15.

Table 2-42. Image Responses

Synthesized Sweeper CW Frequency	TR Entry	Actual MKR Δ Amplitude (dBc)	Minimum MKR Δ Amplitude (dBc)
542.8 MHz	**1**	____________	55
1142.8 MHz	**2**	____________	55

17. Record both of the Actual MKR Δ Amplitude readings listed in Table 2-42 into the performance verification test record.

25. Other Input Related Spurious Responses, HP 8593EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A synthesized source and the EMC analyzer are set to the same frequency and the amplitude of the source is set to 0 dBm (107 dBμV). A marker-amplitude reference is set on the EMC 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 0 dBm and the amplitude of the response, if any, is measured using the EMC 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)

25. Other Input Related Spurious Responses, HP 8593EM

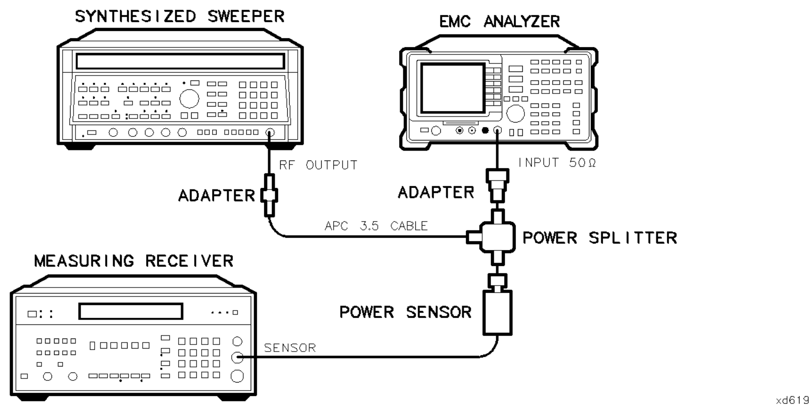

Figure 2-34.
Other Input Related Spurious Responses Test Setup, HP 8593EM

Procedure

Band 0

1. Zero and calibrate the measuring receiver and 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 2-34. Connect the output of the synthesizer to the power sensor.

   Option 026 only: Connect the power splitter to the EMC analyzer input directly. Do not use an adapter to connect the power splitter to the EMC analyzer.

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

   (FREQUENCY) 2.0 (GHz)

(SPAN) 1 (MHz)
(AMPLITUDE) REF LVL 97 (dBμV)
ATTEN AUTO MAN (MAN) 0 (dB)

5. Adjust the synthesized sweeper power level for a −10 dBm ±0.1 dB reading on the measuring receiver.
6. On the EMC analyzer, press the following keys:

   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 200 (kHz)

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

   (MKR →) MKR → HIGH
   (MKR →) More 1 of 3 MARKER →REF LVL
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
   (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ
   (AMPLITUDE) (⇓) (step-down key)
   (SGL SWP)

7. For each of the Band 0 frequencies listed in Table 2-43, 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 −10 dBm reading on the measuring receiver.
   d. Press (SGL SWP) and wait for the completion of a new sweep.
   e. On the EMC analyzer, press (MKR →) MKR → HIGH and record the marker-delta amplitude reading in Table 2-43 as the Actual MKR Δ Amplitude.

   The Actual MKR Δ Amplitude should be greater than the Minimum MKR Δ Amplitude listed in Table 2-43.

   Note that the Minimum 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.

8. Press the following EMC analyzer keys:

   MKR More 1 of 3 MARKER ALL OFF

   DISPLAY HOLD

   AUTO COUPLE AUTO ALL

   SPAN 1 MHz

   AMPLITUDE REF LVL 97 dBμV

   ATTEN AUTO MAN (MAN) 0 dB

   SWEEP/TRIG SWEEP CONT SGL (CONT)

Band 1

9. On the EMC analyzer, press FREQUENCY, 4, GHz.
10. Set the synthesized sweeper CW to 4 GHz.
11. Enter the power sensor 4 GHz CAL Factor into the measuring receiver.
12. Press the following EMC analyzer keys:

    MKR $\rightarrow$ MKR $\rightarrow$ HIGH

    AMPLITUDE More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press:

    MKR More 1 of 3 MARKER ALL OFF

13. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 2-43 for Band 1.

Band 2

14. On the EMC analyzer, press (FREQUENCY), 9, (GHz).
15. Set the synthesized sweeper CW to 9 GHz.
16. Enter the power sensor 9 GHz CAL Factor into the measuring receiver.
17. Press the following EMC analyzer keys:

    (MKR →) MKR → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press:

    (MKR) More 1 of 3 MARKER ALL OFF

18. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 2-43 for Band 2.

Band 3

19. On the EMC analyzer, press (FREQUENCY), 15, (GHz).
20. Set the synthesized sweeper CW to 15 GHz.
21. Enter the power sensor 15 GHz CAL Factor into the measuring receiver.
22. Press the following EMC analyzer keys:

    (MKR →) MKR → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press:

    (MKR) More 1 of 3 MARKER ALL OFF

23. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 2-43 for Band 3.

Band 4

24. On the EMC analyzer, press (FREQUENCY), 21, (GHz).
25. Set the synthesized sweeper CW to 21 GHz.
26. Enter the power sensor 21 GHz CAL Factor into the measuring receiver.
27. Press the following EMC analyzer keys:

    (MKR →) MKR → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press:

    (MKR) More 1 of 3 MARKER ALL OFF

28. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 2-43 for Band 4.

Band 4 for Option 026 or 027

Perform this section only if you EMC analyzer is equipped with Option 026 or Option 027.

29. On the EMC analyzer, press (FREQUENCY), 24, (GHz).
30. Set the synthesized sweeper CW to 24 GHz.
31. Enter the power sensor 24 GHz CAL Factor into the measuring receiver.
32. Press the following EMC analyzer keys:

    (MKR →) MKR → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press:

    (MKR) More 1 of 3 MARKER ALL OFF

33. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 2-43 for Band 4 for Option 026 or Option 027.

Specification Summary

1. Record the maximum Actual MKR Δ Amplitude from Table 2-43 for Band 0 as **TR Entry 1** of the performance verification test record.
2. Record the maximum Actual MKR Δ Amplitude from Table 2-43 for Bands 1, 2, and 3 as **TR Entry 2** of the performance verification test record.
3. Record the maximum Actual MKR Δ Amplitude from Table 2-43 for Band 4 as **TR Entry 3** of the performance verification test record.

   Option 026 or 027 only: Record the maximum Actual MKR Δ Amplitude from Table 2-43 for band 4, Option 026 or 027 as **TR Entry 3** of the performance verification test record.

25. Other Input Related Spurious Responses, HP 8593EM

Table 2-43. Other Input Related Spurious Worksheet

Band	EMC Analyzer Center Frequency (GHz)	Synthesized Sweeper CW Frequency (MHz)	Actual MKR Δ Amplitude (dBc)	Minimum MKR Δ Amplitude (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
3	15.0	15042.8*	________	55
	15.0	15642.8*	________	55
	15.0	4785.8†	________	55
	15.0	15669.65‡	________	55
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	24	24642.8*	________	50
or	24	11839.3†	________	55
Option 027	24	20019.65‡	________	50

* Image Response
† Out-of-Band Response
‡ Multiple Response

26. Other Input Related Spurious Responses, HP 8594EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A synthesized source and the EMC analyzer are set to the same frequency and the amplitude of the source is set to 0 dBm (107 dBμV). 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 0 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, 91 cm (36 in)

26. Other Input Related Spurious Responses, HP 8594EM

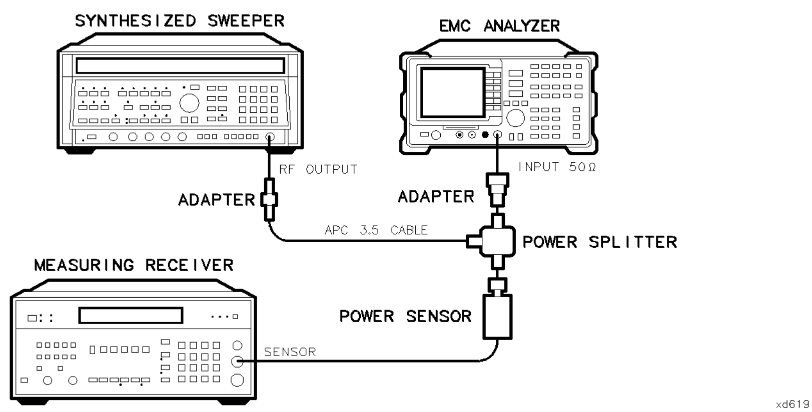

Figure 2-35.
Other Input Related Spurious Responses Test Setup, HP 8594EM

Procedure

1. Zero and calibrate the measuring receiver and power sensor in log mode (power reads out in dBm). Enter the power sensor 2 GHz Cal Factor into the measuring receiver.
2. Press INSTR 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 2-35.
4. On the EMC analyzer, press (PRESET) and wait for the preset to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) 97 (dBμV) ATTEN AUTO MAN (MAN) 0 (dB)

5. Adjust the synthesized sweeper power level for a −10 dBm ±0.1 dB reading on the measuring receiver.
6. On the EMC analyzer, press the following keys:

   (MKR →) MKR → HIGH

(MKR) More 1 of 3 MK TRACK ON OFF (ON)
(SPAN) 200 (kHz)

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

(MKR →) MKR → HIGH More 1 of 3 MARKER →REF LVL
(MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ
(AMPLITUDE) (⇓) (step-down key)
(SGL SWP)

7. For each of the frequencies listed in Table 2-44 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 −10 dBm reading on the measuring receiver.
   d. Press (SGL SWP) and wait for completion of a new sweep.
   e. On the EMC analyzer, press (MKR →) MKR → HIGH and record the MKR Δ amplitude reading in Table 2-44 as the Actual MKR Δ Amplitude.

      The Actual MKR Δ Amplitude should be greater than the Minimum MKR Δ Amplitude listed in the table.

   Note that the Minimum 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.

8. Record the maximum Actual MKR Δ Amplitude from Table 2-44 as **TR Entry 1** of the performance verification test record.

Table 2-44. Other Input Related Spurious Worksheet

EMC Analyzer Center Frequency (GHz)	Synthesized Sweeper CW Frequency (MHz)	Actual MKR Δ Amplitude (dBc)	Minimum MKR Δ Amplitude (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, HP 8595EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A synthesized source and the EMC analyzer are set to the same frequency and the amplitude of the source is set to 0 dBm (107 dBμV). A marker-amplitude reference is set on the EMC 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 0 dBm and the amplitude of the response, if any, is measured using the EMC 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)

27. Other Input Related Spurious Responses, HP 8595EM

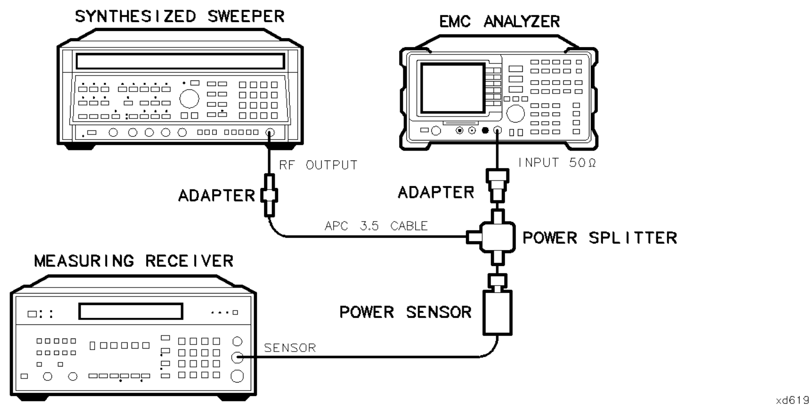

Figure 2-36.
Other Input Related Spurious Responses Test Setup, HP 8595EM

Procedure

Band 0

1. Zero and calibrate the measuring receiver and 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 2-36. Connect the output of the synthesizer to the power sensor.
4. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) REF LVL 97 (dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)

5. Adjust the synthesized sweeper power level for a −10 dBm ±0.1 dB reading on the measuring receiver.

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

   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 200 (kHz)

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

   (MKR →) MKR → HIGH
   (MKR →) More 1 of 3 MARKER →REF LVL
   (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ
   (AMPLITUDE) (⇩) (step-down key)
   (SGL SWP)

7. For each of the frequencies listed in Table 2-45, 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 −10 dBm reading on the measuring receiver.
   d. Press (SGL SWP) and wait for the completion of a new sweep.
   e. On the EMC analyzer, press (MKR →) MKR → HIGH and record the marker-delta amplitude reading in Table 2-45 as the Actual MKR Δ Amplitude.

   The Actual MKR Δ Amplitude should be greater than the Minimum MKR Δ Amplitude listed in Table 2-45.

   Note that the Minimum 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.

8. Press the following EMC analyzer keys:

   (MKR) MARKER 1 ON OFF (OFF)

   (DISPLAY) HOLD

   (AUTO COUPLE) AUTO ALL

   (SPAN) 1 (MHz)

   (AMPLITUDE) REF LVL 97 (dBμV)

   ATTEN AUTO MAN (MAN) 0 (dB)

   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

Band 1

9. On the EMC analyzer, press (FREQUENCY), 4, (GHz).
10. Set the synthesized sweeper CW to 4 GHz.
11. Enter the power sensor 4 GHz CAL Factor into the measuring receiver.
12. Press the following EMC analyzer keys:

    (MKR →) MKR → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press:

    (MKR) More 1 of 3 MARKER ALL OFF

13. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 2-45 for Band 1.

Specification Summary

1. Record the maximum Actual MKR Δ Amplitude from Table 2-45 for Band 0 as **TR Entry 1** of the performance verification test record.
2. Record the maximum Actual MKR Δ Amplitude from Table 2-45 for Bands 1 as **TR Entry 2** of the performance verification test record.

27. Other Input Related Spurious Responses, HP 8595EM

Table 2-45. Other Input Related Spurious Worksheet

Band	EMC Analyzer Center Frequency (GHz)	Synthesized Sweeper CW Frequency (MHz)	Actual MKR Δ Amplitude (dBc)	Minimum MKR Δ Amplitude (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

* Image Response
† Out-of-Band Response
‡ Multiple Response

28. Other Input Related Spurious Responses, HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

A synthesized source and the EMC analyzer are set to the same frequency and the amplitude of the source is set to 0 dBm (107 dBμV). A marker-amplitude reference is set on the EMC 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 0 dBm and the amplitude of the response, if any, is measured using the EMC 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)

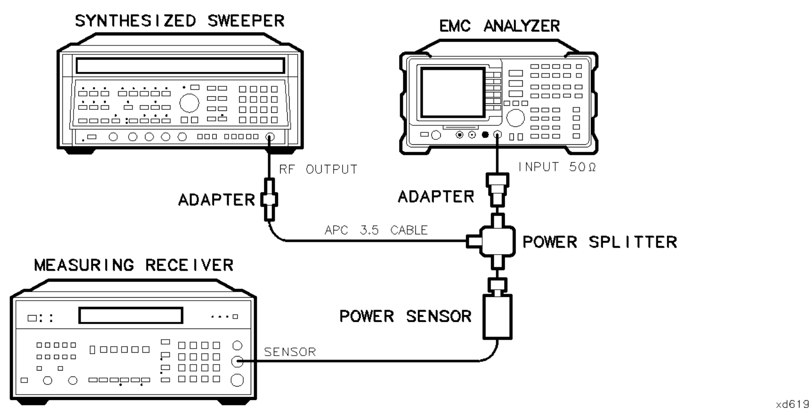

Figure 2-37.
Other Input Related Spurious Responses Test Setup, HP 8596EM

Procedure

Band 0

1. Zero and calibrate the measuring receiver and 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 2-37. Connect the output of the synthesizer to the power sensor.
4. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) REF LVL 97 (dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)

5. Adjust the synthesized sweeper power level for a −10 dBm ±0.1 dB reading on the measuring receiver.
6. On the EMC analyzer, press the following keys:

   MKR → MKR → HIGH
   MKR More 1 of 3 MK TRACK ON OFF (ON)
   SPAN 200 kHz

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

   MKR → MKR → HIGH
   MKR → More 1 of 3 MARKER →REF LVL
   MKR → MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ
   AMPLITUDE ⇩ (step-down key)
   SGL SWP

7. For each of the frequencies listed in Table 2-46, 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 −10 dBm reading on the measuring receiver.
   d. Press SGL SWP and wait for the completion of a new sweep.
   e. On the EMC analyzer, press MKR → MKR → HIGH and record the marker-delta amplitude reading in Table 2-46 as the Actual MKR Δ Amplitude.

   The Actual MKR Δ Amplitude should be greater than the Minimum MKR Δ Amplitude listed in Table 2-46.

   Note that the Minimum 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.

8. Press the following EMC analyzer keys:

   (MKR) MARKER 1 ON OFF (OFF)

   (DISPLAY) HOLD

   (AUTO COUPLE) AUTO ALL

   (SPAN) 1 (MHz)

   (AMPLITUDE) REF LVL 97 (dBμV)

   ATTEN AUTO MAN (MAN) 0 (dB)

   (SWEEP) SWEEP CONT SGL (CONT)

Band 1

9. On the EMC analyzer, press (FREQUENCY), 4, (GHz).
10. Set the synthesized sweeper CW to 4 GHz.
11. Enter the power sensor 4 GHz CAL Factor into the measuring receiver.
12. Press the following EMC analyzer keys:

    (MKR →) MKR → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press:

    (MKR) More 1 of 3 MARKER ALL OFF

13. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 2-46 for Band 1.

Band 2

14. On the EMC analyzer, press (FREQUENCY), 9, (GHz).
15. Set the synthesized sweeper CW to 9 GHz.
16. Enter the power sensor 9 GHz CAL Factor into the measuring receiver.
17. Press the following EMC analyzer keys:

    (MKR →) MKR → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

28. Other Input Related Spurious Responses, HP 8596EM

Wait for the CAL: PEAKING message to disappear, then press:

(MKR) More 1 of 3 MARKER ALL OFF

18. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 2-46 for Band 2.

Specification Summary

1. Record the maximum Actual MKR Δ Amplitude from Table 2-46 for Band 0 as **TR Entry 1** of the performance verification test record.
2. Record the maximum Actual MKR Δ Amplitude from Table 2-46 for Bands 1 and 2 as **TR Entry 2** of the performance verification test record.

Table 2-46. Other Input Related Spurious Worksheet

Band	EMC Analyzer Center Frequency (GHz)	Synthesized Sweeper CW Frequency (MHz)	Actual MKR Δ Amplitude (dBc)	Minimum MKR Δ Amplitude (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, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 EMC 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 EMC 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.

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) *(two 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)

Procedure

This performance verification 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 performing "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

2. Connect the equipment as shown in Figure 2-38.

29. Spurious Response, HP 8591EM

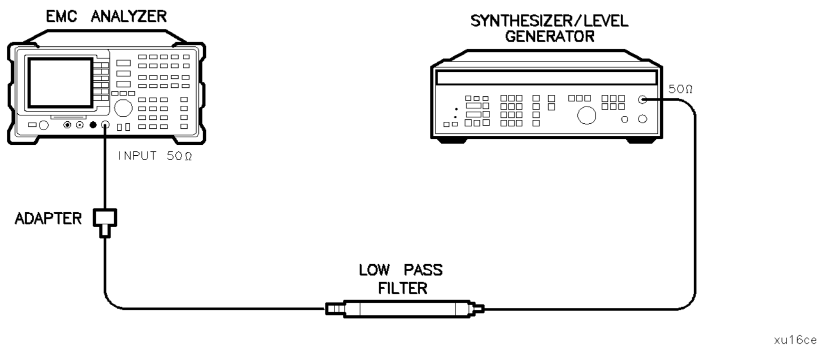

Figure 2-38.
Second Harmonic Distortion Test Setup, 30 MHz, HP 8591EM

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

   (FREQUENCY) 30 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) 97 (+dBμV)
   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 1 (MHz)

4. Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

   (MKR) More 1 of 3 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 (97 dBμV).

6. Set the EMC analyzer control as follows:

   (BW) 1 (kHz)
   AVG BW AUTO MAN (MAN) 100 (Hz)

7. Wait for two sweeps to finish, then press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH

More 1 of 3 MKR →CF STEP

(MKR) MARKER Δ

(FREQUENCY)

8. Press the (⇧), (step-up key) on the EMC analyzer to step to the second harmonic (at 60 MHz). Press (MKR →) MARKER → HIGH. Record the MKR Δ Amplitude reading in the performance verification test record as **TR Entry 1**.

Part 2: Third Order Intermodulation Distortion, 50 MHz

1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.
2. Connect the equipment as shown in Figure 2-39 with the output of the directional bridge connected to the 100 kHz to 1.8 GHZ power sensor.

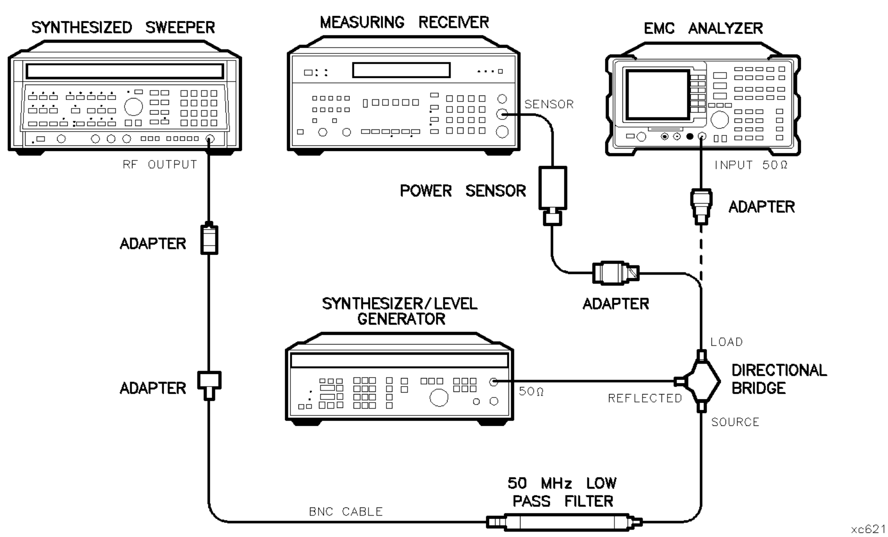

Figure 2-39.
Third Order Intermodulation Distortion Test Setup, HP 8591EM

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 EMC analyzer, press (PRESET), then wait until the preset routine is finished. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 50 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) 97 (+dBμV)
   (MKR →) MARKER → HIGH More 1 of 3 PEAK EXCURSN 3 (dB)
   (DISPLAY) More 1 of 2 THRESHLD ON OFF (ON) 17 dBμV

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 EMC analyzer RF INPUT using an adapter (do not use a cable).

8. On the EMC analyzer, press the following keys:

   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 200 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
   (MKR →) MARKER → HIGH More 1 of 3 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 EMC analyzer center frequency until the two signals are centered on the display, then set the EMC analyzer by pressing the following keys:

    (BW) 3 (kHz)
    AVG BW AUTO MAN (MAN) 300 (Hz)

11. Press (MKR →), MARKER → HIGH, then press (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. See Figure 2-40.

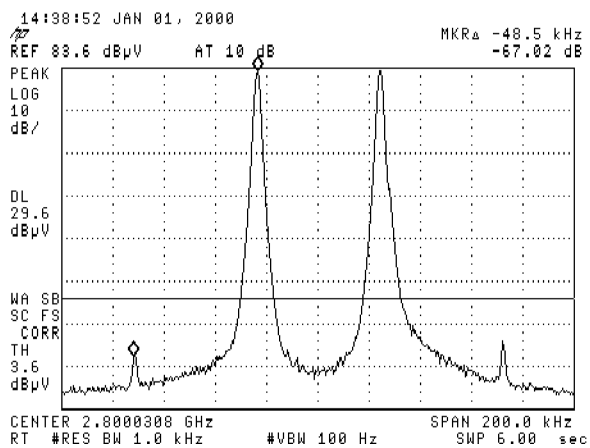

Figure 2-40. Third Order Intermodulation Distortion, HP 8591EM

12. If the distortion products can be seen, proceed as follows:
    a. On the EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    b. Press More 3 of 3 then repeatedly press NEXT PEAK until the active marker is on the highest 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 −54 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 EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    c. Press More 3 of 3 then 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 as **TR Entry 2** of the performance verification test record. The MKR Δ reading should be less than −54 dBc.

30. Spurious Response, HP 8593EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 EMC analyzer marker functions.

For third order intermodulation distortion, two signals are combined in a directional coupler (for isolation) and are applied to the EMC 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.

Equipment Required

Synthesized sweeper *(two 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
Directional coupler
Cable, APC 3.5, 91 cm (36 in) *(two required)*
Cable, BNC, 120 cm (48 in)

30. Spurious Response, HP 8593EM

Adapter, Type N (m) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f) *(two required)*
Adapter, Type N (m) to BNC (f)
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 2-41.

   Option 026 only: Use the BNC to SMA adapter with an APC 3.5 (f) to (f) adapter.

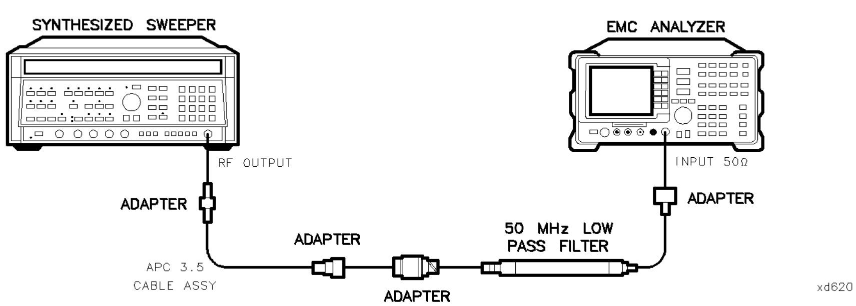

Figure 2-41. Second Harmonic Distortion Test Setup, HP 8593EM

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

   (FREQUENCY) 30 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) REF LVL 77 dBμV
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)

4. Adjust the synthesized sweeper power level to place the peak of the signal displayed on the EMC analyzer at the reference level of 77 dBμV.
5. Press the following EMC analyzer keys:

   (BW) IF BW AUTO MAN (MAN) 1 (kHz)
   AVG BW AUTO MAN (MAN) 100 (Hz)

6. Wait for two sweeps to finish, then press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   More 1 of 3 MKR → CF STEP
   (MKR) MARKER Δ
   (FREQUENCY)

7. Press the (⇧) (step up) key on the EMC analyzer to step to the second harmonic (at 60 MHz). Set the reference level to 57 dBμV.
8. Wait for one full sweep, then press (MKR →) MARKER → HIGH.
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 maximum MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of changing the reference level from 77 dBμV to 57 dBμV.

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 EMC analyzer INPUT 50 Ω.

b. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

(FREQUENCY) 5.6 (GHz)
(SPAN) ZERO SPAN
(AMPLITUDE) REF LVL 67 dBμV
(BW) IF BW AUTO MAN (MAN) 1 (kHz)
AVG BW AUTO MAN (MAN) 30 (Hz)
More 1 of 2 VID AVG ON OFF (ON) 10 (ENTER)
(SWEEP/TRIG) SWP TIME AUTO MAN (MAN) 5.0 (sec)

c. Press (SGL SWP). Wait until AVG 10 is displayed along the left side of the CRT display.

d. Press (MKR →) MARKER → HIGH on the EMC analyzer and record the marker amplitude reading as the Noise Level at 5.6 GHz in Table 2-47.

12. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

(FREQUENCY) More 1 of 2 Band Lock 2.75-6.5 BAND 1
(FREQUENCY) 2.8 (GHz)
(SPAN) 10 (MHz)

13. Connect the equipment as shown in Figure 2-42, with the output of the synthesized sweeper connected to the input of the power splitter, and the power splitter outputs connected to the EMC 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 the preset key, then set the controls as follows:

CW .... 2.8 GHz
POWER LEVEL .... 0 dBm

15. On the EMC analyzer, press the following keys:

    (MKR →) MARKER → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the `peaking` message to disappear.

16. Press (MKR →) MARKER → HIGH, More 1 of 3 More 2 of 3 MARKER Δ, then record the measuring receiver reading at 2.8 GHz in Table 2-47.
17. Set the synthesized sweeper CW to 5.6 GHz.
18. Press the following EMC analyzer keys:

    (FREQUENCY) 5.6 (GHz)
    (MKR →) MARKER → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the `peaking` message to disappear.

    (MKR →) MARKER → HIGH

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

19. Adjust the synthesized sweeper power level until the Marker Δ Amplitude reads 0 dB ±0.20 dB.
20. Enter the power sensor 6 GHz Cal Factor into the measuring receiver.
21. Record the Measuring Receiver Reading at 5.6 GHz in Table 2-47.
22. Subtract the Measuring Receiver Reading at 5.6 GHz from the Measuring Receiver Reading at 2.8 GHz, then record this value as the Frequency Response Error (**FRE**) in Table 2-47. For example, if the Measuring Receiver Reading at 5.6 GHz is −6.45 dBm and the Measuring Receiver Reading at 2.8 GHz is −7.05 dBm, the Frequency Response Error would be −7.05 dBm − (−6.45 dBm) = −0.60 dB.

    Measuring Receiver Reading at 2.8 GHz − Measuring Receiver Reading at 5.6 GHz = FRE

30. Spurious Response, HP 8593EM

Table 2-47. Second Harmonic Distortion Worksheet

Description	Measurement
Noise Level at 5.6 GHz	______________dBμV
Measuring Receiver Reading at 2.8 GHz	______________dBm
Measuring Receiver Reading at 5.6 GHz	______________dBm
Frequency Response Error (FRE)	______________dB
Distortion-limited Specification	______________dBc
Noise-limited Specification	______________dBc

23. 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 2-47.

    Distortion-limited Specification = *−60 dBc* + *FRE*

    b. Subtract 67 dBμV (reference level setting) from Noise Level at 5.6 GHz, then record in Table 2-47.

    Noise-limited Specification = *Noise Level at 5.6 GHz* − *67 dBμV*

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.

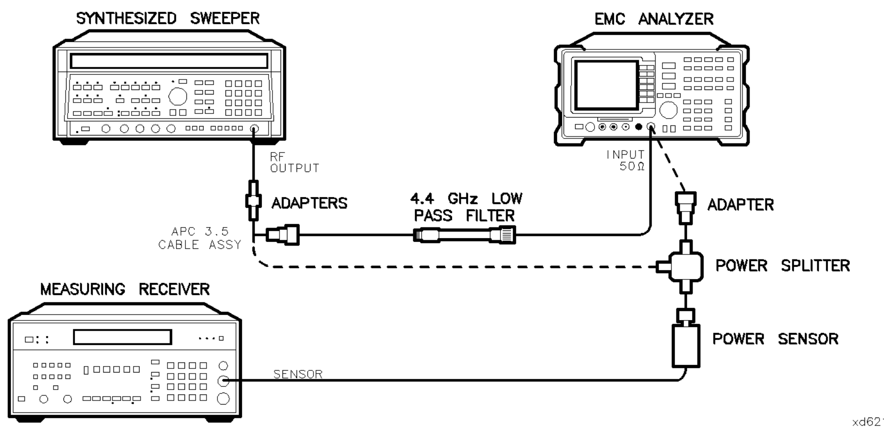

Figure 2-42.
Second Harmonic Distortion Test Setup, >2.9 GHz, HP 8593EM

24. Connect the equipment as shown in Figure 2-42 with the filter in place.
25. Set the synthesized sweeper controls as follows:

CW .... 2.8 GHz
POWER LEVEL .... 0 dBm

26. Set the EMC analyzer by pressing the following keys:

(FREQUENCY) 2.8 (GHz)
(MKR) More 1 of 3 MARKER ALL OFF
(MKR →) MARKER → HIGH
(AMPLITUDE) More 1 of 3 PRESEL PEAK

Wait for the `peaking` message to disappear.

(MKR) More 1 of 3 MK TRACK ON OFF (ON)
(SPAN) 100 (kHz)

27. Adjust the synthesized sweeper power level for an EMC analyzer marker amplitude reading of 107 dBμV $\pm$0.2 dB.
28. On the EMC analyzer, press the following keys:

    (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

    (MKR →) MARKER → HIGH

    More 1 of 3 More 2 of 3 MARKER Δ

    (FREQUENCY) 5.6 (GHz)
    (SPAN) 10 (MHz)

29. Remove the filter and connect the synthesized sweeper output directly to the EMC analyzer INPUT 50 Ω.
30. On the EMC analyzer, press the following keys:

    (MKR →) MARKER → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the `peaking` message to disappear.

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 100 (kHz)

31. Reinstall the filter between the synthesized sweeper output and the EMC analyzer INPUT 50 Ω.
32. Set the EMC analyzer by pressing the following keys:

    (AMPLITUDE) REF LVL 67 dBμV

    (BW) AVG BW AUTO MAN (MAN) 30 (Hz)

    More 1 of 2 VID AVG ON OFF (ON) 10 (ENTER)

    (SGL SWP)

    Wait until `AVG 10` is displayed along the left side of the CRT display.

33. Press (MKR →) MARKER → HIGH, 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

34. 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.

35. Connect the equipment as shown in Figure 2-43 with the input of the directional coupler connected to the power sensor.

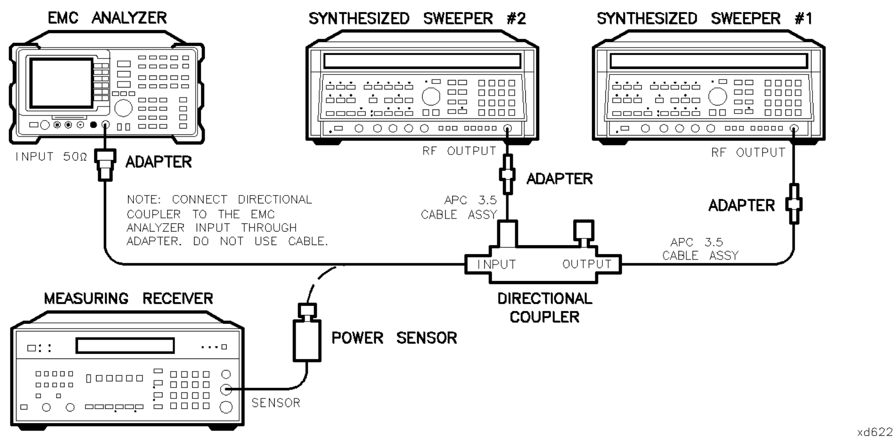

Figure 2-43.
Third-Order Intermodulation Distortion Test Setup, HP 8593EM

36. 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

37. On the EMC analyzer, press (PRESET), then wait until the preset routine is finished. Set the controls as follows:

    (FREQUENCY) 2.8 (GHz)
    (SPAN) 1 (MHz)

30. Spurious Response, HP 8593EM

AMPLITUDE REF LVL 97 dBμV

MKR → MARKER → HIGH More 1 of 3 PEAK EXCURSN 3 dB

DISPLAY More 1 of 2 THRESHLD ON OFF (ON) 17 dBμV

38. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads −12 dBm ±0.05 dB.

39. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the EMC analyzer INPUT 50 Ω using an adapter (do not use a cable).

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

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

    MKR → MARKER → HIGH

    MKR More 1 of 3 MK TRACK ON OFF (ON)

    SPAN 200 kHz

    Wait for the AUTO ZOOM message to disappear.

    MKR More 1 of 3 MK TRACK ON OFF (OFF)

    FREQUENCY ⇧ (step-up key)

    MKR → MARKER → HIGH

    More 1 of 3 MARKER → REF LVL

41. 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 EMC analyzer center frequency until the two signals are centered on the display.

42. Set the EMC analyzer by pressing the following keys:

    BW IF BW AUTO MAN (MAN) 1 kHz

    AVG BW AUTO MAN (MAN) 100 Hz

43. Press the following analyzer keys:

 (MKR →) MARKER → HIGH

 More 1 of 3 More 2 of 3 MARKER Δ

 (DISPLAY) DSP LINE ON OFF (ON)

 Set the display line to a value 54 dB below the current reference level setting.

44. 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 2-44.

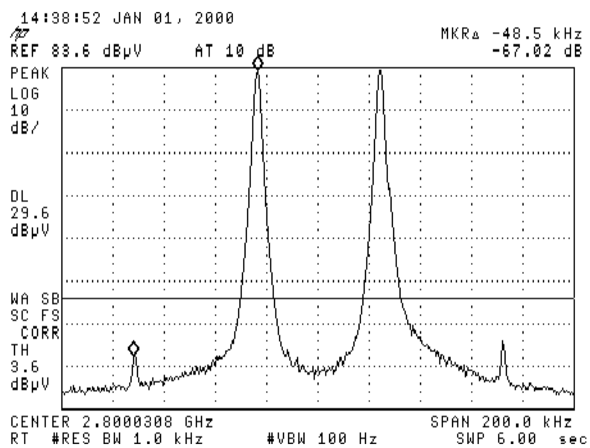

Figure 2-44. Third Order Intermodulation Distortion, HP 8593EM

45. If the distortion products can be seen, proceed as follows:

a. On the EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.

b. Press More 3 of 3 then repeatedly press NEXT PEAK until the active marker is on the highest 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 −54 dBc.

46. 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 EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.

c. Press More 3 of 3 then 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 as **TR Entry 2** of the performance verification test record. The MKR Δ reading should be less than −54 dBc.

Part 4: Third Order Intermodulation Distortion, >2.9 GHz

47. Enter the Power Sensor 4 GHz Cal Factor into the measuring receiver.

48. Disconnect the directional coupler from the EMC analyzer, then connect the power sensor to the output of the directional coupler.

49. 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

50. On the EMC analyzer, press (PRESET), then wait until the preset routine is finished. Set the EMC analyzer by pressing the following keys:

    (FREQUENCY) 4.0 (GHz)
    (SPAN) 1 (MHz)
    (AMPLITUDE) REF LVL 97 dBμV
    (MKR →) MARKER → HIGH More 1 of 3 PEAK EXCURSN 3 (dB)
    (DISPLAY) More 1 of 2 THRESHLD ON OFF 17 dBμV

51. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads −12 dBm ±0.05 dB.

52. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the EMC analyzer INPUT 50 Ω using an adapter (do not use a cable).

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

53. On the EMC analyzer, press the following:

    (MKR →) MARKER → HIGH
    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the `peaking` message to disappear.

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 200 (kHz)

    Wait for the `AUTO ZOOM` message to disappear, then press the following EMC analyzer keys:

    (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
    (FREQUENCY) (⇑) (step-up key)
    (MKR →) MARKER → HIGH
    More 1 of 3 MARKER → REF LVL

54. 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 EMC analyzer center frequency until the two signals are centered on the display.

30. Spurious Response, HP 8593EM

55. Set the EMC analyzer by pressing the following keys:

    (BW) IF BW AUTO MAN (MAN) 1 (kHz)

    AVG BW AUTO MAN (MAN) 100 (Hz)

56. Press (MKR →) MARKER → HIGH, More 1 of 3 More 2 of 3 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 2-44.

57. If the distortion products can be seen, proceed as follows:

    a. On the EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    b. Press More 3 of 3 then repeatedly press NEXT PEAK until the active marker is on the highest 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 −54 dBc.

58. 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 EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    c. Press More 3 of 3 then 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 as **TR Entry 2** of the performance verification test record. The MKR Δ reading should be less than −54 dBc.

31. Spurious Response, HP 8594EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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.

Equipment Required

Synthesized sweeper *(two required)*
Measuring receiver *(used as a power meter)*
Power sensor, 50 MHz to 2.9 GHz
Low pass filter, 50 MHz
Directional coupler
Cable, APC 3.5, 91 cm (36 in) *(two required)*
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) *(two required)*
Adapter, Type N (m) to BNC (f)
Adapter, Type N (m) to APC 3.5 (f)
Adapter, Type N (f) to BNC (m)

31. Spurious Response, HP 8594EM

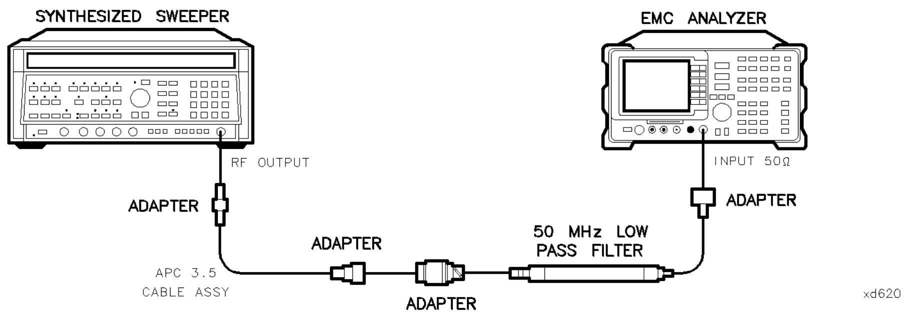

Figure 2-45. Second Harmonic Distortion Test Setup, HP 8594EM

Procedure

Second Harmonic Distortion

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

   (FREQUENCY) 30 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) 77 (+dBμV)
   (BW) 30 (kHz)

4. Adjust the synthesized sweeper power level to place the peak of the signal at the reference level (77 dBμV).
5. Set the EMC analyzer by pressing the following keys:

   (BW) 1 (kHz)
   AVG BW AUTO MAN (MAN) 100 (Hz)

6. Wait for two sweeps to finish, then press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   More 1 of 3 MKR → CF STEP

(MKR) MARKER Δ

(FREQUENCY)

7. Press the (⇧) (step up) key on the EMC analyzer to step to the second harmonic (at 60 MHz). Set the reference level to −57 dBμV. Wait for a full sweep to finish, then press (MKR →) MARKER → HIGH.

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

   Note that the maximum MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of changing the reference level from 77 dBμV to 57 dBμV.

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 2-46 with the input of the directional coupler connected to the power sensor.

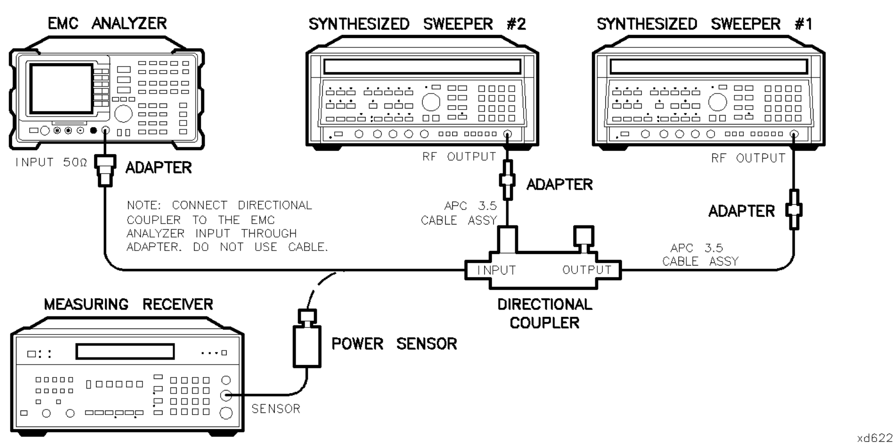

Figure 2-46.
Third-Order Intermodulation Distortion Test Setup, HP 8594EM

11. Press INSTR 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 EMC analyzer, press (PRESET) and wait until the preset routine is finished. Press the following EMC analyzer keys:

    (FREQUENCY) 2.8 (GHz)
    (SPAN) 1 (MHz)
    (AMPLITUDE) 97 (+dBμV)
    (MKR →) MARKER → HIGH More 1 of 3 PEAK EXCURSN 3 (dB)
    (DISPLAY) More 1 of 2 THRESHLD ON OFF (ON) 17 (+dBμV)

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 EMC analyzer INPUT 50 Ω using an adapter (do not use a cable).

15. On the EMC analyzer, press the following keys:

    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 200 (kHz)

    Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

    (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
    (FREQUENCY) (⇑) (step-up key)
    (MKR →) MARKER → HIGH
    More 1 of 3 MARKER → REF LVL

16. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

17. If necessary, adjust the EMC analyzer Center Frequency until the two signals are centered on the display. Press the following EMC analyzer keys:

(BW) 1 (kHz)

AVG BW AUTO MAN (MAN) 100 (Hz)

(MKR →) MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ

(DISPLAY) DSP LINE ON OFF (ON)

Set the display line to a value 54 dB below the current reference level setting.

18. 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 2-47.

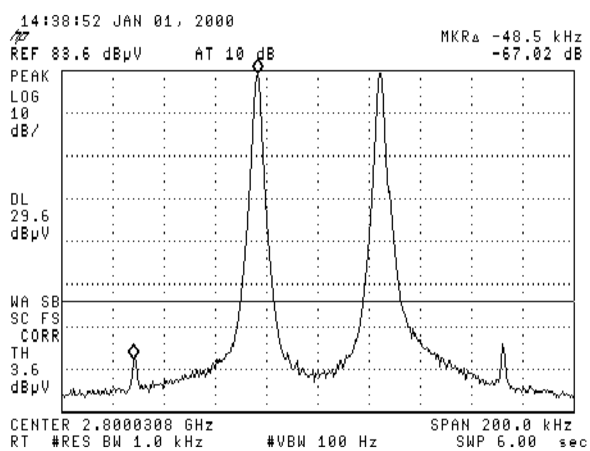

Figure 2-47. Third Order Intermodulation Distortion, HP 8594EM

19. If the distortion products can be seen, proceed as follows:
    a. On the EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    b. Press More 3 of 3 then repeatedly press NEXT PEAK until the active marker is on the highest 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 −54 dBc.
20. 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 EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    c. Press More 3 of 3 then 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 as **TR Entry 2** of the performance verification test record. The MKR Δ reading should be less than −54 dBc.

32. Spurious Response, HP 8595EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 6.5 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 EMC 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.

Equipment Required

Synthesized sweeper *(two 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
Directional coupler
Cable, APC 3.5, 91 cm (36 in) *(two required)*
Cable, BNC, 120 cm (48 in)
Adapter, Type N (m) to APC 3.5 (m)

32. Spurious Response, HP 8595EM

Adapter, APC 3.5 (f) to APC 3.5 (f) *(two required)*
Adapter, Type N (m) to BNC (f)
Adapter, Type N (m) to APC 3.5 (f)
Adapter, Type N (f) to BNC (m)

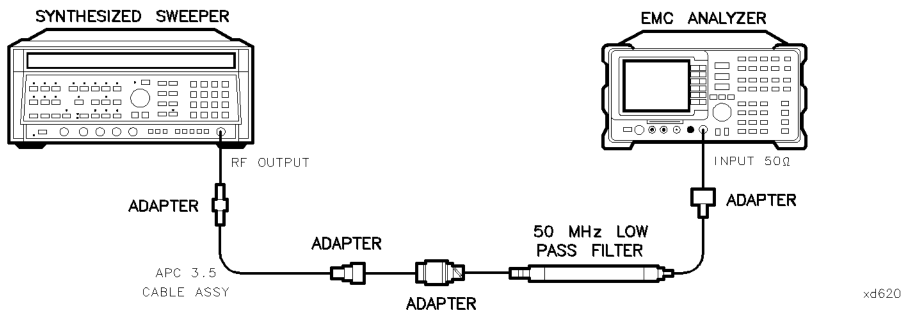

Figure 2-48. Second Harmonic Distortion Test Setup, HP 8595EM

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 2-48.

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

   (FREQUENCY) 30 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) REF LVL 77 (+dBμV)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)

4. Adjust the synthesized sweeper power level to place the peak of the signal displayed on the EMC analyzer at the reference level (77 dBμV).
5. Press the following EMC analyzer keys:

   (BW) IF BW AUTO MAN (MAN) 1 (kHz)

   AVG BW AUTO MAN (MAN) 100 (Hz)
6. Wait for two sweeps to finish, then press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH

   More 1 of 3 MKR → CF STEP

   (MKR) MARKER Δ

   (FREQUENCY)
7. Press the (⇑) (step up) key on the EMC analyzer to step to the second harmonic (at 60 MHz). Set the reference level to −57 dBμV.
8. Wait for one full sweep, then press (MKR →) MARKER → HIGH.
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 maximum MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of changing the reference level from 77 dBμV to 57 dBμV.

