

HP 83751A  
 HP 83751B  
 HP 83752A  
 HP 83752B

- Fully synthesized (phase-locked) CW, step, and ramp modes
- 2 MHz swept frequency accuracy
- Power flatness correction
- Broad 20 GHz frequency coverage
- +17 dBm output power at 20 GHz
- Internal pulse generator



HP 83753B

### HP 83750 Series Sweepers



5

The HP 83750 sweepers bring outstanding synthesized performance to the component-test marketplace. They deliver the best performance for the price in general-purpose benchtop, swept test, or scalar applications.

The latest technological advances in fundamental oscillator design provide up to 20 GHz of frequency coverage with superior harmonic suppression and no subharmonics. When this excellent spurious performance is combined with high-output power capabilities, high-measurement dynamic range is achieved.

The HP 83750 synthesized sweepers provide superior accuracy and stability while maintaining the speed of analog sources. Fully-synthesized CW, stepped, and ramp sweep modes are available in broadband and narrowband operation. The synthesis capabilities are particularly useful for the characterization of narrowband devices, in which the frequency instabilities of open-loop sources become most apparent.

Excellent output-power flatness and accuracy can be translated to the input port of the device-under-test with the power flatness correction feature of these sources. This feature uses a power meter to create an array of power corrections that compensate for power variations in the measurement path between the source and the test device.

Swept testing of frequency translation devices can be achieved simply and economically with the HP 83570 series synthesized sweepers. A traditionally difficult measurement, sweeping the RF and local oscillator (LO) input ports at a fixed offset over a wide frequency span, is easy to implement with superior frequency accuracy by positioning two synchronously tracking HP 83750s in a two-tone configuration. With broadband frequency coverage and excellent performance, the HP 83750 synthesized sweepers are ideal stimuli for frequency translation measurements.

The HP 83750 series make optimal companion sources for scalar-measurement applications. Full compatibility is available via the HP 8757 system interface bus. The HP 8757D scalar analyzer and HP 83750 series have a complementary design that achieves superior frequency accuracy, power accuracy and flatness while significantly reducing measurement uncertainty. In addition, the HP 83750's high-power and low-harmonic capabilities increase the spurious-free measurement dynamic range of scalar systems. Ten independent, continuously variable markers and a marker sweep function allow fast, efficient analysis of the test device at or between critical measurement frequencies. CW, stepped, ramp, or power sweep modes are available for device characterization. A 25 dB power sweep range is particularly useful for compression measurements of active devices such as amplifiers and mixers.

The high-power models HP 83751B and 83752B provide +17 dBm output power with  $-20$  dBc harmonics from 2 to 20 GHz. This high-power capability eliminates the need to externally amplify the signal for test devices that require high-input power levels. When Option 1EE (source module interface connector and extension cable) is added, these sources can directly drive the HP 83550 series mm-wave source modules to provide waveguide frequency coverage up to 110 GHz. All HP 83750 sweepers with Option 1EE automatically provide bias, power flatness correction, and internal leveling for the HP 83550 series source modules.

HP 83750 sweepers offer two operating languages to ensure compatibility with instruments today and in the future. The default language is SCPI (Standard Command for Programmable Instruments), an industry standard. The second operating language employs HP 8350 mnemonics to provide programming compatibility with HP 8350-based measurement systems.

## Specifications

### Frequency Characteristics

**Frequency Range**  
**HP 83751B:** 2 to 20 GHz  
**HP 83752B:** 0.01 to 20 GHz

### Internal Reference Oscillator

**Frequency:** 10 MHz

#### Timebase Stability

**Standard Timebase:**  $\pm 10 \times 10^{-6}$   
**High-Stability Timebase (Option 1E5)**  
**Aging Rate:**  $5 \times 10^{-10}$ /day;  $1 \times 10^{-7}$ /year  
**Temperature Effects:**  $1 \times 10^{-10}$ /°C  
**Line Voltage Effects:**  $5 \times 10^{-10}$  (10° change in voltage)

#### CW and Manual Modes

**Accuracy:** Stability  $\times f_c$ , time base  
**Resolution:** 1 Hz  
**Switching Time (typical):** 70 ms max.

#### Ramp Sweep Mode

**Accuracy<sup>1,2</sup>:** The greater of  $\pm 0.01\%$  of span  $\pm$  timebase stability  $\times f_c$ , or  $\pm 75$  kHz  $\pm$  timebase stability  $\times f_c$ .  
**Sweep Time:** 10 ms to 100 s; 50 ms for full span  
**Resolution:** 1 kHz

#### Step Sweep Mode

**Accuracy:** Timebase stability  $\times f_c$ .  
**Number of Points:** 2 to 1601  
**Switching Time (typical)<sup>3</sup>:** 7 ms  $\pm$  8 ms/GHz step

