

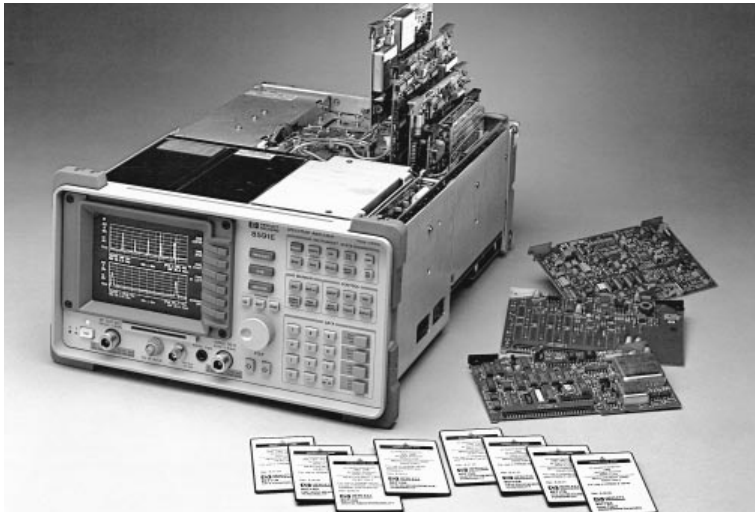
SIGNAL ANALYZERS

Spectrum Analyzers, Portable

HP 8590 E/L 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



HP 8591E with measurement personality and circuit card options



HP 8590 Series Spectrum Analyzers

The HP 8590 E series and 8590 L 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. 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 cable TV, EMC, digital cellular radio, RF communication, noise-figure, and scalar network analysis measurements (see page 231). 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 cardage, 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/parallel or the RS-232/parallel interface option. Both Hewlett-Packard and selected Epson printers are supported.
97-24.8-MID

PC Software Utility for HP 8590 Series

With the new Screen Capture PC software utility you can "capture" your measurement results and transfer analyzer screen images or trace data over HP-IB or RS-232 interfaces to a personal computer.

Screen Capture for HP Analyzers can be obtained free from the World Wide Web at <http://www.tmo.hp.com/>.

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 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 cardage, 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 receiver/video tester
- Quasi-peak detector
- Noise-figure measurements
- Demodulators for CT2-CAI and DECT
- Digital demodulators for GSM900, DCS-1800, NADC-TDMA, PHS, CDMA and PDC wireless communication formats

A built-in 1.8 GHz tracking generator (retrofitable) is available for the HP 8591E, and a 2.9 GHz tracking generator (retrofitable) for the HP 8593E, 8594E, 8595E, and 8596E. The HP 85902A burst carrier trigger provides a TTL timing reference for digital wireless communication measurements. See page 248.

HP 8590L and 8592L Spectrum Analyzers

These models offer general-purpose RF and microwave measurement performance with frequency accuracy at a low cost. The HP 8590L has a frequency range of 9 kHz to 1.8 GHz, amplitude range of -115 to $+30$ dBm. The HP 8592L extends the frequency range to 22/26.5 GHz.

- One button measurement solutions
- Save time, money and training
- Customized for your application
- Easy to use

Measurement Personalities

Measurement personalities are software programs provided on ROM-based memory cards. They customize your HP 8590 analyzer to perform complex tests simply and quickly with the push of a button from easy-to-follow screen menus. The personalities automatically set the analyzer controls and perform calculations required by application standards, improving accuracy and repeatability.

Cable TV and Broadcast

(See page 507 for more information.)

HP 85721A Cable TV Measurements and System Monitor Personality

The HP 85721A measurement personality customizes the HP 8591C and 8590 E-series analyzers for easy, noninterfering proof-of-performance measurements on NTSC-, PAL-, or SECAM-format signals. This software adds dedicated cable TV test functions and measurements for channel and system operation. Three video measurements as well as differential gain and phase and chrominance-to-luminance delay inequality can be performed if the spectrum analyzer has Option 107 TV receiver/video tester.

