Notice

Hewlett-Packard to Agilent Technologies Transition

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. To reduce potential confusion, the only change to product numbers and names has been in the company name prefix: where a product name/number was HP XXXX the current name/number is now Agilent XXXX. For example, model number HP 8648 is now model number Agilent 8648.

Contacting Agilent Sales and Service Offices

The sales and service contact information in this manual may be out of date. The latest service and contact information for your location can be found on the Web at:

`http://www.agilent.com/find/assist`

If you do not have access to the Internet, contact your field engineer. In any correspondence or telephone conversation, refer to your instrument by its model number and full serial number.

Agilent Technologies

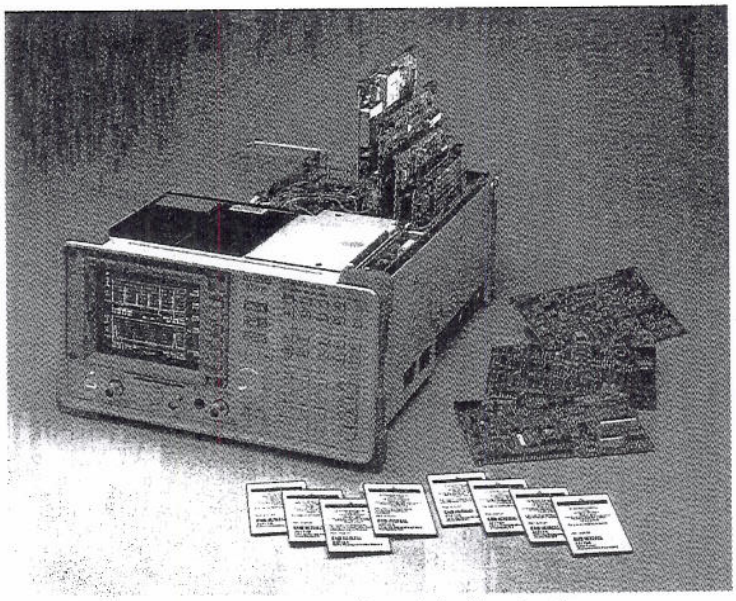
Printed in USA July 2004

SIGNAL ANALYZERS

Spectrum Analyzers, Portable

HP 8590 D/E Series

- Easy-to-use, expandable, portable spectrum analyzers
- Full range of price and performance options
- One-button measurements for FFT, TOI, ACP, and more
- Expanded memory and trace-storage capability
- Optional narrow resolution bandwidths
- New custom measurement personalities



DESIGNED FOR HP-IB SYSTEMS

HP 8591E with measurement personality and circuit card options

HP 8590 Series Spectrum Analyzers

The HP 8590 E Series and 8590 D Series spectrum analyzers offer a wide range of performance, features, and prices designed to fit your budget. Choose from low-cost, basic performance analyzers or from higher-performance models with synthesizer accuracy. Whatever your choice, you'll find HP 8590 Series spectrum analyzers easy to use and reliable. Their expandable feature sets allow them to be easily configured to meet your growing measurement needs.

Application measurement personalities customize the analyzer for tasks such as CATV, EMC, digital cellular radio, RF communication, noise-figure, and scalar network analysis measurements (see page 241). You can also add a variety of printers, plotters, and other accessories.

One Spectrum Analyzer for Many Applications

You can change the test capabilities of these spectrum analyzers to fit specific measurement needs. A memory card reader enables you to load application measurement personalities. Complex measurement routines are reduced to a keystroke. An option cardcage, unique to the HP 8590 E Series, allows you to add circuit-card options for additional capability. Optional built-in tracking generators provide a synchronously swept signal source for stimulus-response measurements. Operating any HP 8590 Series spectrum analyzer requires only minimal training.

Easy-to-Use Features

Numerous features make it easier to control measurements and to analyze the results. These spectrum analyzers have built-in, automatic calibration to ensure measurement consistency. Frequency panning lets you quickly reposition signals without repeated sweeps. The internal memory allows over 50 traces to be stored, and more can be stored on RAM cards using the memory-card reader. Time and date stamping come standard. Direct output to printer or plotter is available with either the HP-IB or the RS-232 interface option. Both Hewlett-Packard and selected Epson printers are supported.

HP 8591E, 8593E, 8594E, 8595E, and 8596E Spectrum Analyzers

These portable spectrum analyzers bring powerful, comprehensive measurement capabilities to RF, microwave, and digital applications. Five models offer a choice of frequency coverage starting at 9 kHz and extending to 26.5 GHz.

Performance specifications include low phase noise of −105 dBc at 30 kHz offset and frequency-synthesized accuracy of 2.1 kHz at 1 GHz, which can be improved to 210 Hz with an optional precision frequency reference. Second- and third-order dynamic ranges are 77 and 90 dB, respectively. Calibrated amplitude range is +30 to −130 dBm with Option 130, and calibrated onscreen display range is 70 dB. Narrow resolution bandwidths of 30, 100, 200 EMI, and 300 Hz are available on an optional circuit card, which can be added to these analyzers at any time.

