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# SIGNAL ANALYZERS

Spectrum Analyzers, Performance Portable

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



HP 8594A

## 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  $\pm 230$  Hz at 1 GHz or  $\pm 2.3$  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  $\mu$ s.
- Quasi-peak detector for EMC measurements.



HP 8595A

## HP 8591A Specifications

### General

**Temperature:**  $0^{\circ}$  to  $+55^{\circ}$  C operating;  $-40^{\circ}$  to  $+75^{\circ}$  C storage

**EMI compatibility:** CISPR Pub. 11 and FTZ 526/527/79

**Audible noise:**  $<37.5$  dBA pressure and  $<5.0$  Bels power (ISO DP7779)

**Power requirements:** 86 to 127 or 195 to 250 Vrms, 47 to 66 Hz, 103 to 126 Vrms, 400 Hz  $\pm 10\%$

**Power consumption:**  $<300$  VA;  $<100$  watts

### Frequency

**Range:** 9 kHz to 1.8 GHz (50  $\Omega$ ); 1 MHz to 1.8 GHz (75  $\Omega$ , opt. 001)

### Reference

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

**Stability:**  $\pm 0.5 \times 10^{-6}$

### Precision frequency reference (option 004)

**Aging:**  $\pm 1 \times 10^{-7}$  /year

**Stability:**  $\pm 1 \times 10^{-8}$

**Temperature stability:**  $\pm 1 \times 10^{-6}$

### Frequency

#### Frequency readout accuracy (start, stop, center, frequency)

**Span  $\leq 10$  MHz:**  $\pm$ (freq readout x freq ref error + 3% of span + 20% of RBW + 100 Hz)

**Span  $\geq 10$  MHz:**  $\pm$ (freq readout x freq ref error + 3% of span + 20% of RBW)

**Marker count accuracy** (signal to noise ratio  $\geq 25$  dB, RBW/span  $\geq 0.01$ )

**Frequency span  $\leq 10$  MHz:**  $\pm$ (marker freq x freq ref error + counter res + 100 Hz)

**Frequency span  $> 10$  MHz:**  $\pm$ (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:**  $\pm 2\%$  of span, span  $\leq 10$  MHz;  $\pm 3\%$  of span, span  $> 10$  MHz

### Sweep time

**Range:** 20 ms to 100 s, span = 0 Hz or  $> 10$  kHz; 20  $\mu$ s to 100 s, span = 0 Hz (option 101)

**Accuracy:**  $\pm 3\%$ , 20 ms to 100 s;  $\pm 2\%$  20  $\mu$ s to  $< 20$  ms (opt 101)

**Sweep trigger:** free run, single, line, video, external

### Stability

**Noise sidebands:**  $\leq 90$  dBc/Hz at  $> 10$  kHz offset from CW signal (1 kHz RBW, 30 Hz VBW, sample detector);  $\leq 100$  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

## 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<sup>-6</sup> /year

**Stability:** ±5 x 10<sup>-7</sup>

**Temperature stability:** ±5 x 10<sup>-6</sup>

#### Precision frequency reference (Opt 004)

**Aging:** ±1 x 10<sup>-7</sup> /year

**Stability:** ±1 x 10<sup>-8</sup>

**Temperature stability:** ±1 x 10<sup>-6</sup>

**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

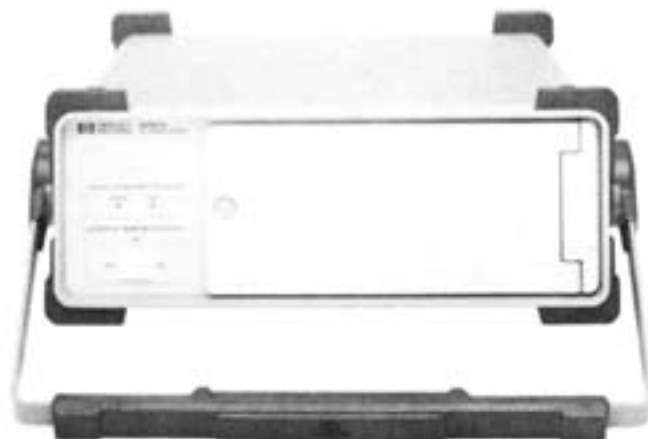
# SIGNAL ANALYZERS

## 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 75 ohm  
100 kHz to 1.8 GHz 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:**  $\pm 1.0$  dB, HP 8591A;  $\pm 1.5$  dB, HP 8590B

#### Output vernier

**Range:** HP 8591A, 10 dB; HP 8590B, 15 dB

**Accuracy:** HP 8591A,  $\pm 0.75$  dB; HP 8590B,  $\pm 1.0$  dB

**Output flatness:**  $\pm 1.75$  dB, HP 8591A ref to 300 MHz and 10 dB attenuation;  $\pm 1.75$  dB 8590B

#### Output attenuator (HP 8591A only)

**Range:** 0 to 60 dB

**Switching accuracy:**  $\pm 0.8$  dB or 2.5% of atten setting, whichever greater for max of 1.5 dB (ref to 10 dB atten setting)

**Repeatability:**  $\pm 0.2$  dB, nominal

#### Dynamic range (difference bet max power out and t.g. feed-through)

> 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  $\pm 5\%$  rectangular waveform with 25% dead zone (115 or 230 Vrms  $\pm 5\%$ )

**Frequency:** 60 Hz  $\pm 0.1\%$ , 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

HP 85901A portable ac power source

**Extra power cord adapter for HP instruments**

HP 8120-5220

**General-purpose power cord adapters**

HP 8120-5210 European

HP 8120-5211 USA

HP 8120-5212 UK

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

#### Price

\$1,120 ☎

\$17

\$55

\$55

\$55



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