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SIGNAL ANALYZERS

Spectrum Analyzers, Performance Portable

HP 8591A, 8593A, 8594A, 8595A



HP 8594A



HP 8595A

HP 8594A and 8595A Spectrum Analyzers

These new models offer expanded frequency ranges with the same frequency accuracy and variety of options associated with the HP 8591A. The HP 8594A has a frequency range of 9 kHz to 2.9 GHz and an amplitude range of −112 to +30 dBm. The HP 8595A has a frequency range of 9 kHz to 6.5 GHz with an amplitude range of −114 to +30 dBm. (For general export, both analyzers offer option 1BH, which does not display spans wider than 2.3 GHz.) Both instruments have an optional 2.9 GHz built-in tracking generator. In addition, each comes standard with a memory-card reader that enables you to load HP's custom measurement personalities, your own programs, or measurement data into the spectrum analyzer using 32-Kbyte memory cards.

HP 8591A and 8593A Spectrum Analyzers

These portable spectrum analyzers offer frequency accuracy and a wide range of options for applications that demand higher performance. The HP 8591A has a frequency range of 9 kHz to 1.8 GHz and amplitude range of −115 to +30 dBm. The HP 8593A has a frequency range of 9 kHz to 22 GHz or 26.5 GHz with option 026, an internal preselector, and an amplitude range of −114 to +30 dBm. (For general export, the HP 8593A option 1BH does not tune above 18 GHz nor span greater than 2.3 GHz.) Both instruments have standard 7.5 ppm frequency accuracy that can be improved with an optional precision frequency reference to marker count accuracy of ±230 Hz at 1 GHz or ±2.3 kHz at 18 GHz.

Standard Features

These performance analyzers share the same ease-of-use features found in the lower-cost HP 8590B and 8592B. (See page 174.) In addition, each performance portable comes with a built-in memory card reader that enables you to load HP's custom measurement personalities (see page 173) and measurement data into the spectrum analyzer using 32-Kbyte memory cards. A catalog function allows you to determine the exact content of information stored on your memory cards or within internal memory.

Option Flexibility

For easy installation of a growing variety of options, a cardcage for circuit cards has been designed in each performance portable spectrum analyzer. All card options are retrofittable, so the options you need are always available. Circuit-card options include:

- AM/FM demodulator speaker to let you view and hear the signal.
- TV sync trigger to let you select any line of the TV field for measurement.
- Fast time-domain sweep to allow zero-span sweep rates to 20 μs.
- Quasi-peak detector for EMC measurements.

HP 8591A Specifications

General

Temperature: 0° to +55° C operating; −40° to +75° C storage
EMI compatibility: CISPR Pub. 11 and FTZ 526/527/79
Audible noise: <37.5 dBA pressure and <5.0 Bels power (ISODP7779)
Power requirements: 86 to 127 or 195 to 250 Vrms, 47 to 66 Hz. 103 to 126 Vrms, 400 Hz ±10%
Power consumption: <300 VA; <100 watts

Frequency

Range: 9 kHz to 1.8 GHz (50 Ω); 1 MHz to 1.8 GHz (75 Ω, opt. 001)
Reference
Aging: $\pm 2 \times 10^{-6}$ /year
Settability: $\pm 0.5 \times 10^{-6}$
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

Frequency readout accuracy (start, stop, center, frequency)
Span ≤10 MHz: ±(freq readout x freq ref error + 3% of span + 20% of RBW + 100 Hz)
Span ≥10 MHz: ±(freq readout x freq ref error + 3% of span + 20% of RBW)
Marker count accuracy (signal to noise ratio ≥25 dB, RBW/span ≥0.01)
Frequency span ≤10 MHz: ±(marker freq x freq ref error + counter res + 100 Hz)
Frequency span >10 MHz: ±(marker freq x freq ref error + counter res + 1 kHz)
Counter resolution: selectable from 10 Hz to 100 kHz
Frequency span
Range: 0 Hz (zero span), 10 kHz to 1.8 GHz
Accuracy: ±2% of span, span ≤10 MHz; ±3% of span, span >10 MHz
Sweep time
Range: 20 ms to 100 s, span = 0 Hz or >10 kHz; 20 μs to 100 s, span = 0 Hz (option 101)
Accuracy: ±3%, 20 ms to 100 s; ±2% 20 μs to <20 ms (opt 101)
Sweep trigger: free run, single, line, video, external
Stability
Noise sidebands: ≤90 dBc/Hz at >10 kHz offset from CW signal (1 kHz RBW, 30 Hz VBW, sample detector); ≤100 dBc/Hz at >30 kHz offset from CW signal (1 kHz RBW, 30 Hz VBW, sample detector)
Residual FM: <250 Hz p-p in 100 ms (1 kHz RBW, 1 kHz VBW)
System-related sidebands: <−65 dBc at >30 kHz offset from CW