HP 85724A Broadcast Measurement Personality

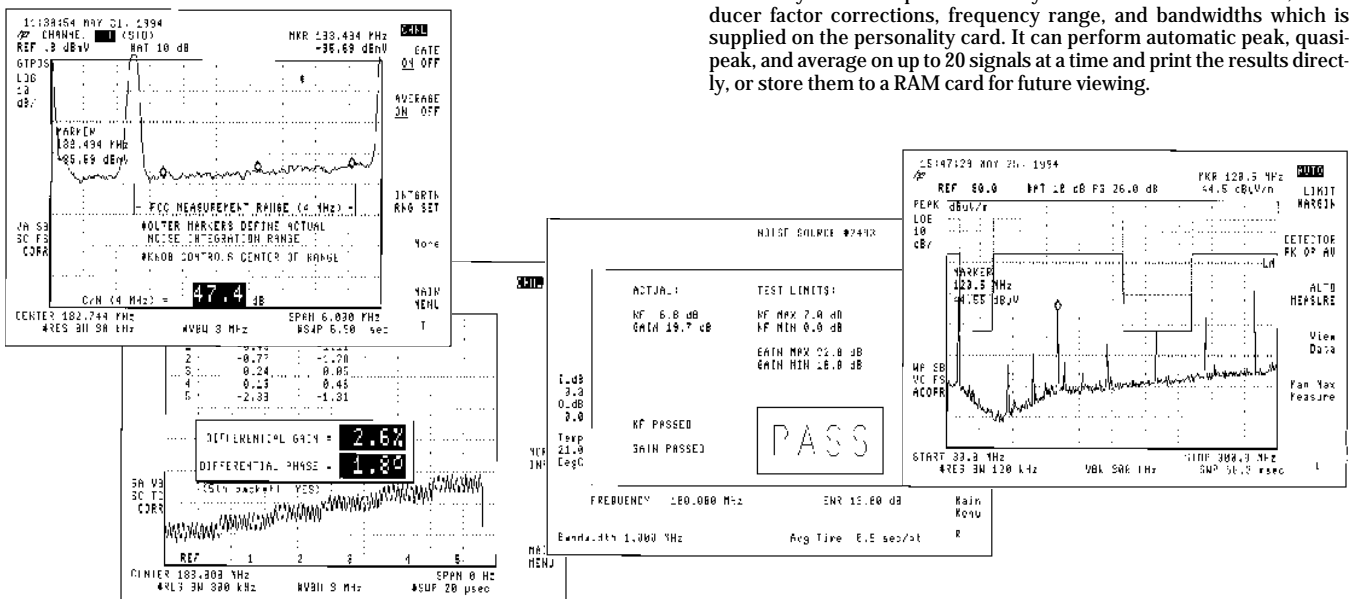
The HP 85724A adds measurements for testing TV broadcast transmitters and relays. It allows selection of PAL-I/B/G, NTSC-M, and SECAM-D/K systems; channel bands CCIR VHF, UHF, S, M & B, FCC-AIR, and PRC; and channel number. Tests include carrier level, chroma level, vision, three-tone intermodulation, depth of modulation, spurious signals, NICAM carrier power and intermodulation, and FE deviation. Three video measurements as well as differential gain and phase, and chrominance-to-luminance delay inequality can be performed if the spectrum analyzer has Option 107 TV receiver/video tester.

Lightwave

(See page 426 for more information.)

HP 11982A Option 001 Lightwave Converter Personality

The HP 11982A Option 001 personality provides frequency response correction and amplitude conversion of the optical marker for lightwave signals when used with the HP 11982A amplified lightwave converter and an HP 8590 series analyzer.



Easy-to-install measurement personalities

Component Test

(See page 241 for more information.)

HP 85714A Scalar Measurement Personality

An HP 85714A measurement personality and HP 8590 series analyzer with optional built-in tracking generator make fast, accurate scalar transmission measurements from 100 kHz to 2.9 GHz. Features include guided calibration, pass/fail limit line testing, 120 dB display, bandwidth, Q factor, and shape factor. The HP 85630A scalar test set adds simultaneous transmission/reflection display.

HP 85719A Noise Figure Measurement Personality

The HP 85719A noise figure measurement personality customizes an HP 8590 Option 119 E-series spectrum analyzer for displayed swept noise figure and gain measurements from 10 MHz to 2.9 GHz.

Electromagnetic Compatibility

(See page 326 for more information.)

HP 85712D EMC Auto-Measurement Personality

The HP 85712D simplifies precompliance EMI measurements. The spectrum analyzer is set up automatically with the correct limit lines, transducer factor corrections, frequency range, and bandwidths which is supplied on the personality card. It can perform automatic peak, quasi-peak, and average on up to 20 signals at a time and print the results directly, or store them to a RAM card for future viewing.

