

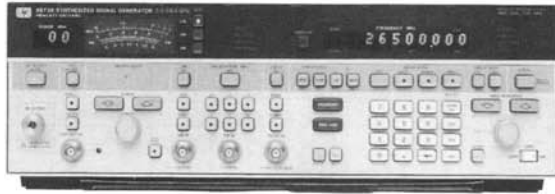
SIGNAL GENERATORS

Synthesized Signal Generators (cont'd)

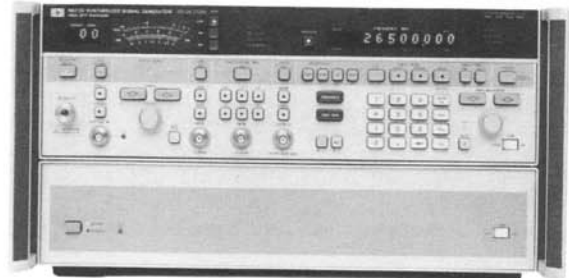
Models 8673B, 8673C, 8673D

- 10 MHz to 26.5 GHz frequency range
- < -60 dBc harmonics/subharmonics
- Low spurious and phase noise

- $+8$ to -100 dBm calibrated output
- Internally leveled AM/FM/pulse modulation
- Frequency extension capability to 60 GHz



HP 8673B



HP 8673D



HP 8673B, 8673C and 8673D Synthesized Signal Generators

The HP 8673B/C/D Synthesized Signal Generators are full performance synthesizers designed to generate precise microwave signals over the 50 MHz to 26.5 GHz frequency range. These generators offer calibrated and leveled power, AM, FM, pulse modulation, digital sweep, programmability, and frequency extension capability to 110 GHz. The HP 8673B covers the 2.0 to 26.5 GHz range, while the HP 8673C/D pair cover from 50 MHz to 18.6 GHz and 26.5 GHz respectively.

Excellent Spectral Purity

A variety of applications ranging from microwave radar to communications systems require the frequency stability available from the HP 8673B/C/D. The broadband frequency coverage is derived from multiplying a fundamental 2.0 to 6.6 GHz YIG-tuned oscillator. This technique provides the wide frequency coverage in a single instrument. Indirect synthesis phase-locks the YIG-tuned oscillator to a 10 MHz quartz crystal reference to provide excellent long term and short term stability (frequency drift $< 5 \times 10^{-10}$ per day). Phase locked loops are optimized for lowest possible single-sideband phase noise. The HP 8673C and HP 8673D include an internal tracking YIG-filter to further reduce unwanted harmonic, subharmonic, and nonharmonic spurious signals above 1.2 GHz to < -60 dBc.

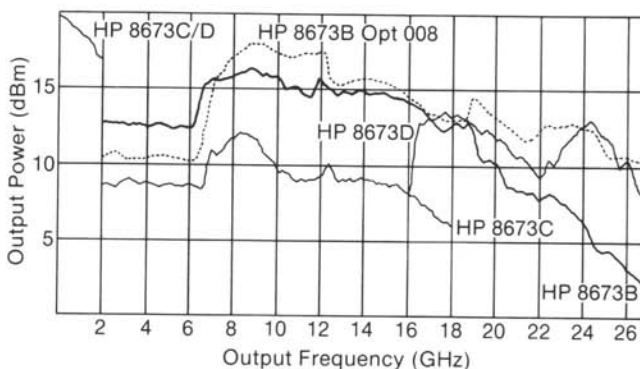


Figure 1. Maximum power typically available from HP 8673D, 8673C, 8673B/G/H, and 8673B/G Option 008 at 25°C.

Wide Dynamic Output Range

For broadband component and receiver testing applications, the HP 8673B/C/D deliver exceptionally flat power output across the full frequency ranges. For receiver sensitivity measurements, power is internally (or externally) leveled to -100 dBm. Maximum available power varies with frequency as shown in Figure 1.

Internally Leveled Pulse Modulation

The HP 8673B/C/D features an internal pulse modulator that provides high-quality pulse modulation over the entire 50 MHz - 26.5 GHz range. Since the modulation is done before the frequency multiplication, the peak pulsed power can be leveled and calibrated to within typically $+1.5/-1.0$ dBm of the set level referenced to CW. External TTL level pulse rates up to 1 MHz and pulse widths as narrow as 100 ns can be easily accommodated by the HP 8673B/C/D to provide ON/OFF ratios in excess of 80 dB.

Calibrated AM/FM Modulation

AM and FM capability is included in the HP 8673B/C/D to expand the versatility in receiver testing applications. AM depth at rates up to 100 kHz can be accurately set using the front panel meter. Six ranges of metered FM are available at rates and peak deviations up to 10 MHz. Both AM depth and FM deviation are linearly controlled by varying the externally supplied modulating input voltage up to 1V peak. Simultaneous modulation of AM, FM, and pulse is possible to simulate complex environments.

