**SIGNAL GENERATORS**

**High-Performance Microwave**
HP 8673B, 8673C, 8673D, 8673E

- 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 110 GHz

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

The HP 8673B/C/D/E 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 2.0 to 26.5 GHz. The HP 8673C/D pair cover 50 MHz to 18.5 GHz and 26.5 GHz respectively and the HP 8673E covers 2.0 to 18.5 GHz.

**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/E. 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 × 10^-13 per day), (HP 8673B/C/D). 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.

**Wide Dynamic Output Range**

For broadband component and receiver testing applications, the HP 8673B/C/D/E deliver exceptionally flat power output across the full frequency ranges. For receiver sensitivity measurements, power is internally (or externally) leveled to -100 dBm (-120 dBm for the HP 8673E). Maximum available power varies with frequency as shown in the figure below.

**Internally Leveled Pulse Modulation**

The HP 8673B/C/D/E features an internal pulse modulator that provides high-quality pulse modulation over the entire 50 MHz to 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/E 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/E 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. The HP 8673E features unlocked mode which allows up to 10 MHz deviation rate at rates as low as 50 Hz. 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 85350-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/E provide 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/E Specifications

Frequency Characteristics

Frequency Range:
HP 8673B: 2.0 to 26.0 GHz (1.95 to 26.5 GHz in overrange).
HP 8673C: 0.05 to 18.6 GHz (0.01 to 18.6 GHz in overrange).
HP 8673D: 0.05 to 26.0 GHz (0.01 to 26.5 GHz in overrange).
HP 8673E: 2.0 to 18.0 GHz (1.95 to 18.6 GHz in overrange).

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

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

Timebase: Internal 10 MHz (<5 x 10^-9 day aging rate for HP 8673 B/C/D, <1.5 x 10^-9 day aging rate for HP 8673E) or ext. 5 or 10 MHz.

Spectral Purity

Single-sideband phase noise (HP 8673B/C/D) (1 Hz BW, CW mode):

<table>
<thead>
<tr>
<th>Fc (MHz)</th>
<th>Offset from Fc (MHz)</th>
<th>-10 Hz</th>
<th>-100 Hz</th>
<th>-1 kHz</th>
<th>-10 kHz</th>
<th>-100 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band 0</td>
<td>64 dBc</td>
<td>-64 dBc</td>
<td>-70 dBc</td>
<td>-78 dBc</td>
<td>-86 dBc</td>
<td>-105 dBc</td>
</tr>
<tr>
<td>Band 1</td>
<td>58 dBc</td>
<td>-62 dBc</td>
<td>-70 dBc</td>
<td>-78 dBc</td>
<td>-86 dBc</td>
<td>-104 dBc</td>
</tr>
<tr>
<td>Band 2</td>
<td>52 dBc</td>
<td>-58 dBc</td>
<td>-64 dBc</td>
<td>-72 dBc</td>
<td>-80 dBc</td>
<td>-102 dBc</td>
</tr>
<tr>
<td>Band 3</td>
<td>48 dBc</td>
<td>-56 dBc</td>
<td>-60 dBc</td>
<td>-68 dBc</td>
<td>-76 dBc</td>
<td>-98 dBc</td>
</tr>
</tbody>
</table>

Single-sideband phase noise (HP 8673E) (1 Hz BW, 1 kHz offset, CW mode): < -60 dBc

Figure 2. Typical HP 8673B/C/D/E 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/E), < -35 dBc (0.05 to 12.0 GHz), < -60 dBc (1.2 to 26.0 GHz (HP 8673C/D)).

Sub-harmonics and multiples thereof: < -60 dBc (HP 8673C/D), < -25 dBc Bands 1 to 3; < -29 dBc Band 4 (HP 8673B/E); < -35 dBc (HP 8673E).

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 (HP 8673B/C/D); < -60 dBc (HP 8673E).

Output Characteristics

Output level (+15°C to +35°C):

<table>
<thead>
<tr>
<th>Level (dBm)</th>
<th>Freq. (GHz)</th>
<th>Level (dBm)</th>
<th>Freq. (GHz)</th>
<th>Level (dBm)</th>
<th>Freq. (GHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 100</td>
<td>2 to 18</td>
<td>+10 to 100</td>
<td>2.2 to 4.2</td>
<td>+10 to 100</td>
<td>4.2 to 6.2</td>
</tr>
<tr>
<td>0 to 100</td>
<td>22 to 26</td>
<td>+20 to 100</td>
<td>16 to 16.6</td>
<td>+10 to 100</td>
<td>16 to 18</td>
</tr>
</tbody>
</table>

Output level (+15°C to +35°C): +8 dBm to -120 dBm (HP 8673E).