SIGNAL ANALYZERS

Measurement Personalities (cont'd)

HP 8590 Series



Wide selection of measurement personalities

4

Wireless Communications

(See page 472 for more information.)

HP 85715B GSM Measurement Personality

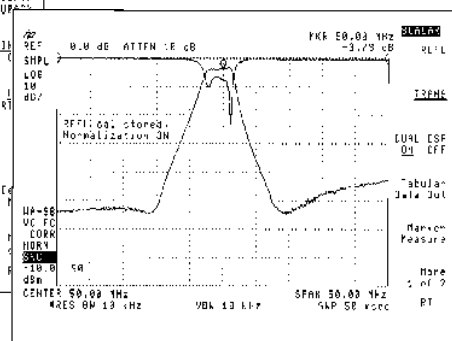
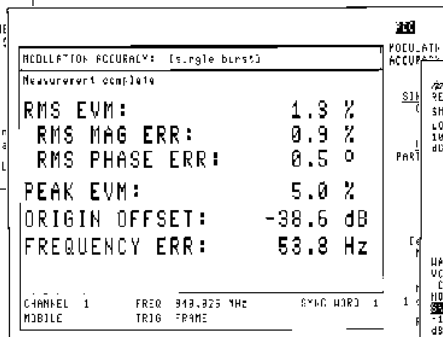
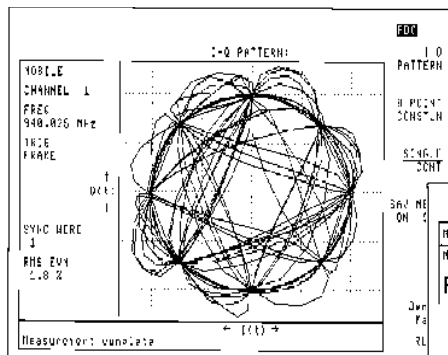
The HP 85715B provides all the GSM900 transmitter tests specified in the GSM 11.10 (mobile) and GSM 11.20 (base) recommendations. Measurements include those for power, frequency, timing, and modulation accuracy. GSM Phase II specification limits are used and the extended GSM (E-GSM) frequency bands are supported.

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 85718B NADC-TDMA Measurement Personality

Based on EIA/TIA IS-54-B, -55-A, and -56-A standards, the HP 85718B simplifies testing of time-division multiple access (TDMA) transmitters for North American Dual-mode Cellular (NADC) radio systems. The personality provides nine power, frequency, and timing tests as well as seven modulation accuracy tests.



HP 85720C PDC Measurement Personality

The HP 85720C provides transmitter measurements for Personal Digital Cellular (PDC) time-division multiple access radio systems. Tests are based on the RCR STD-27C standard. There are 11 power, frequency, and timing tests as well as six modulation accuracy tests.

HP 85722B DCS1800 Measurement Personality

The HP 85722B provides all the DCS1800 transmitter tests specified in the GSM 11.10 (mobile) and GSM 11.20 (base) recommendations. Measurements include those for power, frequency, timing, and modulation accuracy. Phase II specification limits are used. GSM-based PCS measurements at 1900 MHz may be made using the HP 85722B special Option H19.

HP 85723A Option H01 DECT Measurement Personality

The HP 85723A Option H01 adds the key DECT transmitter measurements to the HP 8590 E-series analyzers. With the measurement personality, DECT power, frequency, timing, and modulation accuracy tests can be made. An optional DECT source built-in to the analyzer can be used as a stimulus for module testing or sensitivity measurements.

HP 85725B CDMA Measurement Personality

Simplify your measurements of cellular, PCS, and other spread spectrum transmitters based on EIA/TIA IS-95, -97, and -98 with the HP 85725B. Frequency- and time-domain measurements are provided. The new B version of this personality adds out-of-band transmitter spurious measurements and a high-speed measurement capability. To achieve the high measurement speed the analyzer requires the optional digital signal processing (DSP) hardware and firmware options. The HP 85725B is designed with a great amount of flexibility, including on-screen help messages, enabling measurements to be easily configured to meet your special needs.

HP 85726B PHS Measurement Personality

Measure Personal Handy Phone System (PHS) personal and cell station transmitters operate easily, quickly, and reliably. The HP 85726B PHS personality provides tests based on RCR STD-28. Measurements included are antenna power, adjacent channel power, burst ramp-up and ramp-down power versus time, carrier-off time leakage power, spurious emission, occupied bandwidth, and modulation accuracy (EVM).

