

# Frequency

Specifications describe warranted instrument performance over the 0 to 55°C temperature range, except as noted otherwise. Specifications apply after Full User Calibration, and in coupled attenuator mode of operation (ALC level greater than -10 dBm). Supplemental characteristics, denoted typical or nominal, are intended to provide information useful in applying the instrument, but are non-warranted parameters.

<b>Range</b>	HP 83620A:	10 MHz to 20 GHz
	HP 83622A:	2 to 20 GHz
	HP 83623A:	10 MHz to 20 GHz High Power
	HP 83624A:	2 to 20 GHz High Power
	HP 83640A:	10 MHz to 40 GHz
	HP 83642A:	2 to 40 GHz

<b>Resolution</b>	Standard:	1 kHz
	Option 008:	1 Hz

## Frequency Bands (for CW signals)<sup>1</sup>:

Band	Frequency Range	n
0	10 MHz to <2.3 GHz	1
1	2.3 to <7 GHz	1
2	7 to <12.5 GHz	2
3	12.5 to 20 GHz	3
4	>20 to <25.5 GHz	4
5	25.5 to <32 GHz	6
6	32 to 40 GHz	6

## CW and Manual Sweep Modes

**Accuracy:** Same as time base

### Internal 10 MHz Time Base

#### Accuracy

Calibration ± Aging Rate ± Temperature Effects ± Line Voltage Effects

#### Stability

Aging Rate:  $5 \times 10^{-10}$ /day,  $1 \times 10^{-7}$ /year

With Temperature:  $1 \times 10^{-10}/^{\circ}\text{C}$ , typical

With Line Voltage:  $5 \times 10^{-10}$  for line voltage change of 10%, typical

### Switching Time

For Steps Within a Frequency Band: 15 ms + 5 ms/GHz step size

Maximum, or Across Band Switchpoints: 70 ms

Step or List Modes (steps ≤100 MHz within a frequency band): 5 ms

## Swept Mode

**Accuracy** (sweep times ≥100 ms and ≤5 s)

### Upper Frequencies ≤20 GHz

Sweep Widths ≤n x 10 MHz: 0.1% of sweep width ± time base accuracy

Sweep Widths >n x 10 MHz and ≤300 MHz: 1% of sweep width

Sweep Widths >300 MHz and ≤3 GHz: 3 MHz

Sweep Widths >3 GHz: 0.1% of sweep width

### Upper Frequencies >20 GHz

Sweep Widths ≤n x 10 MHz: 0.1% of sweep width ± time base accuracy

Sweep Widths >n x 10 MHz and ≤600 MHz: 1% of sweep width

Sweep Widths >600 MHz and ≤6 GHz: 6 MHz

Sweep Widths >6 GHz: 0.1% of sweep width

**Sweep Time:** 10 ms to 100 seconds, 300 MHz/ms maximum rate

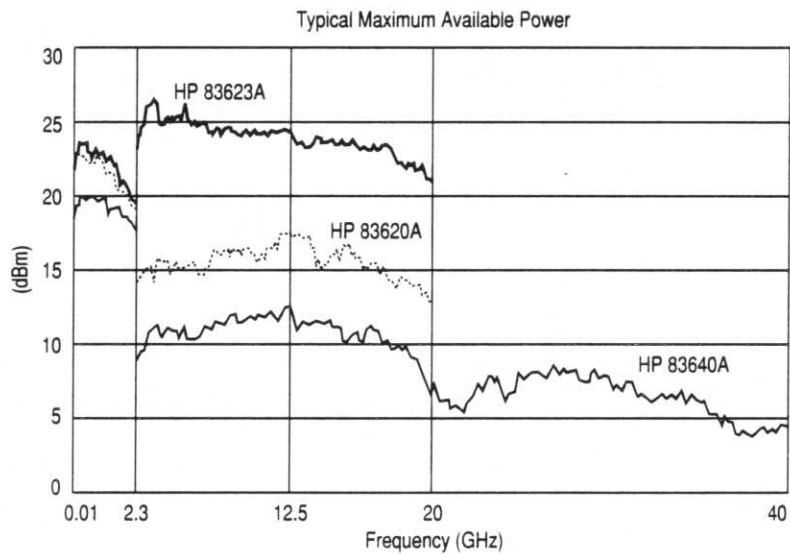
<sup>1</sup> In models with a lower frequency limit of 2 GHz, band 0 does not exist and band 1 begins at 2.0 GHz.

