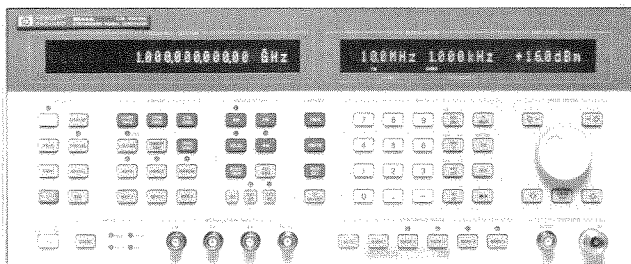


SIGNAL GENERATORS

High-Performance RF

HP 8644A

- 252kHz to 1030MHz frequency range with optional coverage to 2060MHz
- -136 dBc/Hz phase noise at 20 kHz offset, 1 GHz carrier
- -100 dBc nonharmonic spurious



HP 8644A



HP 8644A Synthesized Signal Generator

The HP 8644A Synthesized Signal Generator is a high performance, 252 kHz to 1030 MHz generator that provides excellent spectral purity for confidence in RF measurements. For R & D or stringent testing of communications equipment, the low phase noise and low spurious provide the measurement margin necessary for repeatability and accuracy.

The HP 8644A uses a modular platform that allows you to configure the instrument for your application.

High Performance Modulation

For receiver measurements the HP 8644A offers AM, FM, and pulse modulation. FM deviations up to 20 MHz combined with specified rates to 100 kHz can test most communication receivers. AM performance includes 0-100% depth and rates to 100 kHz.

Advanced Internal Modulation Source

An optional internal modulation synthesizer provides four sources each with a frequency coverage of 0.1 Hz to 400 kHz and sine, square, sawtooth, and white gaussian noise waveforms. Two of these sources can be summed together to provide two-tone capability, and one of these sources can be modulated by up to three of the sources with AM/FM/ϕM, and pulse. This source can also generate signals for testing VOR and ILS receivers.

Lowest Specified Leakage of Any Signal Generator

The standard HP 8644A has typical leakage of $1 \mu\text{V}$ induced in a two-turn loop, which is sufficient for most R & D or production testing. For sensitive measurements, Option 010, a low leakage configuration, provides more RF shielding and has typical leakage of $0.1 \mu\text{V}$.

On-Site Repair and Calibration

The HP 8644A contains its own firmware and hardware for calibration, troubleshooting, and monitoring instrument performance. Built-in sensors continually monitor internal voltages to notify users of temperature drift, hardware failure, or the need for recalibration.

HP 8644A Specifications

Frequency

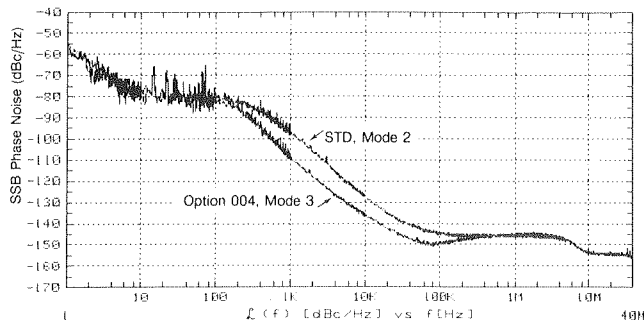
Range: 251.46485 kHz to 1030 MHz; 251.46485 kHz to 2060 MHz with Opt 002. See Optional Internal Modulation Source for coverage below 252 kHz.

Frequency bands: The approximate endpoints of each frequency band can be determined by dividing the 1030 to 2060 MHz band by two for each band decrease.

Stability, Opt 001: $<5 \times 10^{-10}$ /day aging after 10 day warm-up.

- AM, FM, and pulse modulation
- Internal modulation source for complex waveforms
- Options to configure for specific applications
- On-site repair and calibration

Typical SSB phase noise and spurs at 1 GHz.



Residual AM: 0.01% AM rms, 0.3 to 3 kHz post detection bandwidth.