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 EMC analyzer INPUT 50 Ω.

b. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

(FREQUENCY) 5.6 (GHz)
(SPAN) ZERO SPAN
(AMPLITUDE) REF LVL 67 (+dBμV)
(BW) IF BW AUTO MAN (MAN) 1 (kHz)
AVG BW AUTO MAN (MAN) 30 (Hz)
(TRACE) More 1 of 4 More 2 of 4 VID AVG ON OFF (ON) 10 (ENTER)
(SWEEP/TRIG) SWP TIME AUTO MAN (MAN) 5.0 (sec)

c. Press (SGL SWP). Wait until AVG 10 is displayed along the left side of the CRT display.

d. Press (MKR →) MARKER → HIGH on the EMC analyzer and record the marker amplitude reading as the Noise Level at 5.6 GHz in Table 2-48.

12. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC 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 2-49, with the output of the synthesized sweeper connected to the input of the power splitter, and the power splitter outputs connected to the EMC analyzer and the power sensor.

14. On the synthesized sweeper, press preset, then set the controls as follows:

CW .... 2.8 GHz
POWER LEVEL .... 0 dBm

15. On the EMC analyzer, press the following keys:

(MKR →) MARKER → HIGH
(AMPLITUDE) More 1 of 3 PRESEL PEAK

Wait for the peaking message to disappear.

16. Press (MKR →) MARKER → HIGH, More 1 of 3 More 2 of 3 MARKER Δ, then record the power meter reading at 2.8 GHz in Table 2-48.
17. Set the synthesized sweeper CW to 5.6 GHz.
18. Press the following EMC analyzer keys:

    (FREQUENCY) 5.6 (GHz)
    (MKR →) MARKER → HIGH
    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the `peaking` message to disappear.

    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

19. Adjust the synthesized sweeper power level until the Marker Δ Amplitude reads 0 dB ±0.20 dB.
20. Enter the power sensor 6 GHz Cal Factor into the power meter.
21. Record the Power Meter Reading at 5.6 GHz in Table 2-48.
22. Subtract the Power Meter Reading at 5.6 GHz from the Power Meter Reading at 2.8 GHz, then record this value as the Frequency Response Error (FRE) in Table 2-48.

    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.

    Power Meter Reading at 2.8 GHz − Power Meter Reading at 5.6 GHz = FRE

32. Spurious Response, HP 8595EM

Table 2-48. Second Harmonic Distortion Worksheet

Description	Measurement
Noise Level at 5.6 GHz	______________dBμV
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

23. 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 2-48.

 Distortion-limited Specification = −60 dBc + FRE

 b. Subtract 67 dBμV (reference level setting) from Noise Level at 5.6 GHz, then record in Table 2-48.

 Noise-limited Specification = Noise Level at 5.6 GHz + 67 dBμV

 c. Record the more positive of the values recorded in a and b above as **TR Entry 2** of the performance verification test record. For example, if the value in a is −59 dBc and the value in b is −61 dBc, record −59 dBc.

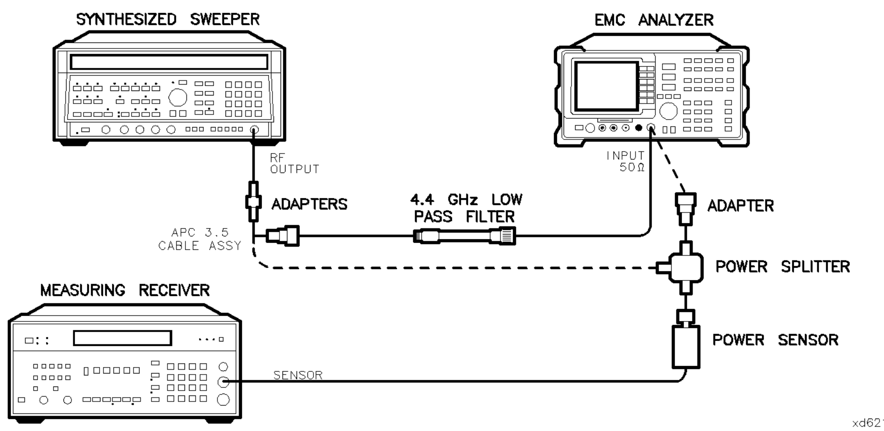

Figure 2-49.
Second Harmonic Distortion Test Setup, >2.9 GHz, HP 8595EM

24. Connect the equipment as shown in Figure 2-49 with the filter in place.

25. Set the synthesized sweeper controls as follows:

 CW .... 2.8 GHz
 POWER LEVEL .... 0 dBm

26. Set the EMC analyzer by pressing the following keys:

    FREQUENCY 2.8 GHz
    MKR MARKERS OFF
    MKR → MARKER → HIGH
    AMPLITUDE More 1 of 3 PRESEL PEAK

    Wait for the peaking message to disappear.

    MKR More 1 of 3 MK TRACK ON OFF (ON)
    SPAN 100 kHz

27. Adjust the synthesized sweeper power level for an EMC analyzer marker amplitude reading of 107 dBμV $\pm$0.2 dB.

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

    MKR More 1 of 3 MK TRACK ON OFF (OFF)
    MKR → MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ
    FREQUENCY 5.6 GHz
    SPAN 10 MHz

29. Remove the filter and connect the synthesized sweeper output directly to the EMC analyzer INPUT 50 Ω.

30. On the EMC analyzer, press the following keys:

    MKR → MARKER → HIGH
    AMPLITUDE More 1 of 3 PRESEL PEAK

    Wait for the peaking message to disappear.

    MKR More 1 of 3 MK TRACK ON OFF (ON)
    SPAN 100 kHz

31. Reinstall the filter between the synthesized sweeper output and the EMC analyzer INPUT 50 Ω.

32. Set the EMC analyzer by pressing the following keys:

    (AMPLITUDE) REF LVL 67 (+dBμV)

    (BW) AVG BW AUTO MAN (MAN) 30 (Hz)

    (TRACE) More 1 of 4 More 2 of 4 VID AVG ON OFF (ON) 10 (ENTER)
    (SGL SWP)

    Wait until AVG 10 is displayed along the left side of the CRT display.

33. Press (MKR →) MARKER → HIGH, 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

34. 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.
35. Connect the equipment as shown in Figure 2-50 with the input of the directional coupler connected to the power sensor.

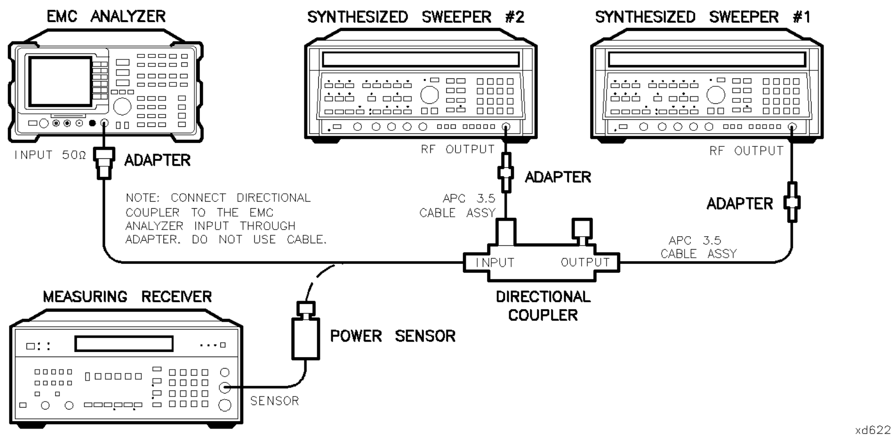

Figure 2-50.
Third-Order Intermodulation Distortion Test Setup, HP 8595EM

36. 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

37. On the EMC 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` 97 (+dBμV)
    (MKR →) `MARKER → HIGH` `More 1 of 3` `PEAK EXCURSN` 3 (dB)
    (DISPLAY) `More 1 of 2` `THRESHLD ON OFF` (ON) 17 (+dBμV)

38. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads −12 dBm ±0.05 dB.

39. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the EMC analyzer INPUT 50 Ω using an adapter (do not use a cable).

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

    (MKR →) MARKER → HIGH

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

    (SPAN) 200 (kHz)

    Wait for the AUTO ZOOM message to disappear.

    (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

    (FREQUENCY) (⇑) (step-up key)

    (MKR →) MARKER → HIGH

    More 1 of 3 MARKER → REF LVL

41. 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 EMC analyzer center frequency until the two signals are centered on the display.

42. Set the EMC analyzer by pressing the following keys:

    (BW) IF BW AUTO MAN (MAN) 1 (kHz)

    AVG BW AUTO MAN (MAN) 100 (Hz)

43. Press the following analyzer keys:

    (MKR →) MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ

    (DISPLAY) DSP LINE ON OFF (ON)

    Set the display line to a value 54 dB below the current reference level setting.

44. 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.

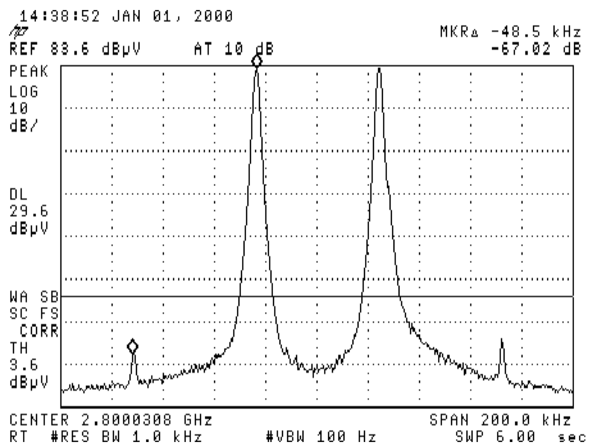

Figure 2-51. Third Order Intermodulation Distortion, HP 8595EM

45. If the distortion products can be seen, proceed as follows:
   a. On the EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
   b. Press More 3 of 3 then repeatedly press NEXT PEAK until the active marker is on the highest 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 −54 dBc.

46. 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 EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    c. Press More 3 of 3 then 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 as **TR Entry 2** of the performance verification test record. The MKR Δ reading should be less than −54 dBc.

Part 4: Third Order Intermodulation Distortion, >2.9 GHz

47. Enter the Power Sensor 4 GHz Cal Factor into the measuring receiver.
48. Disconnect the directional coupler from the EMC analyzer, then connect the power sensor to the output of the directional coupler.
49. 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

50. On the EMC analyzer, press (PRESET), then wait until the preset routine is finished. Set the EMC analyzer by pressing the following keys:

    (FREQUENCY) 4.0 (GHz)
    (SPAN) 1 (MHz)
    (BW) REF LVL 97 (+dBμV)
    (MKR →) MARKER → HIGH More 1 of 3 PEAK EXCURSN 3 (dB)
    (DISPLAY) THRESHLD ON OFF 17 (+dBμV)

51. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads −12 dBm ±0.05 dB.

52. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the EMC analyzer INPUT 50 Ω using an adapter (do not use a cable).

53. On the EMC analyzer, press the following key:

    (MKR →) MARKER → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the peaking message to disappear.

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 200 (kHz)

    Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

    (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
    (FREQUENCY) (⇧) (step-up key)
    (MKR →) MARKER → HIGH
    More 1 of 3 MARKER → REF LVL

54. 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 EMC analyzer center frequency until the two signals are centered on the display.

55. Set the EMC analyzer by pressing the following keys:

    (BW) IF BW AUTO MAN (MAN) 1 (kHz)

    AVG BW AUTO MAN (MAN) 100 (Hz)

56. Press (MKR →) MARKER → HIGH, More 1 of 3 More 2 of 3 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 2-51.

57. If the distortion products can be seen, proceed as follows:
    a. On the EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    b. Press More 3 of 3 then repeatedly press NEXT PEAK until the active marker is on the highest 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 −54 dBc.
58. 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 EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    c. Press More 3 of 3 then 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 as **TR Entry 2** of the performance verification test record. The MKR Δ reading should be less than −54 dBc.

33. Spurious Response, HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode.*

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 EMC 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.

Equipment Required

Synthesized sweeper *(two 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
Directional coupler
Cable, APC 3.5, 91 cm (36 in) *(two required)*
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) *(two required)*
Adapter, Type N (m) to BNC (f)
Adapter, Type N (m) to APC 3.5 (f)
Adapter, Type N (f) to BNC (m)

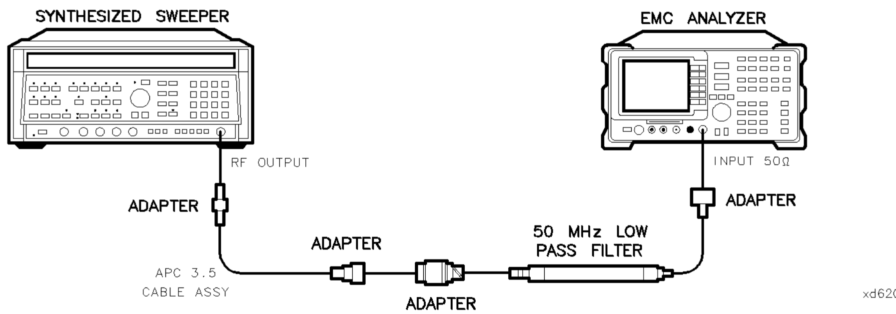

Figure 2-52. Second Harmonic Distortion Test Setup, HP 8596EM

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 2-52.

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

   (FREQUENCY) 30 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) REF LVL 77 (+dBμV)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)

4. Adjust the synthesized sweeper power level to place the peak of the signal displayed on the EMC analyzer at the reference level (77 dBμV).
5. Press the following EMC analyzer keys:

   (BW) IF BW AUTO MAN (MAN) 1 (kHz)

   AVG BW AUTO MAN (MAN) 100 (Hz)

6. Wait for two sweeps to finish, then press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH

   More 1 of 3 MKR → CF STEP

   (MKR) MARKER Δ

   (FREQUENCY)

7. Press the (⇧) (step up) key on the EMC analyzer to step to the second harmonic (at 60 MHz). Set the reference level to 57 dBμV.
8. Wait for one full sweep, then press (MKR →) MARKER → HIGH.
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 maximum MKR Δ Amplitude Reading is 20 dB higher than the specification. This is a result of changing the reference level from 77 dBμV to 57 dBμV.

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 EMC analyzer INPUT 50 Ω.

b. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

(FREQUENCY) 5.6 (GHz)
(SPAN) ZERO SPAN
(AMPLITUDE) REF LVL 67 (+dBμV)
(BW) IF BW AUTO MAN (MAN) 1 (kHz)
AVG BW AUTO MAN (MAN) 30 (Hz)
(TRACE) More 1 of 4 More 2 of 4 VID AVG ON OFF (ON) 10 (ENTER)
(SWEEP/TRIG) SWP TIME AUTO MAN (MAN) 5.0 (sec)

c. Press (SGL SWP). Wait until AVG 10 is displayed along the left side of the CRT display.

d. Press (MKR →) MARKER → HIGH on the EMC analyzer and record the marker amplitude reading as the Noise Level at 5.6 GHz in Table 2-49.

12. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

(FREQUENCY) More 1 of 2 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 EMC analyzer and the power sensor.

14. On the synthesized sweeper, press preset, then set the controls as follows:

CW .... 2.8 GHz
POWER LEVEL .... 0 dBm

15. On the EMC analyzer, press the following keys:

(MKR →) MARKER → HIGH
(AMPLITUDE) More 1 of 3 PRESEL PEAK

Wait for the peaking message to disappear.

33. Spurious Response, HP 8596EM

16. Press (MKR →) MARKER → HIGH, More 1 of 3 More 2 of 3 MARKER Δ, then record the power meter reading at 2.8 GHz in Table 2-49.
17. Set the synthesized sweeper CW to 5.6 GHz.
18. Press the following EMC analyzer keys:

    (FREQUENCY) 5.6 (GHz)

    (MKR →) MARKER → HIGH

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the peaking message to disappear.

    (MKR →) MARKER → HIGH

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

19. Adjust the synthesized sweeper power level until the Marker Δ Amplitude reads 0 dB ±0.20 dB.
20. Enter the power sensor 6 GHz Cal Factor into the power meter.
21. Record the Power Meter Reading at 5.6 GHz in Table 2-49.
22. Subtract the Power Meter Reading at 5.6 GHz from the Power Meter Reading at 2.8 GHz, then record this value as the Frequency Response Error (FRE) in Table 2-49. 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.

    Power Meter Reading at 2.8 GHz − Power Meter Reading at 5.6 GHz = FRE

Table 2-49. Second Harmonic Distortion Worksheet

Description	Measurement
Noise Level at 5.6 GHz	______________dBμV
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

23. 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 2-49.

    $$Distortion\text{-}limited\ Specification = -60\ dBc + FRE$$

    b. Subtract 67 dBμV (reference level setting) from Noise Level at 5.6 GHz, then record in Table 2-49.

    $$Noise\text{-}limited\ Specification = Noise\ Level\ at\ 5.6\ GHz + 67\ dB\mu V$$

    c. Record the more positive of the values recorded in a and b above as **TR Entry 2** of the performance verification test record. For example, if the value in a is −59 dBc and the value in b is −61 dBc, record −59 dBc.

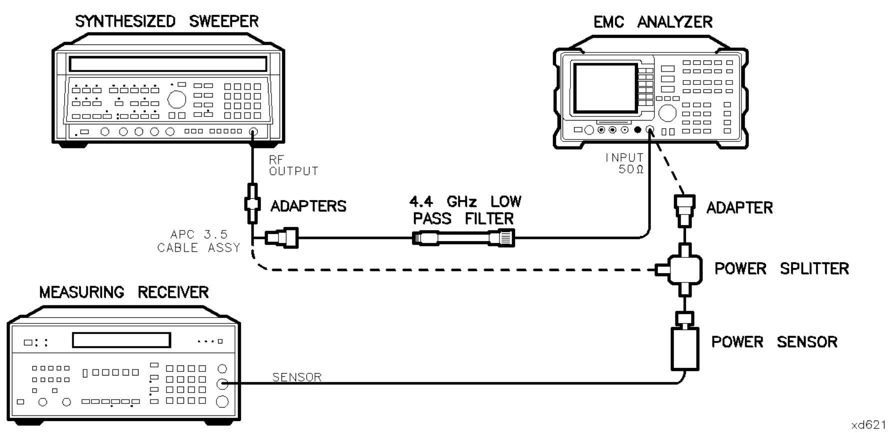

Figure 2-53.
Second Harmonic Distortion Test Setup, >2.9 GHz, HP 8596EM

24. Connect the equipment as shown in Figure 2-53 with the filter in place.

25. Set the synthesized sweeper controls as follows:

    CW .... 2.8 GHz
    POWER LEVEL .... 0 dBm

26. Set the EMC analyzer by pressing the following keys:

    (FREQUENCY) 2.8 (GHz)
    (MKR) More 1 of 3 MARKER ALL OFF
    (MKR →) MARKER → HIGH
    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the peaking message to disappear.

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 100 (kHz)

27. Adjust the synthesized sweeper power level for an EMC analyzer marker amplitude reading of 107 dBμV $\pm$0.2 dB.

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

    (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
    (MKR →) MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ
    (FREQUENCY) 5.6 (GHz)
    (SPAN) 10 (MHz)

29. Remove the filter and connect the synthesized sweeper output directly to the EMC analyzer INPUT 50 Ω.

30. On the EMC analyzer, press the following keys:

    (MKR →) MARKER → HIGH
    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the peaking message to disappear.

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 100 (kHz)

31. Reinstall the filter between the synthesized sweeper output and the EMC analyzer INPUT 50 Ω.

32. Set the EMC analyzer by pressing the following keys:

    (AMPLITUDE) REF LVL 67 (+dBμV)

    (BW) AVG BW AUTO MAN (MAN) 30 (Hz)

    (TRACE) More 1 of 4 More 2 of 4 VID AVG ON OFF (ON) 10 (ENTER)

    (SGL SWP)

    Wait until AVG 10 is displayed along the left side of the CRT display.

33. Press (MKR →) MARKER → HIGH, 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.

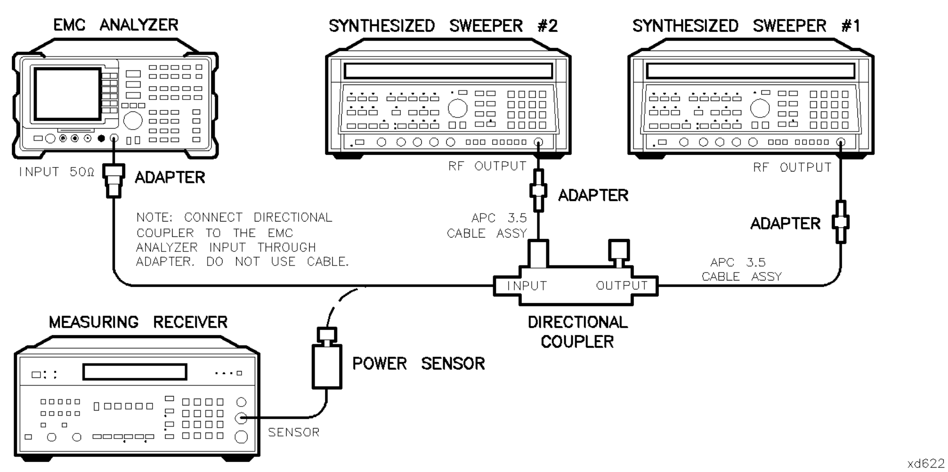

Figure 2-54.
Third-Order Intermodulation Distortion Test Setup, HP 8596EM

Part 3: Third Order Intermodulation Distortion, <2.9 GHz

34. 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.

35. Connect the equipment as shown in Figure 2-54 with the input of the directional coupler connected to the power sensor.

36. 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

37. On the EMC 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 97 (+dBμV)
    (MKR →) MARKER → HIGH More 1 of 3 PEAK EXCURSN 3 (dB)
    (DISPLAY) More 1 of 2 THRESHLD ON OFF (ON) 17 (+dBμV)

38. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads −12 dBm ±0.05 dB.

39. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the EMC analyzer INPUT 50 Ω using an adapter (do not use a cable).

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

    (MKR →) MARKER → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 200 (kHz)

    Wait for the AUTO ZOOM message to disappear.

    (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
    (FREQUENCY) (⇑) (step-up key)
    (MKR →) MARKER → HIGH
    More 1 of 3 MARKER → REF LVL

41. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

33. Spurious Response, HP 8596EM

If necessary, adjust the EMC analyzer center frequency until the two signals are centered on the display.

42. Set the EMC analyzer by pressing the following keys:

    (BW) IF BW AUTO MAN (MAN) 1 (kHz)

    AVG BW AUTO MAN (MAN) 100 (Hz)

43. Press the following analyzer keys:

    (MKR →) MARKER → HIGH More 1 of 3 More 2 of 3 MARKER Δ

    (DISPLAY) DSP LINE ON OFF (ON)

    Set the display line to a value 54 dB below the current reference level setting.

44. 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.

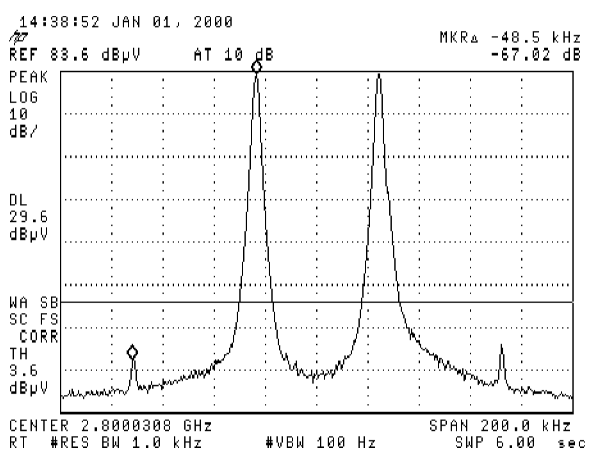

Figure 2-55. Third Order Intermodulation Distortion, HP 8596EM

45. If the distortion products can be seen, proceed as follows:

    a. On the EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    b. Press More 3 of 3 then repeatedly press NEXT PEAK until the active marker is on the highest 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 −54 dBc.

46. 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 EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    c. Press More 3 of 3 then 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 as **TR Entry 2** of the performance verification test record. The MKR Δ reading should be less than −54 dBc.

Part 4: Third Order Intermodulation Distortion, >2.9 GHz

47. Enter the Power Sensor 4 GHz Cal Factor into the measuring receiver.

48. Disconnect the directional coupler from the EMC analyzer, then connect the power sensor to the output of the directional coupler.

49. 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

50. On the EMC analyzer, press (PRESET), then wait until the preset routine is finished. Set the EMC analyzer by pressing the following keys:

    (FREQUENCY) 4.0 (GHz)
    (SPAN) 1 (MHz)
    (AMPLITUDE) REF LVL 97 (+dBμV)
    (MKR →) MARKER → HIGH More 1 of 3 PEAK EXCURSN 3 (dB)
    (DISPLAY) More 1 of 2 THRESHLD ON OFF 17 (+dBμV)

51. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads −12 dBm ±0.05 dB.
52. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the EMC analyzer INPUT 50 Ω using an adapter (do not use a cable).
53. On the EMC analyzer, press the following key:

    (MKR →) MARKER → HIGH
    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the peaking message to disappear.

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 200 (kHz)

    Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

    (MKR) More 1 of 3 MK TRACK ON OFF (OFF)
    (FREQUENCY) (⇧) (step-up key)
    (MKR →) MARKER → HIGH
    More 1 of 3 MARKER → REF LVL

54. 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 EMC analyzer center frequency until the two signals are centered on the display.

55. Set the EMC analyzer by pressing the following keys:

    (BW) IF BW AUTO MAN (MAN) 1 (kHz)

    AVG BW AUTO MAN (MAN) 100 (Hz)

56. Press (MKR →) MARKER → HIGH, More 1 of 3 More 2 of 3 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.

57. If the distortion products can be seen, proceed as follows:
    a. On the EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    b. Press More 3 of 3 then repeatedly press NEXT PEAK until the active marker is on the highest 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 −54 dBc.

58. 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 EMC analyzer, press (MKR →), MARKER → HIGH, More 1 of 3, More 2 of 3, and MARKER Δ.
    c. Press More 3 of 3 then 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 as **TR Entry 2** of the performance verification test record. The MKR Δ reading should be less than −54 dBc.

34. Gain Compression, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

Gain compression is measured by applying two signals, separated by 3 MHz. First, the test places a −20 dBm (87 dBμV) signal at the input of the EMC analyzer (the EMC analyzer reference level is also set to 87 dBμV). Then, a 0 dBm (107 dBμV) signal is applied to the EMC 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 the narrow bandwidth part of this test, 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) *(two 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)

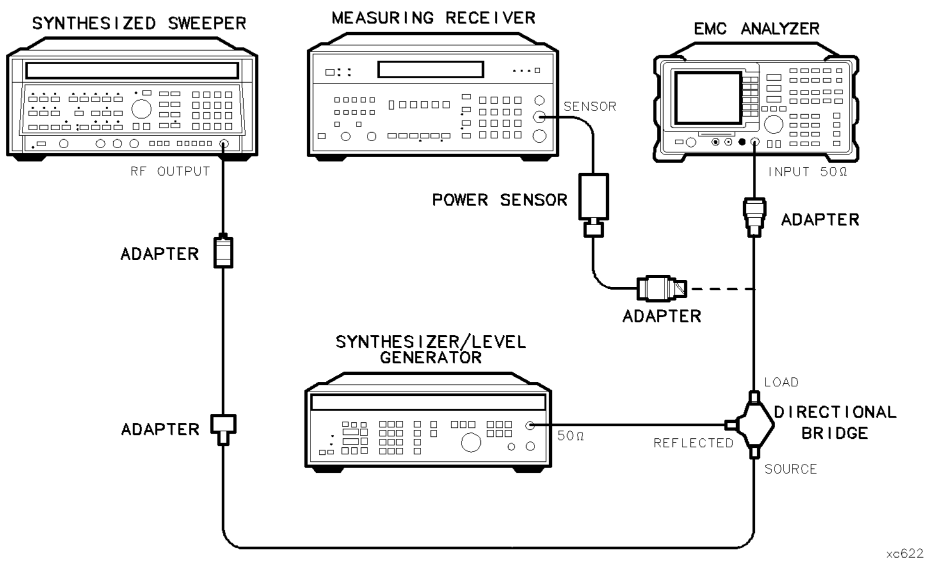

Figure 2-56. Gain Compression Test Setup, HP 8591EM

Procedure

1. Zero and calibrate the measuring receiver and 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.
2. Connect the equipment as shown in Figure 2-56, with the load of the directional bridge connected to the power sensor.
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 EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

   (FREQUENCY) 50 (MHz)
   (SPAN) 20 (MHz)
   (AMPLITUDE) 87 (dBμV)
   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 EMC 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 EMC 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 EMC analyzer using an adapter. Do not use a cable.
9. On the EMC analyzer, press the following keys:

   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 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 EMC analyzer reference level.
11. On the EMC analyzer, press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
12. On the synthesized sweeper, set RF to ON.
13. On the EMC analyzer, press (MKR →) MKR → HIGH, 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 EMC 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.

Narrow Bandwidth

15. Remove the EMC analyzer from the directional bridge and reconnect the measuring receiver power sensor to the directional bridge as shown in Figure 2-56.
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/level generator controls as follows:

    FREQUENCY .... 50 MHz
    AMPLITUDE .... −14 dBm
    50 Ω/75 Ω SWITCH .... 75 Ω (no RF output)

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 synthesizer/level generator, set the 50 Ω/75 Ω switch to 50 Ω.
20. Disconnect the power sensor from the directional bridge and connect the directional bridge to the INPUT 50 Ω connector of the EMC analyzer using an adapter. Do not use a cable.
21. On the EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

    (FREQUENCY) 50 (MHz)
    (SPAN) 10 (MHz)
    (AMPLITUDE) 97 (dBμV)
    (MKR →) MKR → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 2 (kHz)

    Wait for the auto zoom routine to finish.

22. On the synthesizer/level generator, adjust the amplitude to place the signal 10 dB below the EMC analyzer reference level.

23. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
24. On the synthesized sweeper, set RF to ON.
25. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
26. Read the MKR Δ amplitude and record in the performance verification test record as **TR Entry 2**.

35. Gain Compression, HP 8593EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 (77 dBμV) signal at the input of the EMC analyzer (the EMC analyzer reference level is also set to 77 dBμV). Then, a 0 dBm (107 dbμV) signal is applied to the EMC 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 the narrow bandwidth part of this test, 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 *(two 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) *(two required)*
Adapter, Type N (m) to APC 3.5 (m) *(not required for Option 026)*
Adapter, APC 3.5 (f) to APC 3.5 (f) *(two required)*

35. Gain Compression, HP 8593EM

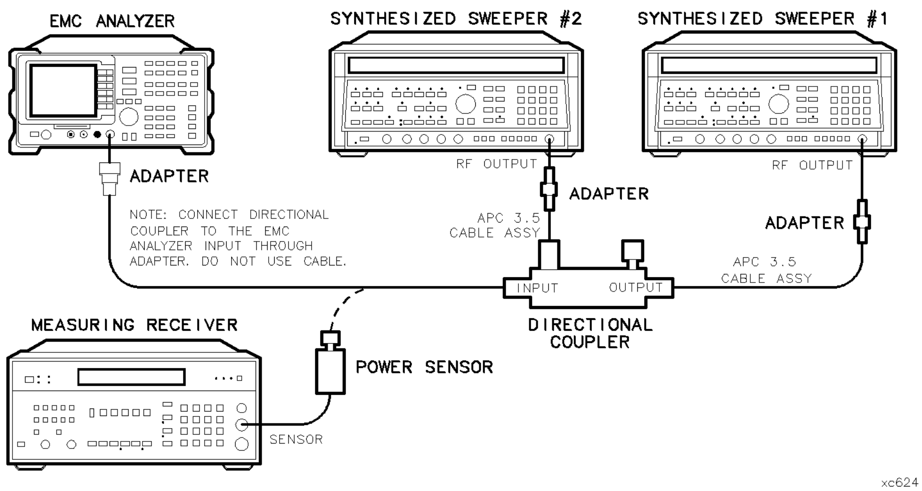

Figure 2-57. Gain Compression Test Setup, HP 8593EM

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 2-57, with the output of the directional coupler connected to the power sensor.
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 EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 20 (MHz)
   (AMPLITUDE) REF LVL 77 (dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) IF BW AUTO MAN (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 EMC 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 EMC 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 EMC analyzer using an adapter. Do not use a cable.

Option 026 only: Connect the directional coupler to the EMC analyzer directly.

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

   (MKR →) MKR → HIGH

   (MKR) More 1 of 3 MK TRACK ON OFF (ON)

   (SPAN) 10 (MHz)

   Wait for the AUTO ZOOM routine to finish.

10. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the EMC analyzer reference level.
11. On the EMC analyzer, press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
12. On synthesized sweeper #1, set RF to ON.
13. On the EMC analyzer, press (MKR →) MKR → HIGH, 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 EMC 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 EMC analyzer input, then connect the directional coupler to the power sensor.
16. Set the EMC analyzer by pressing the following key:

    (FREQUENCY) 4.0 (GHz)
    (SPAN) 20 (MHz)
    (MKR) More 1 of 3 MARKER ALL 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 EMC analyzer using an adapter. Do not use a cable.

22. On the EMC analyzer, press the following keys:

    (MKR →) MKR → HIGH

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

    Wait for the signal to be centered on screen.

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear.

    (SPAN) 10 (MHz)

    Wait for the AUTO ZOOM message to disappear.

23. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the EMC analyzer reference level.

24. On the EMC analyzer, press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.

25. On synthesized sweeper #1, set RF to ON.

26. On the EMC analyzer, press (MKR →) MKR → HIGH, 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 EMC analyzer knob.

27. 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.

Narrow Bandwidth

28. Remove the EMC analyzer from the directional coupler and reconnect the measuring receiver power sensor to the directional coupler as shown in Figure 2-57.
29. Press INSTRUMENT PRESET on both synthesized sweepers.
30. Set synthesized sweeper #1 controls as follows:

    CW .... 2.000 010 MHz
    POWER LEVEL .... 0 dBm

31. Set synthesized sweeper #2 controls as follows:

    CW .... 2.0 GHz
    POWER LEVEL .... −14 dBm
    RF .... OFF

32. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.
33. On synthesized sweeper #2, set the RF to ON.
34. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the EMC analyzer using an adapter. Do not use a cable.
35. On the EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

    (FREQUENCY) 2.0 (GHz)
    (SPAN) 10 (MHz)
    (AMPLITUDE) 97 (dBμV)
    (MKR →) MKR → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 2 (kHz)

    Wait for the AUTO ZOOM message to disappear.
36. On synthesized sweeper #2, adjust the amplitude to place the signal 10 dB below the EMC analyzer reference level.

37. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.

38. On synthesized sweeper #1, set RF to ON.

39. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH, MARKER Δ.

40. Read the MKR Δ amplitude and record in the performance verification test record as **TR Entry 3**.

36. Gain Compression, HP 8594EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

This performance verification test measures gain compression. Two signals, separated by 3 MHz, are used. First, the test places a −30 dBm (77 dBμV) signal at the input of the EMC analyzer (the EMC analyzer reference level is also set to 77 dBμV). Then, a 107 dBμV signal is applied to the EMC 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 the narrow bandwidth part of this test, 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 *(two 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) *(two required)*
Adapter, Type N (m) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f) *(two required)*

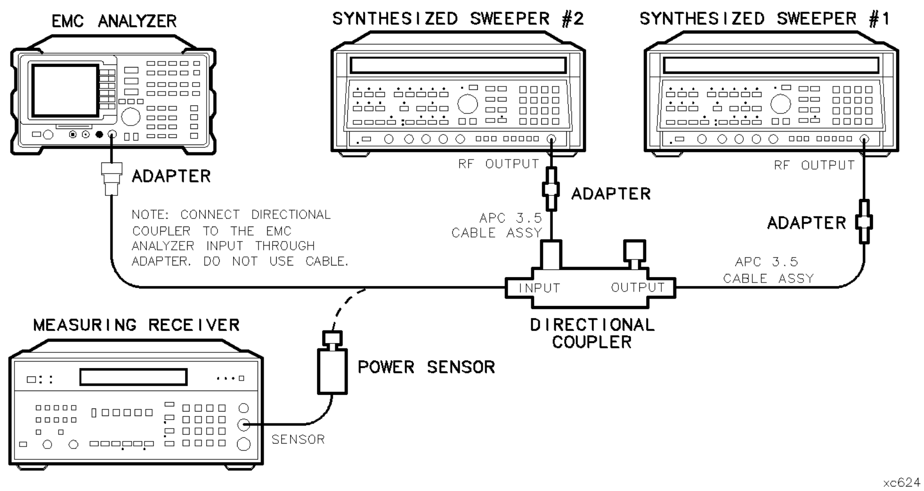

Figure 2-58. Gain Compression Test Setup, HP 8594EM

Procedure

Gain Compression, <2.9 GHz

1. Zero and calibrate the measuring receiver and the 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 2-58, with the output of the directional coupler connected to the power sensor.
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 EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 20 (MHz)
   (AMPLITUDE) REF LVL 77 (dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) IF BW AUTO MAN (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 EMC 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 EMC 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 EMC analyzer using an adapter. Do not use a cable.

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

   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (MHz)

   Wait for the AUTO ZOOM routine to finish.

10. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the EMC analyzer reference level.

11. On the EMC analyzer, press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.

12. On synthesized sweeper #1, set RF to ON.

13. On the EMC analyzer, press (MKR →) MKR → HIGH, 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 EMC 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.

Narrow Bandwidth

15. Remove the EMC analyzer from the directional coupler and reconnect the measuring receiver power sensor to the directional coupler as shown in Figure 2-58.
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 EMC analyzer using an adapter. Do not use a cable.
22. On the EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

    (FREQUENCY) 2.0 (GHz)
    (SPAN) 10 (MHz)
    (AMPLITUDE) 97 (dBμV)
    (MKR →) MKR → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 2 (kHz)

    Wait for the AUTO ZOOM message to disappear.

23. On synthesized sweeper #2, adjust the amplitude to place the signal 10 dB below the EMC analyzer reference level.

24. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
25. On synthesized sweeper #1, set RF to ON.
26. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
27. Read the MKR Δ amplitude and record in the performance verification test record as **TR Entry 2**.

37. Gain Compression, HP 8595EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 (77 dBμV) signal at the input of the EMC analyzer (the EMC analyzer reference level is also set to 77 dBμV). Then, a 0 dBm (107 dBμV) signal is applied to the EMC 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 the narrow bandwidth part of this test, 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 *(two 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) *(two required)*
Adapter, Type N (m) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f) *(two required)*

37. Gain Compression, HP 8595EM

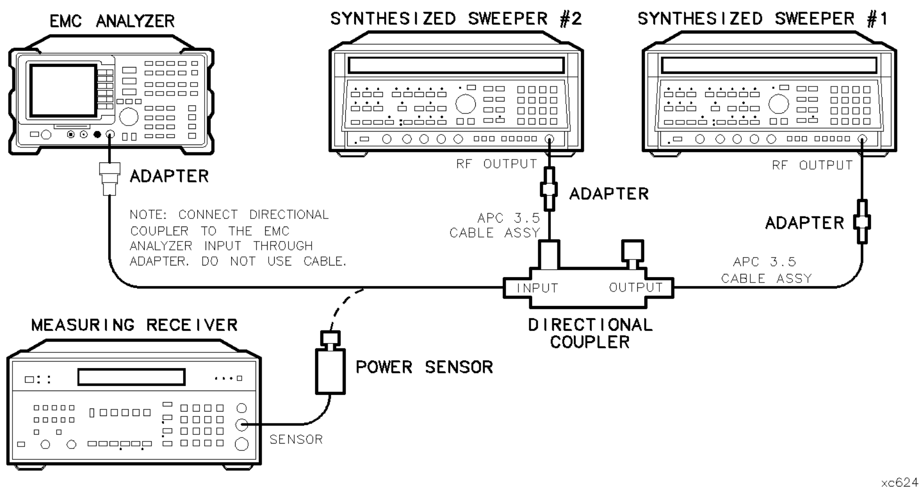

Figure 2-59. Gain Compression Test Setup, HP 8595EM

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 2-59, with the output of the directional coupler connected to the power sensor.
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 EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 20 (MHz)
   (AMPLITUDE) REF LVL 77 (dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) IF BW AUTO MAN (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 EMC 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 EMC 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 EMC analyzer using an adapter. Do not use a cable.

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

   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (MHz)

   Wait for the AUTO ZOOM routine to finish.

10. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the EMC analyzer reference level.

11. On the EMC analyzer, press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.

12. On synthesized sweeper #1, set RF to ON.

13. On the EMC analyzer, press (MKR →) MKR → HIGH, 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 EMC 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 EMC analyzer input, then connect the directional coupler to the power sensor.
16. Set the EMC analyzer by pressing the following key:

    (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 EMC analyzer using an adapter. Do not use a cable.
22. On the EMC analyzer, press the following keys:

    (MKR →) MKR → HIGH

    (MKR) More 1 of 3 MK TRACK ON OFF (ON)

    Wait for the signal to be centered on screen.

    (AMPLITUDE) More 1 of 3 PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear.

    (SPAN) 10 (MHz)

    Wait for the AUTO ZOOM message to disappear.

23. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the EMC analyzer reference level.
24. On the EMC analyzer, press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
25. On synthesized sweeper #1, set RF to ON.
26. On the EMC analyzer, press (MKR →) MKR → HIGH, 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 EMC analyzer knob.
27. 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.

Narrow Bandwidth

28. Connect the equipment as shown in Figure 2-59.
29. Press INSTRUMENT PRESET on both synthesized sweepers.
30. Set synthesized sweeper #1 controls as follows:

    CW .... 2.000 010 GHz
    POWER LEVEL .... 0 dBm
31. Set synthesized sweeper #2 controls as follows:

    CW .... 2.0 GHz
    POWER LEVEL .... −14 dBm
    RF .... OFF
32. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.
33. On synthesized sweeper #2, set the RF to ON.
34. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the EMC analyzer using an adapter. Do not use a cable.
35. On the EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

    (FREQUENCY) 2.0 (GHz)

37. Gain Compression, HP 8595EM

(SPAN) 10 (MHz)
(AMPLITUDE) 97 (dBμV)
(MKR →) MKR → HIGH
(MKR) More 1 of 3 MK TRACK ON OFF (ON)
(SPAN) 2 (kHz)

Wait for the AUTO ZOOM message to disappear.

36. On synthesized sweeper #2, adjust the amplitude to place the signal 10 dB below the EMC analyzer reference level.
37. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH.
38. On synthesized sweeper #1, set RF to ON.
39. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
40. Read the MKR Δ amplitude and record in the performance verification test record as **TR Entry 3**.

38. Gain Compression, HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 (77 dBμV) signal at the input of the EMC analyzer (the EMC analyzer reference level is also set to dBμV). Then, a 0 dBm (107 dBμV) signal is applied to the EMC 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 the narrow bandwidth part of this test, 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 *(two 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) *(two required)*
Adapter, Type N (m) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f) *(two required)*

38. Gain Compression, HP 8596EM

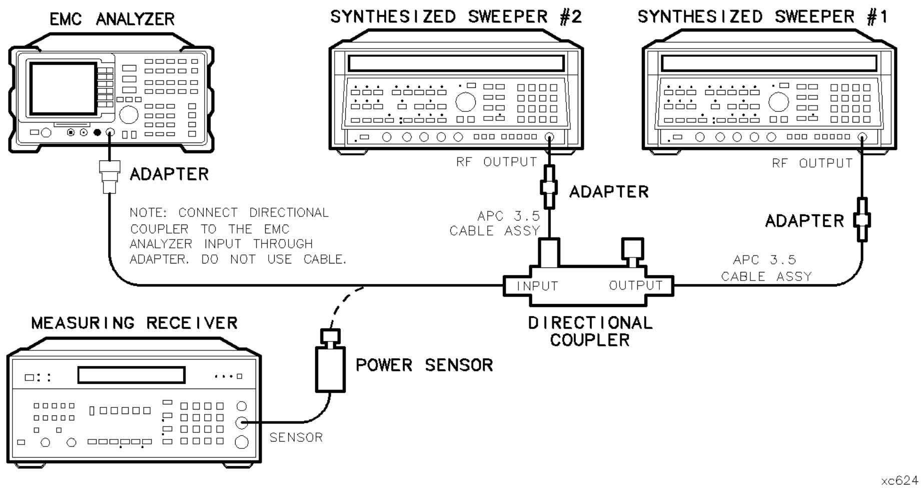

Figure 2-60. Gain Compression Test Setup, HP 8596EM

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 2-60, with the output of the directional coupler connected to the power sensor.
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 EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 20 (MHz)
   (AMPLITUDE) REF LVL 77 (dBμV)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) IF BW AUTO MAN (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 EMC 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 EMC 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 EMC analyzer using an adapter. Do not use a cable.

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

   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (MHz)

   Wait for the AUTO ZOOM routine to finish.

10. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the EMC analyzer reference level.

11. On the EMC analyzer, press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.

12. On synthesized sweeper #1, set RF to ON.

13. On the EMC analyzer, press (MKR →) MKR → HIGH, 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 EMC 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 EMC analyzer input, then connect the directional coupler to the power sensor.
16. Set the EMC analyzer by pressing the following key:

    (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 EMC analyzer using an adapter. Do not use a cable.
22. On the EMC analyzer, press the following keys:

    (MKR →) `MKR → HIGH`

    (MKR) `More 1 of 3` `MK TRACK ON OFF` (ON)

    Wait for the signal to be centered on screen.

    (AMPLITUDE) `More 1 of 3` `PRESEL PEAK`

    Wait for the `CAL: PEAKING` message to disappear.

    (SPAN) 10 (MHz)

    Wait for the `AUTO ZOOM` message to disappear.

23. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the EMC analyzer reference level.
24. On the EMC analyzer, press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
25. On synthesized sweeper #1, set RF to ON.
26. On the EMC analyzer, press (MKR →) MKR → HIGH, 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 EMC analyzer knob.
27. 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.

Narrow Bandwidth

28. Remove the EMC analyzer from the directional coupler and reconnect the measuring receiver power sensor to the directional coupler as shown in Figure 2-60.
29. Press INSTRUMENT PRESET on both synthesized sweepers.
30. Set synthesized sweeper #1 controls as follows:

    CW .... 50.010 MHz
    POWER LEVEL .... 0 dBm
31. Set synthesized sweeper #2 controls as follows:

    CW .... 50 MHz
    POWER LEVEL .... −14 dBm
    RF .... OFF
32. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to OFF.
33. On synthesized sweeper #2, set the RF to ON.
34. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the EMC analyzer using an adapter. Do not use a cable.

35. On the EMC analyzer, press (PRESET), then wait for the preset routine to finish. Press the EMC analyzer keys as follows:

    (FREQUENCY) 50 (MHz)
    (SPAN) 10 (MHz)
    (AMPLITUDE) 97 (dBμV)
    (MKR →) MKR → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (SPAN) 2 (kHz)

    Wait for the AUTO ZOOM message to disappear.

36. On synthesized sweeper #2, adjust the amplitude to place the signal 10 dB below the EMC analyzer reference level.
37. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ.
38. On synthesized sweeper #1, set RF to ON.
39. On the EMC analyzer, press (SGL SWP), then wait for the completion of a new sweep. Press (MKR →) MKR → HIGH.
40. Read the MKR Δ amplitude and record in the performance verification test record as **TR Entry 3**.

39. Displayed Average Noise Level, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

This performance verification test measures the displayed average noise level within the frequency range specified. The EMC analyzer input is terminated in 50 Ω.