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HP 8591A Specifications (continued)

Amplitude

Amplitude range: −115 to +30 dBm (50 ohm); −63 to +75 dBmV (75 ohm, opt 001)

Maximum safe input	**50 ohm**	**75 ohm**
Average cont power	+30 dBm (1 watt)	+75 dBmV (0.4 watts)
Peak pulse power	+30 dBm (1 watt)	+75 dBmV (0.4 watts)
dc	25 Vdc	100 Vdc

Gain compression, >10 MHz: ≤0.5 dB, total power at input mixer = −10 dBm
Displayed average noise level: ≤115 to ≤113 dBm
Noise level
Spurious responses
Second harmonic distortion: 5 MHz to 1.8 GHz, <−70 dBc for −45 dBm tone at input mixer
Third-order intermodulation distortion: 5 MHz to 1.8 GHz, <−70 dBc for two −30 dBm tones at input mixer and >50 kHz sep
Other input-related spurious: <−65 dBc for ≥30 kHz offset from CW signal
Residual responses (input terminated and 0 dB attenuation)
150 kHz to 1 MHz: <−90 dBm, 50 ohm
1 MHz to 1.8 GHz: <−90 dBm, 50 ohm; <−38 dBmV, 75 ohm
Display range
Log scale: 0 to −70 dB from ref lev is cal'd; 1 to 20 dB/div in 1 dB steps; 8 divisions displayed
Linear scale: 8 divisions
Scale units: dBm, dBmV, dBmicroV, volts, watts
Marker readout resolution: 0.05 dB, log scale; 0.07% of ref level, linear scale
Fast sweep times for zero span (opt 101): 20 μs to 20 ms, 0.7% of ref level for linear scale
Reference level
Range: −115 to +30 dBm (50 ohm), −63 to +75 dBmV (75 ohm)
Resolution: 0.01 dB for log scale; 0.12 % of ref level for linear scale
Accuracy, referred to −20 dBm ref level: 0 dBm to −59.9 dBm, ±(0.5 dB + input atten acc @ 50 MHz); −60 dBm to −115 dBm, ±(1.25 dB + input atten acc @ 50 MHz)
Frequency response
Absolute: ±1.5 dB, referred to 300 MHz CAL OUT
Relative flatness: ±1.0 dB, referred to midpoint between highest and lowest response deviations
Calibrator output
Frequency: 300 MHz ±(300 MHz x freq ref error)
Amplitude: −20 dBm ±0.4 dB (50 Ω); +28.75 dBmV ±0.4 dB (75 Ω, opt 001)
Input attenuator
Range: 0 to 60 dB in 10 dB steps
Accuracy at 50 MHz, 10 dB atten: ±0.5 dB, 0 to 50 dB; ±0.75 dB, 60 dB
Resolution Bandwidth: 1 kHz to 3 MHz, ±20%
Switching uncertainty, ref to 3 kHz bandwidth: 3 kHz to 3 MHz RBW, ±0.4 dB; 1 kHz, ±0.5 dB
Video bandwidth range: 30 Hz to 1 MHz
Log to linear switching: ±0.25 dB at reference level
Display scale fidelity
Log incremental accuracy: ±0.2 dB/2 dB, 0 to −70 dB from ref lev
Log maximum cumulative: ±0.75 dB, 0 to −60 dB from ref level; ±1.0 dB, 0 to −70 dB from ref level
Linear accuracy: ±3% of reference level