Standard Features

A new window capability divides the display into two horizontal areas, allowing you to zoom in on critical areas of a measurement trace or to display test data and the trace simultaneously. Many one-button measurements are standard, including a marker table, FFT, N dB bandwidths, third-order intercept, percent AM, and adjacent-channel power. A built-in memory card reader allows you to load measurement personalities, your own custom programs, and measurement data on 32-, 128-, 256-, and 512-K memory cards.

Option Flexibility

A growing number of circuit-card options provides even more measurement capability. Circuit cards are installed easily into a built-in cardcage, and most are retrofittable.

Circuit-card options include:

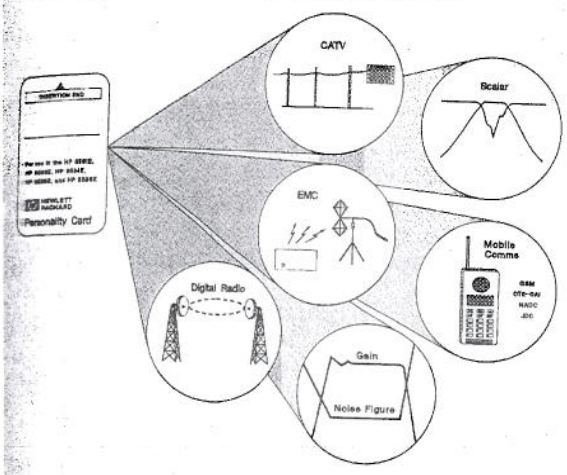
- Narrow resolution bandwidths of 30, 100, 200 EMI, and 300 Hz
- Time-gated spectrum analysis
- "Analog +" display and fast time-domain sweeps
- AM/FM demodulator
- TV sync trigger
- Quasi-peak detector
- Noise-figure measurements
- CT-2 demodulator
- NADC digital demodulator

A built-in 1.8 GHz tracking generator (retrofittable) is available for the HP 8591E, and a 2.9 GHz tracking generator (retrofittable) for the HP 8593E, 8594E, 8595E, and 8596E. For microwave scalar network measurements to 6.5 and 26.5 GHz, the HP 85644A and 85645A microwave tracking sources can be used. See page 252. The HP 85902A burst carrier trigger provides a TTL timing reference for digital wireless communication measurements. See page 258.

HP 8590D and 8592D Spectrum Analyzers

These models offer basic RF and microwave measurement performance at a low cost. The HP 8590D has a frequency range of 9 kHz to 1.8 GHz, amplitude range of −115 to +30 dBm, and an improved frequency accuracy option. The HP 8592D extends to 26.5 GHz.

- Application-specific measurements
- New digital RF communication personalities



Measurement Personality Cards

HP's measurement personality cards are an economical way to customize your HP 8590 Series spectrum analyzer* for easier, more accurate testing in a number of application areas. The measurement personalities are loaded using the built-in memory card reader (optional on the HP 8590D and 8592D). For information on the lightwave measurement personality, see page 570.

Digital RF Communications

Measurement personalities give the HP 8590 Series spectrum analyzers specialized functions to simplify cellular radio and cordless telephone testing. The personalities make it easy to test transmitters according to industry standards. Measurement displays and results are optimized for fast retrieval of test data. Limit-line masks and pass/fail messages speed go/no go testing. Numerical and graphical results can be sent directly to a printer or plotter. Real-time, interactive displays aid troubleshooting.

HP 85715A GSM Measurement Personality

Based on GSM 11.10 and 11.20 recommendations for Pan-European digital cellular radio testing, the HP 85715A personality provides these measurements: mean transmitted carrier power, power versus time, output RF spectrum, spurious emissions, and intermodulation attenuation.

HP 85717A CT2-CAI Measurement Personality

The HP 85717A personality provides all transmitter measurements in the MPT 1375 and I-ETS 300-131 specifications for second generation cordless telephone with common air interface: mean carrier power, carrier-off power, adjacent channel power, out-of-band power, spurious emissions, intermodulation attenuation, and frequency error and deviation.

HP 85718A/B NADC-TDMA Measurement Personalities

The HP 85718A and 85718B personalities simplify testing of time-division multiple-access transmitters for North American digital cellular radio (NADC) systems. Based on IS-54, -55, and -56 standards, they provide these measurements: carrier power, carrier-off power, adjacent channel power, power versus time (for mobiles), and intermodulation (for bases). Other measurements are occupied bandwidth and combiner tuning (for bases). In addition, the new HP 85718B works with HP 8590 E-Series Option 151/161 NADC digital demodulator to add seven modulation accuracy tests and three graphical displays.

HP 85720A JDC-TDMA Measurement Personality

The HP 85720A provides TDMA transmitter measurements for Japanese digital cellular radio (JDC) systems according to RCR STD-27 standards: carrier power, carrier-off power, occupied bandwidth, adjacent channel power, power versus time (for mobiles), intermodulation (for bases), and spurious. Combiner tuning (for bases) is also included.

New HP 85722A DCS-1800 Measurement Personality

The HP 85722A enhances HP 8590 A- and E-Series analyzers for testing DCS-1800 cellular systems. It adds the following DCS measurements: carrier power, power versus time, output RF spectrum, spurious emissions, intermodulation attenuation, and combiner tuning. Features include RF channel and time-slot selection, slow-frequency-hopping verification, and adaptive masks in the time and frequency domains.