The LO feedthrough is used as a frequency reference for these measurements. The test tunes the EMC 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 instrument preset.

Equipment Required

Termination, 50 Ω
Cable, BNC, 23 cm (9 in)
Adapter, Type N (m) to BNC (f)

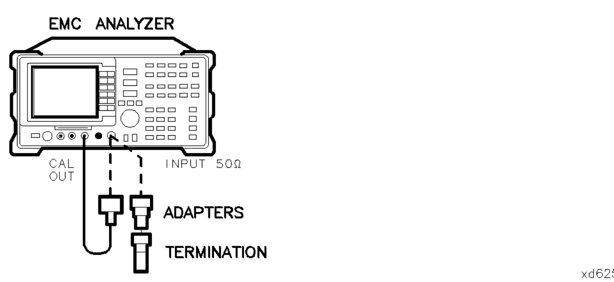

Figure 2-61. Displayed Average Noise Level Test Setup, HP 8591EM

39. Displayed Average Noise Level, HP 8591EM

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the EMC analyzer as shown in Figure 2-61.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) 87 dBμV
   ATTEN AUTO MAN (MAN) 0 (dB)

3. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press the following keys:

   (BW) 300 (Hz) AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

4. Press (SGL SWP), then wait for the completion of a new sweep. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (AMPLITUDE) More 1 of 3 More 2 of 3 REF LVL OFFSET

   Subtract the MKR amplitude reading from 87 dBμV and enter the result as the REF LVL OFFSET. For example, if the marker reads 86.79 dBμV, enter −0.21 dB (87 dBμV − 86.79 dBμV = +0.21 dB).

   REF LVL OFFSET _________ dB

5. Disconnect the cable from the INPUT 50 Ω connector of the EMC analyzer. Connect the 50 Ω termination to the EMC analyzer INPUT 50 Ω connector.

400 kHz

6. Press the following EMC analyzer keys:

   (FREQUENCY) 400 (kHz)
   (SPAN) 20 (kHz)
   (AMPLITUDE) 37 dBμV
   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

7. Press the following EMC analyzer keys:

   (BW) 30 (Hz)
   (TRACE) More 1 of 4 More 2 of 4
   DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
   DETECTOR PK SP NG (SP))
   (SGL SWP)

   Wait for the completion of a new sweep.

8. Press the following EMC analyzer keys:

   (DISPLAY) DSP LINE ON OFF (ON)

   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).

9. 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

10. Press the following EMC analyzer keys:

    (FREQUENCY) 1 (MHz)
    (SGL SWP)

    Wait for the completion of a new sweep.

11. Press the following EMC analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

    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 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

13. Press the following EMC analyzer keys:

    (FREQUENCY) START FREQ 1 (MHz) STOP FREQ 1.5 (GHz)
    (BW) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

    If the IF overload message is displayed on the EMC analyzer, performing the next step should clear the message.

14. Press (FREQUENCY) and adjust the center frequency setting, if necessary, to place the LO feedthrough just off-screen to the left.

15. Press the following EMC analyzer keys:

    (SGL SWP)
    (TRACE) CLEAR WRITE A
    More 1 of 4 More 2 of 4 VID AVG ON OFF (ON) 10 (Hz)

    Wait until AVG 10 is displayed to the left of the graticule (the EMC analyzer will take ten sweeps, then stop).

16. Press (MKR →) MARKER → HIGH and record the MKR frequency as the Measurement Frequency in Table 2-50 for 1 MHz to 1.5 GHz.
17. Press the following EMC analyzer keys:

    (TRACE) More 1 of 4 More 2 of 4 VID AVG ON OFF (OFF)

    DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*

    DETECTOR PK SP NG (SP))

    (AUTO COUPLE) IF BW AUTO MAN (AUTO)

    AVG BW AUTO MAN (AUTO)

    (SPAN) 20 (kHz)
    (FREQUENCY)

18. Set the center frequency to the Measurement Frequency recorded in Table 2-50 for 1 MHz to 1.5 GHz.
19. Press the following EMC analyzer keys:

    (BW) 30 (Hz)
    AVG BW AUTO MAN (MAN) 30 (Hz)
    (SGL SWP)

    Wait for the sweep to finish.

20. Press the following EMC analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

    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 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

22. Press the following EMC analyzer keys:

 (AUTO COUPLE) IF BW AUTO MAN (AUTO)

 AVG BW AUTO MAN (AUTO)

 (SPAN) 10 (MHz)

 (SWEEP/TRIG) SWEEP CONT SGL (CONT)

 (FREQUENCY) START FREQ 1.5 (GHz) STOP FREQ 1.8 (GHz)

23. Repeat steps 15 through 20 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.

24. 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 2-50. 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**

40. Displayed Average Noise Level, HP 8593EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

This test measures the displayed average noise level in all five frequency bands. The EMC 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).

Equipment Required

Cable, BNC, 23 cm (9 in)
Termination, 50 Ω
Adapter, Type N (m) to BNC (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

40. Displayed Average Noise Level, HP 8593EM

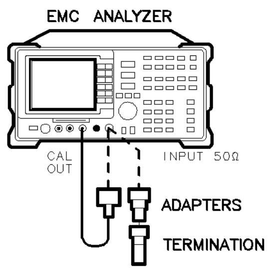

Figure 2-62. Displayed Average Noise Level Test Setup, HP 8593EM

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the EMC analyzer as shown in Figure 2-62.

   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.

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

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) 87 dBμV
   ATTEN AUTO MAN (MAN) 0 (dB)

3. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press the following keys:

   (BW) 300 (Hz) AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

4. Press (SGL SWP), then wait for the completion of a new sweep. Press the following EMC analyzer keys:

(MKR →) MARKER → HIGH

(AMPLITUDE) More 1 of 3 More 2 of 3 REF LVL OFFSET

Subtract the MKR amplitude reading from 87 dBμV and enter the result as the REF LVL OFFSET. For example, if the marker reads 86.79 dBμV, enter −0.21 dB (87 dBμV − 86.79 dBμV = +0.21 dB).

REF LVL OFFSET ________ dB

5. Disconnect the cable from the INPUT 50 Ω connector of the EMC analyzer. Connect the 50 Ω termination to the EMC analyzer INPUT 50 Ω connector.

40. Displayed Average Noise Level, HP 8593EM

400 kHz

6. Press the following EMC analyzer keys:

   (FREQUENCY) 400 (kHz)
   (SPAN) 20 (kHz)
   (AMPLITUDE) 37 dBμV
   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

7. Press the following EMC analyzer keys:

   (BW) 30 (Hz)
   (TRACE) More 1 of 4 More 2 of 4
   DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
   DETECTOR PK SP NG (SP))
   (SGL SWP)

   Wait for the completion of a new sweep.

8. Press the following EMC analyzer keys:

   (DISPLAY) DSP LINE ON OFF (ON)

   Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

9. 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

10. Press the following EMC analyzer keys:

    (FREQUENCY) 1 (MHz)
    (SGL SWP)

    Wait for the completion of a new sweep.

11. Press the following EMC analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

    Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

12. 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

13. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 0-2.9 Gz BAND 0

    (FREQUENCY) START FREQ 1 (MHz)

    STOP FREQ 2.9 (MHz)

    (BW) IF BW AUTO MAN (MAN) 1 (MHz)

    AVG BW AUTO MAN (MAN) 10 (kHz)

    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

14. Press (FREQUENCY), then adjust the center frequency, if necessary, to place the LO feedthrough just off-screen to the left.
15. Press the following EMC analyzer keys:

    (SGL SWP)

    (TRACE) CLEAR WRITE A

    More 1 of 4 More 2 of 4 VID AVG ON OFF (ON) 10 (ENTER)

    Wait until AVG 10 is displayed to the left of the graticule (the analyzer will take ten sweeps, then stop).

16. Press (MKR →) MARKER → HIGH and record the MKR frequency as the Measurement Frequency in the appropriate band under test in Table 2-51.

17. Press the following EMC analyzer keys:

    (TRACE) More 1 of 4 More 2 of 4 VID AVG ON OFF (OFF)
    DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
    DETECTOR PK SP NG (SP))
    (AUTO COUPLE) IF BW AUTO MAN (AUTO)
    AVG BW AUTO MAN (AUTO)
    (SPAN) 10 (kHz)
    (FREQUENCY)

    Set CENTER FREQ to the Measurement Frequency recorded in Table 2-51 in the previous step, then press the following keys:

    (BW) IF BW AUTO MAN (MAN) 30 (Hz)
    AVG BW AUTO MAN (MAN) 30 (Hz)

18. Press (SGL SWP) on the EMC analyzer, then wait for a new sweep to finish. Press the following EMC analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

    Adjust the display line so that it is centered on the average noise trace, ignoring any residual responses.

    Record the display line amplitude setting in the performance verification test record as indicated in Table 2-51. The average noise level should be less than the specified limit.

19. Press (MKR) and MARKER 1 ON OFF (OFF) to turn the marker off.

2.75 to 6.5 GHz

20. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 2.75-6.5 BAND 1
    (BW) IF BW AUTO MAN (MAN) 1 (MHz)
    AVG BW AUTO MAN (MAN) 10 (kHz)
    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

21. Repeat steps 15 through 19 above for Band 1 (2.75 to 6.5 GHz).

6.0 to 12.8 GHz

22. Press the following EMC analyzer keys:

    (FREQUENCY) `More 1 of 2` `Band Lock` `6.0-12.8 BAND 2`

    (BW) `IF BW AUTO MAN` (MAN) 1 (MHz)

    `AVG BW AUTO MAN` (MAN) 10 (kHz)

    (SWEEP/TRIG) `SWEEP CONT SGL` (CONT)

23. Repeat steps 15 through 19 above for Band 2 (6.0 to 12.8 GHz).

12.4 to 19.4 GHz

24. Press the following EMC analyzer keys:

    (FREQUENCY) `More 1 of 2` `Band Lock` `12.4-19. BAND 3`

    (BW) `IF BW AUTO MAN` (MAN) 1 (MHz)

    `AVG BW AUTO MAN` (MAN) 10 (kHz)

    (SWEEP/TRIG) `SWEEP CONT SGL` (CONT)

25. Repeat steps 15 through 19 above for Band 3 (12.4 to 19.4 GHz).

19.1 to 22 GHz

26. Press the following EMC analyzer keys:

    (FREQUENCY) `More 1 of 2` `Band Lock` `19.1-22 BAND 4`

    Option 026 or 027 only: (FREQUENCY) `START FREQ` 19.1 (GHz) `STOP FREQ` 22 (GHz)

    (BW) `IF BW AUTO MAN` (MAN) 1 (MHz)

    `AVG BW AUTO MAN` (MAN) 10 (kHz)

    (SWEEP/TRIG) `SWEEP CONT SGL` (CONT)

27. Repeat steps 15 through 19 above for Band 4.

22 GHz to 26.5 GHz *(Option 026 or 027 Only)*

28. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 19.1 - 22 BAND 4

    (FREQUENCY) START FREQ 22 (GHz)

    STOP FREQ 26.5 (GHz)

29. Set the EMC analyzer by pressing the following keys:

    (BW) IF BW AUTO MAN (MAN) 1 (MHz)

    AVG BW AUTO MAN (MAN) 10 (kHz)

    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

30. Repeat steps 15 through 19 for frequencies from 22 to 26.5 GHz.
31. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish.

Table 2-51. Displayed Average Noise Level Worksheet

Frequency Range	Measurement Frequency	Displayed Average Noise Level TR Entry
400 kHz	400 kHz	**1**
1 MHz	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[1]	______	**8**

1 Option 026 or 027 only

41. Displayed Average Noise Level, HP 8594EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode.*

This performance verification test measures the displayed average noise level within the frequency range specified. The EMC analyzer input is terminated in 50 Ω.

The test tunes the EMC 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 instrument preset.

Equipment Required

Termination, 50 Ω
Cable, BNC, 23 cm (9 in)
Adapter, Type N (m) to BNC (f)

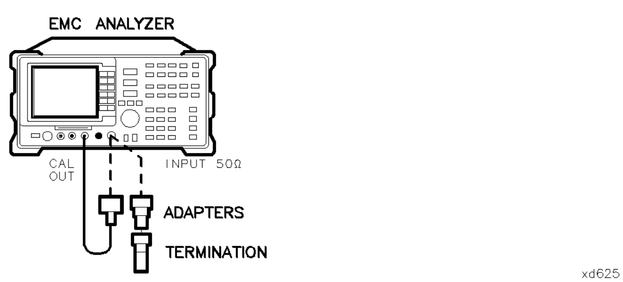

Figure 2-63. Displayed Average Noise Level Test Setup, HP 8594EM

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the EMC analyzer as shown in Figure 2-63.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) 87 (+dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)

3. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press the following keys:

   (BW) 300 (Hz) AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

4. Press (SGL SWP), then wait for the completion of a new sweep. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (AMPLITUDE) More 1 of 3 More 2 of 3 REF LVL OFFSET

   Subtract the MKR amplitude reading from 87 dBμV and enter the result as the REF LVL OFFSET. For example, if the marker reads 86.79 dBμV, enter −0.21 dB (87 dBμV − 86.79 dBμV = +0.21 dB).

   REF LVL OFFSET ________ dB

5. Disconnect the cable from the INPUT 50 Ω connector of the EMC analyzer. Connect the 50 Ω termination to the EMC analyzer INPUT 50 Ω connector.

400 kHz

6. Press the following EMC analyzer keys:

   (FREQUENCY) 400 (kHz)
   (SPAN) 20 (kHz)
   (AMPLITUDE) 17 (+dBμV)
   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

7. Press the following EMC analyzer keys:

   (BW) 30 (Hz)
   (TRACE) More 1 of 4 More 2 of 4
   DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
   DETECTOR PK SP NG (SP))
   (SGL SWP)

   Wait for the completion of a new sweep.

8. Press the following EMC analyzer keys:

   (DISPLAY) DSP LINE ON OFF (ON)

   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).

9. 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.

4 MHz

10. Press the following EMC analyzer keys:

    FREQUENCY 4 MHz
    SGL SWP

    Wait for the completion of a new sweep.

11. Press the following EMC analyzer keys:

    DISPLAY DSP LINE ON OFF (ON)

    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 2** of the performance verification 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

13. Press the following EMC analyzer keys:

    FREQUENCY START FREQ 5 MHz
    STOP FREQ 2.9 GHz
    BW 1 MHz
    AVG BW AUTO MAN (MAN) 10 kHz
    SWEEP/TRIG SWEEP CONT SGL (CONT)

14. Press FREQUENCY and adjust the start frequency setting, if necessary, to place the LO feedthrough just off-screen to the left.

15. Press the following EMC analyzer keys:

    SGL SWP
    TRACE CLEAR WRITE A
    More 1 of 4 More 2 of 4 VID AVG ON OFF (ON) 10 Hz

    Wait until AVG 10 is displayed to the left of the graticule (the EMC analyzer will take ten sweeps, then stop).

16. Press (MKR →) MARKER → HIGH and record the MKR frequency as the Measurement Frequency in Table 2-52 for 5 MHz to 2.9 GHz.
17. Press the following EMC analyzer keys:

    (TRACE)
    More 1 of 4 More 2 of 4 VID AVG ON OFF (OFF)
    DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
    DETECTOR PK SP NG (SP))
    (AUTO COUPLE) IF BW AUTO MAN (AUTO)
    AVG BW AUTO MAN (AUTO)
    (SPAN) 20 (kHz)
    (FREQUENCY)

18. Set the center frequency to the Measurement Frequency recorded in Table 2-52 for 5 MHz to 2.9 GHz.
19. Press the following EMC analyzer keys:

    (BW) 30 (Hz)
    AVG BW AUTO MAN (MAN) 30 (Hz)
    (SGL SWP)

    Wait for the sweep to finish.
20. Press the following EMC analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

    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 3** of the performance verification test record. The average noise level should be less than the specified limit.

Table 2-52. 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, HP 8595EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

This test measures the displayed average noise level in both frequency bands. The EMC 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).

Equipment Required

Cable, BNC, 23 cm (9 in)
Termination, 50 Ω
Adapter, Type N (m) to BNC (f)

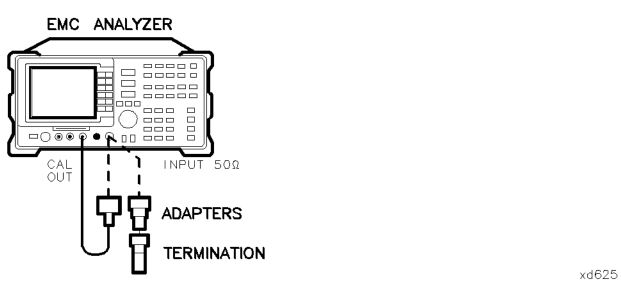

Figure 2-64. Displayed Average Noise Level Test Setup, HP 8595EM

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the EMC analyzer as shown in Figure 2-64.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) 87 (+dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)

3. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press the following keys:

   (BW) 300 (Hz) AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

4. Press (SGL SWP), then wait for the completion of a new sweep. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (AMPLITUDE) More 1 of 3 More 2 of 3 REF LVL OFFSET

   Subtract the MKR amplitude reading from 87 dBμV and enter the result as the REF LVL OFFSET. For example, if the marker reads 86.79 dBμV, enter −0.21 dB (87 dBμV − 86.79 dBμV = +0.21 dB).

   REF LVL OFFSET ________ dB

5. Disconnect the cable from the INPUT 50 Ω connector of the EMC analyzer. Connect the 50 Ω termination to the EMC analyzer INPUT 50 Ω connector.

400 kHz

6. Press the following EMC analyzer keys:

   (FREQUENCY) 400 (kHz)
   (SPAN) 20 (kHz)
   (AMPLITUDE) 37 (+dBμV)
   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

7. Press the following EMC analyzer keys:

   (BW) 30 (Hz)
   (TRACE) More 1 of 4 More 2 of 4
   DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
   DETECTOR PK SP NG (SP))
   (SGL SWP)

   Wait for the completion of a new sweep.

8. Press the following EMC analyzer keys:

   (DISPLAY) DSP LINE ON OFF (ON)

   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).

9. 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

10. Press the following EMC analyzer keys:

    (FREQUENCY) 1 (MHz)
    (SGL SWP)

    Wait for the completion of a new sweep.

11. Press the following EMC analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

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 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

13. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 0-2.9 Gz BAND 0

    (FREQUENCY) START FREQ 1 (MHz)

    STOP FREQ 2.9 (MHz)

    (BW) IF BW AUTO MAN (MAN) 1 (MHz)

    AVG BW AUTO MAN (MAN) 10 (kHz)

    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

14. Press (FREQUENCY), then adjust the center frequency, if necessary, to place the LO feedthrough just off-screen to the left.

15. Press the following EMC analyzer keys:

    (SGL SWP)

    (TRACE) CLEAR WRITE A

    More 1 of 4 More 2 of 4 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).

16. Press (MKR →) MARKER → HIGH and record the MKR frequency as the Measurement Frequency in the appropriate band under test in Table 2-53.

17. Press the following EMC analyzer keys:

    TRACE
    More 1 of 4 More 2 of 4 VID AVG ON OFF (OFF)
    DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
    DETECTOR PK SP NG (SP))
    AUTO COUPLE IF BW AUTO MAN (AUTO)
    AVG BW AUTO MAN (AUTO)
    SPAN 10 kHz
    FREQUENCY

    Set CENTER FREQ to the Measurement Frequency recorded in Table 2-53 in the previous step, then press the following keys:

    BW IF BW AUTO MAN (MAN) 30 Hz
    AVG BW AUTO MAN (MAN) 30 Hz

18. Press SGL SWP on the EMC analyzer, then wait for a new sweep to finish. Press the following EMC analyzer keys:

    DISPLAY DSP LINE ON OFF (ON)

    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).

    Record the display line amplitude setting in the performance verification test record as indicated in Table 2-53. The average noise level should be less than the specified limit.

19. Press MKR and MARKER 1 ON OFF (OFF) to turn the marker off.

2.75 to 6.5 GHz

20. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 2.75-6.5 BAND 1

    (BW) IF BW AUTO MAN (MAN) 1 (MHz)

    AVG BW AUTO MAN (MAN) 10 (kHz)

    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

21. Repeat steps 15 through 19 above for Band 1 (2.75 to 6.5 GHz).

Table 2-53. 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, HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

This test measures the displayed average noise level in all three frequency bands. The EMC 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).

Equipment Required

Cable, BNC, 23 cm (9 in)
Termination, 50 Ω
Adapter, Type N (m) to BNC (f)

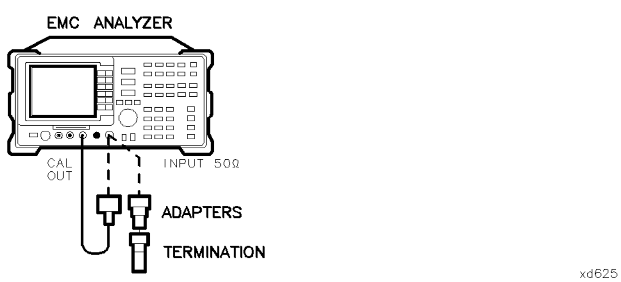

Figure 2-65. Displayed Average Noise Level Test Setup, HP 8596EM

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the EMC analyzer as shown in Figure 2-65.

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

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) 87 (+dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)

3. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 10 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press the following keys:

   (BW) 300 (Hz) AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

4. Press (SGL SWP), then wait for the completion of a new sweep. Press the following EMC analyzer keys:

   (MKR →) MARKER → HIGH
   (AMPLITUDE) More 1 of 3 More 2 of 3 REF LVL OFFSET

   Subtract the MKR amplitude reading from 87 dBμV and enter the result as the REF LVL OFFSET. For example, if the marker reads 86.79 dBμV, enter −0.21 dB (87 dBμV − 86.79 dBμV = +0.21 dB).

   REF LVL OFFSET ________ dB

5. Disconnect the cable from the INPUT 50 Ω connector of the EMC analyzer. Connect the 50 Ω termination to the EMC analyzer INPUT 50 Ω connector.

400 kHz

6. Press the following EMC analyzer keys:

   (FREQUENCY) 400 (kHz)
   (SPAN) 20 (kHz)
   (AMPLITUDE) 37 (+dBμV)
   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

7. Press the following EMC analyzer keys:

   (BW) 30 (Hz)
   (TRACE) More 1 of 4 More 2 of 4
   DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
   DETECTOR PK SP NG (SP))
   (SGL SWP)

   Wait for the completion of a new sweep.

8. Press the following EMC analyzer keys:

   (DISPLAY) DSP LINE ON OFF (ON)

   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.

9. 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

10. Press the following EMC analyzer keys:

    (FREQUENCY) 1 (MHz)
    (SGL SWP)

    Wait for the completion of a new sweep.

11. Press the following EMC analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

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 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

13. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 0-2.9 Gz BAND 0

    (FREQUENCY) START FREQ 1 (MHz)

    STOP FREQ 2.9 (GHz)

    (BW) IF BW AUTO MAN (MAN) 1 (MHz)

    AVG BW AUTO MAN (MAN) 10 (kHz)

    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

14. Press (FREQUENCY), then adjust the center frequency, if necessary, to place the LO feedthrough just off-screen to the left.
15. Press the following EMC analyzer keys:

    (SGL SWP)

    (TRACE) CLEAR WRITE A

    More 1 of 4 More 2 of 4 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).

16. Press (MKR →) MARKER → HIGH and record the MKR frequency as the Measurement Frequency in the appropriate band under test in Table 2-54.

17. Press the following EMC analyzer keys:

    (TRACE) More 1 of 4 More 2 of 4 VID AVG ON OFF (OFF)

    DETECTOR SMP PK (SMP) (*For Options 101, 102, and 301:*
    DETECTOR PK SP NG (SP))

    (AUTO COUPLE) IF BW AUTO MAN (AUTO)

    AVG BW AUTO MAN (AUTO)

    (SPAN) 10 (kHz)
    (FREQUENCY)

    Set CENTER FREQ to the Measurement Frequency recorded in Table 2-54 in the previous step, then press the following keys:

    (BW) IF BW AUTO MAN (MAN) 30 (Hz)

    AVG BW AUTO MAN (MAN) 30 (Hz)

18. Press (SGL SWP) on the EMC analyzer, then wait for a new sweep to finish. Press the following EMC analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

    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.

    Record the display line amplitude setting in the performance verification test record as indicated in Table 2-54. The average noise level should be less than the specified limit.

19. Press (MKR) and MARKER 1 ON OFF (OFF) to turn the marker off.

2.75 to 6.5 GHz

20. Press the following EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 2.75-6.5 BAND 1

    (BW) IF BW AUTO MAN (MAN) 1 (MHz)

    AVG BW AUTO MAN (MAN) 10 (kHz)

    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

    Repeat steps 15 through 19 above for Band 1 (2.75 to 6.5 GHz).

6.0 to 12.8 GHz

21. Press the followings EMC analyzer keys:

    (FREQUENCY) More 1 of 2 Band Lock 6.0-12.8 BAND 2

    (BW) IF BW AUTO MAN (MAN) 1 (MHz)

    AVG BW AUTO MAN (MAN) 10 (kHz)

    (SWEEP/TRIG) SWEEP CONT SGL (CONT)

22. Repeat steps 15 through 19 above for Band 2 (6.0 to 12.8 GHz).

Table 2-54. 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. Residual Responses, HP 8591EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The EMC analyzer input is terminated and the EMC analyzer is swept from 150 kHz to 1 MHz. Then the EMC analyzer is swept in 10 MHz spans throughout the 1 MHz to 1.8 GHz range. Any responses above the specification are noted.

There are no related adjustment procedures for this performance test.

Equipment

Termination, 50 Ω

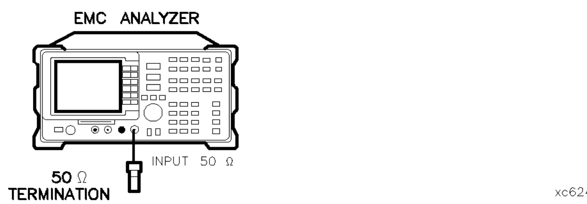

Figure 2-66. Residual Response Test Setup, HP 8591EM

Procedure

150 kHz to 1 MHz

1. Connect the termination to the EMC analyzer input as shown in Figure 2-66.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Press the following EMC analyzer keys:

   (FREQUENCY)
   START FREQ 150 (kHz)
   STOP FREQ 1 (MHz)
   (AMPLITUDE) 47 (dBμV) ATTEN AUTO MAN (MAN) 0 (dB)
   (BW) 300 (Hz)
   (DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

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 2-55.

1 MHz to 1.8 GHz

4. Connect the 300 MHz CAL OUT to the RF INPUT.
5. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Press the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 1 (kHz)

6. Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

   (BW) 300 (Hz)
   (SWEEP/TRIG) 1 (sec)
   (AMPLITUDE) 87 (dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)

7. Press the following EMC analyzer keys:

   (SGL SWP)
   (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ
   (SPAN) 10 (MHz)
   (SGL SWP)
   (MKR →) MKR → HIGH

8. Record the marker-Δ reading below as the MEAS UNCAL Amplitude Error.

   MEAS UNCAL Amplitude Error ________ dB

9. Remove the calibration cable from the EMC analyzer input.

10. Reconnect the termination to the EMC analyzer input as shown in Figure 2-66.
11. Press the following EMC analyzer keys:

    (FREQUENCY) 5 (MHz)
    (AMPLITUDE) 47 (dBμV)
    (SWEEP/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 EMC analyzer keys:

    (FREQUENCY) CF STEP AUTO MAN (MAN) 9.8 (MHz)

    (DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

    Add 17 dBμV 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 17 dBμV to this value for a result of −2.5 dBμV. Enter −2.5 dBμV 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 2-55.

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 2-55.
Residual Responses above Display Line Worksheet

Frequency (MHz)	Amplitude (dBμV)
________	________
________	________
________	________
________	________
________	________

Confirming Residuals

16. Set the EMC analyzer center frequency to a residual frequency recorded in Table 2-55, the press the following keys:

    (PRESET)
    (AMPLITUDE) 47 (dBμV) ATTEN AUTO MAN (MAN) 0 (dB)
    (SPAN) 20 (kHz)
    (SGL SWP)
    (DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

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 2-56.

18. Repeat steps 16 through 17 for all residuals recorded in Table 2-55.

19. Record the highest residual from Table 2-56 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.

Table 2-56.
Confirmed Residual Responses above Display Line

Frequency (MHz)	Amplitude (dBμV)
________	________
________	________
________	________
________	________
________	________

45. Residual Responses, HP 8594EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The EMC analyzer input is terminated and the EMC analyzer is swept from 150 kHz to 1 MHz. Then the EMC analyzer is swept in 10 MHz spans throughout the 1 MHz to 2.9 GHz range. Any responses above the specification are noted.

There are no related adjustment procedures for this performance test.

Equipment

Termination, 50 Ω
Adapter, Type N (m) to APC 3.5 (f)

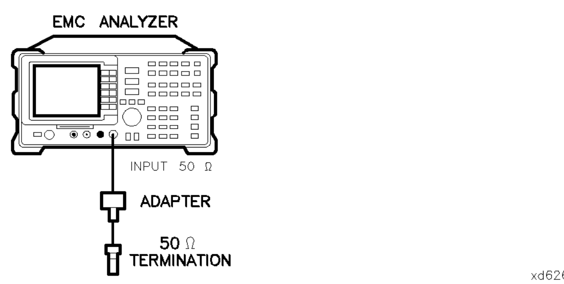

Figure 2-67. Residual Response Test Setup, HP 8594EM

Procedure

150 kHz to 1 MHz

1. Connect the termination to the EMC analyzer input as shown in Figure 2-67.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Press the following EMC analyzer keys:

   (FREQUENCY)
   START FREQ 150 (kHz)
   STOP FREQ 1 (MHz)
   (AMPLITUDE) 47 (dBμV) ATTEN AUTO MAN (MAN) 0 (dB)

45. Residual Responses, HP 8594EM

(BW) 300 (Hz)
AVG BW AUTO MAN (MAN) 300 (Hz)
(DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

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 2-57.

1 MHz to 2.9 GHz

4. Connect the 300 MHz CAL OUT to the RF INPUT.
5. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Press the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 1 (kHz)

6. Wait for the AUTO ZOOM message to disappear, then press the following EMC analyzer keys:

   (BW) 300 (Hz)
   (SWEEP/TRIG) 1 (SEC)
   (AMPLITUDE) 87 (dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)

7. Press the following EMC analyzer keys:

   (SGL SWP)
   (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ
   (SPAN) 10 (MHz)
   (SGL SWP)
   (MKR →) MKR → HIGH

8. Record the marker-Δ reading below as the MEAS UNCAL Amplitude Error.

MEAS UNCAL Amplitude Error ________ dB

9. Remove the cable from the EMC analyzer input.
10. Reconnect the termination to the EMC analyzer input as shown in Figure 2-67.
11. Press the following EMC analyzer keys:

    (FREQUENCY) 5 (MHz)
    (AMPLITUDE) 47 (dBμV)
    (SWEEP/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 EMC analyzer keys:

    (FREQUENCY) CF STEP AUTO MAN (MAN) 9.8 (MHz)

    (DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

    Add 17 dBμV 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 17 dBμV to this value for a result of −2.5 dBμV. Enter −2.5 dBμV 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 2-57.

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.)

45. Residual Responses, HP 8594EM

**Table 2-57.
Residual Responses above Display Line Worksheet**

Frequency (MHz)	Amplitude (dBμV)
__________	__________
__________	__________
__________	__________
__________	__________
__________	__________

Confirming Residuals

16. Set the EMC analyzer center frequency to a residual frequency recorded in Table 2-57, the press the following keys:

    (PRESET)
    (AMPLITUDE) 47 (dBμV) ATTEN AUTO MAN (MAN) 0 (dB)
    (SPAN) 20 (kHz)
    (SGL SWP)
    (DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

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 2-57.

18. Repeat steps 16 through 17 for all residuals recorded in Table 2-58.
19. Record the highest residual from Table 2-58 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.

Table 2-58.
Confirmed Residual Responses above Display Line

Frequency (MHz)	Amplitude (dBμV)
______	______
______	______
______	______
______	______
______	______

46. Residual Responses, HP 8593EM, HP 8595EM, and HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The EMC analyzer input is terminated and the EMC analyzer is swept from 150 kHz to 1 MHz. Then the EMC analyzer is swept in 10 MHz spans throughout the 1 MHz to 6.5 GHz range. Any responses above the specification are noted.

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)

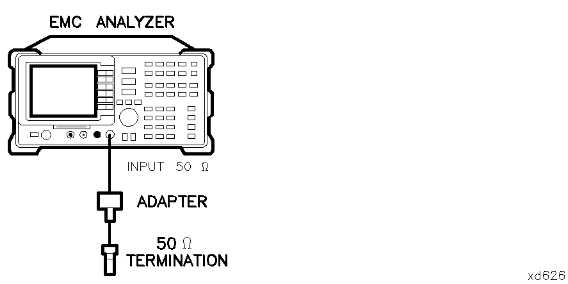

Figure 2-68.
Residual Response Test Setup,
HP 8593EM, HP 8595EM, and HP 8596EM

Procedure

150 kHz to 1 MHz

1. Connect the termination to the EMC analyzer input as shown in Figure 2-68.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Press the following EMC analyzer keys:

   (FREQUENCY) More 1 of 2 Band Lock 0-2.9 Gz BAND 0
   (FREQUENCY)
   START FREQ 150 (kHz)
   STOP FREQ 1 (MHz)
   (AMPLITUDE) 47 (dBμV) ATTEN AUTO MAN (MAN) 0 (dB)
   (BW) 300 (Hz)
   AVG BW AUTO MAN (MAN) 300 (Hz)
   (DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

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 2-59.

46. Residual Responses, HP 8593EM, HP 8595EM, and HP 8596EM

1 MHz to 2.75 GHz

4. Connect the 300 MHz CAL OUT to the RF INPUT.
5. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Press the following keys:

   (FREQUENCY) 300 (MHz) More 1 of 2 Band Lock BAND LOCK ON OFF (ON)
   (SPAN) 10 (MHz)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 1 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press

6. Press the following EMC analyzer keys:

   (BW) 300 (Hz)
   (SWEEP/TRIG) 1 (SEC)
   (AMPLITUDE) 87 (dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)

7. Press the following EMC analyzer keys:

   (SGL SWP)
   (MKR →) MKR → HIGH More 1 of 3 More 2 of 3 MARKER Δ
   (SPAN) 10 (MHz)
   (SGL SWP)
   (MKR →) MKR → HIGH

8. Record the marker-Δ reading below as the MEAS UNCAL Amplitude Error.

   MEAS UNCAL Amplitude Error ________ dB

9. Remove the cable from the EMC analyzer input.
10. Reconnect the termination to the EMC analyzer input as shown in Figure 2-68.
11. Press the following EMC analyzer keys:

    (FREQUENCY) 5 (MHz)
    (AMPLITUDE) 47 (dBμV)

(SWEEP/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 EMC analyzer keys:

    (FREQUENCY) CF STEP AUTO MAN (MAN) 9.8 (MHz)

    (DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

    Add 17 dBμV 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 17 dBμV to this value for a result of −2.5 dBμV. Enter −2.5 dBμV 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 2-59.

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.)

2.75 GHz to 6.5 GHz

16. Press the following EMC analyzer keys:

    (FREQUENCY) Band Lock 2.75-6.5 BAND 1
    (SPAN) 10 (MHz)
    (SWEEP/TRIG) 1 (SEC)
    (FREQUENCY) 2755 (MHz)
    (BW) 300 (Hz)

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 in Table 2-59.

18. Press (FREQUENCY), (⇑) (step-up key), to step to the next frequency and repeat step 17.

19. Repeat step 18 until the range from 2.75 GHz to 6.5 GHz has been checked. (This requires 372 additional frequency steps.)

Table 2-59. Residual Responses above Display Line Worksheet

Frequency (MHz)	Amplitude (dBμV)
________	________
________	________
________	________
________	________
________	________

Confirming Residuals

20. Set the EMC analyzer center frequency to a residual frequency recorded in Table 2-59, the press the following keys:

    (PRESET)
    (AMPLITUDE) 47 (dBμV) ATTEN AUTO MAN (MAN) 0 (dB)
    (SPAN) 20 (kHz)
    (SGL SWP)
    (DISPLAY) DSP LINE ON OFF (ON) 17 (dBμV)

21. 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 2-59.

22. Repeat steps 20 through 21 for all residuals recorded in Table 2-60.
23. Record the highest residual from Table 2-60 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.

Table 2-60.
Confirmed Residual Responses above Display Line

Frequency (MHz)	Amplitude (dBμV)
________	________
________	________
________	________
________	________
________	________

47. Fast Time Domain Sweeps, HP 8591EM Option 101 and Option 301

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 EMC analyzer demodulates this signal in zero span to display the response in the time domain. The marker delta frequency function on the EMC 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)

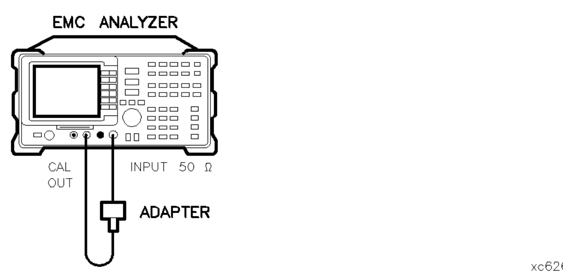

Figure 2-69. Fast Sweep Time Amplitude Accuracy Test Setup, HP 8591EM

Procedure

Fast Sweep Time Amplitude Accuracy

1. Connect the equipment as shown in Figure 2-69.
2. On the EMC analyzer, press (PRESET), then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 0 (Hz)
   (SWEEP/TRIG) 20 (ms)
   (AMPLITUDE) SCALE LOG/LIN (LIN)
   REF LVL 25 (mV)
   (MKR) More 1 of 3 More 2 of 3 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 2-70.

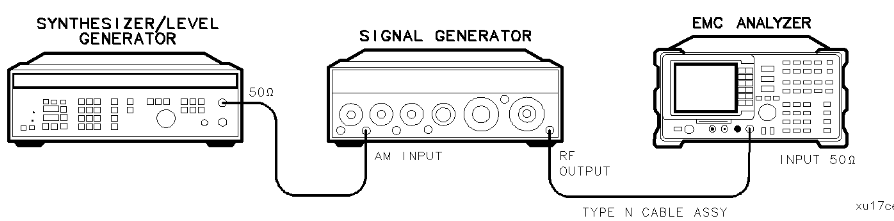

Figure 2-70. Fast Sweep Time Accuracy Test Setup, HP 8591EM

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 EMC analyzer, then wait for the preset routine to finish. Press the following EMC 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 EMC analyzer controls by pressing the following keys:

   (SWEEP/TRIG) Trigger VIDEO
   (SWEEP/TRIG) 18 (ms)

10. Press the following EMC analyzer keys:

    (SGL SWP)
    (MKR →) MKR → HIGH

    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 More 1 of 3 More 2 of 3 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 2-61. The MKR reading should be within the limits shown.

13. Repeat steps 10 through 12 for the remaining sweep time settings listed in Table 2-61.

47. Fast Time Domain Sweeps, HP 8591EM Option 101 and Option 301

Table 2-61. Fast Sweep Time Accuracy

EMC Analyzer Sweep Time	Synthesizer/Function Generator Frequency	Minimum Reading	TR Entry (MKR Δ)
18 ms	556 Hz	14.04 ms	**1**
10 ms	1 kHz	7.8 ms	**2**
1.0 ms	10 kHz	780 μs	**3**
100 μs	100 kHz	78 μs	**4**
20 μs	500 kHz	15.6 μs	**5**

48. Fast Time Domain Sweeps, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM Option 101 and Option 301

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

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 EMC analyzer demodulates this signal in zero span to display the response in the time domain. The marker delta frequency function on the EMC 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)

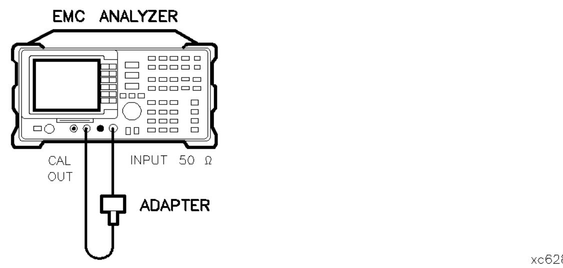

Figure 2-71.
Fast Time Domain Sweeps Amplitude Accuracy Test Setup, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

Procedure

Fast Sweep Time Amplitude Accuracy

1. Connect the equipment as shown in Figure 2-71.

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

2. On the EMC analyzer, press (PRESET), then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 0 (Hz)
   (SWEEP/TRIG) 20 (ms)
   (AMPLITUDE) SCALE LOG/LIN (LIN)
   REF LVL 25 (mV)
   (MKR) More 1 of 3 More 2 of 3 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.

48. Fast Time Domain Sweeps, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM Option 101 and Option 301

Fast Sweep Time Accuracy

4. Connect the equipment as shown in Figure 2-72.

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

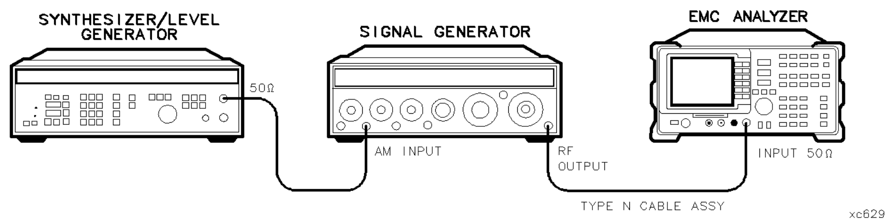

Figure 2-72.
Fast Sweep Time Accuracy Test Setup,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

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 EMC analyzer, then wait for the preset routine to finish. Press the following EMC 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 EMC analyzer controls by pressing the following keys:

   (SWEEP/TRIG) Trigger VIDEO
   (SWEEP/TRIG) 18 (ms)

10. Press the following EMC analyzer keys:

    (SGL SWP)

(MKR →) MKR → HIGH

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 More 1 of 3 More 2 of 3 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 2-62. The MKR reading should be within the limits shown.
13. Repeat steps 10 through 12 for the remaining sweep time settings listed in Table 2-62.

Table 2-62. Fast Sweep Time Accuracy

EMC Analyzer Sweep Time	Synthesizer/Function Generator Frequency	Minimum Reading	TR Entry (MKR Δ)
18 ms	556 Hz	14.04 ms	**1**
10 ms	1 kHz	7.8 ms	**2**
1.0 ms	10 kHz	780 μs	**3**
100 μs	100 kHz	78 μs	**4**
20 μs	500 kHz	15.6 μs	**5**

49. Absolute Amplitude, Vernier, and Power Sweep Accuracy, HP 8591EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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. 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 Offset and Gain for Option 010, HP 8591EM."

Equipment Required

Measuring receiver
Power sensor, 100 kHz to 1800 MHz
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 EMC analyzer. See Figure 2-73.

49. Absolute Amplitude, Vernier, and Power Sweep Accuracy, HP 8591EM Option 010

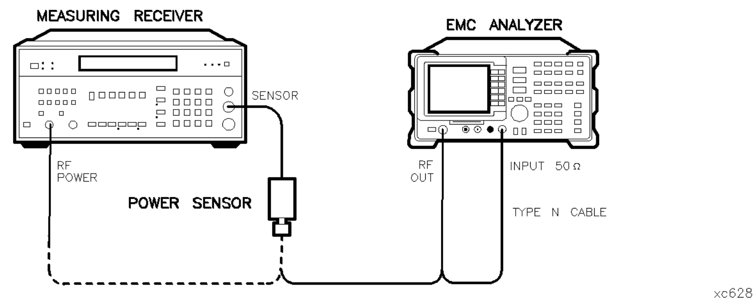

Figure 2-73. Absolute Amplitude, Vernier, and Power Sweep Accuracy Test Setup, HP 8591EM

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

   (FREQUENCY) 300 (MHz)
   (SPAN) ZERO SPAN
   (MKR)
   (AUX/USER) Track Gen
   SRC PWR ON OFF (ON) 102 (dBμV)

3. On the EMC 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 2-73.
6. On the EMC analyzer, press:

   87 (dBμV) (SGL SWP)
   (AUX/USER) Track Gen SRC ATN MAN AUTO (MAN)

7. Subtract −20 dBm (87 dBμV) from the power level displayed on the measuring receiver and record the result as **TR Entry 1** of the performance verification test record as the Absolute Amplitude Accuracy.

8. On the EMC analyzer, press:

   (AUX/USER) `Track Gen` `SRC ATN MAN AUTO` (MAN) 107 (dBμV)
   (SRC PWR) 97 (dBμV)

9. Press RATIO on the measuring receiver. Power levels now readout in dB relative to the power level just measured at the −10 dBm (97 dBμV) output power level setting.

10. Set the SRC POWER to the settings indicated in Table 2-63. At each setting, record the power level displayed on the measuring receiver in Table 2-63.

11. Calculate the absolute vernier accuracy by subtracting the SRC POWER setting and 10 dB from the Measured Power Level for each SRC POWER setting in Table 2-63.

    Vernier Accuracy = Measured Power Level − SRC POWER − 10 dB

    Vernier Accuracy = Measured Power Level − 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 (97 dBμV) recorded in Table 2-63 and record in the performance verification test record the Positive Vernier Accuracy as **TR Entry 2** and the Negative Vernier Accuracy as **TR Entry 3**.

    Positive Vernier Accuracy ______________dB

    Negative Vernier Accuracy ______________dB

13. Locate the most positive and most negative Absolute Vernier Accuracy values for all SRC POWER levels in Table 2-63 and record below.

    Positive Power Sweep Accuracy ______________dB

    Negative Power Sweep Accuracy ______________dB

14. Calculate the power sweep accuracy by subtracting the Negative Power Sweep Accuracy recorded in the previous step from the Positive Power Sweep Accuracy recorded in the previous step. Record this value as

49. Absolute Amplitude, Vernier, and Power Sweep Accuracy, HP 8591EM Option 010

TR Entry 4 of the performance verification test record as the Power Sweep Accuracy.

Power Sweep Accuracy = Positive Power Sweep Accuracy − Negative Power Sweep Accu

Table 2-63. Vernier Accuracy Worksheet

SRC POWER Setting ($dB\mu V$)	Measured Power Level (dB)	Vernier Accuracy (dB)
97	0 (Ref)	0 (Ref)
98	______	______
99	______	______
100	______	______
101	______	______
102	______	______
103	______	______
104	______	______
105	______	______
106	______	______
92	______	______
93	______	______
94	______	______
95	______	______
96	______	______

50. Absolute Amplitude Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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 for Option 010, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM."

Equipment Required

Measuring receiver
Power sensor, 100 kHz to 2.9 GHz
Cable, Type N, 62 cm (24 in)

50. Absolute Amplitude Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

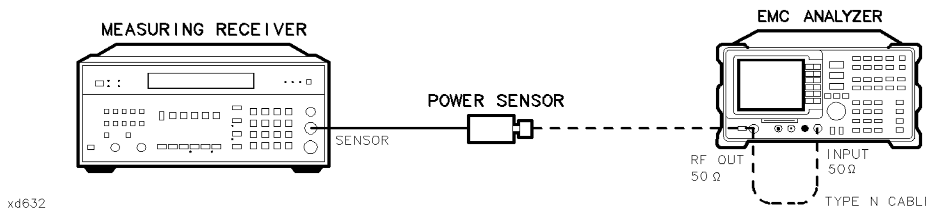

Figure 2-74.
Absolute Amplitude Accuracy Test Setup,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-74.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 0 (Hz)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)
   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)

3. Press TRACKING PEAK on the EMC 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 2-74.
6. On the EMC analyzer, press:

   SRC PWR ON OFF (ON) 87 (dBμV)
   SRC PWR MAN AUTO (MAN) 91 (dBμV)
   (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 87 dBμV (−20 dBm) output power level setting.
9. Set the EMC analyzer SRC POWER to the settings indicated in Table 2-64. At each setting, record the power level displayed on the measuring receiver.
10. Calculate the Absolute Vernier Accuracy by subtracting the SRC POWER setting (in dBm) from the Measured Power Level for each SRC POWER setting in Table 2-64.