HP 8593A Specifications

Frequency

Frequency range: 9 kHz to 22 GHz; 9 kHz to 26.5 GHz (option 026)
Frequency reference
Aging: ±2 x 10^{-8} /year
Settability: ±5 x 10^{-7}
Temperature stability: ±5 x 10^{-8}
Precision frequency reference (Opt 004)
Aging: ±1 x 10^{-9} /year
Settability: ±1 x 10^{-8}
Temperature stability: ±1 x 10^{-8}
Frequency readout accuracy: ±(frequency readout x frequency reference error + 3% of span + 20% of RBW + 100 Hz sweep time) for spans ≤10 MHz; ±(freq readout x freq ref error + 3% of span + 20% of RBW) for spans >10 MHz
Marker count accuracy (signal-to-noise ratio ≥25 dB, RBW/span ≥0.01: ±(marker freq x freq ref error + counter res + 100 Hz) spans ≤10 MHz; ±(marker freq x freq ref error + counter res + 1 kHz), spans >10 MHz
Counter resolution: Selectable from 10 Hz to 100 kHz
Frequency span
Range: zero span, (10 x N) kHz to 19.25 GHz, (10 x N) kHz to 23.75 GHz (opt 026)
Accuracy: ±2% of span, span <10 MHz; ±3% of span, span >10 MHz
Sweep time
Range: 20 ms to 100 s, span = 0 Hz or >10 kHz; 20 μs to 100 s, span = 0 Hz (opt 101)
Accuracy: ±3%, 20 ms to 100 s; ±2%, 20 μs to 20 ms
Sweep trigger: free run, single, line, video, external
Stability
Noise sidebands: ≤−95 dBc/Hz + 20 log N at >30 kHz offset from CW signal
Residual FM: <(400 x N) Hz peak-peak in 100 ms (1 kHz RBW, 1 kHz VBW)
System-related sidebands: <−65 + 20 log N at >30 kHz offset from CW signal
Comb generator: 100 MHz fundamental freq; ±0.007% freq accuracy

Amplitude

Amplitude range: −114 to +30 dBm
Maximum safe input level: +30 dBm (1 watt, 7.1 Vrms), 0 Vdc
Gain compression: ≤0.5 dB (total power at input mixer = −10 dBm)
Displayed average noise level: ≤114 to <−92 dBm
Spurious responses
Second harmonic distortion: <−70 dBc for −40 dBm tone at input mixer, 10 MHz to 2.9 GHz; <−100 dBc for −10 dBm tone power at input mixer or below displayed av noise lev), >2.75 GHz
Third-order intermodulation distortion >10 MHz: <−70 dBc for two −30 dBm tones at input mixer and >50 kHz separation
Other input-related spurious: <−70 dBc for applied freq ≤18 GHz; <−60 dBc for applied freq ≤22 GHz
Display range
Log scale: 0 to −70 dB from ref lev is calibrated; 1 to 20 dB/div in 1 dB steps; 8 divisions displayed
Linear scale: 8 divisions
Scale units: dBm, dBmB, dBmicroV, volts, watts
Reference level
Range: −114 to +30 dBm
Resolution: 0.01 dB for log scale; 0.12% of ref lev for linear
Accuracy (ref to −20 dBm ref level): ±(0.05 dB + input atten acc @ 50 MHz), 0 dBm to −59.9 dBm; ±(1.25 dB + input atten acc @ 50 MHz), −60 to −114 dBm
Frequency response (ref to 300 MHz CAL OUT, preselector peaked)
Absolute: ±2.0 to ±3.0 dB
Relative flatness: ±1.5 to ±2.0 dB
Calibrator output
Frequency: 300 MHz ±30 kHz
Amplitude: −20 dBm ±0.4 dB
Input attenuator
Range: 0 to 70 dB in 10 dB steps
Accuracy at 50 MHz, ref to 10 dB atten: +0.5 dB, 0 to 60 dB; +1.2 dB, 70 dB
Resolution bandwidth: 1 kHz to 3 MHz, ±20%
Switching uncertainty: ±0.4 dB, 3 kHz to 3 MHz RBW; ±0.5 dB, 1 kHz
Video bandwidth range: 30 Hz to 1 MHz
Log to linear switching: +0.25 dB at reference level
Display scale fidelity: ±0.2 dB/2 dB, 0 to −70 from ref lev, incremental; ±0.75 dB, 0 to −60 dB from ref lev and ±1.0 dB, 0 to −70 dB from ref lev, maximum cumulative
Linear accuracy: ±3% of reference level

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SIGNAL ANALYZERS

Spectrum Analyzers, Performance Portable and Accessory

HP 8591A, 8593A, 85901A



HP 8590 series RF spectrum analyzers have built-in tracking generator option



HP 85901A

HP 8591A, 8593A Specifications

Option 010 and 011 built-in tracking generators
Specifications apply to both HP 8590B and 8591A.