Spectral Purity*1

Phase noise (CW, AM, or FM² (operation) Standard/Option 004

Carrier Frequency (MHz)	Offset Frequency		
	1 kHz (dBc/Hz)	20 kHz (dBc/Hz)	100 kHz (dBc/Hz)
1030 - 2060	-81/-94	-121/-130	-131/-136
515 - 1030	-88/-100	-128/-136	-138/-142
257 - 515	-93/-106	-134/-142	-141/-145
128 - 257	-98/-111	-138/-145	-142/-145
64 - 128	-103/-116	-140/-145	-144/-145
32 - 64	-108/-121	-142/-145	-145/-145
16 - 32	-113/-127	-144/-145	-145/-145
8 - 16	-118/-130	-145/-145	-145/-145
4 - 8	-123/-135	-145/-145	-145/-145
2 - 4	-127/-135	-145/-145	-145/-145
1 - 2	-131/-135	-145/-145	-145/-145
0.5 - 1	-135/-135	-145/-145	-145/-145
0.25 - 0.5	-138/-135	-145/-145	-145/-145

Spurious Signals

Harmonics: -30 dBc, output $+8 \text{ dBm}$; -25 dBc, 1030 to 2060 MHz, output $+8 \text{ dBm}$.

Subharmonics: none, 0.25 to 515 MHz; -55 dBc, 515 to 1030 MHz; -40 dBc, 1030 to 2060 MHz.

Nonharmonics: -100 dBc, >15 kHz offset, 0.25 to 1030 MHz; -94 dBc, >15 kHz offset, 1030 to 2060 MHz.

Residual FM (CW, AM, FM operation)^{3, 4}

Standard/Option 004

Carrier Frequency (MHz)	Post Detection Bandwidth	
	0.3 to 3 kHz (Hz rms)	0.05 to 15 kHz (Hz rms)
0.25- 257	<math>1 / <0.5</math>	<math>1.2 / <0.5</math>
257- 515	<math>1.2 / <0.5</math>	<math>2 / <1</math>
515- 1030	<math>2 / <1</math>	<math>4 / <2</math>
1030- 2060	<math>4 / <2</math>	<math>8 / <4</math>

* Refer to product note HP 8644A-1 before using the HP 8644A in phase noise measurements.

² FM at 1% maximum specified deviation for offsets > 1 kHz, FM at minimum deviation for offsets < 1 kHz.

³ Specified for 48 to 63 Hz power line. Typical for 400 Hz power line.

⁴ Deviation $\leq 0.1\%$ of maximum available.

Output

Maximum level: +16 dBm, 0.25 to 1030 MHz; +13 dBm with Opt 005; Opt 002: +14 dBm, 0.25 to 1030 MHz; +13 dBm, 1030 to 2060 MHz.

Minimum level: -137 dBm

Resolution: 0.1 dB.

Absolute accuracy: ±1 dB, output ≥ -127 dBm.

Reverse power protection: 50W from a 50Ω source, 25 Vdc.

Typical third order intermodulation: <-50 dBc, outputs <8 dBm.

Typical output level overrange: 2 dB more than maximum level.

Typical SWR: <1.7:1, output <-2 dBm.

Modulation

External modulation inputs: ac or dc, for AM or FM 600Ω. Pulse, dc only.

Amplitude Modulation

AM depth: 0 to 100%, for output <+7 dBm. 0.1% resolution.

AM indicator accuracy: ±(6% of setting +1%), up to 80% depth, 1 kHz rate.

AM distortion, at 400 Hz and 1 kHz rates:

Depth	0.25 - 1030 MHz	1030 - 2060 MHz
0 - 30%	2%	5%
0 - 70%	3%	5%
70 - 90%	5%	8% AM

3 dB bandwidth: >5 kHz, 0.25 to 8 MHz. >50 kHz, 8 to 128 MHz; >100 kHz, 128 to 2060 MHz.

Frequency Modulation

FM deviation range: 20 MHz for carriers from 1030 to 2060 MHz. Maximum deviation divides in half for each carrier band lower.

FM maximum rate: 100 kHz, 8-2060 MHz 19.5 kHz, 1-2 MHz
 78 kHz, 4-8 MHz 9.7 kHz, .5-1 MHz
 39 kHz, 2-4 MHz 4.8 kHz, .25-.5 MHz

	Mode 1	Mode 2	(Mode 3 opt. 004)
FM indicator accuracy: ⁵ Rates: 0-30 kHz 30-100 kHz	12% 20%	5% 10%	5%, (6% mode 3*) 10%, (15% mode 3*)
FM Distortion: (20 Hz - 100 kHz rates)	3%	5%	1%

* With Option 004, the signal generator defaults to mode 3 for the allowable deviations. For improved FM indicator accuracy, Mode 2 may be selected manually. This degrades spectral purity to that available with Mode 2.

⁵ Accuracy at time of setting for rates that do not exceed maximum rate.

Carrier frequency accuracy in FM: ±0.5% of FM deviation setting.