    Measured Power Level − SRC POWER − 20 = Absolute Vernier Accuracy

    For example: Where the SRC POWER = −21 dBm:

    −0.9 − (−21) − 20 = 0.1
11. Calculate the Step-to-Step Accuracy for the −17 dBm (90 dBμV) to −26 dBm (81 dBμV) 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 (90 dBμV) SRC POWER setting from the Absolute Vernier Accuracy for the −18 dBm (89 dBμV) setting.

    Record this calculation in the Step-to-Step Accuracy column for SRC POWER −18 dBm (89 dBμV).
12. Locate the most positive Absolute Vernier Accuracy value in Table 2-64 and record as **TR Entry 2** of the performance verification test record.
13. Locate the most negative Absolute Vernier Accuracy value in Table 2-64 and record as **TR Entry 3** of the performance verification test record.
14. Locate the largest Step-to-Step Accuracy values in Table 2-64 and record as **TR Entry 4** of the performance verification test record.
15. Locate the smallest Step-to-Step Accuracy values in Table 2-64 and record as **TR Entry 5** of the performance verification test record.

50. Absolute Amplitude Accuracy, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

Table 2-64. Vernier Accuracy

EMC Analyzer SRC POWER		Measured Power Level	Absolute Vernier Accuracy	Step-to-Step Accuracy
dBμV	**dBm**	**dB**	**dB**	**dB**
90	−17	________	________	N/A
89	−18	________	________	________
88	−19	________	________	________
87	−20	0 (Ref)	0 (Ref)	________
86	−21	________	________	________
85	−22	________	________	________
84	−23	________	________	________
83	−24	________	________	________
82	−25	________	________	________
81	−26	________	________	________

51. Power Sweep Range, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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 97 dBμV to 106 dBμV (−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 for Option 010, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM."

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)

51. Power Sweep Range, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

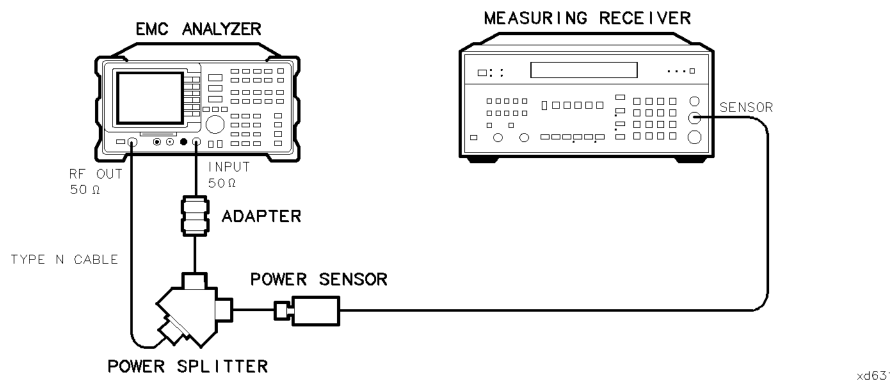

Figure 2-75.
Power Sweep Range Test Setup,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

51. Power Sweep Range, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

Procedure

1. Connect the equipment as shown in Figure 2-75. Do not connect the power sensor to the power splitter at this time.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) Band Lock 0-2.9 Gz BAND 0
   The HP 8594EM does not need to be band locked.
   (FREQUENCY) 300 (MHz)
   (SPAN) 0 (Hz)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)
   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)

3. On the EMC 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 2-75.
5. On the EMC analyzer, press the following keys:

   SRC PWR ON OFF (ON) 97 (dBμV)
   SRC ATN MAN AUTO (MAN) 0 (dB)
   PWR SWP ON OFF (ON) 10 (dB)
   (AMPLITUDE) SCALE LOG LIN (LOG) 2 (dB)

   Press REF LVL on the EMC 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.
6. 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.
7. Press (AUX/USER), Track Gen, PWR SWP ON OFF (OFF) to set power sweep off. The ΔMKR should read 0 dB $\pm$0.1 dB. If it does not, press

SRC PWR ON OFF (ON), and adjust the power level until the marker reads 0 dB ±0.1 dB.

8. Record the power level displayed on the measuring receiver as **TR Entry 1** of the performance verification test record.
9. Press PWR SWP ON OFF (ON) to set power sweep on. Wait for completion of a new sweep.
10. Press (MKR), MARKER NORMAL. Use the knob to place the marker at the right-most graticule line. Press MARKER Δ.

11. Press (AUX/USER), 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.

12. Record the power level displayed on the measuring receiver as **TR Entry 2** of the performance verification test record.

13. 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

52. Tracking Generator Level Flatness, HP 8591EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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 Offset and Gain for Option 010, HP 8591EM."

Equipment Required

Measuring receiver
Power sensor, 100 kHz to 1800 MHz
Cable, Type N, 62 cm (24 in)

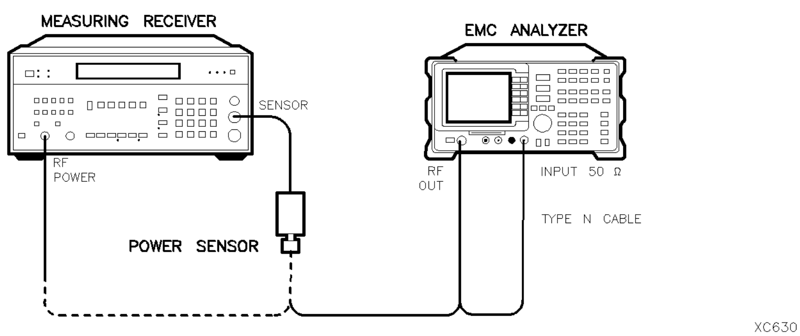

Figure 2-76. Tracking Generator Level Flatness Test Setup, HP 8591EM

52. Tracking Generator Level Flatness, HP 8591EM Option 010

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-76.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   CF STEP AUTO MAN (MAN) 100 (MHz)
   (SPAN) ZERO SPAN

3. On the EMC analyzer, press (MKR), (AUX/USER), Track Gen, SRC PWR ON OFF (ON), and enter 102 (dBμV).
4. On the EMC 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.
7. On the EMC analyzer, press 96 (dBμV), (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 EMC 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 2-65.
11. Record the power level displayed on the measuring receiver as the Level Flatness in Table 2-65.
12. Repeat steps 9 through 11 to measure the flatness at each center frequency setting listed in Table 2-65. The (⇧) (step-up key) may be used to tune to center frequencies above 100 MHz.

Table 2-65. Tracking Generator Level Flatness Worksheet

Center Freq	Level Flatness (dB)	Cal Factor (MHz)	Center Freq	Level Flatness (dB)	Cal Factor (MHz)
100 kHz	____________	0.1	600 MHz	____________	300
300 kHz	____________	0.3	700 MHz	____________	1000
500 kHz	____________	0.3	800 MHz	____________	1000
1 MHz	____________	1	900 MHz	____________	1000
2 MHz	____________	3	1000 MHz	____________	1000
5 MHz	____________	3	1100 MHz	____________	1000
10 MHz	____________	10	1200 MHz	____________	1000
20 MHz	____________	30	1300 MHz	____________	1000
50 MHz	____________	50	1400 MHz	____________	1000
100 MHz	____________	100	1500 MHz	____________	2000
200 MHz	____________	300	1600 MHz	____________	2000
300 MHz	0 (Ref)	300	1700 MHz	____________	2000
400 MHz	____________	300	1800 MHz	____________	2000
500 MHz	____________	300			

13. Locate the most positive Level Flatness reading in Table 2-65 for the frequency ranges listed in Table 2-66 and record as the Maximum Flatness in the performance verification test record as shown in Table 2-66.

Table 2-66. Maximum Flatness

Description	TR Entry (Maximum Flatness)
100 kHz	1
300 kHz to 5 MHz	2
10 MHz to 1800 MHz	3

14. Locate the most negative Level Flatness reading in Table 2-65 for the frequency ranges listed in Table 2-67 and record as the Minimum Flatness in the performance verification test record as shown in Table 2-67.

Table 2-67. Minimum Flatness

Description	TR Entry (Minimum Flatness)
100 kHz	**4**
300 kHz to 5 MHz	**5**
10 MHz to 1800 MHz	**6**

15. Press (PRESET) on the EMC analyzer.

53. Tracking Generator Level Flatness, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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 ohm 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 ohms. The dBm equation used is :

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

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 for Option 010, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM.”

Equipment Required

Measuring receiver
Power sensor, 100 kHz to 2.9 GHz
Cable, Type N, 62 cm (24 in)
Digital voltmeter
50 Ohm termination
Cable, BNC 91 cm (36 in)
Adapter, BNC (f) to dual banana plug
Adapter, Type N tee, (m)(f)(f)

53. Tracking Generator Level Flatness, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

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

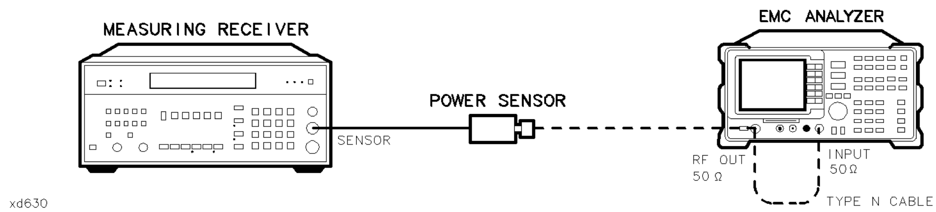

Figure 2-77. Tracking Generator Level Flatness Test Setup, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-77.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) Band Lock 0-2.9 Gz BAND 0
   The HP 8594EM does not need to be band locked.
   (FREQUENCY) 300 (MHz)
   CF STEP AUTO MAN (MAN) 100 (MHz)
   (SPAN) 0 (Hz)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)

3. On the EMC analyzer, press the following keys:

   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)

4. On the EMC 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 EMC analyzer, press SRC PWR ON OFF (ON), 87 (dBμV), (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 EMC 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 2-68.
11. Record the power level displayed on the measuring receiver as the Level Flatness in Table 2-68.
12. Repeat steps 9 through 11 to measure the flatness at each center frequency setting listed in Table 2-68. The (⇧) (step-up key) may be used to tune to center frequencies above 100 MHz.

53. Tracking Generator Level Flatness, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

Table 2-68. Tracking Generator Level Flatness Worksheet

Center Frequency	Level Flatness (dB)	Cal Factor (MHz)	Center Frequency	Level Flatness (dB)	Cal Factor (MHz)
100 kHz	________	0.1	1000 MHz	________	1000
300 kHz	________	0.3	1100 MHz	________	1000
500 kHz	________	0.3	1200 MHz	________	1000
1 MHz	________	1	1300 MHz	________	1000
2 MHz	________	3	1400 MHz	________	1000
5 MHz	________	3	1500 MHz	________	2000
10 MHz	________	10	1600 MHz	________	2000
20 MHz	________	30	1700 MHz	________	2000
40 MHz	________	50	1800 MHz	________	2000
50 MHz	________	10	1900 MHz	________	2000
80 MHz	________	100	2000 MHz	________	2000
100 MHz	________	100	2100 MHz	________	2000
200 MHz	________	300	2200 MHz	________	2000
300 MHz	________	300	2300 MHz	________	2000
400 MHz	________	300	2400 MHz	________	2000
500 MHz	________	100	2500 MHz	________	3000
600 MHz	________	300	2600 MHz	________	3000
700 MHz	________	1000	2700 MHz	________	3000
800 MHz	________	1000	2800 MHz	________	3000
900 MHz	________	1000	2900 MHz	________	3000

13. Disconnect the Power Sensor from the RF OUT 50 Ω and connect the equipment as shown in Figure 2-78.

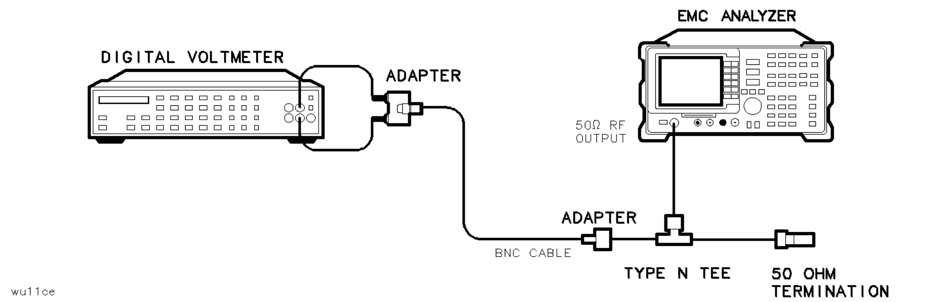

Figure 2-78.
Tracking Generator Level Flatness, Center Frequency <100 kHz,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

14. Set the DVM to measure AC Volts. Press the following DVM keys so that it reads out in dBm:

    50 (STORE) 4
    (MATH) 4

15. Set the EMC analyzer center frequency to 9 kHz and press (SGL SWP). Record the DVM readout in column 2 of Table 2-69.

16. Repeat step 15 for all center frequencies listed in Table 2-69

Table 2-69.
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	______	______

17. Subtract the 100 kHz Level Flatness readout in Table 2-68 from the 100 kHz DVM Readout in Table 2-69 and record as the DVM Offset at 100 kHz.

    DVM Offset ______________ dB

18. For example, if the Level Flatness reading from Table 2-68 is +1.0 dB and the DVM Readout from Table 2-69 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 2-69 and record as the Corrected Level Flatness in column 3.

    For example, if the DVM Readout from Table 2-69 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 2-68 and Table 2-69 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 2-68 and Table 2-69 and record this value as **TR Entry 3** and **TR Entry 4** of the performance verification test record.

54. Harmonic Spurious Outputs, HP 8591EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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

Spectrum analyzer, microwave
Cable, Type N, 62 cm (24 in)
Cable, BNC, 23 cm (9 in)
Adapter, Type N (m) to BNC (f)

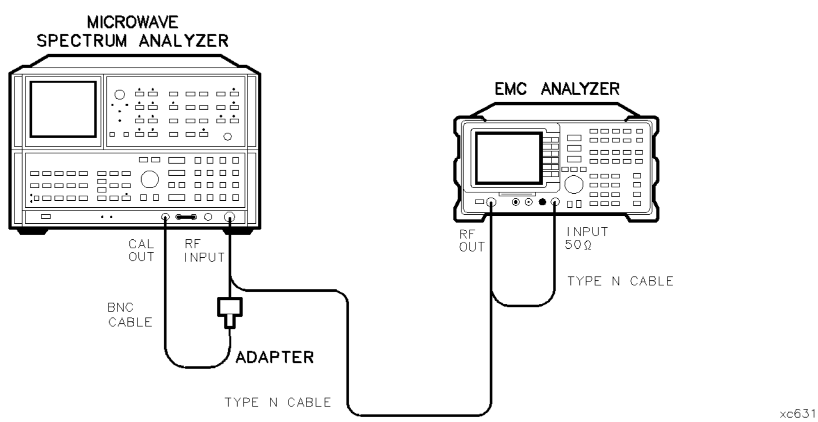

Figure 2-79. Harmonic Spurious Outputs Test Setup, HP 8591EM

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-79.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) ZERO SPAN
   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)

3. On the EMC analyzer, press TRACKING PEAK . Wait for the PEAKING message to disappear, then press the following keys:

   107 (dBμV)
   (FREQUENCY) 10 (MHz)
   (SGL SWP)

   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 that the following steps are for an HP 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 2-79.
6. Set the microwave spectrum analyzer controls as follows:

   CENTER FREQUENCY .... 10 MHz
   SPAN .... 100 kHz

54. Harmonic Spurious Outputs, HP 8591EM Option 010

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 that the following steps are for an HP 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 2-70 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 2-70 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 2-70, then repeat step 7. Note that the microwave spectrum analyzer frequency is the same as the Tracking Generator Output Frequency (*STEP SIZE = TG FREQ*).

Table 2-70. 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

9. Locate the most positive 2nd Harmonic Level in Table 2-70 and record as **TR Entry 1** of the performance verification test record.

10. Locate the most positive 3rd Harmonic Level in Table 2-70 and record as **TR Entry 2** of the performance verification test record.

55. Harmonic Spurious Outputs, HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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

Spectrum analyzer, microwave
Cable, Type N, 62 cm (24 in)
Cable, BNC, 23 cm (9 in)
Adapter, Type N (m) to BNC (f)

Procedure

Note

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 HP 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 EMC analyzer. See Figure 2-80.

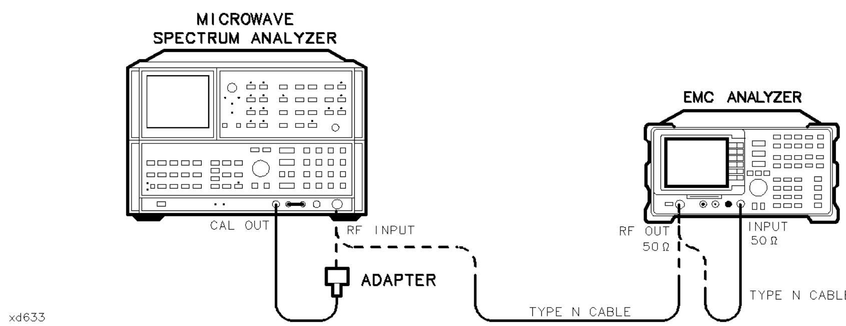

Figure 2-80.
Harmonic Spurious Outputs Test Setup,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM

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

(FREQUENCY) `Band Lock` `0-2.9 Gz BAND 0` (Except HP 8594EM)
(FREQUENCY) 300 (MHz)
(SPAN) 0 (Hz)
(BW) 30 (kHz)
(MKR)
(AUX/USER) `Track Gen` `SRC PWR ON OFF` (ON) 102 (dBμV)
`TRACKING PEAK`

Wait for the PEAKING message to disappear, then press the following keys:

SRC PWR ON OFF (ON) 106 (dBμV)
(FREQUENCY) 300 (kHz)
(SGL SWP)

4. Connect the Type N cable from the tracking generator output to the microwave spectrum analyzer RF INPUT as shown in Figure 2-80.
5. 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

6. Set up the microwave spectrum analyzer by performing the following steps:

   Note that the following steps are for an HP 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 2-71 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 2-71 as the 3rd Harmonic Level for the 300 kHz Tracking Generator Output Frequency.
   f. Press MARKER (OFF).
7. Change the tracking generator and microwave spectrum analyzer frequency to the next frequency listed in Table 2-71, then repeat step 6. Note that

the microwave spectrum analyzer frequency is the same as the Tracking Generator Output Frequency.

8. Locate the 2nd Harmonic Level for 9 kHz in Table 2-71 and record as **TR Entry 1** of the performance verification record.
9. Locate the most positive 2nd Harmonic Level in Table 2-71 and record as **TR Entry 2** of the performance verification test record.
10. Locate the 2nd Harmonic Level for 1.4 GHz in Table 2-71 and record as **TR Entry 3** of the performance verification test record.
11. Locate the 3rd Harmonic Level for 9 kHz in Table 2-71 and record as **TR Entry 4** of the performance verification record.
12. Locate the most positive 3rd Harmonic Level in Table 2-71 and record as **TR Entry 5** of the performance verification test record.

Table 2-71. 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

56. Non-Harmonic Spurious Outputs, HP 8591EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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

Spectrum analyzer, microwave
Cable, Type N, 62 cm (24 in)
Cable, BNC, 23 cm (9 in)
Adapter, Type N (m) to BNC (f)

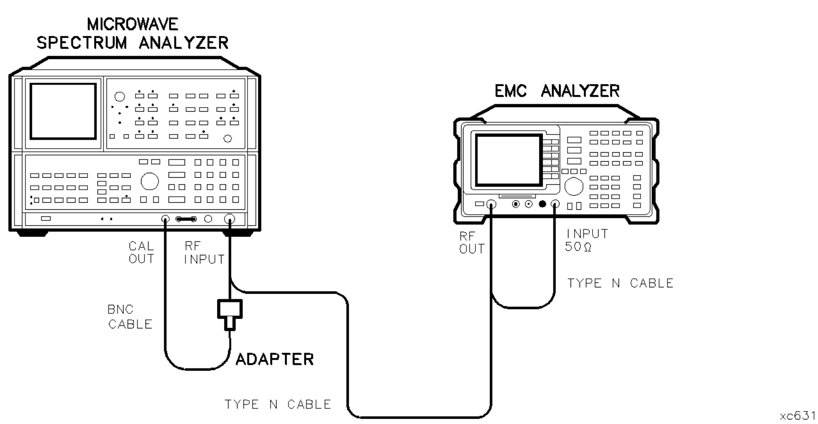

Figure 2-81. Non-Harmonic Spurious Outputs Test Setup, HP 8591EM

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-81.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) ZERO SPAN
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)
   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)

3. On the EMC analyzer, press TRACKING PEAK, then wait for the PEAKING message to disappear.
4. On the EMC analyzer, press 0 (dBm) then (SGL SWP).

   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. Perform a front-panel calibration of the microwave spectrum analyzer by performing the following steps:

   Note that the following steps are for an HP 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

   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 2-81.

Measuring Fundamental Amplitudes

7. Set the EMC analyzer center frequency to the Fundamental Frequency listed in Table 2-72.
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 2-72.
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 2-72 as the Fundamental Amplitude.
12. Repeat steps 8 through 11 for all Fundamental Frequency settings in Table 2-72.

Table 2-72. Fundamental Response Amplitudes Worksheet

Fundamental Frequency	Fundamental Amplitude (dBm)
10 MHz	________
900 MHz	________
1.8 GHz	________

Measuring Non-Harmonic Responses

13. On the EMC 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 2-73.
15. Press SINGLE on the microwave spectrum analyzer and wait for the sweep to finish. Press (MKR →) MKR → HIGH.

16. Verify that the marked signal is not the fundamental or a harmonic of the fundamental by performing the following steps:

    Note that the following steps are for an HP 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

    a. Divide the marker frequency by the fundamental frequency (the EMC 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.

    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.

18. 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 2-72.

    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.

    Record this difference as the Non-Harmonic Response Amplitude for the appropriate EMC analyzer center frequency and microwave spectrum analyzer start and stop frequency settings in Table 2-73.

    Non-Harmonic Amplitude = Marker Amplitude − Fundamental Amplitude

20. If a true non-harmonic spurious response is not found, record "NOISE" as the Non-Harmonic Response Amplitude in Table 2-73 for the appropriate EMC analyzer center frequency and microwave spectrum analyzer start and stop frequency settings.
21. Repeat steps 15 through 20 for the remaining microwave spectrum analyzer settings for start frequency, stop frequency, and resolution bandwidth; and for the EMC analyzer center frequency setting of 10 MHz.
22. Repeat steps 14 through 21 with the EMC analyzer center frequency set to 900 MHz.
23. Repeat steps 14 through 21 with the EMC analyzer center frequency set to 1.8 GHz.
24. Locate in Table 2-73 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.

56. Non-Harmonic Spurious Outputs, HP 8591EM Option 010

Table 2-73. Non-Harmonic Responses Worksheet

Microwave Spectrum Analyzer Settings			Non-Harmonic Response Amplitude (dBc)		
Start Frequency	Stop Frequency	Resolution Bandwidth	Center Frequency		
			10 MHz	900 MHz	1.8 GHz
0.1 MHz	5.0 MHz	10 kHz	________	________	________
5.0 MHz	55 MHz	100 kHz	________	________	________
55 MHz	1240 MHz	1 MHz	________	________	________
1240 MHz	1800 MHz	1 MHz	________	________	________

57. Non-Harmonic Spurious Outputs, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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

Spectrum analyzer, microwave
Cable, Type N, 62 cm (24 in)
Cable, BNC, 23 cm (9 in)
Adapter, Type N (m) to BNC (f)

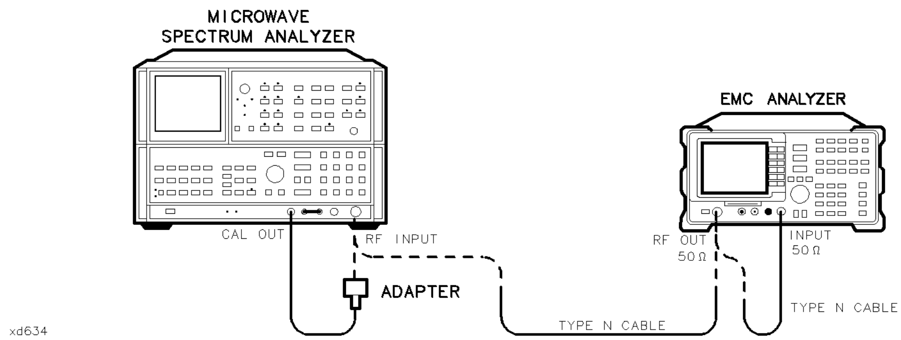

**Figure 2-82.
Non-Harmonic Spurious Outputs Test Setup,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM**

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. Perform a front-panel calibration of the microwave spectrum analyzer by performing the following steps:

   Note that the following steps are for an HP 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

   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.

57. Non-Harmonic Spurious Outputs, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

2. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-82.

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

   (FREQUENCY) Band Lock 0-2.9 Gz BAND 0
   The HP 8594EM does not need to be band locked.
   (FREQUENCY) 300 (MHz)
   (SPAN) 0 (Hz)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)
   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)
   TRACKING PEAK

   Wait for the PEAKING message to disappear, then press the following keys:

   SRC PWR ON OFF (ON) 106 (dBμV)
   (SGL SWP)

4. Connect the Type N cable from the tracking generator output to the microwave spectrum analyzer RF INPUT as shown in Figure 2-82.

Measuring Fundamental Amplitudes

5. Set the EMC analyzer center frequency to the Fundamental Frequency listed in Table 2-74.
6. Set the microwave spectrum analyzer controls as follows:

   SPAN .... 100 kHz
   REFERENCE LEVEL .... +5 dBm
   ATTEN .... 20 dB
   LOG dB/DIV .... 10 dB

7. Set the microwave spectrum analyzer CENTER FREQUENCY to the Fundamental Frequency listed in Table 2-74.
8. 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.
9. Record the microwave spectrum analyzer marker amplitude reading in Table 2-74 as the Fundamental Amplitude.
10. Repeat steps 5 through 9 for all Fundamental Frequency settings in Table 2-74.

Table 2-74. Fundamental Response Amplitudes Worksheet

Fundamental Frequency	Fundamental Amplitude (dBm)
9 kHz	________
1.5 GHz	________
2.9 GHz	________

Measuring Non-Harmonic Responses

11. On the EMC analyzer, set the center frequency to 9 kHz.
12. Set the microwave spectrum analyzer START FREQ, STOP FREQ, and RES BW as indicated in the first row of Table 2-75.
13. 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.
14. Verify that the marked signal is not the fundamental or a harmonic of the fundamental by performing the following steps:

    Note that the following steps are for an HP 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

    a. Divide the marker frequency by the fundamental frequency (the EMC 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.

15. 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 14) and is a true response (see step 15), proceed with step 17.

16. 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 14.

    The following step is only performed if the marker signal is not the fundamental or harmonic of the fundamental and is a true response.

17. Calculate the difference between the amplitude of marked signal and the Fundamental Amplitude as listed in Table 2-74.

    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.

    Record this difference as the Non-Harmonic Response Amplitude for the appropriate EMC analyzer center frequency and microwave spectrum analyzer start and stop frequency settings in Table 2-75.

    Non-Harmonic Amplitude = Marker Amplitude − Fundamental Amplitude

18. If a true non-harmonic spurious response is not found, record "NOISE" as the Non-Harmonic Response Amplitude in Table 2-75 for the appropriate EMC analyzer center frequency and microwave spectrum analyzer start and stop frequency settings.

19. Repeat steps 14 through 18 for the remaining microwave spectrum analyzer settings for start frequency, stop frequency, and resolution bandwidth; and for the EMC analyzer center frequency setting of 9 kHz.

20. Repeat steps 12 through 18 with the EMC analyzer center frequency set to 1.5 GHz.

21. Repeat steps 12 through 18 with the EMC analyzer center frequency set to 2.9 GHz.

22. Locate in Table 2-75 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.

23. Locate in Table 2-75 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.

Table 2-75. Non-Harmonic Responses Worksheet

Microwave Spectrum Analyzer Settings			Non-Harmonic Response Amplitude (dBc)		
Start Frequency	Stop Frequency	Resolution Bandwidth	Center Frequency		
			9 kHz	1.5 GHz	2.9 GHz
0.003 MHz*	0.2 MHz	3 kHz	______	______	______
0.2 MHz	5.0 MHz	30 kHz	______	______	______
5.0 MHz	55 MHz	100 kHz	______	______	______
55 MHz	1240 MHz	1 MHz	______	______	______
1240 MHz	2000 MHz	1 MHz	______	______	______
2000 MHz	2900 MHz	1 MHz	______	______	______

* Adjust start frequency until the LO is just off the left side of the screen.

58. Tracking Generator Feedthrough, HP 8591EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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 EMC analyzer input is also terminated. The noise level of the EMC analyzer is then measured at several frequencies.

There are no related adjustments for this performance test.

Equipment Required

50 Ω Termination *(two required)*
Cable, Type N, 62 cm (24 in)
Cable, BNC, 23 cm (9 in)
Cable, Type N (m) to BNC (f)

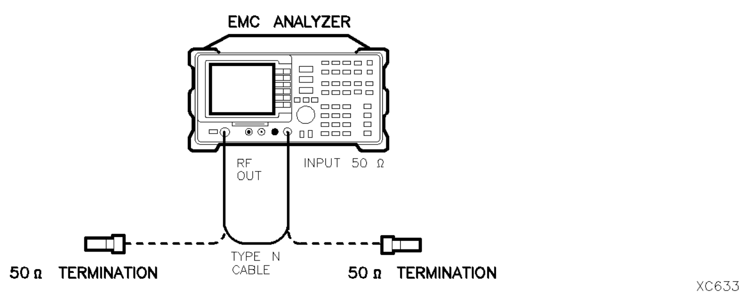

Figure 2-83. Tracking Generator Feedthrough Test Setup, HP 8591EM

58. Tracking Generator Feedthrough, HP 8591EM Option 010

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-83.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 1 (MHz)
   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)

3. On the EMC analyzer, press TRACKING PEAK. Wait for the PEAKING message to disappear.
4. Connect the CAL OUTPUT to the INPUT 50 Ω.
5. Set the EMC analyzer by pressing the following keys:

   (AMPLITUDE) 87 (dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)
   (SPAN) 10 (MHz)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 100 (kHz)

   Wait for the AUTO ZOOM message to disappear, then set the EMC analyzer as follows:

   (BW) AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

6. Press (SGL SWP), wait for the completion of a new sweep, then press (MKR →) MKR → HIGH.

   Subtract the MKR amplitude reading from 87 dBμV, then enter the result in the EMC analyzer as the REF LVL OFFSET. For example, if the marker reads 86.79 dBμV, enter +0.21 dB.

   87 dBμV − (86.79 dBμV) = +0.21 dB

   Then press the following EMC analyzer keys:

   (AMPLITUDE) More 1 of 3 More 2 of 3 REF LVL OFFSET (enter calculated value)

7. Connect one 50 Ω termination to the EMC analyzer INPUT 50 Ω and another to the tracking generator's RF OUT 50 Ω.
8. Press (AUX/USER), Track Gen, then SRC PWR ON OFF (OFF).
9. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 0 (Hz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) 97 (dBμV)
   (BW) AVG BW AUTO MAN (AUTO)
   (MKR) More 1 of 2 MARKER ALL OFF
   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

10. Press the following EMC analyzer keys:

    (MKR →) MKR → HIGH
    (MKR) More 1 of 3 MK TRACK ON OFF (ON)
    (MKR →) More 1 of 3 MARKER →REF LVL
    (SPAN) 2 (MHz)

    Wait for the AUTO ZOOM message to disappear, then press (MKR) More 1 of 3 MK TRACK ON OFF (OFF).

11. Press (FREQUENCY) and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then set the EMC analyzer as follows:

    (SPAN) 50 (kHz)
    (AMPLITUDE) 57 (dBμV)
    (BW) AVG BW AUTO MAN (MAN) 30 (Hz)

12. Press AUX/USER, Track Gen, SRC PWR ON OFF (ON), and enter 107 dBμV.

13. Press SGL SWP, then wait for completion of a new sweep. Press DISPLAY, DSP LINE ON OFF (ON).

14. 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 2-76 as the noise level at 1 MHz.

15. Repeat steps 13 and 14 for the remaining Tracking Generator Output Frequencies (EMC analyzer center frequency) listed in Table 2-76.

16. In Table 2-76, locate the most positive Noise Level Amplitude. Record this amplitude as **TR Entry 1** of the performance verification test record.

Table 2-76. TG Feedthrough Worksheet

Tracking Generator Output Frequency	Noise Level Amplitude (dBμV)	Tracking Generator Output Frequency	Noise Level Amplitude (dBμV)
1 MHz	________	850 MHz	________
20 MHz	________	1000 MHz	________
50 MHz	________	1150 MHz	________
100 MHz	________	1300 MHz	________
250 MHz	________	1450 MHz	________
400 MHz	________	1600 MHz	________
550 MHz	________	1750 MHz	________
700 MHz	________		

59. Tracking Generator Feedthrough, HP 8594EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is terminated and set for 108 dBμV output power (maximum output power). The EMC analyzer input is also terminated. The noise level of the EMC 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)

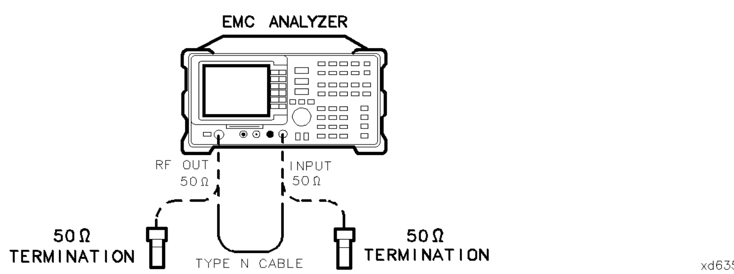

Figure 2-84. Tracking Generator Feedthrough Test Setup, HP 8594EM

59. Tracking Generator Feedthrough, HP 8594EM Option 010

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-84.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 0 (Hz)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)
   (MKR)
   (AUX/USER) Track Gen
   SRC PWR ON OFF (ON) 102 (dBμV)

3. On the EMC analyzer, press TRACKING PEAK. Wait for the PEAKING message to disappear.
4. Connect the CAL OUTPUT to the INPUT 50 Ω.
5. Set the EMC analyzer by pressing the following keys:

   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL 87 (dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 100 (kHz)

   Wait for the AUTO ZOOM message to disappear, then set the EMC analyzer as follows:

   (BW) AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

6. Press (SGL SWP), wait for the completion of a new sweep, then press (MKR →) MKR → HIGH.

   Subtract the MKR amplitude reading from 87 dBμV, then enter the result in the EMC analyzer as the REF LVL OFFSET. For example, if the marker reads 86.79 dBμV, enter +0.21 dB.

87 dBμV – (86.79 dBμV) = +0.21 dB

Press the following EMC analyzer keys:

(AMPLITUDE) More 1 of 3 REF LVL OFFSET (enter calculated value)

7. Connect one 50 Ω termination to the EMC analyzer INPUT 50 Ω and another to the tracking generator RF OUT 50 Ω.
8. Press (AUX/USER), Track Gen, then SRC PWR ON OFF (OFF).
9. Set the EMC analyzer by pressing the following keys:

(FREQUENCY) 0 (Hz)
(SPAN) 10 (MHz)
(AMPLITUDE) REF LVL 97 (dBμV)
(MKR) MARKER 1 ON OFF (OFF)
(BW) AVG BW AUTO MAN (AUTO)
(SWEEP/TRIG) SWEEP CONT SGL (CONT)

10. Press the following EMC analyzer keys:

(MKR →) MKR → HIGH
(MKR) More 1 of 3 MK TRACK ON OFF (ON)
(MKR →) More 1 of 3 MARKER →REF LVL
(SPAN) 800 (kHz)

Wait for the AUTO ZOOM message to disappear, then press (MKR) More 1 of 3 MK TRACK ON OFF (OFF).

11. Press FREQUENCY and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then set the EMC analyzer as follows:

    SPAN 50 kHz

    AMPLITUDE REF LVL 57 dBμV

    BW IF BW AUTO MAN (MAN) 1 kHz

    AVG BW AUTO MAN (MAN) 30 Hz

    TRACE More 1 of 4 More 2 of 4 DETECTOR SMP PK (SMP)

12. Press AUX/USER, Track Gen, SRC PWR ON OFF (ON), then enter 106 dBμV.
13. Press SGL SWP, then wait for completion of a new sweep. Press DISPLAY, DSP LINE ON OFF (ON).
14. 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 2-77 as the noise level at 400 kHz.
15. Repeat steps 13 and 14 for the remaining Tracking Generator Output Frequencies (EMC analyzer center frequency) listed in Table 2-77.
16. In Table 2-77, 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.
17. In Table 2-77, 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.

Table 2-77. TG Feedthrough Worksheet

Tracking Generator Output Frequency	Noise Level Amplitude (dBμV)	Tracking Generator Output Frequency	Noise Level Amplitude (dBμV)
400 kHz	________	1000 MHz	________
500 kHz	________	1150 MHz	________
1 MHz	________	1300 MHz	________
20 MHz	________	1450 MHz	________
50 MHz	________	1600 MHz	________
100 MHz	________	1750 MHz	________
250 MHz	________	2000 MHz	________
400 MHz	________	2300 MHz	________
550 MHz	________	2600 MHz	________
700 MHz	________	2900 MHz	________
850 MHz	________		

60. Tracking Generator Feedthrough, HP 8593EM, HP 8595EM, and HP 8596EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC analyzer input and the tracking is adjusted at 300 MHz for a maximum signal level. The tracking generator output is terminated and set for 106 dBμV output power (maximum output power). The EMC analyzer input is also terminated. The noise level of the EMC 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)

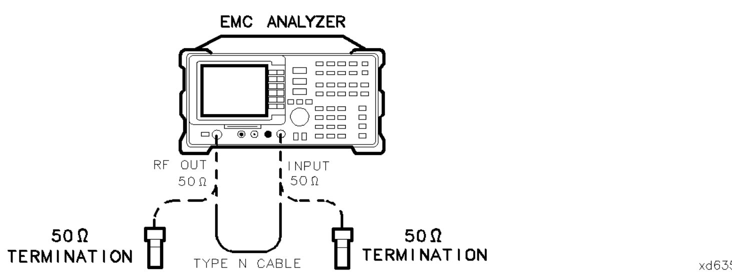

Figure 2-85.
Tracking Generator Feedthrough Test Setup, HP 8593EM, HP 8595EM, and HP 8596EM

Procedure

1. Connect the Type N cable between the RF OUT 50 Ω and INPUT 50 Ω connectors on the EMC analyzer. See Figure 2-85.
2. Press (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) Band Lock 0-2.9 Gz BAND 0
   (FREQUENCY) 300 (MHz)
   (SPAN) 0 (Hz)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)
   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)

3. On the EMC analyzer, press TRACKING PEAK. Wait for the PEAKING message to disappear.
4. Connect the CAL OUTPUT to the INPUT 50 Ω.
5. Set the EMC analyzer by pressing the following keys:

   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL 87 (dBμV)
   ATTEN AUTO MAN (MAN) 0 (dB)
   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (SPAN) 100 (kHz)

   Wait for the AUTO ZOOM message to disappear, then set the EMC analyzer as follows:

   (BW) AVG BW AUTO MAN (MAN) 30 (Hz)
   (MKR) More 1 of 3 MK TRACK ON OFF (OFF)

6. Press (SGL SWP), wait for the completion of a new sweep, then press (MKR →) MKR → HIGH.

   Subtract the MKR amplitude reading from 87 dBμV, then enter the result in the EMC analyzer as the REF LVL OFFSET. For example, if the marker reads 86.79 dBμV, enter +0.21 dB.

87 dBμV − (86.79 dBμV) = +0.21 dB

Press the following EMC analyzer keys:

(AMPLITUDE) More 1 of 3 More 2 of 3 REF LVL OFFSET (enter calculated value)

7. Connect one 50 Ω termination to the EMC analyzer INPUT 50 Ω and another to the tracking generator RF OUT 50 Ω.
8. Press (AUX/USER), Track Gen, then SRC PWR ON OFF (OFF).
9. Set the EMC analyzer by pressing the following keys:

   (FREQUENCY) 0 (Hz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL 97 (dBμV)
   (MKR) MARKER 1 ON OFF (OFF)
   (BW) AVG BW AUTO MAN (AUTO)
   (SWEEP/TRIG) SWEEP CONT SGL (CONT)

10. Press the following EMC analyzer keys:

   (MKR →) MKR → HIGH
   (MKR) More 1 of 3 MK TRACK ON OFF (ON)
   (MKR →) More 1 of 3 MARKER →REF LVL
   (SPAN) 800 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press (MKR) More 1 of 3 MK TRACK ON OFF (OFF).

11. Press (FREQUENCY) and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then set the EMC analyzer as follows:

    (SPAN) 50 (kHz)
    (AMPLITUDE) REF LVL 57 (dBµV)
    (BW) IF BW AUTO MAN (MAN) 1 (kHz)
    AVG BW AUTO MAN (MAN) 30 (Hz)
    (TRACE) More 1 of 4 More 2 of 4 DETECTOR SMP PK (SMP)

12. Press (AUX/USER), Track Gen, SRC PWR ON OFF (ON), then enter 106 (dBµV).
13. Press (SGL SWP), then wait for completion of a new sweep. Press (DISPLAY), DSP LINE ON OFF (ON).
14. 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 2-78 as the noise level at 400 kHz.
15. Repeat steps 13 and 14 for the remaining Tracking Generator Output Frequencies (EMC analyzer center frequency) listed in Table 2-78.
16. In Table 2-78, locate the most positive Noise Level Amplitude. Record this amplitude as **TR Entry 1** of the performance verification test record.

60. Tracking Generator Feedthrough, HP 8593EM, HP 8595EM, and HP 8596EM Option 010

Table 2-78. TG Feedthrough Worksheet

Tracking Generator Output Frequency	Noise Level Amplitude (dBμV)	Tracking Generator Output Frequency	Noise Level Amplitude (dBμV)
400 kHz	________	1000 MHz	________
500 kHz	________	1150 MHz	________
1 MHz	________	1300 MHz	________
20 MHz	________	1450 MHz	________
50 MHz	________	1600 MHz	________
100 MHz	________	1750 MHz	________
250 MHz	________	2000 MHz	________
400 MHz	________	2300 MHz	________
550 MHz	________	2600 MHz	________
700 MHz	________	2900 MHz	________
850 MHz	________		

61. Tracking Generator LO Feedthrough Amplitude, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

This performance verification test must be performed with the EMC analyzer set in the *spectrum analyzer mode*.

The tracking generator output is connected to the EMC 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)

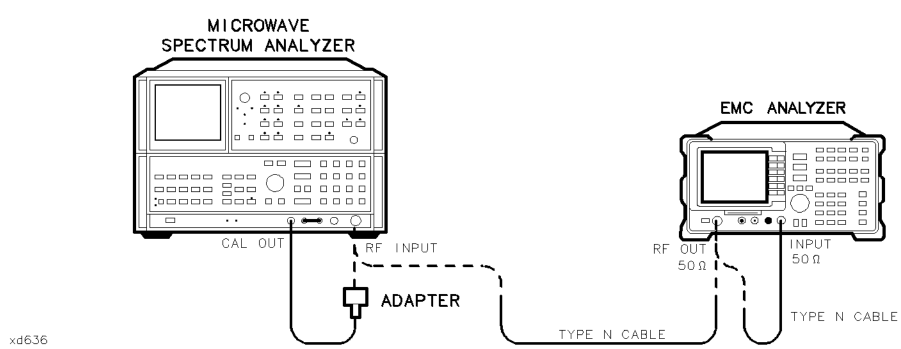

**Figure 2-86.
LO Feedthrough Amplitude Test Setup,
HP 8593EM, HP 8594EM, HP 8595EM, and HP 8596EM**

61. Tracking Generator LO Feedthrough Amplitude, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

Procedure

It is only necessary to perform step 1 if more than 2 hours have elapsed since a front-panel calibration of the microwave spectrum analyzer has been performed.

The microwave spectrum analyzer should be allowed to warm up for at least 30 minutes before proceeding.

1. Perform a front-panel calibration of the microwave spectrum analyzer by performing the following steps:

   Note that the following steps are for an HP 8566A/B microwave spectrum analyzer, the steps may be different if you are using another microwave spectrum analyzer.

   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 EMC analyzer. See Figure 2-86.

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

   (FREQUENCY) Band Lock 0-2.9 Gz BAND 0
   The HP 8594EM does not need to be band locked.
   (FREQUENCY) 300 (MHz)
   (SPAN) 0 (Hz)
   (BW) IF BW AUTO MAN (MAN) 30 (kHz)
   (MKR)
   (AUX/USER) Track Gen SRC PWR ON OFF (ON) 102 (dBμV)

4. Press TRACKING PEAK, then wait for the PEAKING! message to disappear.

5. Press the following EMC 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 2-86.
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 2-79 as the LO Feedthrough Amplitude for 3.9217 GHz.
11. Repeat steps 8 through 10 for the remaining EMC analyzer CENTER FREQ and microwave spectrum analyzer CENTER FREQUENCY settings listed in Table 2-79.
12. Locate in Table 2-79 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 2-79 the LO Feedthrough Amplitude for 2.9 GHz, then record the amplitude as **TR Entry 2** of the performance verification test record.

61. Tracking Generator LO Feedthrough Amplitude, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM Option 010

Table 2-79. LO Feedthrough Amplitude

EMC 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	________

62. CISPR Pulse Response, HP 8590 EM-Series

This is the only performance verification test that is performed with the EMC analyzer set in the *EMC analyzer mode*.

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 receiver 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 3 dB of attenuation. This provides protection as well as a controlled source match. Amplitude accuracy is ensured by measuring the output signal of the 3 dB attenuation 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 200 Hz, 9 kHz, and 120 kHz EMI bandwidth filters with a pulse repetition frequency (PRF) corresponding to CISPR specifications. The required CW amplitude for the tests is calculated based on the DUT's impulse bandwidth, the pulse width of the pulsed RF, and the CISPR specified spectral intensity.

Equipment Required

Pulse generator
Synthesizer/level generator
Power meter
Power sensor, 100 kHz to 1800 MHz
Attenuator, 3 dB
Modulator, TeleTech
Cable, BNC, 122 cm (48 in) *(two required)*
Adapter, Type N (f) to BNC (m)
Adapter, Type N (m) to Type N (m)

62. CISPR Pulse Response, HP 8590 EM-Series

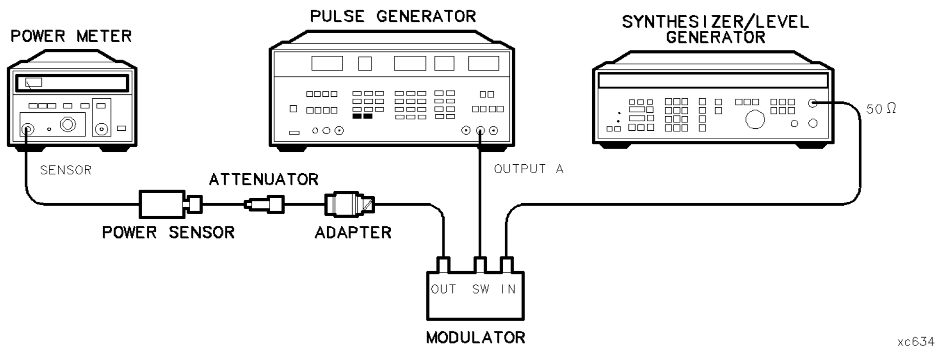

Figure 2-87. Input Amplitude Calibration Test Setup

Procedure

Input Amplitude Calibration

1. Zero and calibrate the power meter and the 100 kHz to 1800 MHz power sensor.
2. Connect the equipment as shown in Figure 2-87.
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 2-80 under Reference Amplitude at 50 MHz for the 200 Hz, 9 kHz and 120 kHz EMI bandwidths.