Frequency range: **50 ohm** 100 kHz to 1.8 GHz; **75 ohm** 1 MHz to 1.8 GHz

Tracking drift (10 kHz RBW, 30-minute warmup): 1.5 kHz/5 min, nominal

Output power level

Range:	50 ohm	75 ohm
HP 8591A	0 to −70 dBm	+42.8 to −27.2 dBmV
HP 8590B	0 to −15 dBm	+42.8 to +27.8 dBmV
Resolution	0.1 dB	0.1 dB

Absolute accuracy: ±1.0 dB, HP 8591A; ±1.5 dB, HP 8590B

Output vernier
Range: HP 8591A, 10 dB; HP 8590B, 15 dB
Accuracy: HP 8591A, ±0.75 dB; HP 8590B, ±1.0 dB

Output flatness: ±1.75 dB, HP 8591A ref to 300 MHz and 10 dB attenuation; ±1.75 dB 8590B

Output attenuator (HP 8591A only)
Range: 0 to 60 dB
Switching accuracy: ±0.8 dB or 2.5% of atten setting, whichever greater for max of 1.5 dB (ref to 10 dB atten setting)
Repeatability: ±0.2 dB, nominal

Dynamic range (difference bet max power out and t.g. feedthrough: >106 dB, nominal, 50 ohm; >100 dB, nominal, 75 ohm

Tracking generator feedthrough: <−106 dBm, 50 ohm; <−52.2 dBm, 75 ohm

Output VSWR
0 dB attenuation: 2.5:1
10 dB attenuation (HP 8591A only): 1.6:1

Ordering Information	Price
HP 8591A spectrum analyzer (9 kHz to 1.8 GHz)	$12,625
HP 8593A spectrum analyzer (9 kHz to 22 GHz)	$24,805
HP 8594A spectrum analyzer (9 kHz to 2.9 GHz)	TBD
HP 8595A spectrum analyzer (9 kHz to 6.5 GHz)	TBD
Opt 001 75-ohm input (HP 8591A only)	$0
Opt 004 precision frequency reference	+$2,050
Opt 010 50-ohm built-in tracking generator (HP 8591A only)	+$4,500
Opt 011 75-ohm built-in tracking generator (HP 8591A only)	+$4,500
Opt 021 HP-IB interface	+$600
Opt 023 RS-232 interface	+$600
Opt 026 26.5 GHz frequency range extension (HP 8593A only)	+$3,000
Opt 101 fast time-domain sweeps	+$1,000
Opt 1BH general export version (HP 8593A, 8594A, 8595A)	$0
Opt 102 AM/FM demodulator and TV sync trigger	+$1,500
Opt 103 quasi-peak detector/AM-FM demodulator	$1,910

HP 85901A Portable ac Power Source

This small, easy-to-carry power source gives you ac power where and when you need it. Use it as a standalone battery or connect it to an external 12 Vdc source for even longer operation. As a standalone battery, the ac power source gives you over an hour of operation at 100 Watts continuous load. When the charge gets low, the power source shuts off automatically. It can be recharged in six hours or less. Over-voltage, short-circuit, and overload protection on the inverter output are built in. Also included are over-voltage protection on the inverter input and over-charge and over-discharge protection for the internal battery.

Specifications
Input inverter voltage: 10.8 to 14.5 Vdc
Charger voltage: 90 to 250 Vac auto selected
Frequency: 47 to 66 Hz
Power consumption: 122 VA maximum
Output
Voltage: 135 or 270 Vpeak + 5% rectangular waveform with 25% dead zone (115 or 230 Vrms ±5%)
Frequency: 60 Hz ±0.1%, crystal reference
Max power: 200 watts continuous
Connectors: two CEE22-V type; female
Temperature: 0° to 55° C, operating; −20° to 40° C storage with battery; −40° to 70° C storage without battery
EMI: conducted and radiated VDE 0871 level B
Battery
Type: sealed acid lead
Voltage: 12 Vdc, nominal
Capacity: 17 AMP-HR, nominal
Mechanical (nominal)
Size: 125 H x 337 W x 461 mm D
Weight: net, with battery, 14.2 kg (31.3 lb); without battery, 8.0 kg (17.7 lb); shipping, 16.3 kg (36.0 lb)

Ordering information	Price
HP 85901A portable ac power source	$1,120 ☎
Extra power cord adapter for HP instruments	
HP 8120-5220	$17
General-purpose power cord adapters	
HP 8120-5210 European	$55
HP 8120-5211 USA	$55
HP 8120-5212 UK	$55

☎ For same-day shipment, call HP DIRECT at 800-538-8787.

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