Digital Radio Measurements

(See page 459 for more information.)

HP 85713A Digital Radio Measurement Personality

The HP 85713A 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. For additional digital radio tests, see the HP 11758V digital radio test system.

HP 11770A Link Measurement Personality

The HP 11770A enables group delay and amplitude flatness measurements on systems that carry digital data, such as microwave radio systems, coax cable, and satellite links. Capability includes end-to-end link, DADE, and IF return loss measurements.



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 (Option 026)	19.1 to 26.5 GHz

Frequency Reference

Aging: $\pm 2 \times 10^{-6}$ /year; $\pm 1 \times 10^{-7}$ /year (Option 004)
Temperature stability: $\pm 5 \times 10^{-6}$; $\pm 1 \times 10^{-8}$ (Option 004)
Initial achievable accuracy: $\pm 0.5 \times 10^{-6}$; $\pm 2.2 \times 10^{-8}$ (Option 004)

Frequency Readout Accuracy (start, stop, center, marker): \pm (freq. readout x freq. ref error + span accuracy + 1% of span + 20% of RBW + 100 Hz x N)

Marker Count Accuracy

Span ≤ 10 MHz x N: \pm (marker freq. x freq. ref error + counter res + 100 Hz x N)
Span > 10 MHz x n: \pm (marker freq. x freq. ref error + counter res + 1 kHz x N)

Counter Resolution

Span ≤ 10 MHz x N: Selectable from 10 Hz to 100 kHz
Span > 10 MHz x 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 (Option 130)
HP 8594E: 10 kHz to 2.9 GHz; 1 kHz min (Option 130)
HP 8595E: 10 kHz to 6.5 GHz; 1 kHz min (Option 130)
HP 8596E: [10 x N] kHz to 12.8 GHz; [1 x N] kHz min (Option 130)
HP 8593E: [10 x N] kHz to 19.25 GHz; [1 x N] kHz min (Option 130)

Resolution: Four digits or 20 Hz x N, whichever is greater

Accuracy

Span ≤ 10 MHz x N: $\pm 2\%$ of span
Span > 10 MHz x N: $\pm 3\%$ of span

Sweep Time

Range
Span = 0 Hz or > 10 kHz: 20 ms to 100 s
Span = 0 Hz (Option 101): 20 μ s to 100 s

Accuracy

20 ms to 100 s: $\pm 3\%$
20 μ s to < 20 ms (Opt 101): $\pm 2\%$

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: $\pm 20\%$

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 Option 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: $\leq (250 \times N)$ Hz p-p in 100 ms

30 Hz RBW, 30 Hz VBW: $\leq (30 \times N)$ 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; $\pm 0.007\%$ frequency accuracy

Amplitude

Amplitude Range: Displayed average noise level to +30 dBm

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

Maximum Safe Input (input attenuator ≥ 10 dB)

Average Continuous Power: +30 dBm (1 W)

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

Peak Pulse Power

HP 8591E: ± 30 dBm (1 W)

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

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

DC

HP 8591E: 25 Vdc

HP 8591E Option 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 Option 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 Option 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 Option 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 ones 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 Option 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, dB μ V, V, W

Marker Readout Resolution

- Log Scale: 0.05 dB
- Linear Scale: 0.05% of ref level
- Fast Time Sweep for Zero Span (Option 101 or 301, 20 μ s 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; $\pm 0.12\%$ of ref level for linear scale
- Accuracy: ± 0.3 dB at -20 dBm
 - 0 to -59.9 dBm: $\pm(0.3 \text{ dB} + 0.01 \times \text{dB from } -20 \text{ dBm})$

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 Option 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: $\pm(0.3 + 0.01 \times \text{dB from ref level})$
 - 30 to 300 Hz RBW: $\pm(0.4 + 0.01 \times \text{dB from ref level})$
- Linear Accuracy: $\pm 3\%$ of ref level

General Specifications

MIL-T-28800: Has been type-tested to the environmental specifications of MIL-T-28800 Class 5

Temperature

- Operating: 0° to +55° C
- Storage: -40° to +75° C

EMI Compatibility: Conducted and radiated interference CISPR Pub. 11 and Messempfaenger Postverfuegung 526/527/779

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): 238 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 x 163 mm H x 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

Option 010 (50 Ω) is available for all HP 8590 series spectrum analyzers except the HP 8592L. Option 011 (75 Ω) is available for the HP 8590L and 8591E only.