Table 2-80. Input Amplitude Calibration Worksheet

EMI Bandwidth	Reference Amplitude at 50 MHz	Amplitude Offset	Required Amplitude
200 Hz	______	−0.40	______
9 kHz	______	0.05	______
120 kHz	______	5.42	______

9. Calculate the Required Amplitude for each EMI bandwidth using the following formula and enter each calculated Required Amplitude values in Table 2-80.

   Reference Amplitude at 50 MHz + Amplitude Offset = Required Amplitude

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

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

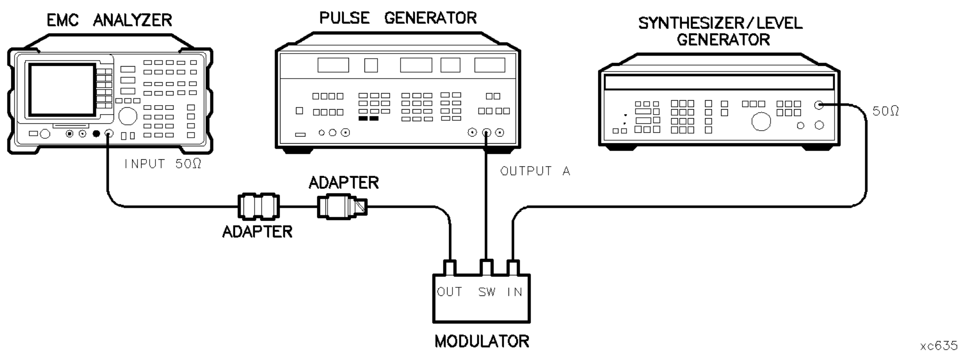

Figure 2-88. Isolation Check Test Setup

11. Connect the equipment as shown in Figure 2-88.
12. On the EMC analyzer, press the following keys:

   (MODE) EMC ANALYZER
   (PRESET) (Wait for the preset routine to finish.)
   (FREQUENCY) CENTER FREQ 50 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) SCALE LOG LIN (LIN)
   More 1 of 3 Amptd Units dBμV
   (AMPLITUDE) SCALE LOG LIN (LOG)
   More 1 of 3 Amptd Units dBμV
   (MKR →) MARKER → HIGH
   (SAVE/RECALL) Save Internal STATE → INTRNL 1
   (MKR →) More 1 of 3 MARKER → REF LVL
   (MKR) MARKER Δ

13. Press (RECALL) 1 on the pulse generator. Set the pulse generator to the following settings to bias the modulator off. (Use the (CHS) key to change signs of the entered value on the pulse generator.)

    HIL .... −1.5 V
    LOL .... −1.7 V

14. Verify that the isolation of the modulator (the marker-delta reading) exceeds 70 dBc.

CW Measurement for 200 Hz EMI Bandwidth

15. Press (RECALL) 1 on the pulse generator.
16. Subtract 40 dB from the Reference Amplitude at 50 MHz in Table 2-80. 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 (PRESET) on the EMC analyzer, then wait for the preset routine to finish. Press the following EMC analyzer keys:

    (SAVE/RECALL) Recall Internal INTERNAL → STATE 1
    (MKR) MARKER NORMAL
    (SPAN) 1 (kHz)
    (BW) 200 Hz EMI BW
    (DET) QP ON OFF (ON)

    Note that this routine will take approximately 1 minute to execute.

    (AMPLITUDE) REF LVL 67 (dBμV)
    (MKR →) MARKER → HIGH

19. Record the marker reading displayed on the EMC analyzer screen in Table 2-81, under the Measured CW Amplitude for 200 Hz.

200 Hz Pulse RF Signal Setup

20. Press (RECALL) 1 on the pulse generator. Set the pulse generator to the following conditions. (Use the (CHS) key to change the sign of the value entered on the pulse generator.)

    PER .... 40 ms
    WID .... 0.1 ms
    LOL .... −1.7 V

21. 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 2-80 by pressing (AMPLITUDE), (enter the Required Amplitude for 200 Hz), (−dBm).

22. Press the following EMC analyzer keys:

    (SPAN) ZERO SPAN

    (SWEEP/TRIG) SWP TIME AUTO MAN (MAN) 2 (SEC)

    (DET) QP ON OFF (ON)

    Note that this routine will take approximately 1 minute to execute.
    (MKR →) MARKER → HIGH

23. Record the marker amplitude reading in:

    - Table 2-81 as the Measured 25 Hz Amplitude for 200 Hz.
    - Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band A, 25 Hz Repetition Frequency.
    - Table 2-83 as the Measured Relative Equivalent Level of Pulse for Band A (QP) 25 Hz Repetition Frequency.

24. Press the following EMC analyzer keys:

    (DET) AVG ON OFF (ON)

    (MKR →) MARKER → HIGH

25. Record the marker amplitude reading in Table 2-83 as the Measured Relative Equivalent Level of Pulse for Band A (AVG) 25 Hz Repetition Frequency.

26. Press the following EMC analyzer keys:

    (DET) QP ON OFF (ON)

(AMPLITUDE) REF LVL 67 (dBμV)

27. Set the PERIOD to 10 ms on the pulse generator.
28. Press the following EMC analyzer keys:

    (SGL SWP)
    MARKER → HIGH

29. Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band A, 100 Hz Repetition Frequency.
30. Set the PERIOD to 16.7 ms on the pulse generator.
31. Press the following EMC analyzer keys:

    (SGL SWP)
    (MKR →) MARKER → HIGH

32. Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band A, 60 Hz Repetition Frequency.
33. Set the PERIOD to 100 ms on the pulse generator.
34. Press the following EMC analyzer keys:

    (SGL SWP)
    MARKER → HIGH

35. Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band A, 10 Hz Repetition Frequency.
36. Set the PERIOD to 200 ms on the pulse generator.
37. Press the following EMC analyzer keys:

    (SGL SWP)
    MARKER → HIGH

38. Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band A, 5 Hz Repetition Frequency.
39. Set the PERIOD to 500 ms on the pulse generator.
40. Press the following EMC analyzer keys:

(DET) QP/AVG 10X OFF (10X)
(SGL SWP)
(MKR →) MARKER → HIGH

41. Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band A, 2 Hz Repetition Frequency.
42. Set the PERIOD to 980 ms on the pulse generator.
43. Press the following EMC analyzer keys:

(SGL SWP)
MARKER → HIGH

44. Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band A, 1 Hz Repetition Frequency.
45. Press (TRIG) on the pulse generator.
46. Press (SGL SWP) on the EMC analyzer.
47. Let the EMC analyzer sweep 3 divisions then press (MAN) on the pulse generator.
48. Press MARKER → HIGH.
49. Record the Marker reading for Isolated Pulse Measurement for Band A in Table 2-82.

CW Measurement for 9 kHz EMI Bandwidth

50. Press (PRESET) on the EMC analyzer. Wait for the preset routine to finish.
51. Press (RECALL) 1 on the pulse generator.
52. Press (RECALL) 2 on the synthesizer/level generator.
53. Press the following keys on the EMC analyzer:

    (SAVE/RECALL) Recall Internal INTERNAL → STATE 1

    (MKR) MARKER NORMAL

    (SPAN) 20 (kHz)

    (BW) 9 kHz EMI BW

    (DET) QP ON OFF (ON)

    Note that this routine takes approximately 1 minute to execute.

    (AMPLITUDE) REF LVL 67 dBμV

    (MKR →) MARKER → HIGH

54. Record the quasi-peak reading displayed below the signal on the EMC analyzer screen in Table 2-81, under the Measured CW Amplitude for 9 kHz.

9 kHz Pulse RF Signal Setup

55. Press (RECALL) 1 on the pulse generator. Set the pulse generator to the following conditions. (Use the (CHS) key to change the sign of the value entered on the pulse generator.)

    PER .... 10 ms
    WID .... 2.2 μs
    LOL .... −1.7 V

56. 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 2-80 by pressing (AMPLITUDE), (enter the Required Amplitude for 9 kHz), (−dBm).

57. Press the following EMC analyzer keys:

    (SPAN) ZERO SPAN

    (SWEEP/TRIG) SWP TIME AUTO MAN (MAN) 2 (SEC)

    (DET) QP ON OFF (ON)

    Note that this routine will take approximately 1 minute to execute.
    (MKR →) MARKER → HIGH

58. Record the marker amplitude reading in:
    - Table 2-81 as the Measured 100 Hz Amplitude for 9 kHz.
    - Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band B, 100 Hz Repetition Frequency.
59. Set the PERIOD to 1 ms on the pulse generator.
60. On the EMC analyzer, press (MKR →) MARKER → HIGH.
61. Record the marker amplitude reading in:
    - Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band B, 1000 Hz Repetition Frequency.
    - Table 2-83 as the Measured Relative Equivalent Level of Pulse for Band B (QP) 1000 Hz Repetition Frequency.
62. Press the following EMC analyzer keys:

    (DET) AVG ON OFF (ON)

    (MKR →) MARKER → HIGH

63. Record the marker amplitude reading in Table 2-83 as the Measured Relative Equivalent Level of Pulse for Band B (AVG) 1000 Hz Repetition Frequency.
64. Press the following EMC analyzer keys:

    (DET) QP ON OFF (ON)

    (AMPLITUDE) REF LVL 67 (dBμV)

65. Set the PERIOD to 50 ms on the pulse generator.
66. Press (SGL SWP) on the EMC analyzer, then press (MKR →) MARKER → HIGH.

Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band B, 20 Hz Repetition Frequency.

67. Set the PERIOD to 100 ms on the pulse generator.
68. On the EMC analyzer, press (SGL SWP), MARKER → HIGH.

    Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band B, 10 Hz Repetition Frequency.
69. Set the PERIOD to 500 ms on the pulse generator.
70. On the EMC analyzer, press the following keys:

    (DET) QP/AVG 10X OFF (10X)
    (SGL SWP)
    (MKR →) MARKER → HIGH

    Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band B, 2 Hz Repetition Frequency.
71. Set the PERIOD to 980 ms on the pulse generator.
72. On the EMC analyzer, press (SGL SWP), MARKER → HIGH.

    Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Band B, 1 Hz Repetition Frequency.
73. Press TRIG on the pulse generator. Press (SGL SWP) on the EMC analyzer. Let the EMC analyzer sweep 3 divisions then press MAN on the pulse generator. On the EMC analyzer, press MARKER → HIGH. Record the Marker reading for Isolated Pulse Measurement for Band B in Table 2-82.

CW Measurement for 120 kHz EMI Bandwidth

74. Press PRESET on the EMC analyzer. Wait for the preset routine to finish.
75. Press RECALL 1 on the pulse generator.
76. Press RECALL 2 on the synthesizer/level generator.
77. Press SAVE/RECALL Recall Internal INTERNAL -> STATE 1 on the EMC analyzer.
78. On the EMC analyzer, press the following keys:

    MKR MARKER NORMAL
    SPAN 200 kHz
    DET QP ON OFF (ON)

    Note that this routine will take approximately 1 minute to execute.
    AMPLITUDE REF LVL 72 dBμV

    MKR → MARKER → HIGH

79. Record the reading displayed below signal on the EMC analyzer screen in Table 2-81 under the Measured CW Amplitude for 120 kHz.

120 kHz Pulse RF Signal Setup

80. Set the pulse generator to the following conditions:

    PER .... 10 ms
    WID .... 167 ns
    LOL .... −1.7 V

81. 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 2-80 by pressing AMPLITUDE, (enter the Required Amplitude for 120 kHz), dBm.

82. Press the following EMC analyzer keys:

    (SPAN) ZERO SPAN

    (SWEEP/TRIG) SWP TIME AUTO MAN (MAN) 2 (SEC)

    (DET) QP ON OFF (ON)

    Note that this routine will take approximately 1 minute to execute.
    (MKR →) MARKER → HIGH

83. Record the marker amplitude reading in:
    - Table 2-81 as the Measured 100 Hz Amplitude for the 120 kHz EMI bandwidth.
    - Table 2-82 as the Measured Relative Equivalent Level of Pulse for Bands C and D,
      100 Hz Repetition Frequency.
84. Set PERIOD to 1 ms on the pulse generator.
85. On the EMC analyzer, press:

    (SGL SWP)
    (MKR →) MARKER → HIGH

86. Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Bands C and D, 1000 Hz Repetition Frequency.
87. Set PERIOD to .1 ms on the pulse generator.
88. On the EMC analyzer, press (SGL SWP) MARKER → HIGH.
89. Record the marker reading in Table 2-83 as the Measured Relative Equivalent Level of Pulse for Bands C and D (QP value) for 10 kHz Repetition Frequency.
90. On the EMC analyzer, press the following keys:

    (DET) AVG ON OFF (ON)
    (SGL SWP)
    (MKR →) MARKER → HIGH

91. Record the marker amplitude reading in Table 2-83 as the Measured Relative Equivalent Level of Pulse for Band C/D (AVG) 10,000 Hz Repetition Frequency.

92. On the EMC analyzer, press the following keys:

    (DET) QP ON OFF (ON)

93. Set the PERIOD to 50 ms on the pulse generator.

94. On the EMC analyzer, press the following keys:

    (DET) QP/AVG 10X OFF (10X)
    (SGL SWP)
    (MKR →) MARKER → HIGH

95. Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Bands C and D, 20 Hz Repetition Frequency.

96. Set PERIOD to 100 ms on the pulse generator. Press (SGL SWP) MARKER → HIGH on the EMC analyzer.

    Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Bands C and D, 10 Hz Repetition Frequency.

97. Set the PERIOD to 500 ms on the pulse generator. Press (SGL SWP) MARKER → HIGH on the EMC analyzer.

    Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Bands C and D, 2 Hz Repetition Frequency.

98. Set PERIOD to 980 ms on the pulse generator. Press (SGL SWP) MARKER → HIGH on the EMC analyzer.

    Record the marker amplitude reading in Table 2-82 as the Measured Relative Equivalent Level of Pulse for Bands C and D, 1 Hz Repetition Frequency.

99. Press (TRIG) on the pulse generator. Press (SGL SWP) on the EMC analyzer. Let the EMC 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 2-82.

100. Enter the Measured value for Band A 25 Hz Repetition Frequency as the Reference value for all the Repetition Frequencies listed for Band A (in Table 2-82).

101. 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.
102. 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.
103. Calculate the error for each of the EMI bandwidths listed in Table 2-81 and record in the Error column. Use the following formula to calculate the error:
Measured CW Amplitude − Measured Amplitude for 25 Hz or 100 Hz = Error
104. Calculate the error for each of the frequencies listed in Table 2-82 and record in the Error column. Use the following formula to calculate the error:

Measured − Reference = Error
105. Calculate the error for each of the bands listed in Table 2-83 and record in the Error column. Use the following formula to calculate the error:

Quasi-Peak Measurement − Average Measurement = Error
106. Record the calculated error values from Table 2-81, and Table 2-82, and Table 2-83 in the performance verification test record.

Table 2-81. Quasi-Peak Detector Reference Accuracy Worksheet

EMI Bandwidth	Measured CW Amplitude	Measured Amplitude for 25 Hz or 100 Hz	Error	TR Entry
200 Hz	________	________	________	1
9 kHz	________	________	________	2
120 kHz	________	________	________	3

62. CISPR Pulse Response, HP 8590 EM-Series

Table 2-82. Quasi-Peak Detector Accuracy

Repetition Frequency (Hz)	Relative Equivalent Level of Pulse			
	Measured ($dB\mu V$)	Reference ($dB\mu V$)	Error (dB)	TR Entry
	Band A (200 Hz EMI BW)			
100				4
60				5
25				6
10				7
5				8
2				9
1				10
Isolated pulse				11
	Band B (9 kHz EMI BW)			
1000				12
100				13
20				14
10				15
2				16
1				17
Isolated pulse				18
	Bands C and D (120 kHz EMI BW)			
1000				19
100				20
20				21
10				22
2				23
1				24
Isolated pulse				25

Table 2-83. Average Detector Accuracy

Band	Repetition Frequency (Hz)	Relative Equivalent Level of Pulse		Error	TR Entry
		Quasi-Peak Measurement	Average Measurement		
Band A	25	________	________	________	**26**
Band B	1000	________	________	________	**27**
Band C/D	10,000	________	________	________	**28**

3

Performance Test Records

HP 8591EM Performance Test Record

Only the tests for HP 8591EM are included in this test record, therefore not all test numbers are included.

HP 8591EM Performance Test Record

Table 3-42. HP 8591EM Performance Test Record

Hewlett-Packard Company

Address: ______________________ Report No. ______________________

____

______________________ Date ______________________

______________________ (For example: 10 MAY 1995)

Model HP 8591EM

Serial No. ______________________

Options ______________________

Firmware Revision ______________________

Customer ______________________ Tested by ______________________

Ambient temperature ______________ °C Relative humidity ______________ %

Power mains line frequency ______________ Hz (nominal)

Test Equipment Used:

Description	Model No.	Trace No.	Cal Due Date
Synthesized Sweeper			
Synthesizer/Function Generator			
Synthesizer/Level Generator			
Signal Generator			
Measuring Receiver			
Power Meter			
RF Power Sensor			
High-Sensitivity Power Sensor			
Pulse Generator			
Microwave Frequency Counter			
Frequency Counter			
Frequency Standard			
Power Splitter			
300 MHz Low Pass Filter			
50 MHz Low Pass Filter			
50Ω Termination			
Microwave Spectrum Analyzer (Option 010 only)			

Notes/Comments: ______________________

HP 8591EM Performance Test Record (page 2 of 11)

Hewlett-Packard Company	
Model HP 8591EM	**Report No.** ______________
Serial No. ______________	**Date** ______________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
1. 10 MHz Reference Output Accuracy		Frequency Error		
Settability	−150 Hz	(1) ______	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Precision Frequency Reference Output 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 and Marker Count Accuracy				
Frequency Readout Accuracy		Frequency (MHz)		
SPAN				
20 MHz	1.49918	(1) ______	1.50082	±1 Hz
10 MHz	1.49958	(2) ______	1.50042	±1 Hz
1 MHz	1.4999680	(3) ______	1.500032	±1 Hz
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
(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	65 dBc	(1) ______		±1.0 dB
Sideband Above Signal	65 dBc	(2) ______		±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

HP 8591EM Performance Test Record (page 3 of 11)

Hewlett-Packard Company
Model HP 8591EM
Serial No. ______________

Report No. ______________
Date ______________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
10. Residual FM				
		(1) ______	250 Hz	±45.8 Hz
Narrow IF Bandwidth		**(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
−22	−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

HP 8591EM Performance Test Record (page 4 of 11)

Hewlett-Packard Company	
Model HP 8591EM	**Report No.** ____________
Serial No. ____________	**Date** ____________

Test Description	Results Measured Min.	Results Measured (TR Entry)	Results Measured Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
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
−22	−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
Narrow IF Bandwidth				
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
−22	−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

HP 8591EM Performance Test Record (page 5 of 11)

Hewlett-Packard Company
Model HP 8591EM — **Report No.** ____________
Serial No. ____________ — **Date** ____________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
Narrow IF Bandwidth				
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
−22	−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	151.59 mV	**(65)** ________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(66)** ________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(67)** ________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(68)** ________	82.88 mV	±1.84 mV
Narrow IF Bandwidth				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.59 mV	**(69)** ________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(70)** ________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(71)** ________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(72)** ________	82.88 mV	±1.84 mV
Log-to-Linear Switching	−0.25 dB	**(73)** ________	+0.25 dB	±0.05 dB
Narrow IF Bandwidth	−0.25 dB	**(74)** ________	+0.25 dB	±0.05 dB

HP 8591EM Performance Test Record (page 6 of 11)

Hewlett-Packard Company
Model HP 8591EM
Serial No. ______________________

Report No. ______________________
Date ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
14. Reference Level Accuracy				
Log Mode				
Reference Level (dBµV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(1)** ______	+0.40 dB	±0.06 dB
107	−0.50 dB	**(2)** ______	+0.50 dB	±0.06 dB
77	−0.40 dB	**(3)** ______	+0.40 dB	±0.06 dB
67	−0.50 dB	**(4)** ______	+0.50 dB	±0.08 dB
57	−0.80 dB	**(5)** ______	+0.80 dB	±0.08 dB
47	−1.00 dB	**(6)** ______	+1.00 dB	±0.12 dB
37	−1.10 dB	**(7)** ______	+1.10 dB	±0.12 dB
27	−1.20 dB	**(8)** ______	+1.20 dB	±0.12 dB
17	−1.30 dB	**(9)** ______	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBµV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(10)** ______	+0.40 dB	±0.06 dB
107	−0.50 dB	**(11)** ______	+0.50 dB	±0.06 dB
77	−0.40 dB	**(12)** ______	+0.40 dB	±0.06 dB
67	−0.50 dB	**(13)** ______	+0.50 dB	±0.08 dB
57	−0.80 dB	**(14)** ______	+0.80 dB	±0.08 dB
47	−1.00 dB	**(15)** ______	+1.00 dB	±0.12 dB
37	−1.10 dB	**(16)** ______	+1.10 dB	±0.12 dB
27	−1.20 dB	**(17)** ______	+1.20 dB	±0.12 dB
17	−1.30 dB	**(18)** ______	+1.30 dB	±0.12 dB
Narrow IF Bandwidth				
Log Mode				
Reference Level (dBµV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(19)** ______	+0.40 dB	±0.06 dB
107	−0.50 dB	**(20)** ______	+0.50 dB	±0.06 dB
77	−0.50 dB	**(21)** ______	+0.50 dB	±0.06 dB
67	−0.50 dB	**(22)** ______	+0.50 dB	±0.08 dB
57	−0.80 dB	**(23)** ______	+0.80 dB	±0.08 dB
47	−1.20 dB	**(24)** ______	+1.10 dB	±0.12 dB
37	−1.20 dB	**(25)** ______	+1.20 dB	±0.12 dB
27	−1.30 dB	**(26)** ______	+1.30 dB	±0.12 dB
17	−1.40 dB	**(27)** ______	+1.40 dB	±0.12 dB

HP 8591EM Performance Test Record (page 7 of 11)

Hewlett-Packard Company
Model HP 8591EM | **Report No.** ____________
Serial No. ____________ | **Date** ____________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
14. Reference Level Accuracy (continued)				
Narrow IF Bandwidth				
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(28)** ____________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(29)** ____________	+0.50 dB	±0.06 dB
77	−0.50 dB	**(30)** ____________	+0.50 dB	±0.06 dB
67	−0.50 dB	**(31)** ____________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(32)** ____________	+0.80 dB	±0.08 dB
47	−1.20 dB	**(33)** ____________	+1.10 dB	±0.12 dB
37	−1.20 dB	**(34)** ____________	+1.20 dB	±0.12 dB
27	−1.30 dB	**(35)** ____________	+1.30 dB	±0.12 dB
17	−1.40 dB	**(36)** ____________	+1.40 dB	±0.12 dB
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	+86.85 dBμV	**(1)** ____________	+87.15 dBμV	N/A
Resolution (IF) Bandwidth Switching Uncertainty				
Resolution (IF) 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
Narrow IF Bandwidth				
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

HP 8591EM Performance Test Record (page 8 of 11)

Hewlett-Packard Company	
Model HP 8591EM	**Report No.** ______________
Serial No. ______________	**Date** ______________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
17. Resolution (IF) Bandwidth Accuracy				
3 dB Bandwidth				
3 MHz	2.4 MHz	(1) ______	3.6 MHz	±138 kHz
300 kHz	240 kHz	(2) ______	360 kHz	±13.8 kHz
100 kHz	80 kHz	(3) ______	120 kHz	±4.6 kHz
30 kHz	24 kHz	(4) ______	36 kHz	±1.38 kHz
10 kHz	8 kHz	(5) ______	12 kHz	±460 Hz
3 kHz	2.4 kHz	(6) ______	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(7) ______	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(8) ______	10.8 kHz	±333 Hz
120 kHz	96 kHz	(9) ______	144 kHz	±4.44 kHz
1 MHz	0.9 MHz	(10) ______	1.1 MHz	±46 kHz
Narrow IF Bandwidth				
3 dB 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
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	55 dBc	(1) ______		±1.0 dB
1142.8 MHz	55 dBc	(2) ______		±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

HP 8591EM Performance Test Record (page 9 of 11)

Hewlett-Packard Company	
Model HP 8591EM	**Report No.** ______
Serial No. ______	**Date** ______

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
34. Gain Compression				
		(1) ______	0.5 dB	+0.21/−0.22 dB
Narrow IF Bandwidth		(2) ______	0.5 dB	+0.21/−0.22 dB
39. Displayed Average Noise Level				
Frequency				
400 kHz		(1) ______	−23 dBμV	+1.15/−1.25 dB
1 MHz		(2) ______	−23 dBμV	+1.15/−1.25 dB
1 MHz to 1.5 GHz		(3) ______	−23 dBμV	+1.15/−1.25 dB
1.5 GHz to 1.8 GHz		(4) ______	−21 dBμV	+1.15/−1.25 dB
44. Residual Responses				
150 kHz to 1.8 GHz		(1) ______	17 dBμV	+1.09/−1.15 dB
47. Fast Time Domain Sweeps				
Options 101 and 301 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%
49. Absolute Amplitude, Vernier, and Power Sweep Accuracy				
Option 010 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

HP 8591EM Performance Test Record (page 10 of 11)

Hewlett-Packard Company	
Model HP 8591EM	**Report No.** ______________
Serial No. ______________	**Date** ______________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
52. 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
54. Harmonic Spurious Outputs				
Option 010 only:				
2nd Harmonic Level	25 dBc	(1) ______		+1.55/−1.80 dB
3rd Harmonic Level	25 dBc	(2) ______		+1.55/−1.80 dB
56. Non-Harmonic Spurious Outputs				
Option 010 only:				
Highest Non-Harmonic Response Amplitude	30 dBc	(1) ______		+1.55/−1.80 dB
58. Tracking Generator Feedthrough				
Option 010 only:		(1) ______	1 dBμV	+1.15/−1.24 dB

HP 8591EM Performance Test Record (page 11 of 11)

Hewlett-Packard Company
Model HP 8591EM
Serial No. ____________________

Report No. ____________________
Date ____________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
62. CISPR Pulse Response				
		Amplitude Error		
Measured Amplitude				
200 Hz EMI BW	−1.5 dB	**(1)** ________	+1.5 dB	±0.34 dB
9 kHz EMI BW	−1.5 dB	**(2)** ________	+1.5 dB	±0.34 dB
120 kHz EMI BW	−1.5 dB	**(3)** ________	+1.5 dB	±0.50 dB
Relative Level, 200 Hz EMI BW				
Repetition Frequency				
100	3.0 dB	**(4)** ________	+5.0 dB	±0.24 dB
60	2.0 dB	**(5)** ________	+4.0 dB	±0.26 dB
25	0 (Ref)	**(6)** ________	0 (Ref)	0 (Ref)
10	−3.0 dB	**(7)** ________	−5.0 dB	±0.29 dB
5	−6.0 dB	**(8)** ________	−9.0 dB	±0.30 dB
2	−11.0 dB	**(9)** ________	−15.0 dB	±0.36 dB
1	−15.0 dB	**(10)** ________	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	**(11)** ________	−21.0 dB	±0.20 dB
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	**(12)** ________	+3.5 dB	±0.17 dB
100	0 (Ref)	**(13)** ________	0 (Ref)	0 (Ref)
20	−5.5 dB	**(14)** ________	−7.5 dB	±0.27 dB
10	−8.5 dB	**(15)** ________	−11.5 dB	±0.25 dB
2	−18.5 dB	**(16)** ________	−22.5 dB	±0.23 dB
1	−20.5 dB	**(17)** ________	−24.5 dB	±0.19 dB
Isolated Pulse	−21.5 dB	**(18)** ________	−25.5 dB	±0.15 dB
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	**(19)** ________	+7.0 dB	±0.17 dB
100	0 (Ref)	**(20)** ________	0 (Ref)	0 (Ref)
20	−8.0 dB	**(21)** ________	−10.0 dB	±0.18 dB
10	−12.5 dB	**(22)** ________	−15.5 dB	±0.18 dB
2	−24.0 dB	**(23)** ________	−28.0 dB	±0.18 dB
1	−26.5 dB	**(24)** ________	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	**(25)** ________	−33.5 dB	±0.17 dB
Band, Bandwidth, Repetition Frequency				
Band A, 200 Hz, 25 Hz	+9.4 dB	**(26)** ________	+13.4 dB	±0.28 dB
Band B, 9 kHz, 1000 Hz	+14.4 dB	**(27)** ________	+18.4 dB	±0.17 dB
Band C/D, 120 kHz, 10,000 Hz	+17.8 dB	**(28)** ________	+21.8 dB	±0.18 dB

HP 8591EM Performance Test Record

HP 8593EM Performance Test Record

Only the tests for HP 8593EM are included in this test record, therefore not all test numbers are included.

Table 3-43. HP 8593EM Performance Test Record

Hewlett-Packard Company

Address: ______________________ Report No. ______________________

____

______________________ Date ______________________

______________________ (For example: 10 MAY 1995)

Model HP 8593EM

Serial No. ______________________

Options ______________________

Firmware Revision ______________________

Customer ______________________ Tested by ______________________

Ambient temperature ______________________ °C Relative humidity ______________________ %

Power mains line frequency ______________________ Hz (nominal)

Test Equipment Used:

Description	Model No.	Trace No.	Cal Due Date
Synthesized Sweeper			
Synthesizer/Function Generator			
Synthesizer/Level Generator			
Signal Generator			
Measuring Receiver			
Power Meter			
RF Power Sensor			
High-Sensitivity Power Sensor			
Pulse Generator			
Microwave Frequency Counter			
Frequency Counter			
Frequency Standard			
Power Splitter			
50 MHz Low Pass Filter			
4.4 GHz Low Pass Filter			
50 Ω Termination			
Microwave Spectrum Analyzer (Option 010)			

Notes/Comments: ______________________

HP 8593EM Performance Test Record

HP 8593EM Performance Test Record (page 2 of 13)

Hewlett-Packard Company
Model HP 8593EM
Serial No. ______________________

Report No. ______________________
Date ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
1. 10 MHz Reference Output Accuracy				
		Frequency Error		
Settability	−150 Hz	**(1)** ________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Precision Frequency Reference Output 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 and Marker Count Accuracy				
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
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

HP 8593EM Performance Test Record (page 3 of 13)

Hewlett-Packard Company
Model HP 8593EM
Serial No. ______________________

Report No. ______________________
Date ______________________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
5. Frequency Readout and Marker Count Accuracy (continued)				
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
Narrow IF Bandwidth				
SPAN				
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
Frequency = 4.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	3.9999989	**(19)** ________	4.0000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	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)** ________	[illegible]	±4 Hz
Narrow IF Bandwidth				
SPAN				
(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

HP 8593EM Performance Test Record (page 4 of 13)

Hewlett-Packard Company
Model HP 8593EM
Serial No. ______

Report No. ______
Date ______

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
6. Noise Sidebands				
Suppression at 10 kHz		(1) ______	−60 dBc	±1.0 dB
Suppression at 20 kHz		(2) ______	−70 dBc	±1.0 dB
Suppression at 30 kHz		(3) ______	−75 dBc	±1.0 dB
7. System Related Sidebands				
Sideband Below Signal	65 dBc	(1) ______		±1.0 dB
Sideband Above Signal	65 dBc	(2) ______		±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
Narrow IF Bandwidth				
1.00 kHz	0.78 kHz	(7) ______	0.82 kHz	±3.54 Hz
11. Residual FM				
		(1) ______	250 Hz	±45.8 Hz
Narrow IF Bandwidth		(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

HP 8593EM Performance Test Record (page 5 of 13)

Hewlett-Packard Company	
Model HP 8593EM	**Report No.** ____________
Serial No. ____________	**Date** ____________

Test Description	Results Measured Min.	Results Measured (TR Entry)	Results Measured Max.	Measurement 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
−22	−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
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
−22	−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

HP 8593EM Performance Test Record (page 6 of 13)

Hewlett-Packard Company
Model HP 8593EM
Serial No. ______________________

Report No. ______________________
Date ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
Narrow IF Bandwidth				
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
−22	−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
Narrow IF Bandwidth				
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
−22	−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

HP 8593EM Performance Test Record (page 7 of 13)

Hewlett-Packard Company	
Model HP 8593EM	**Report No.** ____________
Serial No. ____________	**Date** ____________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.59 mV	**(65)** ____________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(66)** ____________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(67)** ____________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(68)** ____________	82.88 mV	±1.84 mV
Narrow IF Bandwidth				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.59 mV	**(69)** ____________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(70)** ____________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(71)** ____________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(72)** ____________	82.88 mV	±1.84 mV
Log-to-Linear Switching	−0.25 dB	**(73)** ____________	+0.25 dB	±0.05 dB
Narrow IF Bandwidth	−0.25 dB	**(74)** ____________	+0.25 dB	±0.05 dB
15. Reference Level Accuracy				
Log Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(1)** ____________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(2)** ____________	+0.50 dB	±0.06 dB
77	−0.40 dB	**(3)** ____________	+0.40 dB	±0.06 dB
67	−0.50 dB	**(4)** ____________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(5)** ____________	+0.80 dB	±0.08 dB
47	−1.00 dB	**(6)** ____________	+1.00 dB	±0.12 dB
37	−1.10 dB	**(7)** ____________	+1.10 dB	±0.12 dB
27	−1.20 dB	**(8)** ____________	+1.20 dB	±0.12 dB
17	−1.30 dB	**(9)** ____________	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(10)** ____________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(11)** ____________	+0.50 dB	±0.06 dB
77	−0.40 dB	**(12)** ____________	+0.40 dB	±0.06 dB
67	−0.50 dB	**(13)** ____________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(14)** ____________	+0.80 dB	±0.08 dB
47	−1.00 dB	**(15)** ____________	+1.00 dB	±0.12 dB
37	−1.10 dB	**(16)** ____________	+1.10 dB	±0.12 dB

HP 8593EM Performance Test Record (page 8 of 13)

Hewlett-Packard Company
Model HP 8593EM
Serial No. ______________________

Report No. ______________________
Date ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
15. Reference Level Accuracy (continued)				
Narrow IF Bandwidth				
Log Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(19)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(20)** ________	+0.50 dB	±0.06 dB
77	−0.50 dB	**(21)** ________	+0.50 dB	±0.06 dB
67	−0.50 dB	**(22)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(23)** ________	+0.80 dB	±0.08 dB
47	−1.20 dB	**(24)** ________	+1.10 dB	±0.12 dB
37	−1.20 dB	**(25)** ________	+1.20 dB	±0.12 dB
27	−1.30 dB	**(26)** ________	+1.30 dB	±0.12 dB
17	−1.40 dB	**(27)** ________	+1.40 dB	±0.12 dB
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
77	−0.40 dB	**(28)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(29)** ________	+0.50 dB	±0.06 dB
77	−0.50 dB	**(30)** ________	+0.50 dB	±0.06 dB
67	−0.50 dB	**(31)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(32)** ________	+0.80 dB	±0.08 dB
47	−1.20 dB	**(33)** ________	+1.10 dB	±0.12 dB
37	−1.20 dB	**(34)** ________	+1.20 dB	±0.12 dB
27	−1.30 dB	**(35)** ________	+1.30 dB	±0.12 dB
17	−1.40 dB	**(36)** ________	+1.40 dB	±0.12 dB
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	+86.85 dBμV	**(1)** ________	+87.15 dBμV	N/A
Resolution (IF) Bandwidth Switching Uncertainty				
Resolution (IF) 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

HP 8593EM Performance Test Record (page 9 of 13)

Hewlett-Packard Company Model HP 8593EM Serial No. ______________	Report No. ______________ Date ______________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties (continued)				
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
Narrow IF Bandwidth				
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 (IF) Bandwidth Accuracy				
3 dB Bandwidth				
3 MHz	2.4 MHz	**(1)** ______________	3.6 MHz	±138 kHz
300 kHz	240 kHz	**(2)** ______________	360 kHz	±13.8 kHz
100 kHz	80 kHz	**(3)** ______________	120 kHz	±4.6 kHz
30 kHz	24 kHz	**(4)** ______________	36 kHz	±1.38 kHz
10 kHz	8 kHz	**(5)** ______________	12 kHz	±460 Hz
3 kHz	2.4 kHz	**(6)** ______________	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	**(7)** ______________	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	**(8)** ______________	10.8 kHz	±333 Hz
120 kHz	96 kHz	**(9)** ______________	144 kHz	±4.44 kHz
1 MHz	0.9 MHz	**(10)** ______________	1.1 MHz	±46 kHz
Narrow IF Bandwidth				
3 dB 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

HP 8593EM Performance Test Record (page 10 of 13)

Hewlett-Packard Company
Model HP 8593EM | **Report No.** ____________
Serial No. ____________ | **Date** ____________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement 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
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	55 dBc	(1) ________		+1.12/−1.21 dB
≤18 GHz	55 dBc	(2) ________		+1.13/−1.22 dB
≤22 GHz	50 dBc	(3) ________		+1.15/−1.25 dB
Option 026 or 027 only:				
≤26.5 GHz	50 dBc	(3) ________		+1.15/−1.25 dB
30. Spurious Response				
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			*(Step 23c)*	
Frequency				

HP 8593EM Performance Test Record (page 11 of 13)

Hewlett-Packard Company	
Model HP 8593EM	**Report No.** ______________
Serial No. ______________	**Date** ______________

Test Description	**Min.**	**Results Measured (TR Entry)**	**Max.**	**Measurement 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
Narrow IF Bandwidth		**(3)** ________	0.5 dB	+0.21/−0.22 dB
40. Displayed Average Noise Level				
Frequency				
400 kHz		**(1)** ________	−20 dBμV	+1.15/−1.25 dB
1 MHz		**(2)** ________	−20 dBμV	+1.15/−1.25 dB
1 MHz to 2.9 GHz		**(3)** ________	−20 dBμV	+1.15/−1.25 dB
2.75 to 6.4 GHz		**(4)** ________	−22 dBμV	+1.15/−1.25 dB
6.0 to 12.8 GHz		**(5)** ________	−10 dBμV	+1.15/−1.25 dB
12.4 to 19.4 GHz		**(6)** ________	−6 dBμV	+1.15/−1.25 dB
19.1 to 22 GHz		**(7)** ________	0 dBμV	+1.15/−1.25 dB
Option 026 or 027 only:				
19.1 to 26.5 GHz		**(8)** ________	5 dBμV	+1.15/−1.25 dB
46. Residual Responses				
150 kHz to 6.4 GHz		**(1)** ________	17 dBμV	+1.09/−1.15 dB
48. Fast Time Domain Sweeps				
Options 101 and 301 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%
50. 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

HP 8593EM Performance Test Record (page 12 of 13)

Hewlett-Packard Company
Model HP 8593EM
Serial No. ______________________

Report No. ______________________
Date ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
51. Power Sweep Range				
Option 010 only:				
Start Power Level		(1) ________		
Stop Power Level		(2) ________		
Power Sweep Range	9.0 dB	(3) ________		±0.03 dB
53. 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
55. Harmonic Spurious Outputs				
Option 010 only:				
2nd Harmonic Level, 9 kHz	15 dBc	(1) ________		+1.55/−1.80 dB
2nd Harmonic Level, 25 kHz to 900 MHz	25 dBc	(2) ________		+1.55/−1.80 dB
2nd Harmonic Level, 1.4 GHz	25 dBc	(3) ________		+3.45/−4.01 dB
3rd Harmonic Level, 9 kHz	15 dBc	(4) ________		+1.55/−1.80 dB
3rd Harmonic Level, 25 kHz to 900 MHz	25 dBc	(5) ________		+1.55/−1.80 dB
57. Non-Harmonic Spurious Outputs				
Option 010 only:				
Highest Non-Harmonic Response Amplitude				
9 kHz to 2000 MHz	27 dBc	(1) ________		+1.55/−1.80 dB
2000 MHz to 2900 MHz	23 dBc	(2) ________		+3.45/−4.01 dB
60. Tracking Generator Feedthrough				
Option 010 only:				
400 kHz to 2.9 GHz		(1) ________	−5 dBμV	+1.59/−1.70 dB
61. Tracking Generator LO Feedthrough Amplitude				
Option 010 only:				
9 kHz to 1.5 GHz		(1)	−16 dBm	+2.02/−2.50 dB

HP 8593EM Performance Test Record (page 13 of 13)

Hewlett-Packard Company **Model HP 8593EM** **Serial No.** ______________	**Report No.** ______________ **Date** ______________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
62. CISPR Pulse Response				
		Amplitude Error		
Measured Amplitude				
200 Hz EMI BW	−1.5 dB	**(1)** ______	+1.5 dB	±0.34 dB
9 kHz EMI BW	−1.5 dB	**(2)** ______	+1.5 dB	±0.34 dB
120 kHz EMI BW	−1.5 dB	**(3)** ______	+1.5 dB	±0.50 dB
Relative Level, 200 Hz EMI BW				
Repetition Frequency				
100	3.0 dB	**(4)** ______	+5.0 dB	±0.24 dB
60	2.0 dB	**(5)** ______	+4.0 dB	±0.26 dB
25	0 (Ref)	**(6)** ______	0 (Ref)	0 (Ref)
10	−3.0 dB	**(7)** ______	−5.0 dB	±0.29 dB
5	−6.0 dB	**(8)** ______	−9.0 dB	±0.30 dB
2	−11.0 dB	**(9)** ______	−15.0 dB	±0.36 dB
1	−15.0 dB	**(10)** ______	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	**(11)** ______	−21.0 dB	±0.20 dB
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	**(12)** ______	+3.5 dB	±0.17 dB
100	0 (Ref)	**(13)** ______	0 (Ref)	0 (Ref)
20	−5.5 dB	**(14)** ______	−7.5 dB	±0.27 dB
10	−8.5 dB	**(15)** ______	−11.5 dB	±0.25 dB
2	−18.5 dB	**(16)** ______	−22.5 dB	±0.23 dB
1	−20.5 dB	**(17)** ______	−24.5 dB	±0.19 dB
Isolated Pulse	−21.5 dB	**(18)** ______	−25.5 dB	±0.15 dB
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	**(19)** ______	+7.0 dB	±0.17 dB
100	0 (Ref)	**(20)** ______	0 (Ref)	0 (Ref)
20	−8.0 dB	**(21)** ______	−10.0 dB	±0.18 dB
10	−12.5 dB	**(22)** ______	−15.5 dB	±0.18 dB
2	−24.0 dB	**(23)** ______	−28.0 dB	±0.18 dB
1	−26.5 dB	**(24)** ______	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	**(25)** ______	−33.5 dB	±0.17 dB
Band, Bandwidth, Repetition Frequency				
Band A, 200 Hz, 25 Hz	+9.4 dB	**(26)** ______	+13.4 dB	±0.28 dB
Band B, 9 kHz, 1000 Hz	+14.4 dB	**(27)** ______	+18.4 dB	±0.17 dB
Band C/D, 120 kHz, 10,000 Hz	+17.8 dB	**(28)** ______	+21.8 dB	±0.18 dB

HP 8593EM Performance Test Record

HP 8594EM Performance Test Record

Only the tests for HP 8594EM are included in this test record, therefore not all test numbers are included.

