

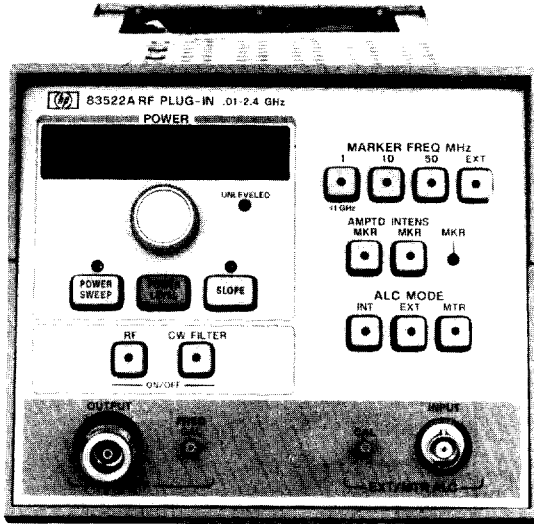


# SWEEP OSCILLATORS

## Model 8350 Series: Broadband RF Plug-Ins (cont.)

Models 83522A, 83525A and 83525B

- 10 MHz 2.4 GHz and 10 MHz 8.4 GHz in one continuous sweep
- Calibrated output power
- Power sweep



HP 83522A

Broadband frequency measurements may be made with the HP 83522A (10 MHz to 2.4 GHz) plug-in and the HP 83525A/B (10 MHz to 8.4 GHz) plug-in. These plug-ins have similar functions as well as individual merits which are all described in the following article.

### HP 83522A

The HP 83522A uses a heterodyne circuit to provide high performance 10 MHz to 2.4 GHz frequency coverage. This frequency range is covered in one continuous sweep having excellent frequency characteristics. Frequency accuracy is maintained within 5 MHz and the linearity is within 2 MHz over the full band. The power output is internally leveled to  $\pm 0.25$  dB flatness over the entire 10 MHz to 2.4 GHz range while maintaining a power level  $\geq 13$  dBm.

### HP 83525A/B

The HP 83525A/B cover the frequency range of 10 MHz to 8.4 GHz with excellent frequency stability, accuracy, and output power. This wide frequency range is created by automatically switching two bands together with a PIN diode switch. The lower frequency band covers 0.01–2.1 GHz which results from a heterodyne circuit. The upper frequency band is produced by a 2–8.4 GHz YIG oscillator. This 0.1 GHz frequency overlap is provided to enable smooth, narrowband sweeps around the switch point. On a full band sweep (10 MHz to 8.4 GHz) the band discontinuity at the switch point is typically  $< 8$  MHz. The HP 83525A/B maintain excellent frequency parameters with a lower band accuracy within  $\pm 5$  MHz and an upper band accuracy within  $\pm 12$  MHz. Full band frequency linearity is  $\pm 3$  MHz while the lower band maintains a linearity of  $\pm 2$  MHz.

The HP 83525A plug-in, with its extremely broad frequency range, does not sacrifice power. This plug-in provides at least +13 dBm of output power while being internally leveled to a flatness of  $\pm 1$  dB.

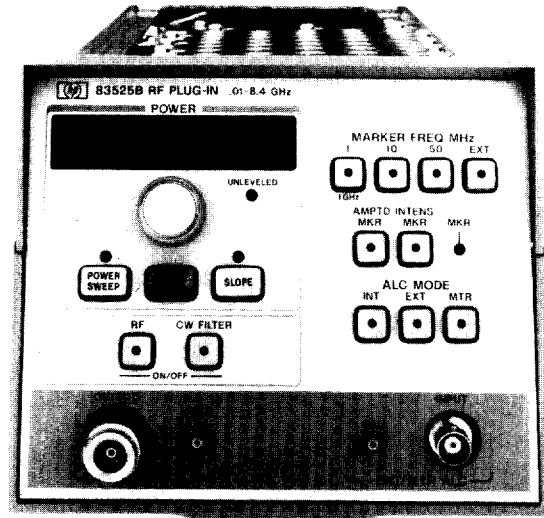
The HP 83525B plug-in provides the same outstanding specifications as the HP 83525A plus 45 dBc harmonics for maximum dynamic range in RF component and system measurements.

## HP 83522/83525 Common Features

### Crystal Marker Capability

A powerful feature offered by the HP 83522A and the HP 83525A/B is Crystal Marker capability. This capability provides harmonic markers at 10 or 50 MHz intervals over the full range of the HP 83522A and below 2 GHz with the HP 83525A/B. In addition, 1 MHz harmonic markers are available below 1 GHz with all three

- 1, 10, and 50 MHz crystal markers
- HP 83525B with  $< -45$  dBc harmonics from 2.8–8.4 GHz
- Complete HP-IB programmability



HP 83525B



plug-ins. These markers may be seen as either intensity spots or amplitude dips. The amplitude markers are compatible with the HP 8756A and 8757A Scalar Network Analyzers. These crystal markers simplify and speed up precision frequency measurements.