New HP 85723A DECT Measurement Personality

The HP 85723A is used to make DECT transmitter tests. It works with an HP 8590 E-Series analyzer, Option 012 DECT source (for receiver sensitivity measurements), and Option 112 DECT demodulator. It adds the following DECT measurements: carrier power, power versus time, adjacent channel power, frequency deviation, frequency error, spurious emissions, and intermodulation attenuation.

New HP 85724A Broadcast Measurement Personality

The HP 85724A adds measurements for testing TV broadcast transmitters and relays. It allows selection of either PAL-I or PAL-B/G systems; channel bands CCIR VHF, UHF, or S; and channel number. Tests include: carrier level, chroma level, vision, three tone intermodulation, depth of modulation, spurious signals, NICAM carrier power and intermodulation, and FM deviation.

Digital Radio Measurements

HP 85713A Digital Radio Measurement Personality

The HP 85713A digital radio measurement personality for microwave spectrum analyzers includes five major agency masks for testing to US, UK, and FRG digital radio specifications. Automatic compare-to-mask and mean power level measurements are made on the modulated signal. Functions include transient analysis monitoring and frequency response measurement. You can create and store your own masks for later use. More digital radio tests, including multipath fading margin, power measurements, and flatness, are available using the HP 11758T digital radio test system.

New HP 11770A Link Measurement Personality

The new HP 11770A makes group delay and amplitude measurements on systems that carry digital data, such as a microwave radio system or a satellite link. See page 553.

Cable Television Testing

Locate your system problems fast without disrupting customer service. CATV measurement personalities simplify manual testing and automate system monitoring.

HP 85716A CATV System Monitoring Personality

The HP 85716A provides nine automatic, non-interfering measurements that allow you to continuously monitor headend operation and make faster, easier system proof-of-performance tests. See page 239.

HP 85711A/B CATV Measurement Personalities

These cards are recommended for manual headend testing, proof-of-performance measurements, trunk maintenance, and (with a microwave analyzer) CARS-band testing. With spectrum analyzer options you can listen to AM and FM signals, measure modulation depth on individual TV lines, or view TV pictures on the CRT of the spectrum analyzer. The new HP 85711B adds measurements for FCC Part 76 proof-of-performance testing. See page 239.

Component Test Measurements

HP 85719A Noise Figure Measurement Personality

The HP 85719A noise figure measurement personality customizes an HP 8590 Option 119 E-Series spectrum analyzer for swept noise figure and gain measurements. See page 252.

HP 85714A Scalar Measurement Personality

An HP 85714A scalar measurement personality and HP 8590 Series analyzer with optional built-in tracking generator make fast, accurate scalar transmission measurements from 300 kHz to 2.9 GHz. The personality card is also the interface for the HP 85630A scalar transmission/reflection test set. See page 252.

Electromagnetic Compatibility Testing

The HP 85712D EMC measurement personality simplifies electromagnetic compatibility (EMC) diagnostic and pre-compliance measurements. See page 260.

* Not all personalities work with every HP 8590 Series analyzer. Contact your local HP sales office for complete specifications and compatibility.

SIGNAL ANALYZERS
Spectrum Analyzers, Portable (cont'd)
HP 8590 Series

HP 8591E

HP 8591E, 8593E, 8594E, 8595E, 8596E Specifications

Specifications apply to any of these analyzers unless otherwise noted.

Frequency

Frequency Range

HP 8591E

50 Ω: 9 kHz to 1.8 GHz

75 Ω: 1 MHz to 1.8 GHz

	dc-coupled	ac-coupled
HP 8594E:	9 kHz to 2.9 GHz	100 kHz to 2.9 GHz
HP 8595E:	9 kHz to 6.5 GHz	100 kHz to 6.5 GHz

HP 8596E

Band	LO harmonic=N	Center frequency
0	1	9 kHz to 2.9 GHz (dc-coupled)
0	1	100 kHz to 2.9 GHz (ac-coupled)
1	1	2.75 to 6.5 GHz
2	2	6.0 to 12.8 GHz

HP 8593E

Band	LO harmonic=N	Center frequency
0	1	9 kHz to 2.9 GHz
1	1	2.75 to 6.5 GHz
2	2	6.0 to 12.8 GHz
3	3	12.4 to 19.4 GHz
4	4	19.1 to 22 GHz
4	4 (Opt 026)	19.1 to 26.5 GHz

Frequency Reference

Aging: $\pm 2 \times 10^{-6}$/year; $\pm 1 \times 10^{-7}$/year (Opt 004)

Temperature stability: $\pm 5 \times 10^{-6}$; $\pm 1 \times 10^{-8}$ (Opt 004)

Initial achievable accuracy: $\pm 0.5 \times 10^{-6}$; $\pm 2.2 \times 10^{-8}$ (Opt 004)

Frequency Readout Accuracy (start, stop, center, marker): ±(frequency readout × freq ref error + span accuracy + 1% of span + 20% of RBW + 100 Hz × N)

Marker Count Accuracy

Span ≤ 10 MHz × N: ±(marker freq × freq ref error + counter res + 100 Hz × N)

Span > 10 MHz × N: ±(marker freq × freq ref error + counter res + 1 kHz × N)