Frequency Extension to 110 GHz

The HP 8673B/C/D can be used as microwave drivers for the HP 83550-series millimeter-wave source modules. This combination (with the addition of the HP 8349B Microwave Amplifier) can provide leveled output signals up to 110 GHz with the "System Leveling" mode. The resultant output frequency can be displayed on the HP 8673B/C/D front panel by entering the multiplication factor of the source module.

Full Programmability and Digital Sweep

The HP 8673B/C/D provides full programmability of all front panel functions for automatic test applications. Output level can be controlled in steps as fine as 0.1 dB. An internal microprocessor is used to simplify HP-IB program code generation and follow front-panel keystroke sequences. This design allows the implementation of digital sweep. Sweep spans can be set over the entire frequency range with variable rates, step sizes, and selectable markers available.

HP 8673B/C/D Specifications

Frequency Characteristics

Frequency Range: HP 8673B: 2.0–26.0 GHz (1.95 to 26.5 GHz in overrange).
HP 8673C: 0.05–18.6 GHz (0.01–18.6 GHz in overrange).
HP 8673D: 0.05–26.0 GHz (0.01–26.5 GHz in overrange).

Frequency Bands: Band 0: 0.05–2.0 GHz
Band 1: 2.0–6.6 GHz
Band 2: 6.6–12.3 GHz
Band 3: 12.3–18.6 GHz
Band 4: 18.6–26.0 GHz

Frequency Resolution: 1 kHz Band 0 and 1 3 kHz Band 3
2 kHz Band 2 4 kHz Band 4

Time base: internal 10 MHz ($<5 \times 10^{-10}$ /day aging rate) or external 5 or 10 MHz.

Frequency switching time: <25 ms (HP 8673B) and <50 ms (HP 8673C/D) to be within specified resolution, all bands.

Spectral Purity

Single-sideband phase noise (1 Hz BW, CW mode):

F _c	Offset from F _c				
	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz
Band 0	-64 dBc	-70 dBc	-78 dBc	-86 dBc	-105 dBc
Band 1	-58 dBc	-70 dBc	-78 dBc	-86 dBc	-110 dBc
Band 2	-52 dBc	-64 dBc	-72 dBc	-80 dBc	-104 dBc
Band 3	-48 dBc	-60 dBc	-68 dBc	-76 dBc	-100 dBc
Band 4	-46 dBc	-58 dBc	-66 dBc	-74 dBc	-98 dBc

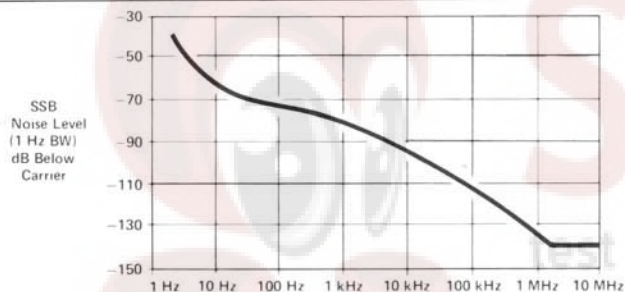


Figure 2. Typical HP 8673B/C/D single-sideband phase noise performance using the internal standard, Band 1.

Harmonics (up to maximum frequency, output level meter readings <0 dB on 0 dBm range and below): <-40 dBc (HP 8673B). <-40 dBc, 50MHz–1.2GHz; <-60 dBc, 1.2–26.0 GHz (HP 8673C/D).
Sub-harmonics and multiples thereof: <-60 dBc (HP 8673C/D) <-25 dBc, Bands 1–3; <-20 dBc, Band 4 (HP 8673B).

Spurious (CW and AM modes)

Non-harmonically related: <-60 dBc, Band 0; <-70 dBc, Band 1; <-64 dBc, Band 2; <-60 dBc, Band 3; <-58 dBc, Band 4.

Power line related and fan rotation related within 5 Hz below line frequency and multiples thereof:

F _c	Offset from F _c		
	<300 Hz	300 Hz to 1 kHz	>1 kHz
Band 0	-50 dBc	-60 dBc	-65 dBc
Band 1	-50 dBc	-60 dBc	-65 dBc
Band 2	-44 dBc	-54 dBc	-59 dBc
Band 3	-40 dBc	-50 dBc	-55 dBc
Band 4	-38 dBc	-48 dBc	-53 dBc

Output Characteristics

Output level (+15°C to +35°C):

8673B		8673C		8673D	
Level (dBm)	Freq. (GHz)	Level (dBm)	Freq. (GHz)	Level (dBm)	Freq. (GHz)
+8 to -100	2-18	+11 to -100	.05-2.0	+11 to -100	.05-2.0
+4 to -100	18-22	+5 to -100	2-16	+5 to -100	2-22
0 to -100	22-26	+2 to -100	16-18.6	+6 to -100	22-26

Flatness (0 dBm range, +15°C to +35°C): ± 0.5 dB through Band 0, ± 0.75 dB through Band 1, ± 1.0 dB through Band 2, ± 1.25 dB through Band 3, ± 1.75 dB through Band 4.