### Power Output

The HP 83522A and the HP 83525A/B plug-ins have a calibrated output power range of typically 15 dB that may be extended to  $> 80$  dB with Option 002 (70 dB attenuator). The output power level accuracy is within 1 dB on the HP 83522A and within 1.5 dB on the HP 83525A/B. The front panel digital resolution enables the power to be manually set to a 0.1 dB resolution. The power may be remotely HP-IB programmed to 0.02 dB resolution.

These plug-ins also offer a variety of power functions. An innovative feature offered on these plug-ins is Power Sweep, which sweeps the output power from one level to another. With this function, power response measurements may be made in a single test. Slope compensation is provided for situations that involve lossy cables or test setups. This function slopes the power to compensate for high frequency losses via a "Slope" control.

### Programmability

The HP 83522A and the HP 83525A/B are completely programmable plug-ins. This infers that the power level, power mode (Power Sweep, Slope, etc.), crystal markers and other plug-in functions may be externally controlled via the HP-IB. Programmability is a key feature for automatic test systems or production environments requiring multiple, repetitive tests.

### Network Measurements

Increased dynamic range scalar measurements can be made using either the HP 83522A or the 83525A with the HP 8756A or the HP 8757A Scalar Network Analyzer. The dynamic range is increased by internally modulating the RF output with the required 27.8 kHz square wave (produced by the HP 8350). This causes the output to be modulated before it is passed through the output amplifier, thereby avoiding modulation of the amplifier noise. The advantage of increased dynamic range is complemented by the simple interface between the sweep oscillator and the HP 8756A. In addition, these plug-ins are directly compatible with the HP 8510 and the HP 8410s' Network Analyzer, for vector and scalar measurements, the HP 8970A Noise Figure Meter for noise level analysis, and the HP 5344S Synchronizer for phase-lock applications.

### Frequency Characteristics

Range	HP 83522A	HP 83525A/B	
	0.01-2.4 GHz	0.01-2 GHz	2-8.4 GHz
<b>Accuracy*</b> (25°C ±5°C) CW Mode: Typically: All Sweep Modes Linearity Typically:	±5 MHz ±1.5 MHz ±15 MHz ±2 MHz	±5 MHz ±1.5 MHz ±15 MHz ±2 MHz	±12 MHz ±3.5 MHz ±20 MHz ±3 MHz
<b>Stability</b> With Temperature: Typically With 10% Line Voltage Change: With 10 dB Power Level Change: With 3:1 Load SWR: With Time (in 10 minute period after one hour warmup at the same frequency setting): Typically Residual FM (10 Hz-10 KHz Bandwidth), peak	±200 kHz/°C ±20 kHz ±100 kHz ±10 kHz ≤±100 kHz <5 kHz	±200 kHz/°C ±20 kHz ±100 kHz ±10 kHz ≤±100 kHz <5 kHz	±200 kHz/°C ±20 kHz ±1 MHz ±250 kHz ≤±200 kHz <7 kHz

### Output Characteristics

	HP 83522A	HP 83525A/B	
	0.01-2.4 GHz	0.01-2 GHz	2-8.4 GHz
<b>Maximum Leveled Output Power</b> (25°C ± 5°C) With Option 002	+20 mW +20 mW	+20 mW +20 mW	+20 mW/10 mW +20 mW/10 mW
<b>Power Level Accuracy</b> (Internally Leveled): Attenuator Accuracy (per 10 dB step, typical): <b>Calibrated Range:</b> With Option 002: <b>Resolution (displayed):</b> <b>Remote Programming (Settable):</b>	±1 dB ±0.3 dB 15 dB 85 dB 0.1 dB ±0.01 dB	±1.5 dB ±0.3 dB 15 dB 85 dB 0.1 dB ±0.01 dB	±1.5 dB ±0.3 dB 15 dB 85 dB 0.1 dB ±0.01 dB
<b>Power Variation (Max. Rated Pwr)</b> Internally Leveled: Externally Leveled (Excludes Coupler/Detector Variation) For Negative Crystal Detector and HP 432A/B/C Power Meter: With Temperature:	±0.25 dB ±0.1 dB ±0.02 dB/°C	±1 dB ±0.1 dB ±0.02 dB/°C	±1 dB ±0.1 dB ±0.02 dB/°C
<b>Residual AM in 100 kHz Bandwidth:</b>	<-50 dBc	<-50 dBc	<-50 dBc
<b>Spurious Signals</b> Harmonics (for 10 mW output pwr): Typical: Non-Harmonics: Typical:	<-25 dBc <-30 dBc <-25 dBc <-30 dBc	<-25 dBc** <-30 dBc <-30 dBc <-35 dBc	<-25 dBc/ 45 dBc <-30 dBc/50 dBc <-60 dBc <-60 dBc
<b>Output VSWR (internally leveled)</b>	<1.5	<2.0	<1.6