Counter resolution

Span ≤ 10 MHz × N: Selectable from 10 Hz to 100 kHz

Span > 10 MHz × N: Selectable from 100 Hz to 100 kHz

Frequency Span

Range: 0 Hz (zero span) and

HP 8591E: 10 kHz to 1.8 GHz; 1 kHz min (Opt 130)

HP 8594E: 10 kHz to 2.9 GHz; 1 kHz min (Opt 130)

HP 8595E: 10 kHz to 6.5 GHz; 1 kHz min (Opt 130)

HP 8596E: [10 × N] kHz to 12.8 GHz; [1 × N] kHz min (Opt 130)

HP 8593E: [10 × N] kHz to 19.25 GHz; [1 × N] kHz min (Opt 130)

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

Sweep Time

Range

Span = 0 Hz or > 10 kHz: 20 ms to 100 s

Span = 0 Hz (Opt 101): 20 μs to 100 s

Accuracy

20 ms to 100 s: ±3%

20 μs to < 20 ms (Opt 101): ±2%

Sweep trigger: Free run, single, line, video, external

Resolution Bandwidths: 1 kHz to 3 MHz (3 dB) in 1, 3, 10 sequence; 9 kHz and 120 kHz (6 dB) EMI bandwidths. Option 130 adds 30, 100, and 300 Hz (3 dB) bandwidths and 200 Hz (6 dB) EMI bandwidth.

Accuracy: ±20%

Selectivity (characteristic)

−60 dB/−3 dB:	3 to 10 kHz	15:1
	100 kHz to 3 MHz	15:1
	1 kHz, 30 kHz	16:1
−40 dB/−3 dB:	30 Hz to 300 Hz	10:1

Video Bandwidth Range: 30 Hz to 1 MHz in 1, 3 sequence (1 Hz to 1 MHz with Opt 130)

Stability

Noise sidebands (1 kHz RBW, 30 Hz VBW, 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

HP 8591E

1 kHz RBW, 1 kHz VBW: ≤250 Hz p-p in 100 ms

30 Hz RBW, 30 Hz VBW: ≤30 Hz p-p in 300 ms

HP 8593E, 8594E, 8595E, 8596E

1 kHz, RBW, 1 kHz VBW: ≤ (250 × N) Hz p-p in 100 ms

30 Hz RBW, 30 Hz VBW: ≤ (30 × N) Hz p-p in 300 ms

System Related Sidebands (> 30 kHz offset from CW signal): ≤ −65 dBc + 20 log N

Comb Generator (HP 8593E, 8596E): 100 MHz fundamental frequency; ±0.007% frequency accuracy

Amplitude

Amplitude Range: Displayed average noise level to +30 dBm

HP 8591 Opt 001: Displayed average noise level to +75 dBmV

Maximum Safe Input (input attenuator ≥ 10 dB)

Average continuous power: +30 dBm (1 W)

HP 8591E Opt 001: +75 dBmV (0.4 W)

Peak pulse power

HP 8591E: +30 dBm (1 W)

HP 8591E Opt 001: +75 dBmV (0.4 W)

HP 8593E, 8594E, 8595E, 8596E: +50 dBm (100 W) for < 10 μs pulse width and < 1% duty cycle, input atten ≥ 30 dB

dc

HP 8591E: 25 Vdc

HP 8591E Opt 001: 100 Vdc

HP 8593E: 0 Vdc

HP 8594E, 8595E, 8596E: 0 V (dc-coupled); 50 V (ac-coupled)

Gain Compression (> 10 MHz): ≤ 0.5 dB (total power at input mixer = −10 dBm)

Displayed Average Noise Level (input terminated, 0 dB atten, 30 Hz VBW or 1 Hz VBW with Opt 130, sample detector)

	30 Hz RBW	1 kHz RBW
HP 8591E		
400 kHz to 1 MHz	≤ −130 dBm	≤ −115 dBm
1 MHz to 1.5 GHz	≤ −130 dBm	≤ −115 dBm
1.5 GHz to 1.8 GHz	≤ −128 dBm	≤ −113 dBm
HP 8591E Opt 001		
1 MHz to 1.5 GHz	≤ −78 dBmV	≤ −63 dBmV
1.5 GHz to 1.8 GHz	≤ −76 dBmV	≤ −61 dBmV
HP 8594E		
400 kHz to 5 MHz	≤ −122 dBm	≤ −107 dBm
5 MHz to 2.9 GHz	≤ −127 dBm	≤ −112 dBm
HP 8595E		
400 kHz to 2.9 GHz	≤ −125 dBm	≤ −110 dBm
2.75 to 6.5 GHz	≤ −127 dBm	≤ −112 dBm
HP 8596E		
400 kHz to 2.9 GHz	≤ −125 dBm	≤ −110 dBm
2.75 to 6.5 GHz	≤ −127 dBm	≤ −112 dBm
6.0 to 12.8 GHz	≤ −115 dBm	≤ −100 dBm
HP 8593E		
400 kHz to 2.9 GHz	≤ −127 dBm	≤ −112 dBm
2.75 to 6.5 GHz	≤ −129 dBm	≤ −114 dBm
6.0 to 12.8 GHz	≤ −117 dBm	≤ −102 dBm
12.4 to 19.4 GHz	≤ −113 dBm	≤ −98 dBm
19.1 to 22 GHz	≤ −107 dBm	≤ −92 dBm
HP 8593E Opt 026		
19.1 to 26.5 GHz	≤ −102 dBm	≤ −87 dBm