### Output Power Characteristics

#### Maximum Leveled Power<sup>1,4</sup>

**HP 83751A, 83752A:** 10 dBm  
**HP 83751B, 83752B:** 17 dBm (16 dBm < 2 GHz on HP 83752B)

#### Minimum Settable Power

**HP 83751A, 83752A:** -15 dBm (-85 dBm w/Option 1E1)  
**HP 83751B, 83752B:** -10 dBm (-80 dBm w/Option 1E1)

**Resolution:** 0.01 dB settable

#### Accuracy<sup>1</sup>

**HP 83751A, 83752A only:**  $\pm 1.0$  dB (levels > -10 dBm)  
**HP 83751A/B, 83752A/B:**  $\pm 1.5$  dB (levels > -75 dBm)

#### Flatness

**HP 83751A, 83752A only:**  $\pm 0.7$  dB (levels > -10 dBm)  
**HP 83751A/B, 83752A/B:**  $\pm 1.3$  dB (levels > -75 dBm)

**Power Sweep Range:** 25 dB/sweep

**Power Slope Range:** 0 to  $\pm 2$  dB/GHz, 25 dB max

**Source Match (typical):** < 1.7:1 SWR

### Spectral Purity

#### Harmonics

**HP 83751A, 83752A:** -45 dBc (-30 dBc < 1.5 GHz on HP 83752A)  
**HP 83751B, 83752B:** -20 dBc  
**Subharmonics:** None  
**Non-Harmonic Spurious<sup>5</sup>:** -50 dBc  
**Residual FM:** 1 kHz RHS in CW mode (0.05 to 15 kHz BW)  
**Phase Noise (typical):** < -75 dBc/Hz at 10 GHz in CW mode, 10 kHz offset

### Modulation

#### External AM (typical)

**Sensitivity:** 1 dB/V  
**3 dB Bandwidth:** > 100 kHz, usable to 1 MHz

#### Depth

**HP 83751A, 83752A:** 20 dB (-10 to +10 dBm)  
**HP 83751B, 83752B:** 22 dB (-5 to +17 dBm)  
**Input Impedance:** 3.5  $\Omega$

#### External FM (typical)

##### DC/Unlocked Mode

**Rates:** dc to 10 MHz  
**Maximum Deviation**  
 dc to 100 Hz Rates:  $\pm 75$  MHz  
 100 Hz to 1 MHz Rates:  $\pm 7$  MHz  
 1 to 2 MHz Rates:  $\pm 5$  MHz  
 2 to 10 MHz Rates:  $\pm 1$  MHz

##### AC/Locked Mode

**Rates:** 50 kHz to 10 MHz  
**Maximum Deviation:** Same as unlocked mode up to 25 x rate

#### Pulse (typical)

**On/Off Ratio:** 60 dB

##### Rise/Fall Times

50 MHz to 2 GHz: 15 ns  
 2 to 20 GHz: 100 ns rise/50 ns fall

**Minimum Pulse Width:** 2  $\mu$ s

##### Internal Pulse Generation

**Width Range:** 1  $\mu$ s to 65 ms  
**Period Range:** 2  $\mu$ s to 65 ms  
**Resolution:** 1  $\mu$ s

**Internal Square Wave:** 1 kHz and 27.8 kHz (scalar analyzer mode)

### General

**Bandwidth Points:** 2 GHz, 3.75 GHz, 6.75 GHz, and 11 GHz.  
 The 3.75 and 6.75 GHz synthesizer switch will disappear if sweep is < 0.8 of an octave in the 2 to 11 GHz band.

**RF Output Connector:** 3.5 mm

**Option 1ED:** Type-N

**Operating Temperature Range:** 0° to 55° C

**Weight:** Net 16 kg (35 lb)

**Size:** 425 W mm x 133 H mm x 483 D mm (16.75 in x 5.25 in x 19 in)

### Key Literature

HP 83751A/B and HP 83752A/B Synthesized Sweepers  
 Technical Data, p/n 5091-5908E

### Ordering Information

**HP 83751A** 2 to 20 GHz Synthesized Sweeper

**HP 83751B** 2 to 20 GHz Synthesized Sweeper (High Power)

**HP 83752A** 0.01 to 20 GHz Synthesized Sweeper

**HP 83752B** 0.01 to 20 GHz Synthesized Sweeper (High Power)

The following options apply to all models:

**Opt 1E1** 70 dB Step Attenuator  
**Opt 1E4** Rear-Panel RF Output  
**Opt 1E5** High-Stability Time Base  
**Opt 1ED** Type-N Connector Output  
**Opt 1EE** Source Module Interface Connector and Extension Cable

<sup>1</sup> For operating temperatures of 25  $\pm$  5° C.

<sup>2</sup> For 100 ms sweep times; improves with slower sweeps.

<sup>3</sup> Up to 50 ms switching times can occur when crossing the 2 GHz band switch point.

<sup>4</sup> Option 1E1 reduces output power up to 1 dB.

<sup>5</sup> For spurs > 500 kHz from output frequency.

HP 83751A  
 HP 83751B  
 HP 83752A  
 HP 83752B

5