**Unleveled indicator:** lights when RF power level is set too high to permit leveling over sweep range selected.

**Impedance:** 50 Ω nominal

#### Power Sweep

**Calibrated range:** 15 dB

**Accuracy (including linearity):** <±1.5 dB typical

**Resolution:** 0.1 dB

#### Slope Compensation

**Calibrated range:** up to 5 dB/GHz (10 dB over full range, typically 15 dB)

**Linearity:** <0.2 dB typical

**Resolution:** 0.01 dB/GHz

### Modulation Characteristics

#### External AM

**Frequency response:** 100 kHz typically

**Input impedance:** Approximately 10 kΩ

**Range of amplitude control:** 15 dB typically

**Sensitivity:** 1 dB/V typically

**Maximum input:** 15 V

**Pulse modulation:** (HP 83525A/B, 2-8.4 GHz)

**Rise/fall time:** 20 ns typically

**Minimum pulse width:** Leveled: 1 μs (HP 83525A), 5 μs (HP 83525B) typically  
Unleveled: 100 ns typically

\*When calibrated using internal crystal markers and FREQ CAL adjustment.

\*\*83525A harmonics <- 20 dBc for 20 mW output power.

#### Internal AM

Selectable (by internal jumper in HP 8350) to 1 kHz or 27.8 kHz square-wave modulation. 27.8 kHz modulation guarantees operation with HP 8755 Frequency Response Test Set.

**On/Off Ratio:** ≥ 30 dB (> 40 dB above 2 GHz)

#### External FM

##### Maximum Deviations for Modulation Frequencies

**DC to 100 Hz:** ±75 MHz

**100 Hz to 1 MHz:** ±7 MHz

**1 MHz to 2 MHz:** ±5 MHz

**2 MHz to 10 MHz:** ±1 MHz

##### Sensitivity

**FM Mode:** -20 MHz/V typical

**Phase-lock mode:** -6 MHz/V typical

**Input impedance:** 2 kΩ nominal

**Frequency response (dc to 2 MHz):** ±3 dB

### Crystal Marker Capability

**Internal crystal markers:** Harmonic markers of 10 and 50 MHz are available over the full range of the HP 83522A and below 2 GHz with HP 83525A/B. 1 MHz harmonic markers are available below 1 GHz with the HP 83522A and 83525A/B. Markers are output as intensity spots through the POS Z BLANK connector on the HP 8350 or as amplitude dips on the RF output.

**Accuracy of center frequencies (25°C):** ±5 × 10<sup>-6</sup>

##### Typical Marker Width Around Center Frequency

**1 MHz Markers:** ±100 kHz

**10 MHz Markers:** ±200 kHz

**50 MHz Markers:** ±300 kHz

**Temperature stability:** ±2 × 10<sup>-6</sup>/°C typical

**External marker input:** generates amplitude or Z-axis marker when sweep frequency equals external input frequency.

**Frequency range:** .01 to 2.4 GHz (2.0 GHz for HP 83525A/B)

**Marker width:** ±300 kHz

**Marker indicator light:** LED lights when coincident with crystal or external marker for accurate CW calibration.

### General Specifications

#### Sweep Time (minimum over full band)

**HP 83522A (.01-2.4 GHz):** 10 ms

**HP 83525A/B (.01-8.4 GHz):** 17 ms

**Switch points (HP 83525A/B only):** low band .01-2.1 GHz, high band 2.0-8.4 GHz. Internal band switch point at 2.0-2.1 GHz.

**Frequency reference output:** nominal 1 V/GHz (over full sweep range); ±10 mV rear panel BNC output.

**RF Output connector:** type N female

**Weight:** net, 4.5 kg (10 lb); shipping, 7.7 kg (17 lb)

#### Improved Network Measurement Capabilities

The HP 83522A and 83525A/B are compatible with the:

HP 8510 Network Analyzer

HP 8410 Network Analyzer

HP 8757A Scalar Network Analyzer

HP 8756A Scalar Network Analyzer

HP 8970A Noise Figure Meter (frequencies >2 GHz)

HP 8709A Phase-lock Synchronizer

HP 5344S Source Synchronizer

### Ordering Information

**HP 83522A +13 dBm .01-2.4 GHz RF Plug-in**

#### Price

\$8,170

#### Options

**002:** Programmable 70 dB Step Attenuator (10 dB steps) add \$1,005

**004:** Rear Panel RF Output add \$200

**HP 83525A +13 dBm .01-8.4 GHz RF Plug-in** \$13,540

**HP 83525B +10 dBm .01-8.4 GHz RF Plug-in** \$15,540

#### Options

**002:** Programmable 70 dB Step Attenuator (10 dB steps) add \$1,105

**004:** Rear Panel RF Output add \$200