Frequency Range

- Option 010:** 100 kHz to 1.8 GHz (HP 8590L, 8591E); 9 kHz to 2.9 GHz (HP 8593E, 8594E, 8595E, 8596E)
- Option 011:** 1 MHz to 1.8 GHz (HP 8590L, 8591E)

Output Level

- Range**
 - Option 010:** 0 to -15 dBm (HP 8590L); 0 to -70 dBm (HP 8591E); -1 to -66 dBm (HP 8593E, 8594E, 8595E, 8596E)
 - Option 011:** +42.8 to +27.8 dBmV (HP 8590L); +42.8 to -27.2 dBmV (HP 8591E)
- Resolution:** 0.1 dB
- Absolute Accuracy:** ± 1.5 dB (HP 8590L); ± 1.0 dB (HP 8591E); ± 0.75 dB (HP 8593E, 8594E, 8595E, 8596E)

Vernier

- Range:** 15 dB (HP 8590L); 10 dB (HP 8591E); 8 dB (HP 8593E, 8594E, 8595E, 8596E)
- Accuracy:** ± 1.0 dB (HP 8590L); ± 0.25 dB (HP 8591E); ± 0.8 dB (HP 8593E, 8594E, 8595E, 8596E)

Output Flatness: ± 1.75 dB (HP 8590L, 8591E); ± 2.0 dB, >10 MHz (HP 8593E, 8594E, 8595E, 8596E)

Spurious Output

- Harmonic Spurs:** 0 dBm + 42.8 dBmV output, < -20 dBc (HP 8590L); < -25 dBc (HP 8591E); -1 dBm output, < -25 dBc (HP 8593E, 8594E, 8595E, 8596E)
- Nonharmonic Spurs:** < -30 dBc

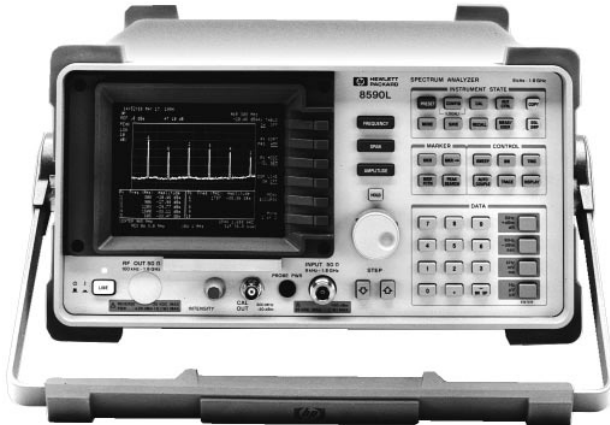
Dynamic Range (characteristic; max. output level -TG feedthrough)

- Option 010:** 106 dB (HP 8590L, 8591E); 108 dB (HP 8594E, >400 kHz); 111 dB (HP 8595E, 8596E, >400 kHz); 113 dB (HP 8593E, >400 kHz)
- Option 011:** 100 dB

Power Sweep

- Range**
 - Option 010:** -15 dBm to 0 dBm (HP 8590L); -75 dBm to 0 dBm (HP 8591E); -66 dBm to -1 dBm in 8 dB increments (HP 8593E, 8594E, 8595E, 8596E)
 - Option 011:** -27.8 dBmV to +42.8 dBmV (HP 8590L); -32.2 to +42.8 dBmV (HP 8591E)
- Resolution:** 0.1 dB

- Low-cost general purpose spectrum analysis with frequency accuracy



HP 8590L and 8592L Specifications

(Specifications apply to either analyzer unless otherwise noted.)

Frequency

Frequency Range

HP 8590L		
50 Ω:		9 kHz to 1.8 GHz
75 Ω (Option 001):		1 MHz to 1.8 GHz
HP 8592L:		
HP 8592L (Option 026/027):		9 kHz to 22 GHz
HP 8592L (Option 026/027):		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 (Option 026/027)	19.1 to 26.5 GHz

Frequency Reference

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):
 \pm (freq. readout x freq. ref. error + span accuracy + 1% of span + 20% of RBW + 100 Hz x N)

Marker Count Accuracy

Span ≤ 10 MHz x N: \pm (marker freq. x freq. ref. error + counter resolution + 100 Hz x N)