Remote programming output level resolution: 0.1 dB.

Source impedance: 50 ohms nominal.

Pulse Modulation

ON/OFF ratio: >80 dB.

Rise/fall times: <30 ns, Band 0; <40 ns, Bands 1–4.

Minimum leveled pulse width: <100 ns.

Pulse repetition frequency: 50 Hz - 1 MHz.

Maximum peak power: same as in CW mode.

Peak level accuracy (relative to CW, +15°C to +35°C): ± 1.5 dB, Band 0; $\pm 1.5/-1.0$ dB, Band 1-4.

Pulse modulation input requirements: normal mode, positive-true TTL levels; complement mode, negative-true TTL levels.

Video feedthrough: typically <-50 dBc.

Amplitude Modulation

Rates (3 dB BW, 30% depth): 20 Hz-100 kHz.

Sensitivity: 30%/V, 100%/V ranges. Max. input 1 V peak into 600 Ω .

Frequency Modulation

Sensitivity	Rate (3 dB BW, typical)	Maximum Peak Deviation
30 kHz/V	50 Hz to 10 MHz	the smaller of 10 MHz or: fmod x 5, Band 0 fmod x 10, Band 1 fmod x 15, Band 2 fmod x 20, Band 3
100 kHz/V	50 Hz to 10 MHz	
300 kHz/V	1 kHz to 10 MHz	
1 MHz/V	1 kHz to 10 MHz	
3 MHz/V	1 kHz to 10 MHz	
10 MHz/V	1 kHz to 10 MHz	

Digital Sweep Characteristics

Sweep function: start/stop or ΔF (span) sweep.

Sweep modes: manual, auto, or single sweep.

Step size: maximum of 9999 frequency points per sweep; minimum step size equals frequency resolution.

Dwell time: set from 1 to 255 ms per frequency.

Markers: 5 independent, settable frequency markers.

Sweep outputs: 0 to +10 V ramp start to stop; 0.5 V/GHz ramp; Z-axis blanking/markers; tone marker; penlift.

Remote Programming

All functions HP-IB programmable except line switch. The HP 8673B/C/D can output over the interface frequency and output level settings, error/malfunction codes, and operational status codes.

Interface functions:

SH1, AH1, T5, TE0, L3, LE0, SR1, RL1, PP1, DC1, DT1, C0, E1.

General

Operating temperature range: 0°C to +55°C.

Power: 100, 120, 220, 240 V, +5%, -10%, 48-66 Hz; 400 VA max. (HP 8673B), 500 VA max. (HP 8673C/D)

Weight: HP 8673B: net 29 kg (64 lb); shipping 34.5 kg (76 lb).

HP 8673C/D: net 42.4 kg (94 lb.); shipping 46.5 kg (103 lb).

Size: HP 8673B: 133 mm x 425 mm x 603 mm (5.25" x 16.75" x 23.75") HxWxD. HP 8673C/D: 234 mm x 425 mm x 620 mm (9.2" x 16.8" x 24.4") HxWxD.

Ordering Information

	Price
HP 8673B Synthesized Signal Generator	\$42,000
Option 001: Delete RF output attenuator	-\$600
Option 002: Delete reference oscillator	-\$735
Option 003: Operation at 400 Hz line	+\$460
Option 004: Rear panel RF output	+\$75
Option 005: Rear panel RF output without RF attenuator	-\$525
Option 006: Chassis slide kit	+\$75
Option 008: +7 dBm output level	+\$7,000
Option 907: Front panel handle kit	+\$55
Option 908: Rack mounting flange kit	+\$33
Option 909: Combination of Opt. 907 plus 908	+\$80
Option W30: Two additional years of return-to-HP warranty	+\$1050
Option 910: Extra operating and service manual	+\$65
HP 8673C Synthesized Signal Generator	\$51,000
Options 001, 002, 003, 004, 005, and 006: same as HP 8673B	
Option 908: Rack mounting flange kit	+\$55
Option 913: Rack flanges for standard front handles	+\$45
Option 910: Service and extra operating manual	+\$85
Option 915: Service manual	+\$20
Option 916: Extra operating manual	+\$65
Option W30: Two additional years of return to HP warranty	+\$1170
HP 8673D Synthesized Signal Generator	\$57,000
Options 001, 002, 003, 004, 005, 006, 908, 913, 910, 915, and 916: Same as HP 8673C	
Option W30: Two additional years of return to HP warranty	+\$1250
HP 11726A Support Kit (for HP 8673B)	