HP 8594EM Performance Test Record

Table 3-44. HP 8594EM Performance Test Record

Hewlett-Packard Company

Address: ______________________________

____

____

Report No. ______________________________

Date ______________________________

(For example: 10 MAY 1995)

Model HP 8594EM

Serial No. ______________________________

Options ______________________________

Firmware Revision ____________________

Customer ______________________________

Tested by ______________________________

Ambient temperature ____________________ °C

Relative humidity ____________________ %

Power mains line frequency ____________________ Hz (nominal)

Test Equipment Used:

Description	Model No.	Trace No.	Cal Due Date
Frequency Counter			
Frequency Standard			
Low Pass Filter, 50 MHz			
Low Pass Filter, 300 MHz			
Measuring Receiver			
Microwave Frequency Counter			
Microwave Spectrum Analyzer (Option 010)			
Power Meter			
RF Power Sensor			
High-Sensitivity Power Sensor			
Power Splitter			
Pulse Generator			
Signal Generator			
Synthesized Sweeper			
Synthesizer/Function Generator			
Synthesizer/Level Generator			
Termination, 50 Ω			

Notes/Comments:

HP 8594EM Performance Test Record (page 2 of 11)

Hewlett-Packard Company **Model HP 8594EM** **Serial No.** ______		**Report No.** ______ **Date** ______			
Test Description	**Results Measured** Min.	(TR Entry)	Max.	**Measurement Uncertainty**	
1. 10 MHz Reference Output Accuracy		Frequency Error			
Settability	−150 Hz	(1) ______	+150 Hz	$\pm 4.2 \times 10^{-9}$	
2. 10 MHz Precision Frequency Reference Accuracy Output 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 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	
Narrow IF Bandwidth					
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	
Narrow IF Bandwidth					
(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	65 dBc	(1) ______		±1.0 dB	
Sideband Below Signal	65 dBc	(2) ______		±1.0 dB	

HP 8594EM Performance Test Record (page 3 of 11)

Hewlett-Packard Company
Model HP 8594EM
Serial No. ______

Report No. ______
Date ______

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
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
Narrow IF Bandwidth				
1.00 kHz	780 Hz	**(7)** ______	820 Hz	±3.54 Hz
11. Residual FM				
		(1) ______	250 Hz	±45.8 Hz
Narrow IF Bandwidth		**(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
−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

HP 8594EM Performance Test Record (page 4 of 11)

Hewlett-Packard Company Model HP 8594EM Serial No. ______________	Report No. ______________ Date ______________

Test Description	Results Measured			Measurement
	Min.	(TR Entry)	Max.	Uncertainty
13. Scale Fidelity (continued)				
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
Narrow IF Bandwidth				
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

HP 8594EM Performance Test Record (page 5 of 11)

Hewlett-Packard Company
Model HP 8594EM | **Report No.** ______________________
Serial No. ______________________ | **Date** ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
Narrow IF Bandwidth				
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	151.59 mV	**(65)** ________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(66)** ________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(67)** ________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(68)** ________	82.88 mV	±1.84 mV
Narrow IF Bandwidth				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.59 mV	**(69)** ________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(70)** ________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(71)** ________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(72)** ________	82.88 mV	±1.84 mV
Log-to-Linear Switching	−0.25 dB	**(73)** ________	+0.25 dB	±0.05 dB
Narrow IF Bandwidth	−0.25 dB	**(74)** ________	+0.25 dB	±0.05 dB

HP 8594EM Performance Test Record (page 6 of 11)

Hewlett-Packard Company	
Model HP 8594EM	**Report No.** ______________
Serial No. ______________	**Date** ______________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
15. Reference Level Accuracy				
Log Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(1)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(2)** ________	+0.50 dB	±0.06 dB
77	−0.40 dB	**(3)** ________	+0.40 dB	±0.06 dB
67	−0.50 dB	**(4)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(5)** ________	+0.80 dB	±0.08 dB
47	−1.00 dB	**(6)** ________	+1.00 dB	±0.12 dB
37	−1.10 dB	**(7)** ________	+1.10 dB	±0.12 dB
27	−1.20 dB	**(8)** ________	+1.20 dB	±0.12 dB
17	−1.30 dB	**(9)** ________	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(10)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(11)** ________	+0.50 dB	±0.06 dB
77	−0.40 dB	**(12)** ________	+0.40 dB	±0.06 dB
67	−0.50 dB	**(13)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(14)** ________	+0.80 dB	±0.08 dB
47	−1.00 dB	**(15)** ________	+1.00 dB	±0.12 dB
37	−1.10 dB	**(16)** ________	+1.10 dB	±0.12 dB
27	−1.20 dB	**(17)** ________	+1.20 dB	±0.12 dB
17	−1.30 dB	**(18)** ________	+1.30 dB	±0.12 dB
Narrow IF Bandwidth				
Log Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(19)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(20)** ________	+0.50 dB	±0.06 dB
77	−0.50 dB	**(21)** ________	+0.50 dB	±0.06 dB
67	−0.50 dB	**(22)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(23)** ________	+0.80 dB	±0.08 dB
47	−1.20 dB	**(24)** ________	+1.10 dB	±0.12 dB
37	−1.20 dB	**(25)** ________	+1.20 dB	±0.12 dB
27	−1.30 dB	**(26)** ________	+1.30 dB	±0.12 dB
17	−1.40 dB	**(27)** ________	+1.40 dB	±0.12 dB

HP 8594EM Performance Test Record (page 7 of 11)

Hewlett-Packard Company
Model HP 8594EM | **Report No.** ____________
Serial No. ____________ | **Date** ____________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
15. Reference Level Accuracy (continued)				
Narrow IF Bandwidth				
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(28)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(29)** ________	+0.50 dB	±0.06 dB
77	−0.50 dB	**(30)** ________	+0.50 dB	±0.06 dB
67	−0.50 dB	**(31)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(32)** ________	+0.80 dB	±0.08 dB
47	−1.20 dB	**(33)** ________	+1.10 dB	±0.12 dB
37	−1.20 dB	**(34)** ________	+1.20 dB	±0.12 dB
27	−1.30 dB	**(35)** ________	+1.30 dB	±0.12 dB
17	−1.40 dB	**(36)** ________	+1.40 dB	±0.12 dB
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	+86.85 dBμV	**(1)** ________	+87.15 dBμV	N/A
Resolution (IF) Bandwidth Switching Uncertainty				
Resolution (IF) 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
Narrow IF Bandwidth				
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

HP 8594EM Performance Test Record (page 8 of 11)

Hewlett-Packard Company
Model HP 8594EM | **Report No.** ____________
Serial No. ____________ | **Date** ____________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
17. Resolution (IF) Bandwidth Accuracy				
3 dB Bandwidth				
3 MHz	2.4 MHz	**(1)** ____________	3.6 MHz	±138 kHz
300 kHz	240 kHz	**(2)** ____________	360 kHz	±13.8 kHz
100 kHz	80 kHz	**(3)** ____________	120 kHz	±4.6 kHz
30 kHz	24 kHz	**(4)** ____________	36 kHz	±1.38 kHz
10 kHz	8 kHz	**(5)** ____________	12 kHz	±460 Hz
3 kHz	2.4 kHz	**(6)** ____________	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	**(7)** ____________	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	**(8)** ____________	10.8 kHz	±333 Hz
120 kHz	96 kHz	**(9)** ____________	144 kHz	±4.44 kHz
1 MHz	0.9 MHz	**(10)** ____________	1.1 MHz	±46 kHz
Narrow IF Bandwidth				
3 dB 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	55 dBc	**(1)** ____________		+1.12/−1.21 dB
31. Spurious Response				
Second Harmonic Distortion		**(1)** ____________	−55 dBc	=1.12/−1.21 dB
Third Order Intermodulation Distortion			*(Step 23c)*	
Frequency				
2.8 GHz		**(2)** ____________	−54 dBc	+2.07/−2.42 dB

HP 8594EM Performance Test Record (page 9 of 11)

Hewlett-Packard Company
Model HP 8594EM
Serial No. ____________

Report No. ____________
Date ____________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
36. Gain Compression				
<2.9 GHz		(1) ________	0.5 dB	+0.21/−0.22 dB
Narrow IF Bandwidth		(2) ________	0.5 dB	+0.21/−0.22 dB
41. Displayed Average Noise Level				
Frequency				
400 kHz		(1) ________	−15 dBμV	+1.15/−1.25 dB
4 MHz		(2) ________	−15 dBμV	+1.15/−1.25 dB
5 MHz to 2.9 GHz		(3) ________	−20 dBμV	+1.15/−1.25 dB
45. Residual Responses				
150 kHz to 2.9 GHz		(1) ________	17 dBμV	+1.09/−1.15 dB
48. Fast Time Domain Sweeps				
Options 101 and 301 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%
50. 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
51. Power Sweep Range				
Option 010 only:				
Start Power Level		(1) ________		
Stop Power Level		(2) ________		
Power Sweep Range	9.0 dB	(3) ________		±0.03 dB

HP 8594EM Performance Test Record (page 10 of 11)

Hewlett-Packard Company
Model HP 8594EM — **Report No.** ______________
Serial No. ______________ — **Date** ______________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
53. 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
55. Harmonic Spurious Outputs				
Option 010 only:				
2nd Harmonic Level, 9 kHz	15 dBc	(1) ______		+1.55/−1.80 dB
2nd Harmonic Level, 25 kHz to 900 MHz	25 dBc	(2) ______		+1.55/−1.80 dB
2nd Harmonic Level, 1.4 GHz	25 dBc	(3) ______		+3.45/−4.01 dB
3rd Harmonic Level, 9 kHz	15 dBc	(4) ______		+1.55/−1.80 dB
3rd Harmonic Level, 25 kHz to 900 MHz	25 dBc	(5) ______		+1.55/−1.80 dB
57. Non-Harmonic Spurious Outputs				
Option 010 only:				
Highest Non-Harmonic Response Amplitude				
9 kHz to 2000 MHz	27 dBc	(1) ______		+1.55/−1.80 dB
2000 MHz to 2900 MHz	23 dBc	(2) ______		+3.45/−4.01 dB
59. Tracking Generator Feedthrough				
Option 010 only:				
400 kHz to 5 MHz		(1) ______	0 dBμV	+1.59/−1.70 dB
5 MHz to 2.9 GHz		(2) ______	−5 dBμV	+1.59/−1.70 dB
61. 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

HP 8594EM Performance Test Record (page 11 of 11)

Hewlett-Packard Company
Model HP 8594EM
Serial No. ______________

Report No. ______________
Date ______________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
62. CISPR Pulse Response				
		Amplitude Error		
Measured Amplitude				
200 Hz EMI BW	−1.5 dB	**(1)** ______	+1.5 dB	±0.34 dB
9 kHz EMI BW	−1.5 dB	**(2)** ______	+1.5 dB	±0.34 dB
120 kHz EMI BW	−1.5 dB	**(3)** ______	+1.5 dB	±0.50 dB
Relative Level, 200 Hz EMI BW				
Repetition Frequency				
100	3.0 dB	**(4)** ______	+5.0 dB	±0.24 dB
60	2.0 dB	**(5)** ______	+4.0 dB	±0.26 dB
25	0 (Ref)	**(6)** ______	0 (Ref)	0 (Ref)
10	−3.0 dB	**(7)** ______	−5.0 dB	±0.29 dB
5	−6.0 dB	**(8)** ______	−9.0 dB	±0.30 dB
2	−11.0 dB	**(9)** ______	−15.0 dB	±0.36 dB
1	−15.0 dB	**(10)** ______	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	**(11)** ______	−21.0 dB	±0.20 dB
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	**(12)** ______	+3.5 dB	±0.17 dB
100	0 (Ref)	**(13)** ______	0 (Ref)	0 (Ref)
20	−5.5 dB	**(14)** ______	−7.5 dB	±0.27 dB
10	−8.5 dB	**(15)** ______	−11.5 dB	±0.25 dB
2	−18.5 dB	**(16)** ______	−22.5 dB	±0.23 dB
1	−20.5 dB	**(17)** ______	−24.5 dB	±0.19 dB
Isolated Pulse	−21.5 dB	**(18)** ______	−25.5 dB	±0.15 dB
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	**(19)** ______	+7.0 dB	±0.17 dB
100	0 (Ref)	**(20)** ______	0 (Ref)	0 (Ref)
20	−8.0 dB	**(21)** ______	−10.0 dB	±0.18 dB
10	−12.5 dB	**(22)** ______	−15.5 dB	±0.18 dB
2	−24.0 dB	**(23)** ______	−28.0 dB	±0.18 dB
1	−26.5 dB	**(24)** ______	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	**(25)** ______	−33.5 dB	±0.17 dB
Band, Bandwidth, Repetition Frequency				
Band A, 200 Hz, 25 Hz	+9.4 dB	**(26)** ______	+13.4 dB	±0.28 dB
Band B, 9 kHz, 1000 Hz	+14.4 dB	**(27)** ______	+18.4 dB	±0.17 dB
Band C/D, 120 kHz, 10,000 Hz	+17.8 dB	**(28)** ______	+21.8 dB	±0.18 dB

HP 8594EM Performance Test Record

HP 8595EM Performance Test Record

Only the tests for HP 8595EM are included in this test record, therefore not all test numbers are included.

Table 3-45. HP 8595EM Performance Verification Test Record

Hewlett-Packard Company

Address: ______________________ Report No. ______________________

____

______________________ Date ______________________

______________________ (For example: 10 MAY 1995)

Model HP 8595EM

Serial No. ______________________

Options ______________________

Firmware Revision ______________________

Customer ______________________ Tested by ______________________

Ambient temperature ____________ °C Relative humidity ____________ %

Power mains line frequency ____________ Hz (nominal)

Test Equipment Used:

Description	Model No.	Trace No.	Cal Due Date
Frequency Counter			
Frequency Standard			
Low Pass Filter, 50 MHz			
Low Pass Filter, 300 MHz			
Low Pass Filter, 4.4 GHz			
Measuring Receiver			
Microwave Frequency Counter			
Microwave Spectrum Analyzer (Option 010)			
Power Meter			
RF Power Sensor			
High-Sensitivity Power Sensor			
Power Splitter			
Pulse Generator			
Signal Generator			
Synthesized Sweeper			
Synthesizer/Function Generator			
Synthesizer/Level Generator			
Termination, 50 Ω			

Notes/Comments:

HP 8595EM Performance Verification Test Record (page 2 of 11)

Hewlett-Packard Company
Model HP 8595EM | **Report No.** ______________________
Serial No. ______________________ | **Date** ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
1. 10 MHz Reference Output Accuracy				
		Frequency Error		
Settability	−150 Hz	**(1)**________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Precision Frequency Reference Output 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 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
Narrow IF Bandwidth				
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
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
Narrow IF Bandwidth				
(CNT RES = 10 Hz) 20 kHz	1.49999989	**(27)**________	1.50000011	±1.0 Hz
(CNT RES = 1[illegible]) [illegible]	[illegible]	**(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	65 dBc	**(1)**		±1.0 dB
Sideband Below Signal	65 dBc	**(2)**		±1.0 dB

HP 8595EM Performance Verification Test Record (page 3 of 11)

Hewlett-Packard Company
Model HP 8595EM
Serial No. ______________________

Report No. ______________________
Date ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
9. Frequency Span Readout Accuracy				
SPAN		MKRΔ Reading		
1800 MHz	1446.00 MHz	**(6-1)** ________	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
Narrow IF Bandwidth				
1.00 kHz	780 Hz	**(7)** ________	820 Hz	±3.54 Hz
11. Residual FM				
		(1) ________	250 Hz	±45.8 Hz
Narrow IF Bandwidth		**(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
−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

HP 8595EM Performance Verification Test Record (page 4 of 11)

Hewlett-Packard Company
Model HP 8595EM | **Report No.** ______________________
Serial No. ______________________ | **Date** ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
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
Narrow IF Bandwidth				
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

HP 8595EM Performance Verification Test Record (page 5 of 11)

Hewlett-Packard Company	
Model HP 8595EM	**Report No.** ______________
Serial No. ______________	**Date** ______________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
Narrow IF Bandwidth				
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	151.59 mV	**(65)** ________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(66)** ________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(67)** ________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(68)** ________	82.88 mV	±1.84 mV
Narrow IF Bandwidth				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.59 mV	**(69)** ________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(70)** ________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(71)** ________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(72)** ________	82.88 mV	±1.84 mV
Log-to-Linear Switching	−0.25 dB	**(73)** ________	+0.25 dB	±0.05 dB
Narrow IF Bandwidth	−0.25 dB	**(74)** ________	+0.25 dB	±0.05 dB

HP 8595EM Performance Verification Test Record (page 6 of 11)

Hewlett-Packard Company	
Model HP 8595EM	Report No. ______________
Serial No. ______________	Date ______________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
15. Reference Level Accuracy				
Log Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(1)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(2)** ________	+0.50 dB	±0.06 dB
77	−0.40 dB	**(3)** ________	+0.40 dB	±0.06 dB
67	−0.50 dB	**(4)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(5)** ________	+0.80 dB	±0.08 dB
47	−1.00 dB	**(6)** ________	+1.00 dB	±0.12 dB
37	−1.10 dB	**(7)** ________	+1.10 dB	±0.12 dB
27	−1.20 dB	**(8)** ________	+1.20 dB	±0.12 dB
17	−1.30 dB	**(9)** ________	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(10)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(11)** ________	+0.50 dB	±0.06 dB
77	−0.40 dB	**(12)** ________	+0.40 dB	±0.06 dB
67	−0.50 dB	**(13)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(14)** ________	+0.80 dB	±0.08 dB
47	−1.00 dB	**(15)** ________	+1.00 dB	±0.12 dB
37	−1.10 dB	**(16)** ________	+1.10 dB	±0.12 dB
27	−1.20 dB	**(17)** ________	+1.20 dB	±0.12 dB
17	−1.30 dB	**(18)** ________	+1.30 dB	±0.12 dB
Narrow IF Bandwidth				
Log Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(19)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(20)** ________	+0.50 dB	±0.06 dB
77	−0.50 dB	**(21)** ________	+0.50 dB	±0.06 dB
67	−0.50 dB	**(22)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(23)** ________	+0.80 dB	±0.08 dB
47	−1.20 dB	**(24)** ________	+1.10 dB	±0.12 dB
37	−1.20 dB	**(25)** ________	+1.20 dB	±0.12 dB
27	−1.30 dB	**(26)** ________	+1.30 dB	±0.12 dB
17	−1.40 dB	**(27)** ________	+1.40 dB	±0.12 dB

HP 8595EM Performance Verification Test Record (page 7 of 11)

Hewlett-Packard Company	
Model HP 8595EM	**Report No.** ______________
Serial No. ______________	**Date** ______________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
15. Reference Level Accuracy (continued)				
Narrow IF Bandwidth				
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(28)** ______	+0.40 dB	±0.06 dB
107	−0.50 dB	**(29)** ______	+0.50 dB	±0.06 dB
77	−0.50 dB	**(30)** ______	+0.50 dB	±0.06 dB
67	−0.50 dB	**(31)** ______	+0.50 dB	±0.08 dB
57	−0.80 dB	**(32)** ______	+0.80 dB	±0.08 dB
47	−1.20 dB	**(33)** ______	+1.10 dB	±0.12 dB
37	−1.20 dB	**(34)** ______	+1.20 dB	±0.12 dB
27	−1.30 dB	**(35)** ______	+1.30 dB	±0.12 dB
17	−1.40 dB	**(36)** ______	+1.40 dB	±0.12 dB
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	+86.85 dBμV	**(1)** ______	+87.15 dBμV	N/A
Resolution (IF) Bandwidth Switching Uncertainty				
Resolution (IF) 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
Narrow IF Bandwidth				
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

HP 8595EM Performance Test Record

HP 8595EM Performance Verification Test Record (page 8 of 11)

Hewlett-Packard Company
Model HP 8595EM
Serial No. ____________________

Report No. ____________________
Date ____________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
17. Resolution (IF) Bandwidth Accuracy				
3 dB Bandwidth				
3 MHz	2.4 MHz	**(1)** ____________	3.6 MHz	±138 kHz
300 kHz	240 kHz	**(2)** ____________	360 kHz	±13.8 kHz
100 kHz	80 kHz	**(3)** ____________	120 kHz	±4.6 kHz
30 kHz	24 kHz	**(4)** ____________	36 kHz	±1.38 kHz
10 kHz	8 kHz	**(5)** ____________	12 kHz	±460 Hz
3 kHz	2.4 kHz	**(6)** ____________	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	**(7)** ____________	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	**(8)** ____________	10.8 kHz	±333 Hz
120 kHz	96 kHz	**(9)** ____________	144 kHz	±4.44 kHz
1 MHz	0.9 MHz	**(10)** ____________	1.1 MHz	±46 kHz
Narrow IF Bandwidth				
3 dB 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				
50 kHz to 2.9 GHz	55 dBc	**(1)** ____________		+1.12/−1.21 dB
≤ 6.5 GHz	55 dBc	**(2)** ____________		+1.12/−1.21 dB

HP 8595EM Performance Verification Test Record (page 9 of 11)

Hewlett-Packard Company	
Model HP 8595EM	**Report No.** ____________
Serial No. ____________	**Date** ____________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
32. Spurious Response				
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			*(Step 23c)*	
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
Narrow IF Bandwidth		(3) ________	0.5 dB	+0.21/−0.22 dB
42. Displayed Average Noise				
Level **Frequency**				
400 kHz		(1) ________	−18 dBµV	+1.15/−1.25 dB
1 MHz		(2) ________	−18 dBµV	+1.15/−1.25 dB
1 MHz to 2.9 GHz		(3) ________	−18 dBµV	+1.15/−1.25 dB
2.75 to 6.5 GHz		(4) ________	−20 dBµV	+1.15/−1.25 dB
46. Residual Responses				
150 kHz to 6.5 GHz		(1) ________	17 dBµV	+1.09/−1.15 dB
48. Fast Time Domain Sweeps				
Options 101 and 301 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%
50. 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

HP 8595EM Performance Test Record

HP 8595EM Performance Verification Test Record (page 10 of 11)

Hewlett-Packard Company
Model HP 8595EM

Serial No. ____________

Report No. ____________

Date ____________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
51. Power Sweep Range				
Option 010 only:				
Start Power Level		(1) ________		
Stop Power Level		(2) ________		
Power Sweep Range	9.0 dB	(3) ________		±0.03 dB
53. 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
55. Harmonic Spurious Outputs				
Option 010 only:				
2nd Harmonic Level, 9 kHz	15 dBc	(1) ________		+1.55/−1.80 dB
2nd Harmonic Level, 25 kHz to 900 MHz	25 dBc	(2) ________		+1.55/−1.80 dB
2nd Harmonic Level, 1.4 GHz	25 dBc	(3) ________		+3.45/−4.01 dB
3rd Harmonic Level, 9 kHz	15 dBc	(4) ________		+1.55/−1.80 dB
3rd Harmonic Level, 25 kHz to 900 MHz	25 dBc	(5) ________		+1.55/−1.80 dB
57. Non-Harmonic Spurious Outputs				
Option 010 only:				
Highest Non-Harmonic Response Amplitude				
9 kHz to 2000 MHz	27 dBc	(1) ________		+1.55/−1.80 dB
2000 MHz to 2900 MHz	23 dBc	(2) ________		+3.45/−4.01 dB
60. Tracking Generator Feedthrough				
Option 010 only:				
400 kHz to 2.9 GHz		(1) ________	−5 dBμV	+1.59/−1.70 dB
61. Tracking Generator LO Feedthrough Amplitude				
Option 010 only:				
9 kHz to 1.5 GHz		(1)	−16 dBm	+2.02/−2.50 dB

HP 8595EM Performance Verification Test Record (page 11 of 11)

Hewlett-Packard Company
Model HP 8595EM
Serial No. ______________

Report No. ______________
Date ______________

Test Description	Results Measured Min.	Results Measured (TR Entry)	Results Measured Max.	Measurement Uncertainty
62. CISPR Pulse Response				
		Amplitude Error		
Measured Amplitude				
200 Hz EMI BW	−1.5 dB	**(1)** ______	+1.5 dB	±0.34 dB
9 kHz EMI BW	−1.5 dB	**(2)** ______	+1.5 dB	±0.34 dB
120 kHz EMI BW	−1.5 dB	**(3)** ______	+1.5 dB	±0.50 dB
Relative Level, 200 Hz EMI BW				
Repetition Frequency				
100	3.0 dB	**(4)** ______	+5.0 dB	±0.24 dB
60	2.0 dB	**(5)** ______	+4.0 dB	±0.26 dB
25	0 (Ref)	**(6)** ______	0 (Ref)	0 (Ref)
10	−3.0 dB	**(7)** ______	−5.0 dB	±0.29 dB
5	−6.0 dB	**(8)** ______	−9.0 dB	±0.30 dB
2	−11.0 dB	**(9)** ______	−15.0 dB	±0.36 dB
1	−15.0 dB	**(10)** ______	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	**(11)** ______	−21.0 dB	±0.20 dB
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	**(12)** ______	+3.5 dB	±0.17 dB
100	0 (Ref)	**(13)** ______	0 (Ref)	0 (Ref)
20	−5.5 dB	**(14)** ______	−7.5 dB	±0.27 dB
10	−8.5 dB	**(15)** ______	−11.5 dB	±0.25 dB
2	−18.5 dB	**(16)** ______	−22.5 dB	±0.23 dB
1	−20.5 dB	**(17)** ______	−24.5 dB	±0.19 dB
Isolated Pulse	−21.5 dB	**(18)** ______	−25.5 dB	±0.15 dB
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	**(19)** ______	+7.0 dB	±0.17 dB
100	0 (Ref)	**(20)** ______	0 (Ref)	0 (Ref)
20	−8.0 dB	**(21)** ______	−10.0 dB	±0.18 dB
10	−12.5 dB	**(22)** ______	−15.5 dB	±0.18 dB
2	−24.0 dB	**(23)** ______	−28.0 dB	±0.18 dB
1	−26.5 dB	**(24)** ______	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	**(25)** ______	−33.5 dB	±0.17 dB
Band, Bandwidth, Repetition Frequency				
Band A, 200 Hz, 25 Hz	+9.4 dB	**(26)** ______	+13.4 dB	±0.28 dB
Band B, 9 kHz, 1000 Hz	+14.4 dB	**(27)** ______	+18.4 dB	±0.17 dB
Band C/D, 120 kHz, 10,000 Hz	+17.8 dB	**(28)** ______	+21.8 dB	±0.18 dB

HP 8595EM Performance Test Record

HP 8596EM Performance Test Record

Only the tests for HP 8596EM are included in this test record, therefore not all test numbers are included.

HP 8596EM Performance Test Record

Table 3-46. HP 8596EM Performance Verification Test Record

Hewlett-Packard Company

Address: ______________________ Report No. ______________________

____

______________________ Date ______________________

______________________ (For example: 10 MAY 1995)

Model HP 8596EM

Serial No. ______________________

Options ______________________

Firmware Revision ______________________

Customer ______________________ Tested by ______________________

Ambient temperature ____________ °C Relative humidity ____________ %

Power mains line frequency ____________ Hz (nominal)

Test Equipment Used:

Description	**Model No.**	**Trace No.**	**Cal Due Date**
Frequency Counter			
Frequency Standard			
Low Pass Filter, 50 MHz			
Low Pass Filter, 300 MHz			
Low Pass Filter, 4.4 GHz			
Measuring Receiver			
Microwave Frequency Counter			
Microwave Spectrum Analyzer (Option 010)			
Power Meter			
RF Power Sensor			
High-Sensitivity Power Sensor			
Power Splitter			
Pulse Generator			
Signal Generator			
Synthesized Sweeper			
Synthesizer/Function Generator			
Synthesizer/Level Generator			
Termination, 50 Ω			

Notes/Comments:

HP 8596EM Performance Verification Test Record (page 2 of 12)

Hewlett-Packard Company	
Model HP 8596EM	**Report No.** ______________________
Serial No. ______________________	**Date** ______________________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
1. 10 MHz Reference Output Accuracy				
		Frequency Error		
Settability	−150 Hz	**(1)**__________	+150 Hz	$\pm 4.2 \times 10^{-9}$
2. 10 MHz Precision Frequency Reference Output 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 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
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
Narrow IF Bandwidth				
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
Frequency = 4.0 GHz				
SPAN				

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Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
5. Frequency Readout and Marker Count Accuracy (continued)				
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
Narrow IF Bandwidth				
(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	65 dBc	**(1)** ________		±1.0 dB
Sideband Below Signal	65 dBc	**(2)** ________		±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
Narrow IF Bandwidth				
1.00 kHz	780 Hz	**(7)** ________	820 Hz	±3.54 Hz
11. Residual FM		**(1)** ________	250 Hz	±45.8 Hz
Narrow IF Bandwidth		**(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

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Test Description	Results Measured Min.	Results Measured (TR Entry)	Results Measured Max.	Measurement 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
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

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Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
Narrow IF Bandwidth				
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
Narrow IF Bandwidth				
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

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Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
13. Scale Fidelity (continued)				
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.59 mV	**(65)** ________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(66)** ________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(67)** ________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(68)** ________	82.88 mV	±1.84 mV
Narrow IF Bandwidth				
% of Ref Level				
100.00	0 (Ref)	0 (Ref)	0 (Ref)	
70.70	151.59 mV	**(69)** ________	165.01 mV	±1.84 mV
50.00	105.36 mV	**(70)** ________	118.78 mV	±1.84 mV
35.48	72.63 mV	**(71)** ________	86.05 mV	±1.84 mV
25.00	49.46 mV	**(72)** ________	82.88 mV	±1.84 mV
Log-to-Linear Switching	−0.25 dB	**(73)** ________	+0.25 dB	±0.05 dB
Narrow IF Bandwidth	−0.25 dB	**(74)** ________	+0.25 dB	±0.05 dB
15. Reference Level Accuracy				
Log Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(1)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(2)** ________	+0.50 dB	±0.06 dB
77	−0.40 dB	**(3)** ________	+0.40 dB	±0.06 dB
67	−0.50 dB	**(4)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(5)** ________	+0.80 dB	±0.08 dB
47	−1.00 dB	**(6)** ________	+1.00 dB	±0.12 dB
37	−1.10 dB	**(7)** ________	+1.10 dB	±0.12 dB
27	−1.20 dB	**(8)** ________	+1.20 dB	±0.12 dB
17	−1.30 dB	**(9)** ________	+1.30 dB	±0.12 dB

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Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
15. Reference Level Accuracy (continued)				
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(10)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(11)** ________	+0.50 dB	±0.06 dB
77	−0.40 dB	**(12)** ________	+0.40 dB	±0.06 dB
67	−0.50 dB	**(13)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(14)** ________	+0.80 dB	±0.08 dB
47	−1.00 dB	**(15)** ________	+1.00 dB	±0.12 dB
37	−1.10 dB	**(16)** ________	+1.10 dB	±0.12 dB
27	−1.20 dB	**(17)** ________	+1.20 dB	±0.12 dB
17	−1.30 dB	**(18)** ________	+1.30 dB	±0.12 dB
Narrow IF Bandwidth				
Log Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
77	−0.40 dB	**(19)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(20)** ________	+0.50 dB	±0.06 dB
77	−0.50 dB	**(21)** ________	+0.50 dB	±0.06 dB
67	−0.50 dB	**(22)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(23)** ________	+0.80 dB	±0.08 dB
47	−1.20 dB	**(24)** ________	+1.10 dB	±0.12 dB
37	−1.20 dB	**(25)** ________	+1.20 dB	±0.12 dB
27	−1.30 dB	**(26)** ________	+1.30 dB	±0.12 dB
17	−1.40 dB	**(27)** ________	+1.40 dB	±0.12 dB
Narrow IF Bandwidth				
Linear Mode				
Reference Level (dBμV)				
87	0 (Ref)	0 (Ref)	0 (Ref)	
97	−0.40 dB	**(28)** ________	+0.40 dB	±0.06 dB
107	−0.50 dB	**(29)** ________	+0.50 dB	±0.06 dB
77	−0.50 dB	**(30)** ________	+0.50 dB	±0.06 dB
67	−0.50 dB	**(31)** ________	+0.50 dB	±0.08 dB
57	−0.80 dB	**(32)** ________	+0.80 dB	±0.08 dB
47	−1.20 dB	**(33)** ________	+1.10 dB	±0.12 dB
37	−1.20 dB	**(34)** ________	+1.20 dB	±0.12 dB
27	−1.30 dB	**(35)** ________	+1.30 dB	±0.12 dB
17	−1.40 dB	**(36)** ________	+1.40 dB	±0.12 dB

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Test Description	Results Measured Min.	Results Measured (TR Entry)	Results Measured Max.	Measurement Uncertainty
16. Absolute Amplitude Calibration and Resolution (IF) Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	+86.85 dBμV	**(1)** ________	+87.15 dBμV	N/A
Resolution (IF) Bandwidth Switching Uncertainty				
Resolution (IF) 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
Narrow IF Bandwidth				
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 (IF) Bandwidth Accuracy				
3 dB Bandwidth				
3 MHz	2.4 MHz	**(1)** ________	3.6 MHz	±138 kHz
300 kHz	240 kHz	**(2)** ________	360 kHz	±13.8 kHz
100 kHz	80 kHz	**(3)** ________	120 kHz	±4.6 kHz
30 kHz	24 kHz	**(4)** ________	36 kHz	±1.38 kHz
10 kHz	8 kHz	**(5)** ________	12 kHz	±460 Hz
3 kHz	2.4 kHz	**(6)** ________	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	**(7)** ________	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	**(8)** ________	10.8 kHz	±333 Hz
120 kHz	96 kHz	**(9)** ________	144 kHz	±4.44 kHz
1 MHz	0.9 MHz	**(10)** ________	1.1 MHz	±46 kHz

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Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
17. Resolution (IF) Bandwidth Accuracy (continued)				
Narrow IF Bandwidth				
3 dB 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
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				
50 kHz to 2.9 GHz	55 dBc	**(1)** ______		+1.12/−1.21 dB
≤ 12.8 GHz	55 dBc	**(1)** ______		+1.13/−1.22 dB
33. Spurious Response				
Second Harmonic Distortion				
Applied Frequency				
40 MHz		**(1)** ______	−50 dBc	+1.86/−2.27 dB
2.8 GHz		**(3)** ______	**(2)** ______ *(Step 23c)*	+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

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Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
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
Narrow IF Bandwidth		(3) ______	0.5 dB	+0.21/−0.22 dB
43. Displayed Average Noise				
Frequency				
400 kHz		(1) ______	−18 dBμV	+1.15/−1.25 dB
1 MHz		(2) ______	−18 dBμV	+1.15/−1.25 dB
1 MHz to 2.9 GHz		(3) ______	−18 dBμV	+1.15/−1.25 dB
2.75 to 6.5 GHz		(4) ______	−20 dBμV	+1.15/−1.25 dB
6.0 to 12.8 GHz		(5) ______	−8 dBμV	+1.15/−1.25 dB
46. Residual Responses				
150 kHz to 6.5 GHz		(1) ______	17 dBμV	+1.09/−1.15 dB
48. Fast Time Domain Sweeps				
Options 101 and 301 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%
50. 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
51. Power Sweep Range				
Option 010 only:				
Start Power Level		(1) ______		
Stop Power Level		(2) ______		
Power Sweep Range	9.0 dB	(3) ______		±0.03 dB

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Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
53. 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
55. Harmonic Spurious Outputs				
Option 010 only:				
2nd Harmonic Level, 9 kHz	15 dBc	**(1)** ____________		+1.55/−1.80 dB
2nd Harmonic Level, 25 kHz to 900 MHz	25 dBc	**(2)** ____________		+1.55/−1.80 dB
2nd Harmonic Level, 1.4 GHz	25 dBc	**(3)** ____________		+3.45/−4.01 dB
3rd Harmonic Level, 9 kHz	15 dBc	**(4)** ____________		+1.55/−1.80 dB
3rd Harmonic Level, 25 kHz to 900 MHz	25 dBc	**(5)** ____________		+1.55/−1.80 dB
57. Non-Harmonic Spurious Outputs				
Option 010 only:				
Highest Non-Harmonic Response Amplitude				
9 kHz to 2000 MHz	27 dBc	**(1)** ____________		+1.55/−1.80 dB
2000 MHz to 2900 MHz	23 dBc	**(2)** ____________		+3.45/−4.01 dB
60. Tracking Generator Feedthrough				
Option 010 only:				
400 kHz to 2.9 GHz		**(1)** ____________	−3 dBμV	+1.59/−1.70 dB
61. 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

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Test Description	**Min.**	**Results Measured (TR Entry)**	**Max.**	**Measurement Uncertainty**
62. CISPR Pulse Response				
		Amplitude Error		
Measured Amplitude				
200 Hz EMI BW	−1.5 dB	**(1)** ______	+1.5 dB	±0.34 dB
9 kHz EMI BW	−1.5 dB	**(2)** ______	+1.5 dB	±0.34 dB
120 kHz EMI BW	−1.5 dB	**(3)** ______	+1.5 dB	±0.50 dB
Relative Level, 200 Hz EMI BW				
Repetition Frequency				
100	3.0 dB	**(4)** ______	+5.0 dB	±0.24 dB
60	2.0 dB	**(5)** ______	+4.0 dB	±0.26 dB
25	0 (Ref)	**(6)** ______	0 (Ref)	0 (Ref)
10	−3.0 dB	**(7)** ______	−5.0 dB	±0.29 dB
5	−6.0 dB	**(8)** ______	−9.0 dB	±0.30 dB
2	−11.0 dB	**(9)** ______	−15.0 dB	±0.36 dB
1	−15.0 dB	**(10)** ______	−19.0 dB	±0.28 dB
Isolated Pulse	−17.0 dB	**(11)** ______	−21.0 dB	±0.20 dB
Relative Level, 9 kHz EMI BW				
Repetition Frequency				
1000	+5.5 dB	**(12)** ______	+3.5 dB	±0.17 dB
100	0 (Ref)	**(13)** ______	0 (Ref)	0 (Ref)
20	−5.5 dB	**(14)** ______	−7.5 dB	±0.27 dB
10	−8.5 dB	**(15)** ______	−11.5 dB	±0.25 dB
2	−18.5 dB	**(16)** ______	−22.5 dB	±0.23 dB
1	−20.5 dB	**(17)** ______	−24.5 dB	±0.19 dB
Isolated Pulse	−21.5 dB	**(18)** ______	−25.5 dB	±0.15 dB
Relative Level, 120 kHz EMI BW				
Repetition Frequency				
1000	+9.0 dB	**(19)** ______	+7.0 dB	±0.17 dB
100	0 (Ref)	**(20)** ______	0 (Ref)	0 (Ref)
20	−8.0 dB	**(21)** ______	−10.0 dB	±0.18 dB
10	−12.5 dB	**(22)** ______	−15.5 dB	±0.18 dB
2	−24.0 dB	**(23)** ______	−28.0 dB	±0.18 dB
1	−26.5 dB	**(24)** ______	−30.5 dB	±0.18 dB
Isolated Pulse	−29.5 dB	**(25)** ______	−33.5 dB	±0.17 dB
Band, Bandwidth, Repetition Frequency				
Band A, 200 Hz, 25 Hz	+9.4 dB	**(26)** ______	+13.4 dB	±0.28 dB
Band B, 9 kHz, 1000 Hz	+14.4 dB	**(27)** ______	+18.4 dB	±0.17 dB
Band C/D, 120 kHz, 10,000 Hz	+17.8 dB	**(28)** ______	+21.8 dB	±0.18 dB

4

HP 8591EM Specifications and Characteristics

This chapter contains specifications and characteristics for the HP 8591EM EMC analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first, followed by the characteristics.

General	General 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 +55 °C (unless otherwise noted). The EMC analyzer will meet its specifications under the following conditions:
  - □ The instrument is within the one year calibration cycle.
  - □ 2 hours of storage at a constant temperature within the operating temperature range.
  - □ 30 minutes after the EMC analyzer is turned on.
  - □ After the CAL FREQ and CAL AMP routines have been run.
- Characteristics provide useful, but nonwarranted information about the functions and performance of the EMC 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 +55 °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

Frequency Specifications

Frequency Range	9 kHz 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	$\pm 1 \times 10^{-8}$
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 IF BW + 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, IF BW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when IF BW/Span < 0.01.	

Frequency Specifications

Frequency Span	
Range	0 Hz (zero span), 1 kHz to 1.8 GHz
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy	
Span $\leq$ 10 MHz	$\pm$2% of span*
Span $>$ 10 MHz	$\pm$3% of span
* For spans $<$ 10 kHz, add an additional 10 Hz resolution error.	

Frequency Sweep Time	
Range	
	20 ms to 100 s
(Options 101 and 301)	20 μs to 100 s for span = 0 Hz
Accuracy	
20 ms to 100 s	$\pm$3%
20 μs to <20 ms *(Options 101 and 301)*	$\pm$2%
Sweep Trigger	Free Run, Single, Line, Video, External

IF Bandwidths	
Measurement	200 Hz, 9 kHz, and 120 kHz (6 dB EMC bandwidths)
	1 MHz (6 dB bandwidth $\pm$10%)
Diagnostic	30 Hz to 300 kHz, 3 dB bandwidths in 1,3,10 steps ($\pm$20% characteristic), also 3 MHz and 5 MHz.

Stability	
Noise Sidebands	(1 kHz IF BW, 30 Hz AVG BW 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 IF BW, 1 kHz Avg BW	≤250 Hz pk-pk in 100 ms
30 Hz IF BW, 30 Hz Avg BW	≤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	−23 dBμV to +137 dBμV

Maximum Safe Input Level	(Input attenuator ≥10 dB)
Average Continuous Power	+137 dBμV (1 W)
Peak Pulse Power	+137 dBμV (1 W)
dc	25 Vdc

Quasi-Peak Detector Specifications *(All except Option 703)*

The specifications for Quasi-Peak Detector have been based on the following:

- The EMC analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radioélectriques (CISPR) Section 1, Clause 2.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the EMC analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, IF bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB) *(All except Option 703)*			
	Frequency Band		
Pulse Repetition Frequency (Hz)	**120 kHz EMI BW 0.03 to 1 GHz**	**9 kHz EMI BW 0.15 to 30 MHz**	**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 the CW signal is <1.5 dB as specified in CISPR Pub. 16.
CISPR reference pulse: 0.044 μVs for 30 MHz to 1 GHz, 0.316 μVs for 15 kHz to 30 MHz, and 13.5 μVs ±1.5 μVs for 9 kHz to 150 kHz.

Gain Compression†	
>10 MHz	≤0.5 dB (total power at input mixer* = 97 dBμV)

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).
† If IF BW ≤ 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 AVG BW, sample detector)
1 kHz IF BW	
400 kHz to 1 MHz	≤−8 dBμV
1 MHz to 1.5 GHz	≤−8 dBμV
1.5 GHz to 1.8 GHz	≤−6 dBμV
30 Hz IF BW	
400 kHz to 1 MHz	≤−23 dBμV
1 MHz to 1.5 GHz	≤−23 dBμV
1.5 GHz to 1.8 GHz	≤−21 dBμV

Amplitude Specifications

Spurious Responses	
Second Harmonic Distortion	
5 MHz to 1.8 GHz	<-70 dBc for $+62$ dBμV tone at input mixer.*
Third Order Intermodulation Distortion	
5 MHz to 1.8 GHz	<-70 dBc for two $+77$ dBμV tones at input mixer* and $>$50 kHz separation.
Other Input Related Spurious	<-65 dBc at $\geq$30 kHz offset, for $+87$ dBμV tone at input mixer $\leq$1.8 GHz.

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 1.8 GHz	$<+17$ dBμV

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 $\leq$ 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	+8 dBμV to maximum amplitude*
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to +87 dBμV reference level, 10 dB input attenuation, at a single frequency, in a fixed IF BW)
107 dBμV to +47.1 dBμV	±(0.3 dB + .01 × dB from +87 dBμV)
+47 dBμV and below	
1 kHz to 3 MHz IF BW	±(0.6 dB + .01 × dB from +87 dBμV)
30 Hz to 300 Hz IF BW	±(0.7 dB + .01 × dB from +87 dBμV)

* 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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Calibrator Output	
Amplitude	+87 dBμV ±0.4 dB

Absolute Amplitude Calibration Repeatability*	±0.15 dB

* Repeatability 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 +87 dBμV; Input Attenuation 10 dB; Center Frequency 300 MHz; IF BW 3 kHz; Averaging BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON.

Amplitude Specifications

Input Attenuator	
Range	0 to 60 dB, in 10 dB steps

IF Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz IF BW)
3 kHz to 3 MHz IF BW	±0.4 dB
1 kHz IF BW	±0.5 dB
30 Hz to 300 Hz IF BW	±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 IF BW	± (0.3 dB + 0.01 × dB from reference level)
IF BW ≤ 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)

All specifications apply over 0 °C to +55 °C. The EMC-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 EMC-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	100 kHz to 1.8 GHz

Output Power Level	
Range	+107 to +37 dBμV
Resolution	0.1 dB
Absolute Accuracy	±1.0 dB (at 300 MHz, +87 dBμV, and coupled source attenuator)
Vernier	
Range	10 dB*
Accuracy	±0.75 dB over 10 dB range (referenced to +87 dBμV 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	(+92 dBμV to +107 dBμV) − (Source Attenuator Setting)
Resolution	0.1 dB
Accuracy (zero span)	<1.5 dB peak-to-peak

Option Specifications

Output Flatness	
(referenced to 300 MHz, 10 dB attenuator)	±1.75 dB

Spurious Outputs	(+107 dBμV output, 100 kHz to 1.8 GHz)
Harmonic Spurs	<−25 dBc
Nonharmonic Spurs	<−30 dBc

Dynamic Range	
Tracking Generator Feedthrough	<+1 dBμV

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 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.	

Diagnostic IF Bandwidths	
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio IF Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
40 dB/3 dB Bandwidth Ratio IF Bandwidth	
30 Hz to 300 Hz	10:1

Frequency Characteristics

Averaging Bandwidth (−3 dB)	
Range	1 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy ±30% and 3 MHz. Averaging bandwidths may be selected manually, or coupled to IF bandwidth and frequency span.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
	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 *(All except Option 703)*	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.

Quasi-Peak Detector *(All except Option 703)*	
Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation *(All except Option 703)*	
Input Level	> (+47 dBμV + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz/volt nominal
Range	10 kHz/volt to 1 MHz/volt
Bandwidth (6 dB)	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	$\leq$ 1% of FM deviation + 290 Hz

Amplitude Characteristics

Measurement Detector Types	Positive Peak, Quasi-Peak, and Average
	Quasi-Peak and Average time constants conform with CISPR Pub. 16.
(Option 101 and Option 301)	Negative Peak
(Option 703)	Delete Quasi-Peak and Average

IF Overload Detector	Available in EMC analyzer mode only. Detects overload of the analyzer video circuitry.

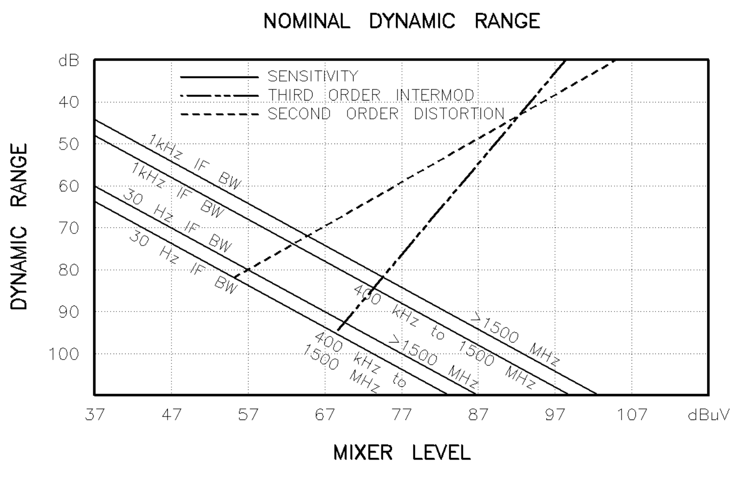
Input Attenuation Uncertainty*	
Attenuator Setting	
0 dB	±0.5 dB
10 dB	Reference
20 dB	±0.5 dB
30 dB	±0.6 dB
40 dB	±0.8 dB
50 dB	±1.0 dB
60 dB	±1.2 dB

* Referenced to 10 dB input attenuator setting from 9 kHz to 1.8 GHz. See the "Frequency Response" table under "Specifications".

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 IF bandwidth and 321.4 MHz ± selected IF bandwidth the displayed average noise level may be up to +62 dBμV. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to +37 dBμV 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.
Electrical Fast Transient	When subjected to Electrical Fast Transient testing per EN 50082-1/EIC 801-4 noise may appear on the display of the analyzer during the application of the test voltage.

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.

In these modes, the following analyzer specifications remain as specifications:

Amplitude Range	**Calibrator Output**
Maximum Safe Input Level	

In these modes, the following analyzer specifications are reduced to characteristics:

Gain Compression	**Reference Level**
Displayed Average Noise Level	**IF 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 are replaced by the characteristics which follow in this subsection:

Marker Readout Resolution	**Frequency Response**

Marker Readout Resolution	
(digitizing resolution)	
Log Scale	±0.31 dB
Linear Scale	
frequency $\leq$ 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 $\leq$ 20 MHz)	
	Absolute*	**Relative Flatness†**
	±1.9 dB	±1.4 dB

* Referenced to 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Option Characteristics

TV Trigger Characteristics (Options 101, 102, and 301)

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

Tracking Generator Characteristics (Option 010)

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)	
+107 dBμV output	
Harmonic	<−20 dBc
Nonharmonic	<−40 dBc
2121.4 MHz Feedthrough	<+62 dBμV

RF Power-Off Residuals	
100 kHz to 1.8 GHz	<−8 dBμV

Output Attenuator	
Repeatability	±0.2 dB

Option Characteristics

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	>106 dB

TRACKING GENERATOR OUTPUT ACCURACY, Option 010
(after CAL TRK GEN in auto-coupled mode)

TG Output Power Level	Attenuator Setting	Relative Accuracy (at 300 MHz referred to +87 dBμV)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to +87 dBμV) (+0.2 dB/GHz)*	Absolute Accuracy (+0.2 dB/GHz)*
+107 to +96.1 dBμV	0 dB	±1.25 dB	±2.25 dB	±2.75 dB	±3.75 dB
+96 to +86.1 dBμV	10 dB	±0.75 dB	±1.75 dB	±2.25 dB	±3.25 dB
+87 dBμV	10 dB	0 dB Reference	±1.0 dB	±1.50 dB	±2.50 dB
+86 to +76.1 dBμV	20 dB	±1.25 dB	±2.25 dB	±2.75 dB	±3.75 dB
+76 to +66.1 dBμV	30 dB	±1.35 dB	±2.35 dB	±2.85 dB	±3.85 dB
+66 to +56.1 dBμV	40 dB	±1.55 dB	±2.55 dB	±3.05 dB	±4.05 dB
+56 to +46.1 dBμV	50 dB	±1.75 dB	±2.75 dB	±3.25 dB	±4.25 dB
+46 to +37 dBμV	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 50Ω	
Connector	Type N female
Impedance	50 Ω nominal

RF OUT *(Option 010)*	
Connector	Type N female
Impedance	50 Ω nominal
Maximum Safe Reverse Level	+127 dBμV (0.1 W), 25 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.

CAL OUT	
Connector	BNC female
Impedance	50 Ω nominal

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>107 dBμV

Physical Characteristics

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	+105 to +117 dBμV
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	+97 to +47 dBμV
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EARPHONE *(All except Option 703)*	
Connector	1/8 inch monaural jack

EXT ALC INPUT *(Option 010)*	
Impedance	1 MΩ
Polarity	Positive or negative
Range	−66 dBV to +6 dBV
Connector	BNC

EXT KEYBOARD	Interface compatible with HP part number C1405 Option ABA 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).

HI-SWEEP IN/OUT	
Connector	BNC female
Output	High = sweep, Low = retrace (TTL)
Input	Open collector, low stops sweep.