Pulse Modulation

On/off ratio: >35 dB; >80 dB for 1030 to 2060 MHz.

Rise fall time: <100 nsec, between 10% and 90% response points.

Maximum pulse repetition frequency: 1 MHz.

Minimum pulse width: 0.5 μsec.

Internal Modulation Source

Rates: 0.3, 0.4, 1, 3 kHz. Accuracy ±5%.

Optional Internal Modulation Source

Frequency range: 0.1 Hz to 400 kHz; 0.1 Hz resolution.

Maximum output level: 0 to 2 V_{pk} into 600 Ω; 2 mV resolution.

Phase Continuous Sweep

Sweep type: linear, phase continuous.

Sweep time: 20 ms to 10 s.

Maximum sweep span: twice maximum FM deviation.

Digitally Stepped Sweep

Sweep type: linear or log, frequency stepped.

Sweep time: 500 ms to 1000 s

Remote Programming

Interface/language: HP-IB/HP-SL (HP systems language)

General

Power requirements: ±10% of 100, 120, 220, or 240V; 48 to 440 Hz 400 VA maximum.

Operating temperature range: 0 to 55°C.

Storage temperature range: -55 to +75°C.

Leakage: Typical leakage is <1 μV induced in a two-turn loop 1 inch from any surface with output level <0 dBm; <0.1 μV with Opt 010.

Calibration interval: 3 years (MTBC).

Storage registers: 10 full function and 40 frequency/amplitude.

Weight: net, 28 kg (61 lb); shipping, 35 kg (77 lb).

Size: 178 x 425 x 648mmD (7" x 16.75" x 23.5"). Opt 010 adds 35mm (1.4") to the depth.

Avionics Specifications

Option 009 provides specified VOR/ILS performance for the HP 8644A with Option 007. These specifications apply when using the HP 8644A with Option 007 to generate standard VOR and ILS signals. Can not be ordered with Option 002 or Option 005.

VOR bearing accuracy: 0.1 degrees.

VOR, LOC, G/S AM accuracy: ±5% of setting.

VOR, LOC, G/S AM distortion: 2%.

VOR FM accuracy (480 Hz deviation): ±1.5 Hz.

Localizer DDM resolution: 0.0002 DDM.

Localizer DDM accuracy: ±0.0004 ±5% of DDM.

Glide slope DDM resolution: 0.0004 DDM.

Glide slope DDM accuracy: ±0.0008 ±5% of DDM.

Marker beacon AM accuracy (95% AM): ±5% of setting +1%.

Marker beacon AM distortion (95% AM): 5%.

Frequency Counter Specifications

Option 011 provides an optional frequency counter.

Frequency range: selectable from 20 Hz to 2 GHz.

Impedance: 20 Hz to 10 MHz, 1 mΩ shunted by less than 65 pF.
 10 MHz to 2 GHz, 50Ω nominal.

Sensitivity: 25 mV rms -19 dBm into 50Ω

Gate times: adjustable in 0.1 s steps from 0.1 s to 1 s.

Measurement resolution (Hz): $\frac{\text{Measured frequency (Hz)} \times 10^{-8}}{\text{Gate time(s)}}$

or 0.01 Hz, which ever is greater.

Measurement uncertainty: +/- timebase accuracy plus +/- measurement resolution.

Ordering Information

	Price
HP 8644A Synthesized Signal Generator ¹	\$17,200
Opt 001 High stability time base	+\$1,550
Opt 002 2 GHz doubled output	+\$7,150
Opt 003 RF connectors on rear panel only	+\$400
Opt 004 Enhanced spectral purity	+\$4,100
Opt 005 Electronic attenuator (5-year warranty on attenuator, cannot be used with Opt 002)	+\$500
Opt 007 Synthesized audio oscillator	+\$1,050
Opt 009 Specified VOR/ILS performance (can not be ordered with Opt 002 or Opt 005)	+\$1,500
Opt 010 Reduced leakage configuration	+\$1,500
Opt 011 2 GHz frequency counter	+\$1,000
Opt 907 Front handle kit (5061-9690)	+\$65
Opt 908 Rack flange kit (5061-9678)	+\$35
Opt 909 Rack flange kit with front handles (5061-9684)	+\$90
Opt 910 Provides an additional operation and calibration manual (08644-90009) and two service manuals (08645-90024)	+\$190
Opt 915 Add service manual (08645-90024)	+\$65
Opt W30 Extended repair service. See page 723.	
08645-61116 Service kit	+\$500

¹ HP-IB cables not included. For description and price, see page 579.

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