HP 8591E, 8593E, 8594E, 8595E, 8596E Specifications (cont'd)

Spurious Responses
Second harmonic distortion
5 MHz to 1.8 GHz (HP 8591E): < −70 dBc for −45 dBm tone at input mixer
10 MHz to 2.9 GHz (HP 8593E): < −70 dBc for −40 dBm tone at input mixer
> 10 MHz (HP 8594E, 8595E, 8596E): < −70 dBc for −40 dBm tone at input mixer
> 2.75 GHz (HP 8593E, 8595E, 8596E): < −100 dBc for −10 dBm tone at input mixer (or below DANL)
Third-order intermodulation
HP 8591E (5 MHz to 1.8 GHz): < −70 dBc for two −30 dBm tones at input and > 50 kHz separation
HP 8593E, 8594E, 8595E, 8596E (> 10 MHz): < −70 dBc for two −30 dBm tones at input and > 50 kHz separation
Other input-related spurious (≥ 30 kHz offset, −20 dBm tone at input mixer)
HP 8591E, 8594E, 8595E, 8596E: < −65 dBc
HP 8593E: < −65 dBc (applied freq ≤ 18 GHz); < −60 dBc (applied freq ≤ 22 GHz)
Residual Responses (input terminated, 0 dB attenuation)
1 MHz to 1.8 GHz (HP 8591E Opt 001): < −38 dBmV
150 kHz to 1.8 GHz (HP 8591E): < −90 dBm
150 kHz to 2.9 GHz (HP 8594E): < −90 dBm
150 kHz to 6.5 GHz (HP 8593E, 8595E, 8596E): < −90 dBm
Display Range
Log scale: 0 to −70 dB from ref level is calibrated; 0.1, 0.2, 0.5 dB/div and 1 to 20 dB/div in 1 dB steps; 8 div displayed
Linear scale: 8 divisions
Scale units: dBm, dBmV, dBμV, V, W
Marker Readout Resolution
Log scale: 0.05 dB
Linear scale: 0.05% of ref level
Fast time sweep for zero span (Opt 101 or 301, 20 μs to 20 ms)
≤ 1 GHz: 0.7% of ref level for linear scale
> 1 GHz: 1.0% of ref level for linear scale
Reference Level
Range: Same as amplitude range
Resolution: ±0.01 dB for log scale; ±0.12% of ref level for linear scale
Accuracy: ±0.3 dB at −20 dBm
0 to −59.9 dBm: ±(0.3 dB + 0.01 × dB from −20 dBm)
Frequency Response (10 dB input attenuation)
Absolute (referenced to 300 MHz CAL OUT)
HP 8591E, 8594E: ±1.5 dB
HP 8595E: ±1.5 to ±2.0 dB
HP 8596E: ±1.5 to ±2.5 dB
HP 8593E: ±1.5 to ±5.0 dB (preselector peaked)
Relative flatness (referenced to midpoint between highest and lowest frequency response deviations)
HP 8591E, 8594E: ±1.0 dB
HP 8595E: ±1.0 to ±1.5 dB
HP 8596E: ±1.0 to ±2.0 dB
HP 8593E: ±1.0 to ±2.0 dB (preselector peaked)
Calibrator Output Amplitude: −20 dBm ±0.4 dB; +28.75 dBmV ±0.4 dB, HP 8591 Opt 001
Resolution Bandwidth Switching Uncertainty (ref to 3 kHz RBW, at ref level)
3 kHz to 3 MHz RBW: ±0.4 dB
1 kHz RBW: ±0.5 dB
30 Hz to 300 Hz RBW: ±0.6 dB
Log to Linear Switching: ±0.25 dB at ref level
Display Scale Fidelity
Log incremental accuracy (0 to −60 dB from ref level): ±0.4 dB/4 dB
Log maximum cumulative (0 to −70 dB from ref level)
1 kHz to 3 MHz RBW: ±(0.3 + 0.01 × dB from ref level)
30 to 300 Hz RBW: ±(0.4 + 0.01 × dB from ref level)
Linear accuracy: ±3% of ref level

General Specifications

Temperature
Operating: 0° to +55° C
Storage: −40° to +75° C
EMI Compatibility: Conducted and radiated interference CISPR Pub. 11 and Messempfaenger Postverfuegung 526/527/79
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
User Program Memory (nominal): 121 KB nonvolatile RAM
Data Storage (nominal)
Internal: 50 traces; 8 states
External
Memory cards: HP 85700A (32 KB), 24 traces or 32 states
HP 85702A (128 KB), 99 traces or 128 states
Video cassette recorder (VCR): Continuous video recording of display supported through composite video output
Size (nominal, without handle, feet, or cover): 325 mm W × 163 mm H × 427 mm D
Weight: 14.5 kg (HP 8591E): 16.4 kg (HP 8593E, 8594E, 8595E, 8596E)

Option 010 and 011 Built-In Tracking Generators

Opt 010 (50 Ω) is available for all HP 8590 Series spectrum analyzers except the HP 8592D. Opt 011 (75 Ω) is available for the HP 8590D and 8591E only.