MONITOR OUTPUT *(EMC 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	
HP-IB	
HP-IB Codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28
RS-232 *(Option 023)*	25 pin subminiature D-shell, female
Parallel *(Option 024)*	25 pin subminiature D-shell, female

SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp

TV TRIG OUT *(Options 101, 102, and 301)*	
Connector	BNC female
Amplitude	Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

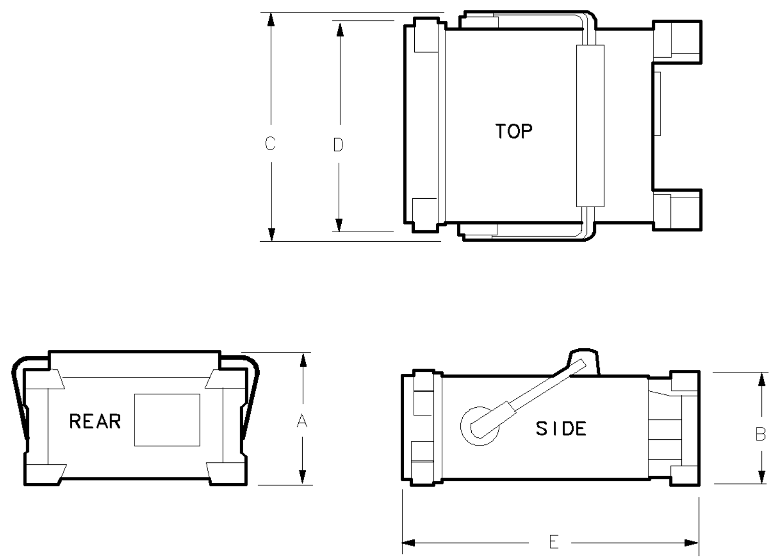
Physical Characteristics

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 V_{dc} ±7%	150 mA	—	—
8*	$+5$ V_{dc} ±5%	150 mA	—	—
9†	$+15$ V_{dc} ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants. † Total current drawn from the +15 V_{dc} on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the −12.6 V_{dc} on the PROBE POWER and the −15 V_{dc} on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net	
HP 8591EM	14.4 kg (32 lb)
Shipping	
HP 8591EM	17.1 kg (38 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)



Regulatory Information

The information on the following section applies to the HP 8591EM EMC analyzer.

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Co.

Manufacturer's Address: Santa Rosa Systems Division
1400 Fountaingrove Parkway
Santa Rosa, CA 95403
USA

declares that the product

Product Name: EMC Analyzer

Model Number: HP 8591EM, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM

Product Options: This declaration covers all options of the above products.

conforms to the following Product specifications:

Safety: IEC 348:1978/HD 401 S1:1981
CAN/CSA-C22.2 No. 231 (Series M-89)

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, 27-500 MHz
IEC 801-4:1988/EN 50082-1:1992 0.5 kV Sig. Lines, 1 kV Power Lines

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Rohnert Park, California, USA 16 Jan. 1995
Date

Dixon Browder/Quality Manager

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department ZQ/Standards Europe, Herrenberger Strasse 130, D-71034 Böblinger, Germany (FAX +49-7031-14-3143)

Notice for Germany: Noise Declaration

LpA < 70 dB
am Arbeitsplatz (operator position)
normaler Betrieb (normal position)
nach DIN 45635 T. 19 (per ISO 7779)

5

HP 8593EM Specifications and Characteristics

This chapter contains specifications and characteristics for the HP 8593EM EMC analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first, then followed by the characteristics.

General	General 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 +55 °C (unless otherwise noted). The EMC analyzer will meet its specifications under the following conditions:
  - □ The instrument is within the one year calibration cycle.
  - □ 2 hours of storage at a constant temperature within the operating temperature range.
  - □ 30 minutes after the EMC analyzer is turned on.
  - □ After the CAL FREQ, CAL AMP, and CAL YTF routines have been run.
- Characteristics provide useful, but nonwarranted information about the functions and performance of the EMC 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 +55 °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

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	$\pm 1 \times 10^{-8}$
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 IF BW + 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.

Frequency Specifications

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, IF BW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when IF BW/Span < 0.01.
‡ N = LO harmonic. See "Frequency Range."

Frequency Span	
Range	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."
‡ For spans < 10 kHz × N†, add an additional 10 Hz × N† resolution error.

Frequency Sweep Time	
Range	
	20 ms to 100 s
(Options 101 and 301)	20 μs to 100 s for span = 0 Hz
Accuracy	
20 ms to 100 s	±3%
20 μs to <20 ms *(Options 101 and 301)*	±2%
Sweep Trigger	Free Run, Single, Line, Video, External

IF Bandwidths	
Measurement	200 Hz, 9 kHz, and 120 kHz (6 dB EMC bandwidths)
	1 MHz (6 dB bandwidth ±10%)
Diagnostic	30 Hz to 300 kHz, 3 dB bandwidths in 1,3,10 steps (±20% characteristic), also 3 MHz and 5 MHz.

Stability	
Noise Sidebands	(1 kHz IF BW, 30 Hz Avg BW 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 IF BW, 1 kHz Avg BW	$\leq$(250 × N*) Hz pk-pk in 100 ms
30 Hz IF BW, 30 Hz Avg BW	$\leq$(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	−22 dBμV to +137 dBμV

Maximum Safe Input Level	
Average Continuous Power	+137 dBμV (1 W, 7.1 V rms), input attenuation ≥10 dB in bands 1 through 4.
Peak Pulse Power	+157 dBμV (100 W) for <10 μs pulse width and <1% duty cycle, input attenuation ≥30 dB.
dc	0 Vdc

Quasi-Peak Detector Specifications *(All except Option 703)*

The specifications for Quasi-Peak Detector have been based on the following:

- The EMC analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radioélectriques (CISPR) Section 1, Clause 2.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the EMC analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, IF bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB) *(All except Option 703)*			
	Frequency Band		
Pulse Repetition Frequency (Hz)	**120 kHz EMI BW 0.03 to 1 GHz**	**9 kHz EMI BW 0.15 to 30 MHz**	**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 the CW signal is <1.5 dB as specified in CISPR Pub. 16.
CISPR reference pulse: 0.044 μVs for 30 MHz to 1 GHz, 0.316 μVs for 15 kHz to 30 MHz, and 13.5 μVs ±1.5 μVs for 9 kHz to 150 kHz.

Gain Compression†	
>10 MHz	≤0.5 dB (total power at input mixer* = 97 dBμV)

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).
† If IF BW ≤ 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 AVG BW, sample detector)	
	1 kHz IF BW	**30 Hz IF BW**
400 kHz to 2.9 GHz	≤−5 dBμV	≤−20 dBμV
2.75 GHz to 6.5 GHz	≤−7 dBμV	≤−22 dBμV
6.0 GHz to 12.8 GHz	≤+5 dBμV	≤−10 dBμV
12.4 GHz to 19.4 GHz	≤+9 dBμV	≤−6 dBμV
19.1 GHz to 22 GHz	≤+15 dBμV	≤0 dBμV
19.1 GHz to 26.5 GHz *(Options 026 and 027)*	≤+20 dBμV	≤+5 dBμV

Amplitude Specifications

Spurious Responses	
Second Harmonic Distortion	
10 MHz to 2.9 GHz	<−70 dBc for +67 dBμV tone at input mixer.*
> 2.75 GHz	<−100 dBc for +97 dBμV tone at input mixer* (or below displayed average noise level).
Third Order Intermodulation Distortion	
>10 MHz	<−70 dBc for two +77 dBμV tones at input mixer* and >50 kHz separation.
Other Input Related Spurious	
9 kHz to 18 GHz	<−65 dBc at ≥30 kHz offset, for +87 dBμV tone at input mixer ≤18 GHz.
18 GHz to 22 GHz	<−60 dBc at ≥30 kHz, for +87 dBμV tone at input mixer ≤22 GHz.

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 2.9 GHz (Band 0)	<+17 dBμV
2.75 GHz to 6.5 GHz (Band 1)	<+17 dBμV

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	+8 dBμV to maximum amplitude*
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to +87 dBμV reference level, 10 dB input attenuation, at a single frequency, in a fixed IF BW)
107 dBμV to +47.1 dBμV	±(0.3 dB + .01 × dB from +87 dBμV)
+47 dBμV and below	
1 kHz to 3 MHz IF BW	±(0.6 dB + .01 × dB from +87 dBμV)
30 Hz to 300 Hz IF BW	±(0.7 dB + .01 × dB from +87 dBμV)

* 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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Calibrator Output	
Amplitude	+87 dBμV ±0.4 dB

Amplitude Specifications

Absolute Amplitude Calibration Repeatability*	±0.15 dB
* Repeatability 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 +87 dBμV; Input Attenuation 10 dB; Center Frequency 300 MHz; IF BW 3 kHz; Averaging 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

IF Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz IF BW)
3 kHz to 3 MHz IF BW	±0.4 dB
1 kHz IF BW	±0.5 dB
30 Hz to 300 Hz IF BW	±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 IF BW	± (0.3 dB + 0.01 × dB from reference level)
IF BW ≤ 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)

All specifications apply over 0 °C to +55 °C. The EMC-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 EMC-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	9 kHz to 2.9 GHz

Output Power Level	
Range	+106 dBμV to +41 dBμV
Resolution	0.1 dB
Absolute Accuracy (at 25 °C ±10 °C)	
(+87 dBμV at 300 MHz)	±0.75 dB
Vernier*	
Range	9 dB
Accuracy (at 25 °C ±10 °C)	
(+87 dBμV 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."

Option Specifications

Output Power Sweep	
Range	(+97 dBμV to +106 dBμV) − (Source Attenuator Setting)
Resolution	0.1 dB

Output Flatness	
(referenced to 300 MHz, +87 dBμV)	
Frequency > 10 MHz	±2.0 dB
Frequency ≤ 10 MHz	±3.0 dB

Spurious Output (+106 dBμV 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
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
LO Feedthrough	
LO Frequency 3.9217 to 6.8214 GHz	≤+91 dBμV

Tracking Generator Feedthrough	
400 kHz to 2.9 MHz	<−5 dBμV

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	$\leq (2 \times N^{\dagger})$ 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."	

Diagnostic IF Bandwidths	
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio IF Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
40 dB/3 dB Bandwidth Ratio IF Bandwidth	
30 Hz to 300 Hz	10:1

Frequency Characteristics

Averaging Bandwidth (−3 dB)	
Range	1 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy ±30% and 3 MHz. Averaging bandwidths may be selected manually, or coupled to IF bandwidth and frequency span.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
	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 *(All except Option 703)*	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.

Quasi-Peak Detector *(All except Option 703)*	
Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation *(All except Option 703)*	
Input Level	> (+47 dBμV + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz/volt nominal
Range	10 kHz/volt to 1 MHz/volt
Bandwidth (6 dB)	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Amplitude Characteristics

Measurement Detector Types	Positive Peak, Quasi-Peak, and Average
	Quasi-Peak and Average time constants conform with CISPR Pub. 16.
(Option 101 and Option 301)	Negative Peak
(Option 703)	Delete Quasi-Peak and Average

IF Overload Detector	Available in EMC analyzer mode only. Detects overload of the analyzer video circuitry.

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 "Frequency Response" table under "Specifications".

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

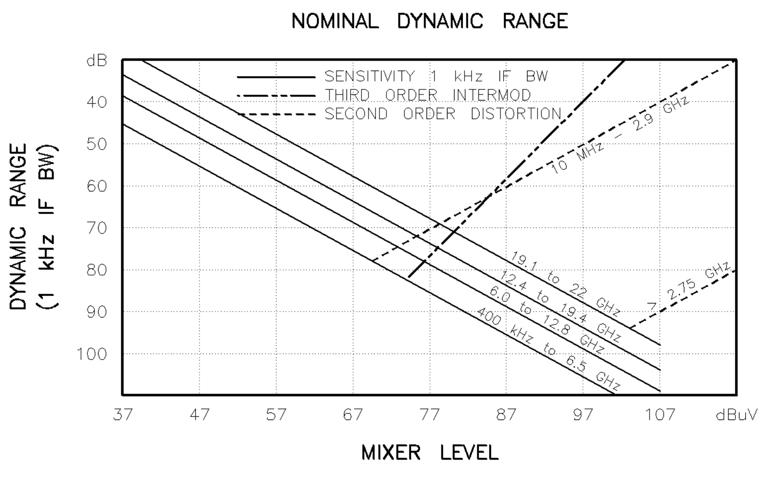
RF Input SWR	
10 dB attenuation	
Frequency	
300 MHz	1.15:1
10 dB to 70 dB attenuation	
Band	
9 kHz to 2.9 GHz	1.3:1
2.75 GHz to 6.5 GHz	1.5:1
6.0 GHz to 12.8 GHz	1.6:1
12.4 GHz to 19.4 GHz	2.0:1
19.1 GHz to 22.0 GHz	3.0:1

Unpeaked Frequency Response	(10 dB input attenuation)	
Without Preselector Peaking, Span $\leq$ 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

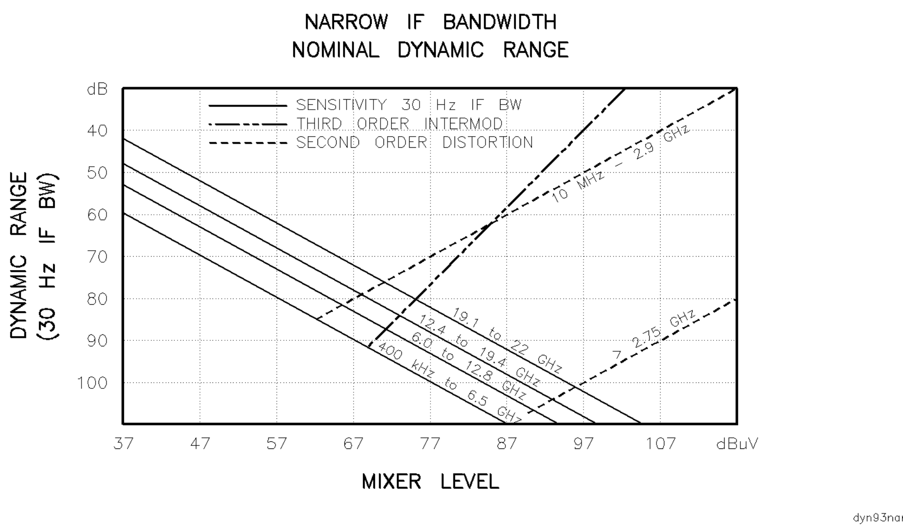
* Referenced to 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Amplitude Characteristics

DYNAMIC RANGE



NARROW IF BANDWIDTH 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 IF bandwidth and 321.4 MHz ± selected IF bandwidth the displayed average noise level may be up to +62 dBμV. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to +37 dBμV 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.
Electrical Fast Transient	When subjected to Electrical Fast Transient testing per EN 50082-1/EIC 801-4 noise may appear on the display of the analyzer during the application of the test voltage.

Amplitude Characteristics

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.

In these modes, the following analyzer specifications remain as specifications:

Amplitude Range	**Calibrator Output**
Maximum Safe Input Level	

In these modes, the following analyzer specifications are reduced to characteristics:

Gain Compression	**Reference Level**
Displayed Average Noise Level	**IF 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 are replaced by the characteristics which follow in this subsection:

Marker Readout Resolution	**Frequency Response**

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)	
Preselector peaked in band > 0		
	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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Option Characteristics

TV Trigger Characteristics (Options 101, 102, and 301)

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

Tracking Generator Characteristics (Option 010)

Tracking Drift	
(Usable in a 1 kHz IF BW after 5-minute warmup)	1.5 kHz/5 minute

RF Power Off Residuals	
9 kHz to 2.9 GHz	<-13 dBμV

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 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 +87 dBμV)**	**Absolute Accuracy (at 300 MHz)**	**Relative Accuracy (referred to +87 dBμV)**	**Absolute Accuracy**
+106 to +97 dBμV	0 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
+97 to +89 dBμV	8 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
+87 dBμV	16 dB	Reference	0.75 dB	2.0 dB	2.75 dB
+89 to +81 dBμV	16 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
+81 to +73 dBμV	24 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
+73 to +65 dBμV	32 dB	1.6 dB	2.35 dB	3.6 dB	4.35 dB
+65 to +57 dBμV	40 dB	1.8 dB	2.55 dB	3.8 dB	4.55 dB
+57 to +49 dBμV	48 dB	2.0 dB	2.75 dB	4.0 dB	4.75 dB
+49 to +41 dBμV	56 dB	2.1 dB	2.85 dB	4.1 dB	4.85 dB

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	+134 dBμV
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.	

CAL OUT	
Connector	BNC female
Impedance	50 Ω nominal

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>107 dBμV

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	+105 to +117 dBμV
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	+97 to +47 dBμV
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EARPHONE *(All except Option 703)*	
Connector	1/8 inch monaural jack

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

EXT KEYBOARD	Interface compatible with HP part number C1405 Option ABA and most IBM/AT non-auto switching keyboards.

Physical Characteristics

EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (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	+118 to +125 dBμV

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 *(EMC 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	
HP-IB	
HP-IB Codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28
RS-232 *(Option 023)*	25 pin subminiature D-shell, female
Parallel *(Option 024)*	25 pin subminiature D-shell, female

SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp

TV TRIG OUT *(Options 101, 102, and 301)*	
Connector	BNC female
Amplitude	Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

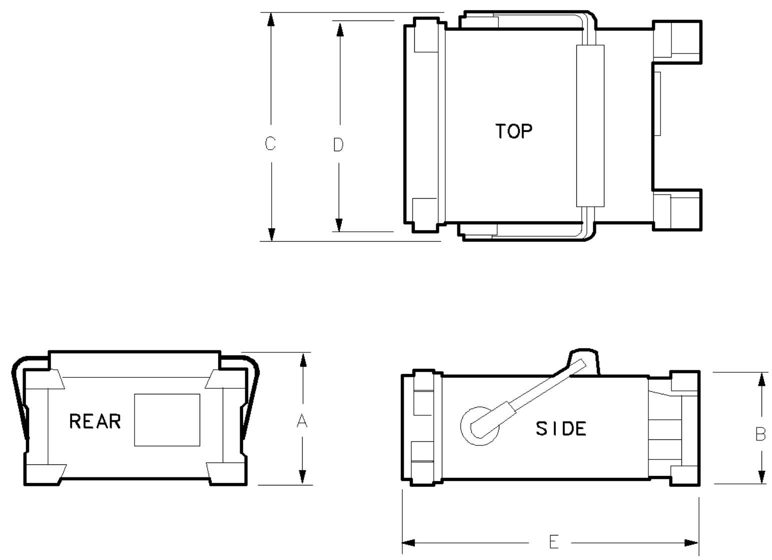
Physical Characteristics

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 V_{dc} ±7%	150 mA	—	—
8*	$+5$ V_{dc} ±5%	150 mA	—	—
9†	$+15$ V_{dc} ±5%	150 mA	—	—

* Exceeding the +5 V current limits may result in loss of factory correction constants.
† Total current drawn from the +15 V_{dc} on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the −12.6 V_{dc} on the PROBE POWER and the −15 V_{dc} on the AUX INTERFACE cannot exceed 150 mA.

WEIGHT	
Net	
HP 8593EM	16.4 kg (36 lb)
Shipping	
HP 8593EM	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)



Regulatory Information

The information on the following section applies to the HP 8593EM EMC analyzer.

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Co.

Manufacturer's Address: Santa Rosa Systems Division
1400 Fountaingrove Parkway
Santa Rosa, CA 95403
USA

declares that the product

Product Name: EMC Analyzer

Model Number: HP 8591EM, HP 8593EM, HP 8594EM,
HP 8595EM, HP 8596EM

Product Options: This declaration covers all options of the above products.

conforms to the following Product specifications:

Safety: IEC 348:1978/HD 401 S1:1981
CAN/CSA-C22.2 No. 231 (Series M-89)

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, 27-500 MHz
IEC 801-4:1988/EN 50082-1:1992 0.5 kV Sig. Lines, 1 kV Power Lines

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Rohnert Park, California, USA 16 Jan. 1995
Date

Dixon Browder/Quality Manager

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department ZQ/Standards Europe, Herrenberger Strasse 130, D-71034 Böblinger, Germany (FAX +49-7031-14-3143)

Notice for Germany: Noise Declaration

LpA < 70 dB
am Arbeitsplatz (operator position)
normaler Betrieb (normal position)
nach DIN 45635 T. 19 (per ISO 7779)

6

HP 8594EM Specifications and Characteristics

This chapter contains specifications and characteristics for the HP 8594EM EMC analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first, then followed by the characteristics.

General	General 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 +55 °C. The EMC analyzer will meet its specifications under the following conditions:
  - The instrument is within the one year calibration cycle.
  - 2 hours of storage at a constant temperature within the operating temperature range.
  - 30 minutes after the EMC analyzer is turned on.
  - After the CAL FREQ and CAL AMP routines have been run.
- Characteristics provide useful, but nonwarranted information about the functions and performance of the EMC 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 +55 °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

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	$\pm 1 \times 10^{-8}$
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 IF BW + 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, IF BW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when IF BW/Span < 0.01.	

Frequency Specifications

Frequency Span	
Range	0 Hz (zero span), 1 kHz to 2.9 GHz
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy	
Span $\leq$10 MHz	±2% of span*
Span >10 MHz	±3% of span
* For spans < 10 kHz, add an additional 10 Hz resolution error.	

Frequency Sweep Time	
Range	
	20 ms to 100 s
(Options 101 and 301)	20 μs to 100 s for span = 0 Hz
Accuracy	
20 ms to 100 s	±3%
20 μs to <20 ms *(Options 101 and 301)*	±2%
Sweep Trigger	Free Run, Single, Line, Video, External

IF Bandwidths	
Measurement	200 Hz, 9 kHz, and 120 kHz (6 dB EMC bandwidths)
	1 MHz (6 dB bandwidth ±10%)
Diagnostic	30 Hz to 300 kHz, 3 dB bandwidths in 1,3,10 steps (±20% characteristic), also 3 MHz and 5 MHz.

Stability	
Noise Sidebands	(1 kHz IF BW, 30 Hz AVG BW 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 IF BW, 1 kHz AVG BW	≤250 Hz pk-pk in 100 ms
30 Hz IF BW, 30 Hz AVG BW	≤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	−20 dBμV to +137 dBμV

Maximum Safe Input Level	
Average Continuous Power	+137 dBμV (1 W, 7.1 V rms), input attenuation ≥10 dB.
Peak Pulse Power	+157 dBμV (100 W) for <10 μs pulse width and <1% duty cycle, input attenuation ≥30 dB.
dc	0 V (dc coupled)
	50 V (ac coupled)

Quasi-Peak Detector Specifications *(All except Option 703)*

The specifications for Quasi-Peak Detector have been based on the following:

- The EMC analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radioélectriques (CISPR) Section 1, Clause 2.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the EMC analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, IF bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB) *(All except Option 703)*			
	Frequency Band		
Pulse Repetition Frequency (Hz)	**120 kHz EMI BW 0.03 to 1 GHz**	**9 kHz EMI BW 0.15 to 30 MHz**	**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 the CW signal is <1.5 dB as specified in CISPR Pub. 16.
CISPR reference pulse: 0.044 μVs for 30 MHz to 1 GHz, 0.316 μVs for 15 kHz to 30 MHz, and 13.5 μVs ±1.5 μVs for 9 kHz to 150 kHz.

Gain Compression†	
>10 MHz	≤0.5 dB (total power at input mixer* = 97 dBμV)

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).
† If IF BW ≤ 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 AVG BW, sample detector)	
	1 kHz IF BW	**30 Hz IF BW**
400 kHz to <5 MHz	≤ 0 dBμV	≤−15 dBμV
5 MHz to 2.9 GHz	≤−5 dBμV	≤−20 dBμV

Amplitude Specifications

Spurious Responses	
Second Harmonic Distortion	
>10 MHz	<−70 dBc for +67 dBμV tone at input mixer.*
Third Order Intermodulation Distortion	
>10 MHz	<−70 dBc for two +77 dBμV tones at input mixer* and >50 kHz separation.
Other Input Related Spurious	<−65 dBc at ≥30 kHz offset, for +87 dBμV tone at input mixer ≤2.9 GHz.

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 2.9 GHz	+17 dBμV

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	+8 dBμV to maximum amplitude*
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to +87 dBμV reference level, 10 dB input attenuation, at a single frequency, in a fixed IF BW)
107 dBμV to +47.1 dBμV	±(0.3 dB + .01 × dB from +87 dBμV)
+47 dBμV and below	
1 kHz to 3 MHz IF BW	±(0.6 dB + .01 × dB from +87 dBμV)
30 Hz to 300 Hz IF BW	±(0.7 dB + .01 × dB from +87 dBμV)

* 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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Calibrator Output	
Amplitude	+87 dBμV ±0.4 dB

Absolute Amplitude Calibration Repeatability*	±0.15 dB

* Repeatability 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 +87 dBμV; Input Attenuation 10 dB; Center Frequency 300 MHz; IF BW 3 kHz; AVG BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON, DC Coupled.

Amplitude Specifications

Input Attenuator	
Range	0 to 70 dB, in 10 dB steps

IF Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz IF BW)
3 kHz to 3 MHz IF BW	±0.4 dB
1 kHz IF BW	±0.5 dB
30 Hz to 300 Hz IF BW	±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 IF BW	± (0.3 dB + 0.01 × dB from reference level)
IF BW ≤ 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)

All specifications apply over 0 °C to +55 °C. The EMC-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 EMC-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	9 kHz to 2.9 GHz

Output Power Level	
Range	+106 dBμV to +41 dBμV
Resolution	0.1 dB
Absolute Accuracy (at 25 °C ±10 °C)	
(+87 dBμV at 300 MHz)	±0.75 dB
Vernier*	
Range	9 dB
Accuracy (at 25 °C ±10 °C)	
(+87 dBμV 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."	

Option Specifications

Output Power Sweep	
Range	(+97 dBμV to +106 dBμV) − (Source Attenuator Setting)
Resolution	0.1 dB

Output Flatness	
(referenced to 300 MHz, +87 dBμV)	
Frequency > 10 MHz	±2.0 dB
Frequency ≤ 10 MHz	±3.0 dB

Spurious Output (+106 dBμV 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
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
LO Feedthrough	
LO Frequency 3.9217 to 6.8214 GHz	≤+91 dBμV

Tracking Generator Feedthrough	
400 kHz to 5 MHz	< 0 dBμV
5 MHz to 2.9 GHz	<−5 dBμV

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.	

Diagnostic IF Bandwidths	
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio IF Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
40 dB/3 dB Bandwidth Ratio IF Bandwidth	
30 Hz to 300 Hz	10:1

Frequency Characteristics

Averaging Bandwidth (−3 dB)	
Range	1 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy ±30% and 3 MHz. Averaging bandwidths may be selected manually, or coupled to IF bandwidth and frequency span.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
	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 *(All except Option 703)*	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.

Quasi-Peak Detector *(All except Option 703)*	
Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation *(All except Option 703)*	
Input Level	> (+47 dBμV + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz/volt nominal
Range	10 kHz/volt to 1 MHz/volt
Bandwidth (6 dB)	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Amplitude Characteristics

Measurement Detector Types	Positive Peak, Quasi-Peak, and Average
	Quasi-Peak and Average time constants conform with CISPR Pub. 16.
(Option 101 and Option 301)	Negative Peak
(Option 703)	Delete Quasi-Peak and Average

IF Overload Detector	Available in EMC analyzer mode only. Detects overload of the analyzer video circuitry.

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 "Frequency Response" table under "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 x F†) dB

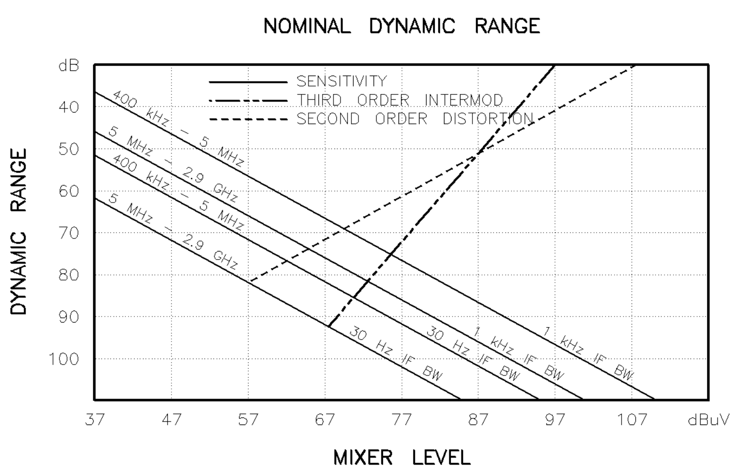
* Referenced to dc coupled mode.
† F = frequency in GHz.

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**
Frequency		
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
Band		
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



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Amplitude Characteristics

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 IF bandwidth and 321.4 MHz ± selected IF bandwidth the displayed average noise level may be up to +62 dBμV. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to +37 dBμV 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.
Electrical Fast Transient	When subjected to Electrical Fast Transient testing per EN 50082-1/EIC 801-4 noise may appear on the display of the analyzer during the application of the test voltage.

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.
In these modes, the following analyzer specifications remain as specifications: **Amplitude Range** — **Calibrator Output** **Maximum Safe Input Level** In these modes, the following analyzer specifications are reduced to characteristics: **Gain Compression** — **Reference Level** **Displayed Average Noise Level** — **IF 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 are replaced by the characteristics which follow in this subsection: **Marker Readout Resolution** — **Frequency Response**

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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Option Characteristics

TV Trigger Characteristics (Options 101, 102, and 301)

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

Tracking Generator Characteristics (Option 010)

Tracking Drift	
(Usable in a 1 kHz IF BW after 5-minute warmup)	1.5 kHz/5 minute

RF Power Off Residuals	
9 kHz to 2.9 GHz	<-13 dBμV

Dynamic Range (difference between maximum power out and tracking generator feedthrough)	
Frequency $<$ 5 MHz	$>$106 dB
Frequency $\geq$ 5 MHz	$>$111 dB

Output Attenuator Repeatability	
9 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 +87 dBμV)**	**Absolute Accuracy (at 300 MHz)**	**Relative Accuracy (referred to +87 dBμV)**	**Absolute Accuracy**
+106 to +97 dBμV	0 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
+97 to +89 dBμV	8 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
+87 dBμV	16 dB	Reference	0.75 dB	2.0 dB	2.75 dB
+89 to +81 dBμV	16 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
+81 to +73 dBμV	24 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
+73 to +65 dBμV	32 dB	1.6 dB	2.35 dB	3.6 dB	4.35 dB
+65 to +57 dBμV	40 dB	1.8 dB	2.55 dB	3.8 dB	4.55 dB
+57 to +49 dBμV	48 dB	2.0 dB	2.75 dB	4.0 dB	4.75 dB
+49 to +41 dBμV	56 dB	2.1 dB	2.85 dB	4.1 dB	4.85 dB

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.	

CAL OUT	
Connector	BNC female
Impedance	50 Ω nominal

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>107 dBμV

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	+105 to +117 dBμV
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	+97 to +47 dBμV
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EARPHONE *(All except Option 703)*	
Connector	1/8 inch monaural jack

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

EXT KEYBOARD	Interface compatible with HP part number C1405 Option ABA 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).

Physical Characteristics

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	+118 to +125 dBμV

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 *(EMC 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	
HP-IB	
HP-IB Codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28
RS-232 *(Option 023)*	25 pin subminiature D-shell, female
Parallel *(Option 024)*	25 pin subminiature D-shell, female

SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp

TV TRIG OUT *(Options 101, 102, and 301)*	
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

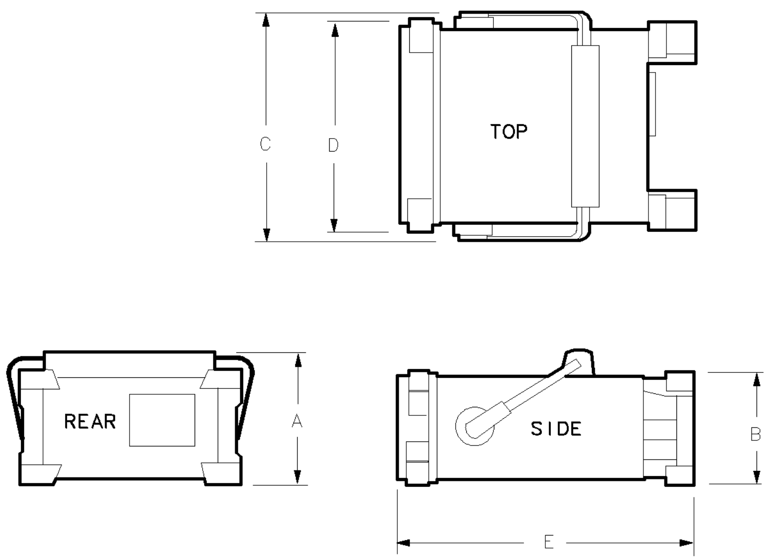
Pin #	Function	Current	"Logic" Mode	"Serial Bit" Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7†	$-15\ V_{dc}\ \pm7\%$	150 mA	—	—
8*	$+5\ V_{dc}\ \pm5\%$	150 mA	—	—
9†	$+15\ V_{dc}\ \pm5\%$	150 mA	—	—

* Exceeding the +5 V current limits may result in loss of factory correction constants.
† Total current drawn from the $+15\ V_{dc}$ on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the $-12.6\ V_{dc}$ on the PROBE POWER and the $-15\ V_{dc}$ on the AUX INTERFACE cannot exceed 150 mA.

Physical Characteristics

WEIGHT	
Net	
HP 8594EM	16.4 kg (36 lb)
Shipping	
HP 8594EM	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)



Regulatory Information

The information on the following section applies to the HP 8594EM EMC analyzer.

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Co.

Manufacturer's Address: Santa Rosa Systems Division
1400 Fountaingrove Parkway
Santa Rosa, CA 95403
USA

declares that the product

Product Name: EMC Analyzer

Model Number: HP 8591EM, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM

Product Options: This declaration covers all options of the above products.

conforms to the following Product specifications:

Safety: IEC 348:1978/HD 401 S1:1981
CAN/CSA-C22.2 No. 231 (Series M-89)

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, 27-500 MHz
IEC 801-4:1988/EN 50082-1:1992 0.5 kV Sig. Lines, 1 kV Power Lines

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Rohnert Park, California, USA 16 Jan. 1995
Date

Dixon Browder/Quality Manager

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department ZQ/Standards Europe, Herrenberger Strasse 130, D-71034 Böblinger, Germany (FAX +49-7031-14-3143)

Notice for Germany: Noise Declaration

LpA < 70 dB
am Arbeitsplatz (operator position)
normaler Betrieb (normal position)
nach DIN 45635 T. 19 (per ISO 7779)

7

HP 8595EM Specifications and Characteristics

This chapter contains specifications and characteristics for the HP 8595EM EMC analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first, then followed by the characteristics.

General	General 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 +55 °C. The EMC analyzer will meet its specifications under the following conditions:
  - □ The instrument is within the one year calibration cycle.
  - □ 2 hours of storage at a constant temperature within the operating temperature range.
  - □ 30 minutes after the EMC analyzer is turned on.
  - □ After the CAL FREQ, CAL AMP, and CAL YTF routines have been run.
- Characteristics provide useful, but nonwarranted information about the functions and performance of the EMC 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 +55 °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

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	$\pm 1 \times 10^{-8}$
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 IF BW + 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, IF BW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when IF BW/Span < 0.01.	

Frequency Specifications

Frequency Span	
Range	0 Hz (zero span), 1 kHz to 6.5 GHz
Resolution	Four digits or 20 Hz, whichever is greater.
Accuracy (single band spans)	
Span $\leq$10 MHz	±2% of span*
Span >10 MHz	±3% of span
* For spans < 10 kHz, add an additional 10 Hz resolution error.	

Frequency Sweep Time	
Range	
	20 ms to 100 s
(Options 101 and 301)	20 μs to 100 s for span = 0 Hz
Accuracy	
20 ms to 100 s	±3%
20 μs to <20 ms *(Options 101 and 301)*	±2%
Sweep Trigger	Free Run, Single, Line, Video, External

IF Bandwidths	
Measurement	200 Hz, 9 kHz, and 120 kHz (6 dB EMC bandwidths)
	1 MHz (6 dB bandwidth ±10%)
Diagnostic	30 Hz to 300 kHz, 3 dB bandwidths in 1,3,10 steps (±20% characteristic), also 3 MHz and 5 MHz.

Stability	
Noise Sidebands	(1 kHz IF BW, 30 Hz AVG BW 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 IF BW, 1 kHz AVG BW	≤250 Hz pk-pk in 100 ms
30 Hz IF BW, 30 Hz AVG BW	≤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	−20 dBμV to +137 dBμV

Maximum Safe Input Level	
Average Continuous Power	+137 dBμV (1 W, 7.1 V rms), input attenuation ≥10 dB above 2.75 GHz.
Peak Pulse Power	+157 dBμV (100 W) for <10 μs pulse width and <1% duty cycle, input attenuation ≥30 dB.
dc	0 V (dc coupled)
	50 V (ac coupled)

Quasi-Peak Detector Specifications *(All except Option 703)*

The specifications for Quasi-Peak Detector have been based on the following:

- The EMC analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radioélectriques (CISPR) Section 1, Clause 2.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the EMC analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, IF bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB) *(All except Option 703)*			
	Frequency Band		
Pulse Repetition Frequency (Hz)	**120 kHz EMI BW 0.03 to 1 GHz**	**9 kHz EMI BW 0.15 to 30 MHz**	**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 the CW signal is <1.5 dB as specified in CISPR Pub. 16.
CISPR reference pulse: 0.044 μVs for 30 MHz to 1 GHz, 0.316 μVs for 15 kHz to 30 MHz, and 13.5 μVs ±1.5 μVs for 9 kHz to 150 kHz.

Gain Compression†	
>10 MHz	≤0.5 dB (total power at input mixer* = 97 dBμV)

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).
† If IF BW ≤ 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 AVG BW, sample detector)	
	1 kHz IF BW	**30 Hz IF BW**
400 kHz to 2.9 GHz	≤−3 dBμV	≤−18 dBμV
2.75 GHz to 6.5 GHz	≤−5 dBμV	≤−20 dBμV

Amplitude Specifications

Spurious Responses	
Second Harmonic Distortion	
>10 MHz	<−70 dBc for +67 dBμV tone at input mixer.*
>2.75 GHz	<−100 dBc for +97 dBμV tone at input mixer* (or below displayed average noise level).
Third Order Intermodulation Distortion	
>10 MHz	<−70 dBc for two +77 dBμV tones at input mixer* and >50 kHz separation.
Other Input Related Spurious	<−65 dBc at ≥30 kHz offset, for +87 dBμV tone at input mixer ≤6.5 GHz.

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 6.5 GHz	<+17 dBμV

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	+8 dBμV to maximum amplitude*
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to +87 dBμV reference level, 10 dB input attenuation, at a single frequency, in a fixed IF BW)
107 dBμV to +47.1 dBμV	±(0.3 dB + .01 × dB from +87 dBμV)
+47 dBμV and below	
1 kHz to 3 MHz IF BW	±(0.6 dB + .01 × dB from +87 dBμV)
30 Hz to 300 Hz IF BW	±(0.7 dB + .01 × dB from +87 dBμV)

* 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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Calibrator Output	
Amplitude	+87 dBμV ±0.4 dB

Absolute Amplitude Calibration Repeatability*	±0.15 dB

* Repeatability 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 +87 dBμV; Input Attenuation 10 dB; Center Frequency 300 MHz; IF BW 3 kHz; AVG BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON, DC Coupled.

Amplitude Specifications

Input Attenuator	
Range	0 to 70 dB, in 10 dB steps

IF Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz IF BW)
3 kHz to 3 MHz IF BW	±0.4 dB
1 kHz IF BW	±0.5 dB
30 Hz to 300 Hz IF BW	±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 IF BW	± (0.3 dB + 0.01 × dB from reference level)
IF BW ≤ 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)

All specifications apply over 0 °C to +55 °C. The EMC-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 EMC-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	9 kHz to 2.9 GHz

Output Power Level	
Range	+106 dBμV to +41 dBμV
Resolution	0.1 dB
Absolute Accuracy (at 25 °C ±10 °C)	
(+87 dBμV at 300 MHz)	±0.75 dB
Vernier*	
Range	9 dB
Accuracy (at 25 °C ±10 °C)	
(+87 dBμV 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."

Option Specifications

Output Power Sweep	
Range	($+97$ dBμV to $+106$ dBμV) − (Source Attenuator Setting)
Resolution	0.1 dB

Output Flatness	
(referenced to 300 MHz, $+87$ dBμV)	
Frequency $>$ 10 MHz	±2.0 dB
Frequency $\leq$ 10 MHz	±3.0 dB

Spurious Output ($+106$ dBμV 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
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
LO Feedthrough	
LO Frequency 3.9217 to 6.8214 GHz	$\leq +91$ dBμV

Tracking Generator Feedthrough	
400 kHz to 2.9 GHz	< -3 dBμV

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 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.	

Diagnostic IF Bandwidths	
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio IF Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
40 dB/3 dB Bandwidth Ratio IF Bandwidth	
30 Hz to 300 Hz	10:1

Frequency Characteristics

Averaging Bandwidth (−3 dB)	
Range	1 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy ±30% and 3 MHz. Averaging bandwidths may be selected manually, or coupled to IF bandwidth and frequency span.
Shape	Post detection, single pole low-pass filter used to average displayed noise. 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 *(All except Option 703)*	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.

Quasi-Peak Detector *(All except Option 703)*	
Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation *(All except Option 703)*	
Input Level	> (+47 dBμV + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz/volt nominal
Range	10 kHz/volt to 1 MHz/volt
Bandwidth (6 dB)	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Amplitude Characteristics

Measurement Detector Types	Positive Peak, Quasi-Peak, and Average
	Quasi-Peak and Average time constants conform with CISPR Pub. 16.
(Option 101 and Option 301)	Negative Peak
(Option 703)	Delete Quasi-Peak and Average

IF Overload Detector	Available in EMC analyzer mode only. Detects overload of the analyzer video circuitry.

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 "Frequency Response" table under "Specifications".

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

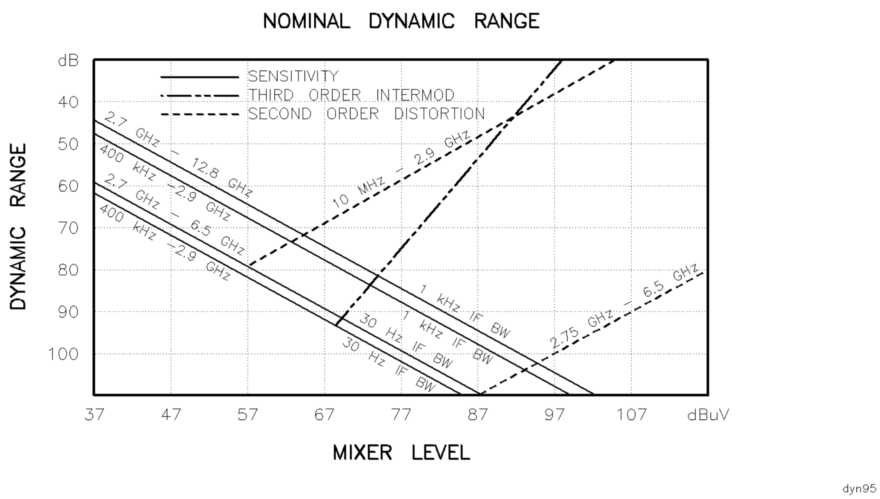
RF Input SWR		
10 dB attenuation	**dc Coupled**	**ac Coupled**
Frequency		
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
Band		
100 kHz to 300 kHz	1.3:1	2.3:1
300 kHz to 1 MHz	1.3:1	1.4:1
1 MHz to 2.9 GHz	1.3:1	1.3:1
2.9 GHz to 6.5 GHz	1.5:1	1.6:1

Unpeaked Frequency Response (dc coupled)	(10 dB input attenuation)	
Without Preselector Peaking, Span $\leq$ 50 MHz	**Absolute***	**Relative Flatness†**
2.75 GHz to 6.5 GHz	±4.0 dB	±3.5 dB

* Referenced to 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Amplitude Characteristics

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 IF bandwidth and 321.4 MHz ± selected IF bandwidth the displayed average noise level may be up to +62 dBμV. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to +37 dBμV 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.
Electrical Fast Transient	When subjected to Electrical Fast Transient testing per EN 50082-1/EIC 801-4 noise may appear on the display of the analyzer during the application of the test voltage.

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.

In these modes, the following analyzer specifications remain as specifications:

Amplitude Range	**Calibrator Output**
Maximum Safe Input Level	

In these modes, the following analyzer specifications are reduced to characteristics:

Gain Compression	**Reference Level**
Displayed Average Noise Level	**IF 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 are replaced by the characteristics which follow in this subsection:

Marker Readout Resolution	**Frequency Response**

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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Option Characteristics

TV Trigger Characteristics (Options 101, 102, and 301)

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

Tracking Generator Characteristics (Option 010)

Tracking Drift	
(Usable in a 1 kHz IF BW after 5-minute warmup)	1.5 kHz/5 minute

RF Power Off Residuals	
9 kHz to 2.9 GHz	<-13 dBμV

Dynamic Range (difference between maximum power out and tracking generator feedthrough)	$>$109 dB

Output Attenuator Repeatability	
9 kHz to 300 MHz	$\pm$0.1 dB
300 MHz to 2.0 GHz	$\pm$0.2 dB
2.0 GHz to 2.9 GHz	$\pm$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 +87 dBμV)	Absolute Accuracy (at 300 MHz)	Relative Accuracy (referred to +87 dBμV)	Absolute Accuracy
+106 to +97 dBμV	0 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
+97 to +89 dBμV	8 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
+87 dBμV	16 dB	Reference	0.75 dB	2.0 dB	2.75 dB
+89 to +81 dBμV	16 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
+81 to +73 dBμV	24 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
+73 to +65 dBμV	32 dB	1.6 dB	2.35 dB	3.6 dB	4.35 dB
+65 to +57 dBμV	40 dB	1.8 dB	2.55 dB	3.8 dB	4.55 dB
+57 to +49 dBμV	48 dB	2.0 dB	2.75 dB	4.0 dB	4.75 dB
+49 to +41 dBμV	56 dB	2.1 dB	2.85 dB	4.1 dB	4.85 dB

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.	

CAL OUT	
Connector	BNC female
Impedance	50 Ω nominal

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>107 dBμV

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	+105 to +117 dBμV
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	+97 to +47 dBμV
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EARPHONE *(All except Option 703)*	
Connector	1/8 inch monaural jack

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

EXT KEYBOARD	Interface compatible with HP part number C1405 Option ABA 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).

Physical Characteristics

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	+118 to +125 dBμV

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 *(EMC 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	
HP-IB	
HP-IB Codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28
RS-232 *(Option 023)*	25 pin subminiature D-shell, female
Parallel *(Option 024)*	25 pin subminiature D-shell, female

SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp

TV TRIG OUT *(Options 101, 102, and 301)*	
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†	$-15\ V_{dc}\ \pm 7\%$	150 mA	—	—
8*	$+5\ V_{dc}\ \pm 5\%$	150 mA	—	—
9†	$+15\ V_{dc}\ \pm 5\%$	150 mA	—	—

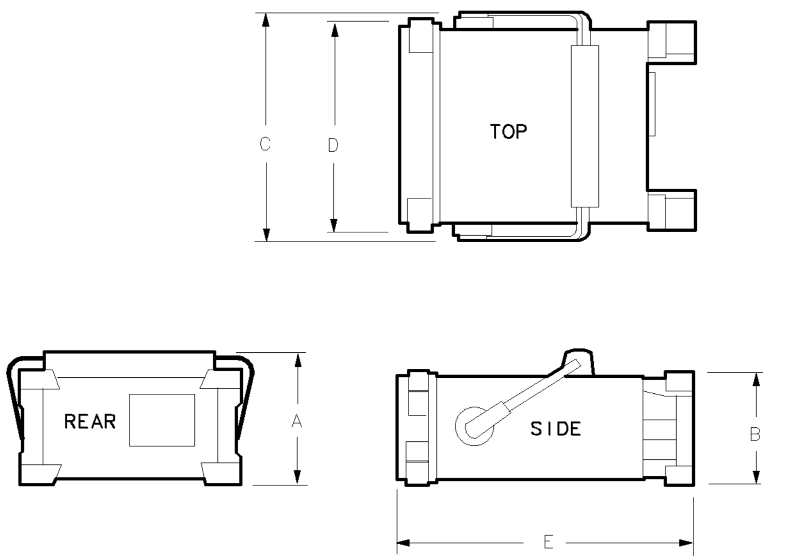
* Exceeding the +5 V current limits may result in loss of factory correction constants.
† Total current drawn from the $+15\ V_{dc}$ on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the $-12.6\ V_{dc}$ on the PROBE POWER and the $-15\ V_{dc}$ on the AUX INTERFACE cannot exceed 150 mA.