Remote programming output level resolution: 0.1 dB.

Pulse Modulation

ON/OFF ratio: > 60 dB (HP 8673B/C/D) > 70 dB (HP 8673E).
Rise/fall times: < 30 ns, Band 0; < 40 ns, Bands 1 to 4 (HP 8673 B/C/D); < 50 ns (HP 8673E).
Minimum Levelled pulse width: < 100 ns.
Pulse repetition frequency: 50 Hz to 1 MHz.
Minimum Duty Cycle: < 0.001 for levelled performance.

Amplitude Modulation

Rates (3 dB BW, 30% depth): 20 Hz to 100 kHz. (HP 8673 B/C/D); 10 Hz to 50 kHz (HP 8673E).
Sensitivity: 30%/V, 100%/V ranges. Max input 1 V peak into 600 Ω.

Frequency Modulation (8673B/C/D)

<table>
<thead>
<tr>
<th>Deviation Range</th>
<th>Frequency (MHz)</th>
<th>Maximum Peak Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>30, 100 kHz/V</td>
<td>100 Hz to 10 MHz</td>
<td>The smaller of 10 kHz or fmod x 5. Band 0 and Band 1 fmod x 10. Band 2 fmod x 15. Band 3 fmod x 20. Band 4</td>
</tr>
<tr>
<td>3, 1, 3 kHz/V</td>
<td>1 kHz to 10 MHz</td>
<td>fmod x 10. Band 2 fmod x 15. Band 3 fmod x 20. Band 4</td>
</tr>
<tr>
<td>10 kHz/V</td>
<td>1 kHz to 10 MHz</td>
<td>fmod x 10. Band 2 fmod x 15. Band 3 fmod x 20. Band 4</td>
</tr>
</tbody>
</table>

Frequency Modulation (8673E)

<table>
<thead>
<tr>
<th>Deviation Range</th>
<th>Frequency (MHz)</th>
<th>Maximum Peak Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>30, 100 kHz/V</td>
<td>100 Hz to 2 MHz</td>
<td>fmod x 10. Band 2 fmod x 15. Band 3 fmod x 20. Band 4</td>
</tr>
<tr>
<td>3, 1, 3 kHz/V</td>
<td>3 kHz to 2 MHz</td>
<td>fmod x 10. Band 2 fmod x 15. Band 3 fmod x 20. Band 4</td>
</tr>
<tr>
<td>10 kHz/V</td>
<td>50 Hz to 2 MHz, typical</td>
<td>fmod x 10. Band 2 fmod x 15. Band 3 fmod x 20. Band 4</td>
</tr>
</tbody>
</table>

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: Maximum of 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.

Remote Programming

All functions HP-IB programmable except line switch.

Ordering Information

HP 8673B Synthesized Signal Generator
Opt 001 Delete RF Output Attenuator $44,000
Opt 002 Delete Reference Oscillator $735
Opt 004 Rear-panel RF Output +$75
Opt 006 Chassis Slide Kit +$75
Opt 008 +10 dBm Output Level $5,000
Opt 009 Front-panel Handle Kit (5062-3998) $55
Opt 008 Rack Mounting Flange Kit (5062-3977) $33
Opt 909 Front-panel and Rack Mounting Kits (5062-3983) $80
Opt 910 Extra Operating and Service Manual (08673-9014) (08673-9016) (08673-60097) $65
Opt W30 Two Additional Years of Return-to-HP Warranty. See page 671. $1,050
HP 8673C Synthesized Signal Generator
Opts 001, 002, 004, and 006 Same as HP 8673B $55,500
Opt 908 Rack Mounting Flange Kit (5062-3974) $55
Opt 910 Service and Extra Operating Manual (08673-90077) (08673-90038) (08673-60097) $85
Opt 913 Rack Flanges for Standard Front Handles (5062-4073) $45
Opt 915 Service Manual (08673-90138) (08673-60097) $20
Opt 916 Extra Operating Manual (08673-90070) $65
Opt W30 Two Additional Years of Return-to-HP Warranty. See page 671. $1,170

HP 8673D Synthesized Signal Generator
Opts 001, 002, 004, 006, 908, 910, 915, and 916 Same as HP 8673C $59,000
Opt W30 Two Additional Years of Return-to-HP Warranty. See page 671. $1,250
HP 8673E Synthesized Signal Generator
Opts 001, 002, 004, 006, 907, 908, 999 and 910 Same as HP 8673C $41,000
Opt W30 Two Additional Years of Return-to-HP Warranty. See page 671. $95

For off-the-shelf shipment, call 800-452-4844.