Frequency Range
Opt 010: 100 kHz to 1.8 GHz (HP 8590D, 8591E); 300 kHz to 2.9 GHz (HP 8593E, 8594E, 8595E, 8596E)
Opt 011: 1 MHz to 1.8 GHz (HP 8590D, 8591E)
Output Level
Range
Opt 010: 0 to −15 dBm (HP 8590D); 0 to −70 dBm (HP 8591E); −1 to −66 dBm (HP 8593E, 8594E, 8595E, 8596E)
Opt 011: +42.8 to −27.8 dBm V (HP 8590D); +42.8 to −27.2 dBm V (HP 8591E)
Resolution: 0.1 dB
Absolute accuracy: ±1.5 dB (HP 8590D, 8592D); ±1.0 dB (HP 8591E); ±0.75 dB (HP 8593E, 8594E, 8595E, 8596E)
Vernier
Range: 15 dB (HP 8590D); 10 dB (HP 8591E); 8 dB (HP 8593E, 8594E, 8595E, 8596E)
Accuracy: ±1.0 dB (HP 8590D); ±0.25 dB (HP 8591E); ±0.8 dB (HP 8593E, 8594E, 8595E, 8596E)
Output Flatness: ±1.75 dB (HP 8590D, 8591E); ±2.0 dB, >10 MHz (HP 8593E, 8594E, 8595E, 8596E)
Spurious Output
Harmonic spurs: 0 dBm + 42.8 dBmV output, < −20 dBc (HP 8590D); < −25 dBc (HP 8591E); −1 dBm output, < −25 dBc (HP 8593E, 8594E, 8595E, 8596E)
Nonharmonic spurs: < −30 dBc
Dynamic Range (characteristic; max output level −TG feedthrough)
Opt 010: 106 dB (HP 8590D, 8591E); 108 dB (HP 8594E, >400 kHz); 111 dB (HP 8595E, 8596E, >400 kHz); 113 dB (HP 8593E, >400 kHz)
Opt 011: 100 dB
Power Sweep
Range
Opt 010: −15 dBm to 0 dBm (HP 8590D); −75 dBm to 0 dBm (HP 8591E); −66 dBm to −1 dBm in 8 dB increments (HP 8593E, 8594E, 8595E, 8596E)
Opt 011: −27.8 dBmV to +42.8 dBmV (HP 8590D); −32.2 to +42.8 dBmV (HP 8591E)
Resolution: 0.1 dB

SIGNAL ANALYZERS

Spectrum Analyzers, Portable (cont'd)

HP 8590 Series

Ordering Information
HP 8590D Spectrum Analyzer (9 kHz to 1.8 GHz)
HP 8592D Spectrum Analyzer (9 kHz to 22 GHz)
Options
Opt 001 75 Ω Input (HP 8590D only)
Opt 003 Memory Card Reader
Opt 010 Tracking Generator (100 kHz to 1.8 GHz, HP 8590D only)
Opt 011 Tracking Generator (75 Ω, HP 8590D only)
Opt 013 Frequency Accuracy Enhancements (HP 8590D only)
Opt 021 HP-IB Interface
Opt 023 RS-232 Interface
Opt 026 26.5 GHz Frequency Extension, APC Connector (HP 8592D only)
Opt 027 26.5 GHz Frequency Extension, Type N Connector (HP 8592D only)
Opt 040 Front Panel Protective Cover With Storage
Opt 042 Protective Soft Carrying Case
Opt 908 Rack Mount Without Handles
Opt 909 Rack Mount With Handles
Opt 910 Additional Manual Set
Opt 915 Component Level Information and Service Guide
Opt W30 Two Additional Years Return-to-HP Service
Opt W32 Two Additional Years Return-to-HP Calibration
Opt W50 Five Additional Years Return-to-HP Service
Opt W52 Five Additional Years Return-to-HP Calibration

HP 8591E Spectrum Analyzer (9 kHz to 1.8 GHz)
HP 8594E Spectrum Analyzer (9 kHz to 2.9 GHz)
HP 8595E Spectrum Analyzer (9 kHz to 6.5 GHz)
HP 8596E Spectrum Analyzer (9 kHz to 12.8 GHz)
HP 8593E Spectrum Analyzer (9 kHz to 22 GHz)
Options
Opt 001 75 Ω Input (HP 8591E only)
Opt 004 Precision Frequency Reference
Opt 009 LO and Sweep + Tune
Opt 010 Tracking Generator (100 kHz to 1.8 GHz, HP 8591E only)
Opt 010 Tracking Generator (300 kHz to 2.9 GHz)
Opt 011 Tracking Generator (75 Ω, HP 8591E only)
Opt 012 Source for DECT Receiver Test
Opt 021 HP-IB Interface
Opt 023 RS-232 Interface
Opt 026 26.5 GHz Frequency Extension, APC 3.5 mm Connector (HP 8593E only)
Opt 027 26.5 GHz Frequency Extension, Type N Connector (HP 8593E only)
Opt 040 Front Panel Protective Cover With Storage
Opt 042 Protective Soft Carrying Case
Opt 050 Improved Amplitude Accuracy
Opt 101 Fast Time Domain Sweeps and Analog + Display
Opt 102 AM/FM Demodulator and TV Sync Trigger (TV Sync requires Opt 101)
Opt 103 Quasi-Peak Detector, AM/FM Demodulator
Opt 105 Time-Gated Spectrum Analysis
Opt 110 CT2 Demodulator
Opt 111 Group Delay and Amplitude Flatness (HP 8593/4/5/6 only)
Opt 112 DECT Demodulator
Opt 119 Noise Figure
Opt 130 Narrow Resolution Bandwidths (30 to 300 Hz and 200 Hz EMI)
Opt 140 Narrow Bandwidths and Precision Frequency Reference
Opt 151 Digital Demodulator with Fast ADC
Opt 161 NADC-TDMA Firmware for Opt 151
Opt 301 TV Sync Trigger, Fast Time Domain Sweeps, AM/FM Demodulator, Analog + Display
Opt W30 Two Additional Years Return-to-HP Service
Opt W32 Two Additional Years Return-to-HP Calibration