Span > 10 MHz x N: \pm (marker freq. x freq. ref. error + counter resolution + 1 kHz x N)

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

Frequency Span

Range

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

HP 8592L: 0 Hz, [50 kHz x N] to 19.25 GHz

Resolution: Four digits

Accuracy:

HP 8590L: $\pm 3\%$ of span

HP 8592L: Span ≤ 10 MHz x N! $\pm 5\%$ of span

Span > 10 MHz x N! $\pm 3\%$ of span

Sweep Time

Range: 20 ms to 100 s

Accuracy: $\pm 3\%$

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

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

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

Stability (same as for HP 8590E series)

Noise Sidebands (1 kHz RBW, 30 Hz VBW and sample detector):
 ≤ -105 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 8592L): 100 MHz fundamental frequency

Accuracy: $\pm 0.007\%$

Amplitude

Amplitude Range

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

HP 8590L Option 001: Displayed average noise level to +75 dBmV

Maximum Safe Input Level (input attenuator ≥ 10 dB)

Average Continuous Power

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

HP 8590L Option 001: +75 dBmV (0.4 W)

Peak Pulse Power

HP 8590L: +30 dBm (1 W); +75 dBmV (0.4 W) (Option 001)

HP 8592L: +50 dBm (100 W) for < 10 μ s pulse width and $< 1\%$ duty cycle, input atten. ≥ 30 dB

DC

HP 8590L: 25 Vdc; 100 Vdc (Option 001)

HP 8592L: 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, sample detector)

HP 8590L: ≤ -115 to ≤ -113 dBm; ≤ -63 to ≤ -61 dBmV (Option 001)

HP 8592L: ≤ -112 to ≤ -92 dBm; ≤ -112 to ≤ -87 dBm (Option 026)

Spurious Responses

Second Harmonic Distortion

HP 8590L: (> 5 MHz) < -70 dBc for -45 dBm tone at input mixer

HP 8592L

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 Distortion

HP 8590L

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 8592L

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, dB μ V, V, W

Marker Readout Resolution: 0.05 dB for log scale; 0.05% 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: $\pm(0.3$ dB + $0.01 \times$ dB from -20 dBm)

Frequency Response (10 dB input attenuation)

Absolute (referenced to 300 MHz CAL OUT)

HP 8590L: ± 1.5 dB

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

Relative: Referred to midpoint between highest and lowest frequency response deviations

HP 8590L: ± 1.0 dB

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

Calibrator Output Amplitude:

-20 dBm ± 0.4 dB

HP 8590L Option 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: $\pm(0.4$ dB + $0.01 \times$ dB from ref. level), 0 to -70 dB from ref. level

Linear Accuracy: $\pm 3\%$ of ref. level

General

Same as for HP 8590 E-series

Built-in tracking generator (see page 234)

Ordering Information

HP 8590L Spectrum Analyzer (9 kHz to 1.8 GHz)

HP 8592L Spectrum Analyzer (9 kHz to 22 GHz)

Options¹

- Opt 001** 75 Ω Input (HP 8590L only)
- Opt 003** Memory Card Reader
- Opt 010** Tracking Generator (100 kHz to 1.8 GHz, HP 8590L only)
- Opt 011** Tracking Generator (75 Ω, HP 8590L only)
- Opt 015** Soft Tan Carrying/Operating Case
- Opt 016** Soft Yellow Carrying/Operating Case
- Opt 041** HP-IB and Parallel Printer Interfaces
- Opt 043** RS-232 and Parallel Printer Interfaces
- Opt 026** 26.5 GHz Frequency Extension, APC Connector (HP 8592L only)
- Opt 027** 26.5 GHz Frequency Extension, Type-N Connector (HP 8592L only)
- Opt 040** Front Panel Protective Cover With Storage
- Opt 042** Protective Soft Carrying Case/Backpack
- Opt 711** 50/75 Ω Matching Pad/100 Vdc Block
- Opt 0Q8** Factory Service Training
- Opt UK6** Commercial Calibration Certificate with Test Data
- Opt ABX** Quick Reference Guide in Local Languages
- Opt 908** Rackmount Without Handles
- Opt 909** Rackmount 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

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)