Physical Characteristics

WEIGHT	
Net	
HP 8595EM	16.4 kg (36 lb)
Shipping	
HP 8595EM	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)



Regulatory Information

The information on the following section applies to the HP 8595EM EMC analyzer.

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Co.

Manufacturer's Address: Santa Rosa Systems Division
1400 Fountaingrove Parkway
Santa Rosa, CA 95403
USA

declares that the product

Product Name: EMC Analyzer

Model Number: HP 8591EM, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM

Product Options: This declaration covers all options of the above products.

conforms to the following Product specifications:

Safety: IEC 348:1978/HD 401 S1:1981
CAN/CSA-C22.2 No. 231 (Series M-89)

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, 27-500 MHz
IEC 801-4:1988/EN 50082-1:1992 0.5 kV Sig. Lines, 1 kV Power Lines

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Rohnert Park, California, USA 16 Jan. 1995
Date

Dixon Browder/Quality Manager

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department ZQ/Standards Europe, Herrenberger Strasse 130, D-71034 Böblinger, Germany (FAX +49-7031-14-3143)

Notice for Germany: Noise Declaration

LpA < 70 dB
am Arbeitsplatz (operator position)
normaler Betrieb (normal position)
nach DIN 45635 T. 19 (per ISO 7779)

8

HP 8596EM Specifications and Characteristics

This chapter contains specifications and characteristics for the HP 8596EM EMC analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first, then followed by the characteristics.

General	General 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 +55 °C (unless otherwise noted). The EMC analyzer will meet its specifications under the following conditions:
  - □ The instrument is within the one year calibration cycle.
  - □ 2 hours of storage at a constant temperature within the operating temperature range.
  - □ 30 minutes after the EMC analyzer is turned on.
  - □ After the CAL FREQ, CAL AMP, and CAL YTF routines have been run.
- Characteristics provide useful, but nonwarranted information about the functions and performance of the EMC 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 +55 °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

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	$\pm 1 \times 10^{-8}$
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 IF BW + 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.

Frequency Specifications

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, IF BW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when IF BW/Span < 0.01.
‡ N = LO harmonic. See "Frequency Range."

Frequency Span	
Range	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

* For spans < 10 kHz × N†, add an additional 10 Hz × N† resolution error.
† N = LO harmonic. See "Frequency Range."

Frequency Sweep Time	
Range	
	20 ms to 100 s
(Options 101 and 301)	20 μs to 100 s for span = 0 Hz
Accuracy	
20 ms to 100 s	±3%
20 μs to <20 ms *(Options 101 and 301)*	±2%
Sweep Trigger	Free Run, Single, Line, Video, External

IF Bandwidths	
Measurement	200 Hz, 9 kHz, and 120 kHz (6 dB EMC bandwidths)
	1 MHz (6 dB bandwidth ±10%)
Diagnostic	30 Hz to 300 kHz, 3 dB bandwidths in 1,3,10 steps (±20% characteristic), also 3 MHz and 5 MHz.

Stability	
Noise Sidebands	(1 kHz IF BW, 30 Hz Avg BW 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 IF BW, 1 kHz Avg BW	$\leq$(250 × N*) Hz pk-pk in 100 ms
30 Hz IF BW, 30 Hz Avg BW	$\leq$(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	−20 dBμV to +137 dBμV

Maximum Safe Input Level	
Average Continuous Power	+137 dBμV (1 W, 7.1 V rms), input attenuation ≥10 dB above 2.75 GHz.
Peak Pulse Power	+157 dBμV (100 W) for <10 μs pulse width and <1% duty cycle, input attenuation ≥30 dB.
dc	0 V (dc coupled)
	50 V (ac coupled)

Quasi-Peak Detector Specifications *(All except Option 703)*

The specifications for Quasi-Peak Detector have been based on the following:

- The EMC analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radioélectriques (CISPR) Section 1, Clause 2.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the EMC analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, IF bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB) *(All except Option 703)*			
	Frequency Band		
Pulse Repetition Frequency (Hz)	**120 kHz EMI BW 0.03 to 1 GHz**	**9 kHz EMI BW 0.15 to 30 MHz**	**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 the CW signal is <1.5 dB as specified in CISPR Pub. 16.
CISPR reference pulse: 0.044 μVs for 30 MHz to 1 GHz, 0.316 μVs for 15 kHz to 30 MHz, and 13.5 μVs ±1.5 μVs for 9 kHz to 150 kHz.

Gain Compression†	
>10 MHz	≤0.5 dB (total power at input mixer* = 97 dBμV)

* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).
† If IF BW ≤ 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 AVG BW, sample detector)	
	1 kHz IF BW	**30 Hz IF BW**
400 kHz to 2.9 GHz	≤−3 dBμV	≤−18 dBμV
2.75 GHz to 6.5 GHz	≤−5 dBμV	≤−20 dBμV
6.0 GHz to 12.8 GHz	≤+7 dBμV	≤−8 dBμV

Amplitude Specifications

Spurious Responses	
Second Harmonic Distortion	
> 10 MHz	<−70 dBc for +67 dBμV tone at input mixer.*
> 2.75 GHz	<−100 dBc for +97 dBμV tone at input mixer* (or below displayed average noise level).
Third Order Intermodulation Distortion	
>10 MHz	<−70 dBc for two +77 dBμV tones at input mixer* and >50 kHz separation.
Other Input Related Spurious	<−65 dBc at ≥30 kHz offset, for +87 dBμV tone at input mixer ≤12.8 GHz.
* Mixer Power Level (dBμV) = Input Power (dBμV) − Input Attenuation (dB).	

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 2.9 GHz (Band 0)	<+17 dBμV
2.75 GHz to 6.5 GHz (Band 1)	<+17 dBμV

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	+8 dBμV to maximum amplitude*
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to +87 dBμV reference level, 10 dB input attenuation, at a single frequency, in a fixed IF BW)
107 dBμV to +47.1 dBμV	±(0.3 dB + .01 × dB from +87 dBμV)
+47 dBμV and below	
1 kHz to 3 MHz IF BW	±(0.6 dB + .01 × dB from +87 dBμV)
30 Hz to 300 Hz IF BW	±(0.7 dB + .01 × dB from +87 dBμV)

* 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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Calibrator Output	
Amplitude	+87 dBμV ±0.4 dB

Amplitude Specifications

Absolute Amplitude Calibration Repeatability*	±0.15 dB

* Repeatability 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 +87 dBμV; Input Attenuation 10 dB; Center Frequency 300 MHz; IF BW 3 kHz; Averaging 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

IF Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz IF BW)
3 kHz to 3 MHz IF BW	±0.4 dB
1 kHz IF BW	±0.5 dB
30 Hz to 300 Hz IF BW	±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 IF BW	± (0.3 dB + 0.01 × dB from reference level)
IF BW ≤ 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)

All specifications apply over 0 °C to +55 °C. The EMC-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 EMC-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	9 kHz to 2.9 GHz

Output Power Level	
Range	+106 dBμV to +41 dBμV
Resolution	0.1 dB
Absolute Accuracy (at 25 °C ±10 °C)	
(+87 dBμV at 300 MHz)	±0.75 dB
Vernier*	
Range	9 dB
Accuracy (at 25 °C ±10 °C)	
(+87 dBμV 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.”	

Option Specifications

Output Power Sweep	
Range	(+97 dBμV to +106 dBμV) − (Source Attenuator Setting)
Resolution	0.1 dB

Output Flatness	
(referenced to 300 MHz, +87 dBμV)	
Frequency > 10 MHz	±2.0 dB
Frequency ≤ 10 MHz	±3.0 dB

Spurious Output (+106 dBμV 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
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
LO Feedthrough	
LO Frequency 3.9217 to 6.8214 GHz	≤+91 dBμV

Tracking Generator Feedthrough	
400 kHz to 2.9 MHz	<−3 dBμV

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	$\leq (2 \times N^{\dagger})$ 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."	

Diagnostic IF Bandwidths	
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio IF Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
40 dB/3 dB Bandwidth Ratio IF Bandwidth	
30 Hz to 300 Hz	10:1

Frequency Characteristics

Averaging Bandwidth (−3 dB)	
Range	1 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy ±30% and 3 MHz. Averaging bandwidths may be selected manually, or coupled to IF bandwidth and frequency span.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
	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 *(All except Option 703)*	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.

Quasi-Peak Detector *(All except Option 703)*	
Measurement Range	
Displayed	70 dB
Total	115 dB

FM Demodulation *(All except Option 703)*	
Input Level	> (+47 dBμV + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz/volt nominal
Range	10 kHz/volt to 1 MHz/volt
Bandwidth (6 dB)	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	$\leq$ 1% of FM deviation + 290 Hz

Amplitude Characteristics

Measurement Detector Types	Positive Peak, Quasi-Peak, and Average
	Quasi-Peak and Average time constants conform with CISPR Pub. 16.
(Option 101 and Option 301)	Negative Peak
(Option 703)	Delete Quasi-Peak and Average

IF Overload Detector	Available in EMC analyzer mode only. Detects overload of the analyzer video circuitry.

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 “Frequency Response” table under “Specifications”.

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 x F†) dB
2.9 GHz to 6.5 GHz	0.05 dB + (0.13 x F†) dB
6.5 GHz to 12.8 GHz	0.65 dB + (0.04 x 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

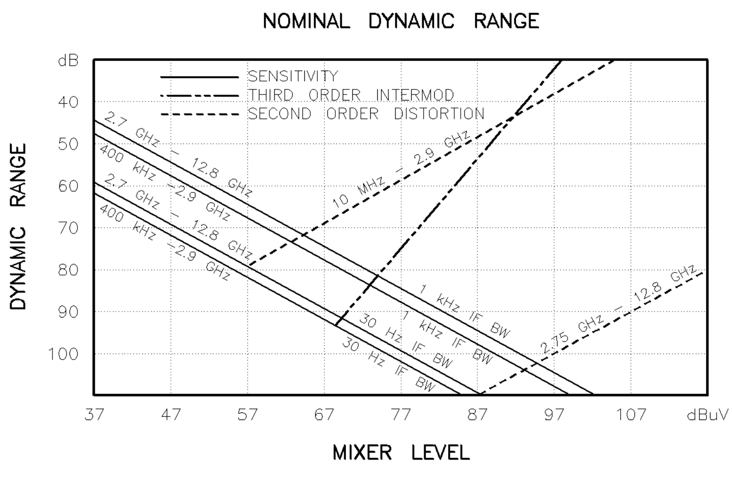
Input Attenuator Repeatability	±0.05 dB

RF Input SWR		
10 dB attenuation	**dc Coupled**	**ac Coupled**
Frequency		
300 MHz	1.15:1	1.4:1
10 dB to 70 dB attenuation		
Band		
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 $\leq$ 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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Amplitude Characteristics

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 IF bandwidth and 321.4 MHz ± selected IF bandwidth the displayed average noise level may be up to +62 dBμV. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to +37 dBμV 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.
Electrical Fast Transient	When subjected to Electrical Fast Transient testing per EN 50082-1/EIC 801-4 noise may appear on the display of the analyzer during the application of the test voltage.

Analog+ Mode and Negative Peak Detector Mode (Options 101 and 301)

These modes do not utilize the full set of internal amplitude corrections. Therefore, in these modes, some analyzer amplitude specifications are reduced to characteristics. Characteristics provide useful but nonwarranted information about instrument performance.

In these modes, the following analyzer specifications remain as specifications:

Amplitude Range	**Calibrator Output**
Maximum Safe Input Level	

In these modes, the following analyzer specifications are reduced to characteristics:

Gain Compression	**Reference Level**
Displayed Average Noise Level	**IF 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 are replaced by the characteristics which follow in this subsection:

Marker Readout Resolution	**Frequency Response**

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 6.4 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 300 MHz CAL OUT.
† Referenced to midpoint between highest and lowest frequency response deviations.

Option Characteristics

TV Trigger Characteristics (Options 101, 102, and 301)

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

Tracking Generator Characteristics (Option 010)

Tracking Drift	
(Usable in a 1 kHz IF BW after 5-minute warmup)	1.5 kHz/5 minute

RF Power Off Residuals	
9 kHz to 2.9 GHz	<-13 dBμV

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 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 +87 dBμV)**	**Absolute Accuracy (at 300 MHz)**	**Relative Accuracy (referred to +87 dBμV)**	**Absolute Accuracy**
+106 to +97 dBμV	0 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
+97 to +89 dBμV	8 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
+87 dBμV	16 dB	Reference	0.75 dB	2.0 dB	2.75 dB
+89 to +81 dBμV	16 dB	1.0 dB	1.75 dB	3.0 dB	3.75 dB
+81 to +73 dBμV	24 dB	1.5 dB	2.25 dB	3.5 dB	4.25 dB
+73 to +65 dBμV	32 dB	1.6 dB	2.35 dB	3.6 dB	4.35 dB
+65 to +57 dBμV	40 dB	1.8 dB	2.55 dB	3.8 dB	4.55 dB
+57 to +49 dBμV	48 dB	2.0 dB	2.75 dB	4.0 dB	4.75 dB
+49 to +41 dBμV	56 dB	2.1 dB	2.85 dB	4.1 dB	4.85 dB

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	+134 dBμV
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.	

CAL OUT	
Connector	BNC female
Impedance	50 Ω nominal

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>107 dBμV

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	+105 to +117 dBμV
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	+97 to +47 dBμV
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EARPHONE *(All except Option 703)*	
Connector	1/8 inch monaural jack

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

EXT KEYBOARD	Interface compatible with HP part number C1405 Option ABA and most IBM/AT non-auto switching keyboards.

Physical Characteristics

EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (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	+118 to +125 dBμV

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 *(EMC 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	
HP-IB	
HP-IB Codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28
RS-232 *(Option 023)*	25 pin subminiature D-shell, female
Parallel *(Option 024)*	25 pin subminiature D-shell, female

SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp

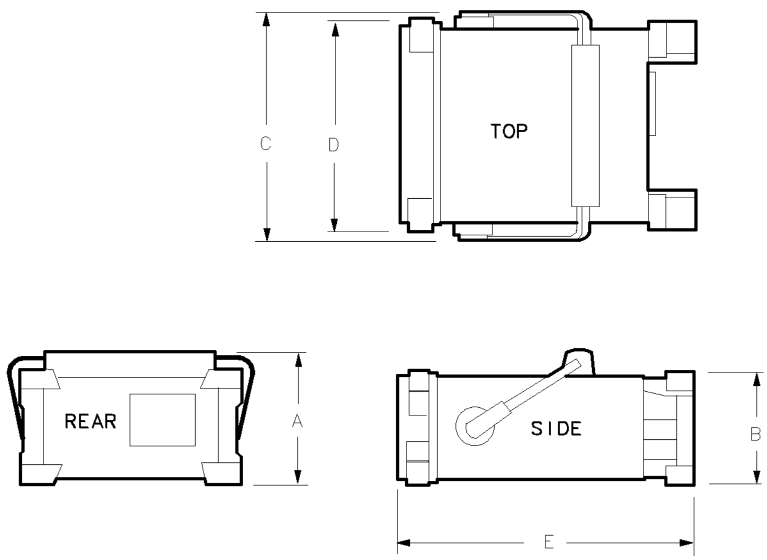
TV TRIG OUT *(Options 101, 102, and 301)*	
Connector	BNC female
Amplitude	Negative edge corresponds to start of the selected TV line after sync pulse (TTL).

Physical Characteristics

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 V_{dc} ±7%	150 mA	—	—
8*	$+5$ V_{dc} ±5%	150 mA	—	—
9†	$+15$ V_{dc} ±5%	150 mA	—	—
* Exceeding the +5 V current limits may result in loss of factory correction constants. † Total current drawn from the +15 V_{dc} on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the −12.6 V_{dc} on the PROBE POWER and the −15 V_{dc} on the AUX INTERFACE cannot exceed 150 mA.				

WEIGHT	
Net	
HP 8596EM	16.4 kg (36 lb)
Shipping	
HP 8596EM	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)



Regulatory Information

The information on the following section applies to the HP 8596EM EMC analyzer.

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Co.

Manufacturer's Address: Santa Rosa Systems Division
1400 Fountaingrove Parkway
Santa Rosa, CA 95403
USA

declares that the product

Product Name: EMC Analyzer

Model Number: HP 8591EM, HP 8593EM, HP 8594EM, HP 8595EM, HP 8596EM

Product Options: This declaration covers all options of the above products.

conforms to the following Product specifications:

Safety: IEC 348:1978/HD 401 S1:1981
CAN/CSA-C22.2 No. 231 (Series M-89)

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, 27-500 MHz
IEC 801-4:1988/EN 50082-1:1992 0.5 kV Sig. Lines, 1 kV Power Lines

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Rohnert Park, California, USA 16 Jan. 1995
Date
Dixon Browder/Quality Manager

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department ZQ/Standards Europe, Herrenberger Strasse 130, D-71034 Böblinger, Germany (FAX +49-7031-14-3143)

Notice for Germany: Noise Declaration

LpA $<$ 70 dB
am Arbeitsplatz (operator position)
normaler Betrieb (normal position)
nach DIN 45635 T. 19 (per ISO 7779)

9

Characteristics for the EMC Analyzer with the RF Filter Section

This chapter contains characteristics for the HP 8590 EM-Series EMC Analyzer with the HP 85420E Option 1EM RF filter section.

General	General characteristics.
Frequency	Frequency-related characteristics.
Amplitude	Amplitude-related characteristics.
Physical	Input, output and physical characteristics.

- Optimal performance is achieved under the following conditions:
  - The instrument is within the one year calibration cycle.
  - 2 hours of storage at a constant temperature within the operating temperature range.
  - 30 minutes after the EMC analyzer with the RF filter section is turned on.
  - After the CAL FREQ and CAL AMP (or the CAL ALL) routines have been run.
  - After the CAL YTF routine has been run on the HP 8595EM or the HP 8596EM.
- Characteristics provide useful, but nonwarranted information about the functions and performance of the EMC analyzer.
- 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 Characteristics

Temperature Range	
Operating	0 °C to +55 °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 <5.5 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
	EMC Analyzer	Power consumption <500 VA; <180 W
	RF Filter Section	Power consumption <115 VA; <85 W
Standby (LINE 0)	EMC Analyzer	Power consumption <7 W

Environmental Characteristics	Type tested to the environmental specifications of Mil-T-28800 class 5

Frequency Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Frequency Range		
Input 1		9 kHz to 50 MHz
Input 2	HP 8591EM	20 MHz to 1.8 GHz
	HP 8594EM, HP 8595EM, HP 8596EM	20 MHz to 2.9 GHz
Bypass	HP 8591EM	9 kHz to 1.8 GHz
	HP 8594EM	9 kHz to 2.9 GHz
	HP 8595EM	9 kHz to 6.5 GHz
	HP 8596EM	9 kHz to 12.8 GHz

Single Band Range*	
Band 0	9 kHz to 2.9 GHz†
Band 1	2.75 GHz to 6.5 GHz†
Band 2	6.0 GHz to 12.8 GHz†

* Bypass only.
† Refer to "Frequency Range" in this section for the maximum frequency range of the EMC analyzer.

Frequency Reference	
Aging	$\pm 1.0 \times 10^{-7}$/day
	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$

Frequency Characteristics

Precision Frequency Reference *(Option 004)*	
Aging	5×10^{-10}/day, 7-day average after being powered on for 7 days.
	$\pm 1 \times 10^{-7}$/year
Settability	$\pm 1 \times 10^{-8}$
Temperature Stability	$\pm 1 \times 10^{-8}$
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 Readout Accuracy	
(Start, Stop, Center, Marker)	±(frequency readout × frequency reference error* + span accuracy + 1% of span + 20% of IF BW + 200 Hz)†
* frequency reference error = (aging rate × period of time since adjustment + initial achievable accuracy + temperature stability). † See "Drift".	

Marker Count Accuracy†	
Frequency Span	
≤10 MHz × N‡	±(marker frequency × frequency reference error* + counter resolution + 200 Hz)
>10 MHz × N‡	±(marker frequency × frequency reference error* + counter resolution + 2 kHz)
Counter Resolution	
Frequency Span	
≤ 10 MHz × N‡	Selectable from 10 Hz to 100 kHz
> 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). † Marker level to displayed noise level > 25 dB, IF BW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when IF BW/Span < 0.01. ‡ N=1 (except for the HP 8596EM from 6.0 GHz to 12.8 GHz, where N=2)	

Frequency Span	
Range	0 Hz (zero span), (1 kHz × N#) to maximum frequency range limit of the EMC analyzer†
Resolution	Four digits or (20 Hz × N#), whichever is greater.
Accuracy*	
Span ≤10 MHz × N#	±2% of span‡
Span >10 MHz × N#	±3% of span

* Sweeptime > 75 ms and single-band spans.
† Refer to the "Frequency Range" table in this section for the maximum frequency range of the EMC analyzer.
‡ For spans < 10 kHz, add an additional 10 Hz resolution error.
# N=1 (except for the HP 8596EM from 6.0 GHz to 12.8 GHz, where N=2)

Frequency Sweep Time	
Range	
	20 ms to 100 s
(Option 101 and 301)	20 μs to 100 s for span = 0 Hz
Sweep Trigger	Free Run, Single, Line, Video, External

IF Bandwidths	
Measurement	200 Hz, 9 kHz, and 120 kHz (6 dB EMC bandwidths)
	1 MHz (6 dB bandwidth ±10%)
Diagnostic	30 Hz to 300 kHz, 3 dB bandwidths in 1,3,10 steps (±20% characteristic), also 3 MHz and 5 MHz. Four-pole synchronously-tuned, approximately Gaussian shape.

Frequency Characteristics

Stability	
Noise Sidebands	(1 kHz IF BW, 30 Hz Avg BW 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 IF BW, 1 kHz Avg BW	$\leq$(250 Hz pk-pk $\times$ N*) in 100 ms
30 Hz IF BW, 30 Hz Avg BW	$\leq$(30 Hz pk-pk $\times$ N*) in 300 ms
System-Related Sidebands	
>30 kHz offset from CW signal	≤ -65 dBc + 20 Log N*
* N=1 (except for the HP 8596EM from 6.0 GHz to 12.8 GHz, where N=2)	

Calibrator Output Frequency	300 MHz $\pm$(frequency reference error* $\times$ 300 MHz)
* frequency reference error = (aging rate $\times$ period of time since adjustment + initial achievable accuracy + temperature stability).	

Input Filter Bandwidths	Frequency Range	Filter Type
	9 kHz to 74 kHz	fixed
	74 kHz to 198 kHz	fixed
	198 kHz to 525 kHz	fixed
	525 kHz to 1025 kHz	fixed
	1 MHz to 2 MHz	fixed
	2 MHz to 6 MHz	tunable (20%, 3 dB)
	6 MHz to 17 MHz	tunable (10%, 3 dB)
	17 MHz to 29 MHz	tunable (7%, 3 dB)
	29 MHz to 52 MHz	tunable (8%, 3 dB)
	52 MHz to 98 MHz	tunable (6%, 3 dB)
	98 MHz to 152 MHz	tunable (6%, 3 dB)
	152 MHz to 216 MHz	tunable (6%, 3 dB)
	216 MHz to 330 MHz	tunable (5%, 3 dB)
	330 MHz to 500 MHz	tunable (5%, 3 dB)
	0.5 GHz to 1 GHz	tunable (4%, 3 dB)
	1 GHz to 2.9 GHz*	fixed
	1 GHz to 6.5 GHz*	fixed

* Refer to “Frequency Range” in this section for the maximum frequency range of the EMC analyzer.

Drift (after warmup at stabilized temperature)	
Frequency Span $\leq$ 10 MHz	$\leq$(2 kHz $\times$ N†)/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=1 (except for the HP 8596EM from 6.0 GHz to 12.8 GHz, where N=2)

Averaging Bandwidth (−3 dB)	
Range	1 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy ±30% and 3 MHz. Averaging bandwidths may be selected manually, or coupled to IF bandwidth and frequency span.
Shape	Post detection, single pole low-pass filter used to average displayed noise. Bandwidths below 30 Hz are digital bandwidths with anti-aliasing filtering.

Frequency Characteristics

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.

Amplitude Range	−39 dBμV to +137 dBμV

Maximum Safe Input Level	
Average Continuous Power	
Input 1 and Input 2	< +137 dBμV
Bypass	< +137 dBμV (Input Attenuation ≥10 dB)
Peak Pulse Power	
Input 1	< 2000 W peak for 10 μs and > 20 dB input attenuation
Input 2	< 100 W for < 10 μs pulse width < 1% duty cycle and > 30 dB input attenuation
Bypass	< 50 W for < 10 μs pulse width < 1% duty cycle and > 30 dB input attenuation
dc	0 Vdc

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

RF Filter Section Amplification	(Input 1 and Input 2 only)
Fixed Gain	15 dB ±0.5 dB
Preamplification	12 dB ±0.5 dB

Amplitude Characteristics

	Input 1	Input 2	Bypass
Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz IF BW, 30 Hz Avg BW, sample detection)		
400 kHz			
Preamp Off	< -31 dBμV	< -31 dBμV	< -18 dBμV
Preamp On	< -39 dBμV	< -39 dBμV	
Second Harmonic Intercept*			
1 MHz $< f <$ 1 GHz			
Preamp Off	> 122 dBμV	> 122 dBμV	
Preamp On	> 110 dBμV	> 110 dBμV	
Third Order Intercept†			
> 10 MHz			
Preamp Off	$> +98$ dBμV	$> +98$ dBμV	$> +5$ dBμV
Preamp On	$> +89$ dBμV	$> +89$ dBμV	
Residual Responses	(Input terminated, 0 dB attenuation, Preamp On except in Bypass)		
> 150 kHz	$< +10$ dBμV	$< +10$ dBμV	< -17 dBμV
Input VSWR			
0 dB input attenuation	$< 2:1$	$< 2:1$	$< 3:1$
10 dB input attenuation			
100 kHz to 1 GHz	$< 1.2:1$	$< 1.2:1$	$< 2:1$
> 1 GHz	$< 1.6:1$	$< 1.6:1$	$< 2:1$

* Indicated characteristic was derived from measured harmonic levels for a -40 dB input signal.
† Signal separation > 50 kHz. Indicated characteristic was derived from measured distortion products for
two $+77$ dBμV CW signals at the input.

Other Input Related Spurious*	< -65 dBc

* 30 kHz offset for $+87$ dBμV tone at the mixer $\leq$ the maximum frequency range limit of the EMC analyzer†,
f > 10 MHz.
Power at the input mixer = input power − input attenuation + RF filter section amplification
† Refer for the “Frequency Range” table in this section for the maximum frequency range of the EMC analyzer.

Gain Compression*	
10 MHz	< 0.5 dB
* Indicated characteristic is derived from measured distortion at the input mixer of $+97$ dBμV. Power at the input mixer = input power − input attenuation + RF filter section amplification. If the IF BW is $\leq$ 300 Hz, this applies only if signal separation is $\geq$ 4 kHz and signal amplitudes $\leq$ Ref Level + 10 dB.	

Reference Level	
Range	
Log Scale	Minimum amplitude to maximum amplitude*
Linear Scale	$+8$ dBμV to maximum amplitude*
Resolution	
Log Scale	± 0.01 dB
Linear Scale	$\pm 0.12\%$ of reference level
Accuracy	(referenced to $+87$ dBμV reference level, 10 dB input attenuation, at a single frequency, in a fixed IF BW)
107 dBμV to $+47.1$ dBμV	$\pm(0.3$ dB + .01 $\times$ dB from $+87$ dBμV)
$+47$ dBμV and below	
1 kHz to 3 MHz IF BW	$\pm(0.6$ dB + .01 $\times$ dB from $+87$ dBμV)
30 Hz to 300 Hz IF BW	$\pm(0.7$ dB + .01 $\times$ dB from $+87$ dBμV)
* See "Amplitude Range."	

Amplitude Characteristics

Frequency Response*		
Input 1		±2.0 dB
Input 2		±2.0 dB
Bypass†	9 kHz to 2.9 GHz	±2.5 dB
	2.75 GHz to 6.5 GHz	±3.5 dB
	6.0 GHz to 12.8 GHz	±5.0 dB

* Referenced to 300 MHz. Analyzer set to 10 dB input attenuation and dc coupled.
† Refer to "Frequency Range".

Calibrator Output	
Amplitude	+87 dBμV ±0.4 dB

IF Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz IF BW)
3 kHz to 3 MHz IF BW	±0.4 dB
1 kHz IF BW	±0.5 dB
30 Hz to 300 Hz IF BW	±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 IF BW	± (0.3 dB + 0.01 × dB from reference level)
IF BW ≤ 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

Quasi-Peak Detector Characteristics *(All except Option 703)*

- The EMC analyzer displays the quasi-peak amplitude of pulsed radio frequency (RF) or continuous wave (CW) signals.
- Amplitude response conforms with Publication 16 of Comité International Spécial des Perturbations Radioélectriques (CISPR) Section 1, Clause 2.

Absolute amplitude accuracy is the sum of the pulse amplitude response relative to the reference, plus the reference pulse amplitude accuracy, plus the EMC analyzer amplitude accuracy (calibrator output, reference level, frequency response, input attenuator, IF bandwidth switching, linear display scale fidelity, and gain compression).

Relative Quasi-Peak Response to a CISPR Pulse (dB) *(All except Option 703)*

Pulse Repetition Frequency (Hz)	Frequency Band 120 kHz EMI BW 0.03 to 1 GHz	9 kHz EMI BW 0.15 to 30 MHz	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 the CW signal is <1.5 dB as specified in CISPR Pub. 16.
CISPR reference pulse: 0.044 μVs for 30 MHz to 1 GHz, 0.316 μVs for 15 kHz to 30 MHz, and 13.5 μVs ±1.5 μVs for 9 kHz to 150 kHz.

Quasi-Peak Detector *(All except Option 703)*	
Measurement Range	
Displayed	70 dB
Total	115 dB

Amplitude Characteristics

Input Attenuator	
Range	0 to 50 dB, in 10 dB steps
Uncertainty*	
Input 1 and Input 2	±0.5 dB
Bypass	±1.0 dB
10 dB Step Uncertainty	±1.0 dB/10 dB
Repeatability	±0.05 dB
* Referenced to 10 dB input attenuator setting.	

Measurement Detector Types	Positive Peak, Quasi-Peak, and Average
	Quasi-Peak and Average time constants conform with CISPR Pub. 16.
(Option 101 and Option 301)	Negative Peak
(Option 703)	Delete Quasi-Peak and Average

Overload Detectors	Available in EMC analyzer mode only.
IF overload	Detects overload of the analyzer video circuitry.
RF overload	Detects overload of the RF Filter Section circuitry.

FM Demodulation *(All except Option 703)*	
Input Level	> (+47 dBμV + attenuator setting)
Signal Level	0 to −30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz/volt nominal
Range	10 kHz/volt to 1 MHz/volt
Bandwidth (6 dB)	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Demod Tune Listen *(All except Option 703)*	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.

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 IF bandwidth and 321.4 MHz ± selected IF bandwidth the displayed average noise level may be up to +62 dBμV. When the analyzer tuned frequency is identical to the immunity test signal frequency there may be signals of up to +37 dBμV 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.
Electrical Fast Transient	When subjected to Electrical Fast Transient testing per EN 50082-1/EIC 801-4 noise may appear on the display of the analyzer during the application of the test voltage.

Physical Characteristics

EMC Analyzer 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
Maximum Safe Reverse Level	+127 dBμV (0.1 W), 25 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.

CAL OUT	
Connector	BNC female
Impedance	50 Ω nominal

EMC Analyzer Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>107 dBμV

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	+105 to +117 dBμV
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	+97 to +47 dBμV
Impedance	50 Ω nominal

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EARPHONE *(All except Option 703)*	
Connector	1/8 inch monaural jack

EXT ALC INPUT *(Option 010)*	
Impedance	1 MΩ
Polarity	Positive or negative
Range	−66 dBV to +6 dBV
Connector	BNC

EXT KEYBOARD	Interface compatible with HP part number C1405 Option ABA 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).

Physical Characteristics

HI-SWEEP IN/OUT	
Connector	BNC female
Output	High = sweep, Low = retrace (TTL)
Input	Open collector, low stops sweep.

MONITOR OUTPUT *(EMC 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	
HP-IB	
HP-IB Codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3 and C28
RS-232 *(Option 023)*	25 pin subminiature D-shell, female
Parallel *(Option 024)*	25 pin subminiature D-shell, female

SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp

TV TRIG OUT *(Options 101, 102, and 301)*	
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 V_{dc} ±7%	150 mA	—	—
8*	$+5$ V_{dc} ±5%	150 mA	—	—
9†	$+15$ V_{dc} ±5%	150 mA	—	—

* Exceeding the +5 V current limits may result in loss of factory correction constants.
† Total current drawn from the +15 V_{dc} on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the −12.6 V_{dc} on the PROBE POWER and the −15 V_{dc} on the AUX INTERFACE cannot exceed 150 mA.

Physical Characteristics

WEIGHT	
EMC Analyzer	
Net	
HP 8591EM	14.4 kg (32 lb.)
HP 8594EM	16.4 kg (36 lb.)
HP 8595EM	16.4 kg (36 lb.)
HP 8596EM	16.4 kg (36 lb.)
Shipping	
HP 8591EM	17.1 kg (38 lb.)
HP 8594EM	19.1 kg (42 lb.)
HP 8595EM	19.1 kg (42 lb.)
HP 8596EM	19.1 kg (42 lb.)

RF Filter Section Front-Panel Inputs and Outputs

INPUT 1	
Connector	Type N female
Impedance	50 Ω nominal

INPUT 2	
Connector	Type N female
Impedance	50 Ω nominal

300 MHz Input	
Connector	Type N female
Impedance	50 Ω nominal

Tracking Generator Input	
Connector	Type N female
Impedance	50 Ω nominal

Tracking Generator Output	
Connector	Type N female
Impedance	50 Ω nominal

RF Output	
Connector	Type N female
Impedance	50 Ω nominal

ALC	
	Negative Detector

RF Filter Section Rear-Panel Inputs and Outputs

High Sweep Output	
Connector	SMA female
Output	High = sweep, Low = retrace (TTL)

SWEEP RAMP INPUT	
Connector	SMA female
Amplitude	0 to +10 V ramp

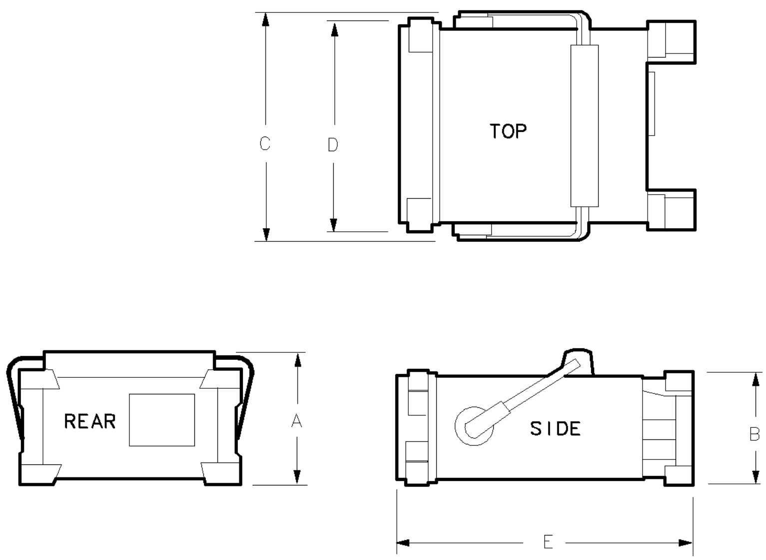
AUX Interface	
Connector	9-pin subminiature

Service Bus	
Connector	HP-IB Compatible

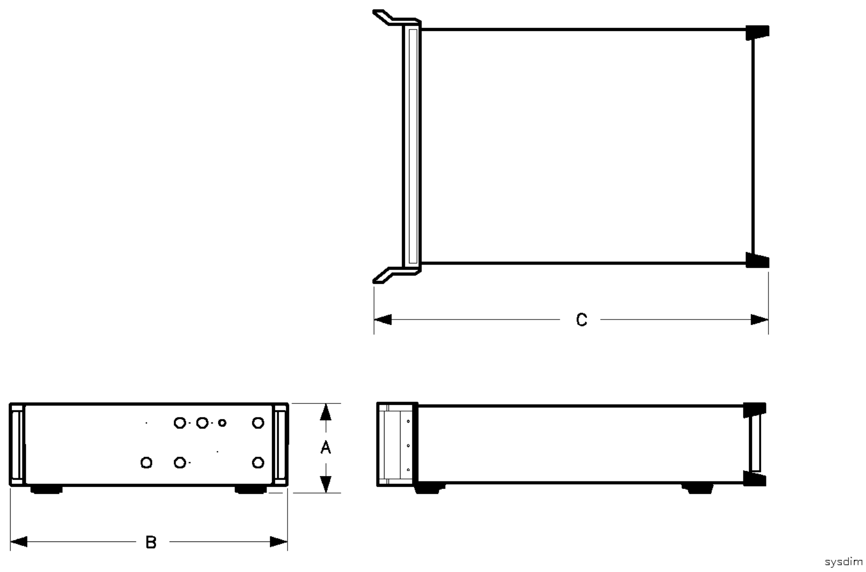
WEIGHT	
RF Filter Section	
HP 85420E	20.7 kg (46 lb.)

Physical Characteristics

EMC ANALYZER 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)



RF FILTER SECTION DIMENSIONS
A = 5.26 in (133.5 mm) B = 18.03 in (457.9 mm) C = 25.35 in (643.9 mm)



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Customer Support

Your EMC analyzer is built to provide dependable service. It is unlikely that you will experience a problem. However, Hewlett-Packard's worldwide sales and service organization is ready to provide the support you need.

If You Have a Problem

Before calling Hewlett-Packard or returning the EMC 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 manual. If your EMC analyzer is covered by a separate maintenance agreement, please be familiar with its terms.

Hewlett-Packard offers several maintenance plans to service your EMC analyzer after warranty expiration. Call your HP Sales and Service Office for full details.

If you want to service the EMC analyzer yourself after warranty expiration, contact your HP Sales and Service Office to obtain the most current test and maintenance information.

Calling HP Sales and Service Offices

Sales and service offices are located around the world to provide complete support for your EMC analyzer. To obtain servicing information or to order replacement parts, contact the nearest Hewlett-Packard Sales and Service office listed in Table 10-1. In any correspondence or telephone conversations, refer to the EMC analyzer by its model number and full serial number. With this information, the HP representative can quickly determine whether your unit is still within its warranty period.

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.

If Your EMC Analyzer Does Not Turn On

- ☐ Check that the EMC analyzer is plugged into the proper ac power source.
- ☐ Check that the line socket has power.
- ☐ Check that the rear-panel voltage selector switches are set correctly.
- ☐ Check that the line fuses are good.
- ☐ Check that the EMC analyzer is turned on.

If the EMC Analyzer Cannot Communicate Via HP-IB

- ☐ Verify that the proper HP-IB address has been set.
- ☐ Verify that there are no equipment address conflicts.
- ☐ Check that the other equipment and cables are connected properly and operating correctly.
- ☐ Verify that the HP-IB cable is connected to the EMC analyzer.
- ☐ Verify that the HP-IB cable is not connected to the RF filter section if your system includes an RF filter section.

Verification of Proper Operation

- ☐ Check that the test being performed and the expected results are within the specifications and capabilities of the EMC analyzer.
- ☐ Check the operation by performing the operation verification procedures in Chapter 2 of the *HP 8590 EM-Series EMC Analyzer Verification Guide*. Record all results in the operation verification test record.

Error Messages

- □ Check the EMC analyzer display for error messages. Refer to Appendix A of the *HP 8590 EM-Series EMC Analyzer Quick Reference Guide*.

If the EMC Analyzer with the RF Filter Section Does Not Seem to be Working

- □ Check that the ac power is connected to the system as described above in “If Your EMC Analyzer Does Not Turn On”.
- □ Verify that the rear-panel auxiliary interface cable is properly connected.
- □ Verify that the rear-panel sweep ramp and high sweep cables are properly connected.
- □ Verify that the RF filter section DIP switch near the service bus connecter is set to the normal mode.

If the RF Filter Section Does Not Power Off

- □ Verify that the service power switch on the RF filter section is set to normal mode.

Additional Support Services

CompuServe

CompuServe, the worldwide electronic information utility, provides technical information and support for EMC instrumentation and communication with other EMI users.

With a CompuServe account and a modem-equipped computer, simply type `GO HPSYS` and select the EMC system section to get information on documentation, application notes, product notes, service notes, software, firmware revision listings, data sheets, and more.

If you are not a member of CompuServe and would like to join, call CompuServe and take advantage of the Free Introductory Membership. The membership includes the following:

- An introductory usage credit to CompuServe
- A private User ID and Password
- A complimentary subscription to CompuServe's monthly computing publication, *CompuServe Magazine*

To take advantage of the CompuServe Free Introductory Membership offer, call one of the telephone numbers below and ask for Representative Number 999.

Country	Toll-Free	Direct
Argentina	—	(+54) 01-372-7883
Australia	008-023-158	(+61) 2-410-4555
Canada	—	(+1) 614-457-8650
Chile	—	(+56) 2-696-8807
Germany	0130 86 4643	(+49) (+89) 66 55 0-222
Hong Kong	—	(+852) 867-0102
Israel	—	(+972) 3-290466
Japan	0120-22-1200	(+81) 3-5471-5806
Korea	080-022-7400	(+82) 2-569-5400
New Zealand	0800-441-082	—
South Africa	—	(+27) 12-841-2530
Switzerland	155 31 79	—
Taiwan	—	(+886) 2-515-7035
United Kingdom	0800 289458	(+44) (+272) 255111
United States	800-848-8990	(+1) 614-457-8650
Venezuela	—	(+58) 2-793-2984
Elsewhere	—	(+1) 614-457-8650

FAX Support Line

A fax sheet is provided at the end of this chapter as a method in which to directly contact the HP EMC support team in the event of a problem. The fax cover sheet provides EMC support team with information about your company, the product, and a detailed description about the problem.

Note	**All** items on the fax cover sheet *must* be completed in order to expedite your response. Any incomplete item may delay your response.

Simply copy the fax cover sheet, fill out the requested information, include any additional information sheets, and fax the sheet(s) to HP EMC Support at (707) 577-4200. Depending on the complexity of the problem, you should receive a response back within a few days.

Returning the EMC analyzer for Service

Use the information in this section if it is necessary to return the EMC analyzer to Hewlett-Packard.

Note If you are returning an EMC analyzer with an RF filter section, you must package the units individually to avoid damage.

Package the EMC analyzer for shipment

Use the following steps to package the EMC analyzer for shipment to Hewlett-Packard for service:

1. Fill in a service tag (available at the end of this chapter) 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 EMC analyzer display.
   - A completed operation verification test record located at the end of Chapter 3 in the *HP 8590 EM-Series EMC Analyzer Verification Guide*.
   - Any other specific data on the performance of the EMC analyzer.

CAUTION Damage to the EMC 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 fan.

2. Use the original packaging materials, if possible. You may also use strong shipping containers that are made of double-walled, corrugated cardboard with 159 kg (350 lb) bursting strength. The cartons must be both large enough and strong enough and allow at least 3 to 4 inches on all sides of the instrument for packing material. Containers and materials for factory shipments are also available through any Hewlett-Packard sales or service office.
3. 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.

Table 10-1. Hewlett-Packard Sales and Service Offices

US FIELD OPERATIONS

Customer Information
Hewlett-Packard Company
19320 Pruneridge Avenue
Cupertino, CA 95014, USA
(800) 752-0900

California, Northern
Hewlett-Packard Co.
301 E. Evelyn
Mountain View, CA 94041
(415) 694-2000

California, Southern
Hewlett-Packard Co.
1421 South Manhattan Ave.
Fullerton, CA 92631
(714) 999-6700

Colorado
Hewlett-Packard Co.
24 Inverness Place, East
Englewood, CO 80112
(303) 649-5000

Georgia
Hewlett-Packard Co.
2000 South Park Place
Atlanta, GA 30339
(404) 955-1500

Illinois
Hewlett-Packard Co.
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 255-9800

New Jersey
120 W. Century Road
Paramus, NJ 07653
(201)599-5000

Texas
930 E. Campbell Rd.
Richardson, TX 75081
(214) 231-6101

EUROPEAN FIELD OPERATIONS

Headquarters
Hewlett-Packard S.A.
150, Route du Nant-d'Avril
1217 Meyrin 2/Geneva
Switzerland
(41 22) 780.8111

France
Hewlett-Packard France
1 Avenue Du Canada
Zone D'Activite De Courtaboeuf
F-91947 Les Ulis Cedex
France
(33 1) 69 82 60 60

Germany
Hewlett-Packard GmbH
Berner Strasse 117
6000 Frankfurt 56
West Germany
(49 69) 500006-0

Great Britain
Hewlett-Packard Ltd
Eskdale Road, Winnersh Triangle
Wokingham, Berkshire RF11 5DZ
England
(44 734) 696622

INTERCON FIELD OPERATIONS

Headquarters
Hewlett-Packard Company
3495 Deer Creek Rd.
Palo Alto, California 94304-1316
(415) 857-5027

Australia
Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130
(61 3) 895-2895

Canada
Hewlett-Packard (Canada) Ltd.
17500 South Service Road
Trans-Canada Highway
Kirkland, Quebec H9J 2X8
Canada
(514) 697-4232

China
China Hewlett-Packard Co.
38 Bei San Huan X1 Road
Shuang Yu Shu
Hai Dian District
Beijing, China
(86 1) 256-6888

Japan
Yokogawa-Hewlett-Packard Ltd.
1-27-15 Yabe, Sagamihara
Kanagawa 229, Japan
(81 427) 59-1311

Singapore
Hewlett-Packard Singapore (Pte.) Ltd
1150 Depot Road
Singapore 0410
(65) 273-7388

Taiwan
Hewlett-Packard Taiwan
8th Floor, H-P Building
337 Fu Hsing North Road
Taipei, Taiwan
(886 2) 712-0404

HEWLETT PACKARD

Fax Cover Sheet

To: HP EMC Support **FAX Number: (707) 577-4200** **Page ____ of ____**

Date Transmitted: ____________________ **Time Transmitted:** ____________________

From:

Company: ____

Last Name: ____________________ First Name: ____________________

Address: ____

City: ____________________ State: ____________________

Country: ______________ Postal Code: __________ Mail Stop: __________

Telephone Number **(include Country Code)**: ______________________________

Fax Number **(required)**: ______________________________

- -

Product:

☐ HP 8591EM ☐ HP 8594EM ☐ HP 8596EM

☐ HP 8593EM ☐ HP 8595EM Option(s): ____________________

	EMC Analyzer	RF Filter Section
Serial Number(s):	______________	______________
Firmware Revision:	______________	______________

Is the problem reproducible? ☐ **Yes** ☐ **No**

- -

Detailed Problem Description: (include all setup information and any additional pages)

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