For the most current prices and product information, contact your local Hewlett-Packard sales office—see page 654.

Application Measurement Cards/Personalities*
HP 11770A Link Measurement Personality
HP 85700A Blank 32-KB Memory Card
HP 85702A Blank 128-KB Memory Card
HP 85711A CATV Measurement Personality
HP 85711B CATV Measurement Personality
HP 85712D EMC Measurement Personality
HP 85713A Digital Radio Measurement Personality
HP 85714A Scalar Measurement Personality
HP 85715A GSM Measurement Personality
HP 85716A CATV System Monitoring Personality
HP 85717A CT2-CAI Measurement Personality
HP 85718A NADC-TDMA Measurement Personality
HP 85718B NADC-TDMA Measurement Personality
HP 85719A Noise Figure Measurement Personality
HP 85720A JDC-TDMA Measurement Personality
HP 85721A CATV Measurement Personality
HP 85722A DCS-1800 Measurement Personality
HP 85723A DECT Measurement Personality
HP 85724A Broadcast Personality

Selected Accessories
HP 85901A Portable AC Power Source
HP 85902A Burst Carrier Trigger Accessory
HP 85905A 75 Ω Preamplifier
HP 11758V Digital Radio Test Set
HP 11945A Opt E51 EMC Close-Field Probe Set
HP 11946A Quasi-Peak Adapter, AM/FM Demodulator Upgrade Kit
HP 8447D Broadband Preamplifier (100 kHz to 1.3 GHz)
HP 8449B Microwave Preamplifier (1 to 26.5 GHz)
HP 87405A Preamplifier (0.01 to 3 GHz)
HP 41800A Active Probe (5 Hz to 500 MHz)
HP 85024A High-Frequency Active Probe (300 kHz to 3 GHz)
HP 7440A ColorPro Plotter
HP C2106A DeskJet 500 Portable Printer (RS-232/Parallel Interface)
HP C2114A DeskJet 500C Portable Printer (RS-232/Parallel Interface)
HP C2614A DeskJet Portable Printer (requires HP 92203J/K HP-IB to Centronics Converter)
Epson MX80 Printer (Centronics version, requires the HP 92203J/K HP-IB to Centronics Converter)
Epson LQ570 Printer (Centronics version, requires the HP 92203J/K HP-IB to Centronics Converter)
HP 92203J/K HP-IB to Centronics Converter

☎ For off-the-shelf shipment, call 800-452-4844.
* Some measurement personalities are not supported by all HP 8590 Series mode complete information, please contact your local HP sales representative.

HP 8590D and 8592D Specifications

(Specifications apply to either analyzer unless otherwise noted.)

Frequency

Frequency Range

HP 8590D

50 Ω: 9 kHz to 1.8 GHz

75 Ω (Opt 001): 1 MHz to 1.8 GHz

HP 8592D: 9 kHz to 22 GHz

HP 8592D Opt 026: 9 kHz to 26.5 GHz

Band	LO harmonic=N	Center frequency
0	1	9 kHz to 2.9 GHz
1	1	2.75 to 6.5 GHz
2	2	6.0 to 12.8 GHz
3	3	12.4 to 19.4 GHz
4	4	19.1 to 22.0 GHz
4	4 (Opt 026)	19.1 to 26.5 GHz

Frequency Reference (HP 8590D Opt 013)

Aging: $\pm 2 \times 10^{-6}$/year

Temperature stability: $\pm 5 \times 10^{-6}$

Initial achievable accuracy: $\pm 0.5 \times 10^{-6}$

Frequency Readout Accuracy (start, stop, center, marker)

HP 8590D: ±(5 MHz + 1% of freq span)

HP 8590D Opt 013: ±(freq readout × freq ref error + span accuracy + 1% of span + 20% of RBW + 100 Hz)

HP 8592D: ±[(5 × N) MHz + 0.01% of center freq + 2% of freq span]

Marker Count Accuracy (HP 8590D Opt 013)

Span ≤10 MHz: ±(marker freq × freq ref error + counter resolution + 100 Hz)

Span >10 MHz: ±(marker freq × freq ref error + counter resolution + 1 kHz)