Options¹

- 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 (9 kHz to 2.9 GHz)
- Opt 011** Tracking Generator (75 Ω, HP 8591E only)
- Opt 012** Source for DECT Receiver Test
- Opt 015** Soft Tan Carrying/Operating Case
- Opt 016** Soft Yellow Carrying/Operating Case
- 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 041** HP-IB and Parallel Printer Interfaces
- Opt 042** Protective Soft Carrying Case/Backpack
- Opt 043** RS-232 and Parallel Printer Interfaces
- Opt 050** Improved Amplitude Accuracy (NADC-TDMA bands)
- Opt 051** Improved Amplitude Accuracy for PDC Bands
- Opt 052** Improved Amplitude Accuracy for PHS Band
- Opt 053** Improved Amplitude Accuracy for CDMA Bands
- Opt 101** Fast Time-Domain Sweeps and Analog + Display
- Opt 102** AM/FM Demodulator and TV Sync Trigger (TV Sync requires Option 101)
- Opt 103** Quasi-Peak Detector, AM/FM Demodulator
- Opt 105** Time-Gated Spectrum Analysis
- Opt 107** TV Receiver Video Tester
- Opt 110** CT2 Demodulator

Ordering Information

Opt 111 Group Delay and Amplitude Flatness

(HP 8593/4/5/6E 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 DSP, FAST ADC, and Digital Demodulator

Opt 160 PDC, PHS, NADC, and CDMA Firmware for Option 151

Opt 163 GSM900/DCS1800 Firmware for Option 151

Opt 180 TV Picture NTSC/PAL/SECAM

Opt 301 TV Sync Trigger, Fast Time-Domain Sweeps, AM/FM Demodulator, Analog + Display

Opt 711 50/75 Ω Matching Pad/100 Vdc Block

Opt 0Q8 Factory Service Training

Opt UK6 Commercial Calibration Certificate with Test Data

Opt ABX Quick Reference Guide in Local Languages

Opt W30 Two Additional Years Return-to-HP Service

Opt W32 Two Additional Years Return-to-HP Calibration

Application Measurement Cards/Personalities^{2,3}

HP 11770A Link Measurement Personality

HP 85700A Blank 32-KB Memory Card

HP 85702A Blank 128-KB Memory Card

HP 85704A Blank 256-KB Memory Card

HP 85705A Blank 512-KB Memory Card

HP 85712D EMC Measurement Personality

HP 85713A Digital Radio Measurement Personality

HP 85714A Scalar Measurement Personality

HP 85715B GSM900 Measurement Personality

HP 85717A CT2-CAI Measurement Personality

HP 85718B NADC-TDMA Measurement Personality

HP 85719A Noise Figure Measurement Personality

HP 85720C PDC Measurement Personality

HP 85721A Cable TV Measurement Personality

HP 85722B DCS1800 Measurement Personality

HP 85723A DECT Measurement Personality

HP 85724A Broadcast Measurement Personality

HP 85725B CDMA Measurement Personality

HP 85726B PHS Measurement Personality

Printers

HP C2655A HP DeskJet 340 Printer (Parallel Interface)

HP C4549A HP DeskJet 680C Printer (Parallel Interface)

HP C1405B Keyboard (requires C1405-60015 Adapter)

HP 10833A HP-IB Cable (1 m)

HP 24542U RS-232 Cable 3 Meter (9 Pin F to 9 Pin F)

Option 043 Only (for RS-232 9 Pin PC Connection to Analyzer)

HP 24542G RS-232 Cable 3 Meter (25 Pin M to 9 Pin F)

Option 043 Only (for RS-232 25 Pin PC or Printer

Connection to Analyzer)

HP C2932A RS-232 Cable 3 Meter (9 Pin M to 9 Pin F)

Option 043 Only (for Serial 9 Pin LaserJet 4P/4Plus

Connection to Analyzer)

HP C2950A HP IEEE-1284 A-B Parallel Cable (2m)

HP ITEL-45CHVUB HP-IB/Parallel Converter (U.S./Canada)

HP ITEL-45CHVEB HP-IB/Parallel Converter

(International) (requires HP F1011A ac adapter)

Key Literature

HP 8590 Series Configuration Guide, p/n 5963-6858E

HP 8590 E-Series Data Sheet, p/n 5963-6909E

HP 8590 L-Series Product Overview, p/n 5962-7575E

HP 8590 Series Brochure, p/n 5963-6908E

¹Most options can be retrofitted. Please contact your local HP sales representative.

²Some measurement personalities are not supported by all HP 8590 series models.

For complete information, please contact your local HP sales representative.

³HP 8590L series requires Option 003 memory card reader.