Counter resolution: Span ≤ 10 MHz, selectable from 10 Hz to 100 kHz; span > 10 MHz, selectable from 100 Hz to 100 kHz

Frequency Span

Range

HP 8590D: 0 Hz (zero span), 10 kHz to 1.8 GHz

HP 8592D: 0 Hz, [50 × N] kHz to 19.25 GHz

Resolution: Four digits

Accuracy: ±3% of span

Sweep Time

Range: 20 ms to 100 s

Accuracy: ±3%

Sweep trigger: Free run, single, line, video, external

Resolution Bandwidth (characteristic): 1 kHz to 3 MHz (3 dB) in 1, 3, 10 sequence ±20% accuracy; 9 kHz and 120 kHz (6 dB) EMI bandwidths

Video Bandwidth Range: 30 Hz to 1 MHz in 1, 3, 10 sequence

Stability

Noise sidebands (1 kHz RBW, 30 Hz VBW and sample detector): ≤ −95 dBc/Hz + 20 log N at > 30 kHz offset from CW signal

System-related sidebands: ≤ −65 dBc + 20 log N at > 30 kHz offset from CW signal

Comb Generator Frequency (HP 8592D): 100 MHz fundamental freq

Accuracy: ±0.007%

Amplitude

Amplitude Range

HP 8590D, 8592D: Displayed average noise level to +30 dBm

HP 8590D Opt 001: Displayed average noise level to +75 dBmV

Maximum Safe Input Level (input attenuator ≥ 10 dB)

Average Continuous Power

HP 8590D, 8592D: +30 dBm (1 W)

HP 8590D Opt 001: +75 dBmV (0.4 W)

Peak Pulse Power

HP 8590D: +30 dBm (1 W); +75 dBmV (0.4 W) (Opt 001)

HP 8592D: +50 dBm (100 W) for < 10 μs pulse width and < 1% duty cycle, input atten ≥ 30 dB

dc

HP 8590D: 25 Vdc; 100 Vdc (Opt 001)

HP 8592D: 0 Vdc

Gain Compression (> 10 MHz): ≤ 0.5 dB (total power at input mixer= −10 dBm)

Displayed Average Noise Level (input terminated, 0 dB atten, 1 kHz RBW, 30 Hz VBW)

HP 8590D: ≤ −115 to ≤ −113 dBm; ≤ −63 to ≤ −61 dBmV (Opt 001)

HP 8592D: ≤ −112 to ≤ −92 dBm; ≤ −112 to ≤ −87 dBm (Opt 026)

Spurious Responses

Second harmonic distortion (> 5 MHz)

HP 8590D: < −70 dBc for −45 dBm tone at input mixer

HP 8592D

10 MHz to 2.9 GHz: < −70 dBc for −40 dBm tone at input mixer

>2.75 GHz: < −100 dBc for −10 dBm tone at input mixer (or below DANL)

Third-order intermodulation

HP 8590D

Distortion >5 MHz: < −70 dBc for two −30 dBm tones at input mixer and > 50 kHz separation

Other input-related: < −65 dBc at ≥ 30 kHz offset, for −20 dBm tone at input mixer

HP 8592D

Distortion >10 MHz: < −70 dBc for two −30 dBm tones at input mixer and > 50 kHz separation

Other input-related: < −65 dBc at ≥ 30 kHz offset, for −20 dBm tone at input mixer, ≤ 18 GHz; < −60 dBc for −20 dBm tone at input mixer, ≤ 22 GHz

Display Range

Log scale: 0 to −70 dB from ref level is calibrated; 0.1, 0.2, 0.5 dB/div and 1 to 20 dB/div in 1 dB steps; 8 div displayed

Linear scale: 8 divisions

Scale units: dBm, dBmV, dBμV, V, W

Marker readout resolution: 0.05 dB for log scale; 0.5% of reference level for linear

Reference Level

Range: Same as amplitude range

Resolution: 0.01 dB for log scale; 0.12% of ref level for linear

Accuracy: ±0.3 dB @ −20 dBm

0 dBm to −59.9 dBm: ±(0.3 dB + 0.01 × dB from −20 dBm)

Frequency Response (10 dB input attenuation)

Absolute (referenced to 300 MHz CAL OUT)

HP 8590D: ±1.5 dB

HP 8592D (preselector peaked in band > 0): ±1.5 to ±5.0 dB

Relative: ±1.0 dB, referred to midpoint between highest and lowest frequency response deviations

HP 8590D: ±1.0 dB

HP 8592D (preselector peaked in band > 0): ±1.0 to ±2.0 dB

Calibrator Output Amplitude: −20 dBm ±0.4 dB

HP 8590D Opt 001: +28.75 dBmV ±0.4 dB

Resolution Bandwidth Switching Uncertainty (ref to 3 kHz RBW, at ref level): ±0.4 dB for 3 kHz to 3 MHz RBW; ±0.5 dB for 1 kHz

Log to Linear Switching: ±0.25 dB at ref level

Display Scale Fidelity

Log incremental accuracy: ±0.4 dB/4 dB, 0 to −60 dB from ref level

Log maximum cumulative: ±(0.4 dB + 0.01 × dB from ref level), 0 to −70 dB from ref level

Linear accuracy: ±3% of ref level

General

Same as for HP 8590 E-Series.