# RF Output

## Output Power

Maximum Levelled (dBm) <sup>2</sup>	Standard	Option 006
HP 83620A, 83622A	+10	+13
HP 83623A	+17	
HP 83624A	+20	
HP 83640A, 83642A		
Output Frequencies <12.5 GHz	+7	+10
Output Frequencies ≥12.5 and ≤20 GHz	+2	+7
Output Frequencies >20 GHz	+2	+2

Option 001: Lowers maximum levelled output power by 1.5 dB to 20 GHz, and 2 dB above 20 GHz.



### Minimum Settable

Standard: -20 dBm

Option 001: -110 dBm

**Resolution:** 0.02 dB

**Switching Time** (without attenuator change): 10 ms, typical

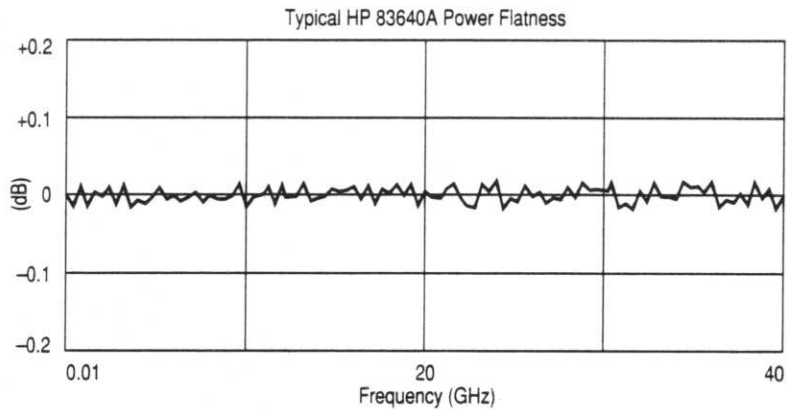
**Temperature Stability:** 0.01 dB/°C, typical

<sup>2</sup> Specification applies over the 0 to 35°C temperature range (0 to 25°C for output frequencies >20 GHz). Maximum levelled output power over the 35 to 55°C temperature range typically degrades by less than 2 dB.

	HP 83620A HP 83622A	HP 83623A HP 83624A	HP 83640A HP 83642A
<b>Accuracy (dB)<sup>3</sup>:</b>			
<b>Output Frequencies</b>			
<b>&lt;2.3 GHz</b>			
Power Levels >+10 dBm	±1.2	±1.2	±1.4
Power Levels >-10 dBm <sup>4</sup>	±0.6	±0.6	±0.8
Power Levels >-60 dBm	±0.9	±0.9	±1.1
Power Levels ≤-60 dBm	±1.4	±1.4	±1.6
<b>Output Frequencies</b>			
<b>≥2.3 and ≤20.0 GHz</b>			
Power Levels >+10 dBm	±1.3	±1.3	±1.3
Power Levels >-10 dBm <sup>4</sup>	±0.7	±0.7	±0.7
Power Levels >-60 dBm	±1.0	±1.0	±1.0
Power Levels ≤-60 dBm	±1.5	±1.5	±1.5
<b>Output Frequencies</b>			
<b>&gt;20.0 GHz</b>			
Power Levels >-10 dBm <sup>4</sup>			±0.9
Power Levels >-60 dBm			±1.2
Power Levels ≤-60 dBm			±1.7
<b>Flatness (dB):</b>			
<b>Output Frequencies</b>			
<b>&lt;2.3 GHz</b>			
Power Levels >+10 dBm	±0.9	±0.9	±1.1
Power Levels >-10 dBm	±0.5	±0.5	±0.7
Power Levels >-60 dBm	±0.7	±0.7	±0.9
Power Levels ≤-60 dBm	±1.1	±1.1	±1.3
<b>Output Frequencies</b>			
<b>≥2.3 and ≤20.0 GHz</b>			
Power Levels >+10 dBm	±1.0	±1.0	±1.0
Power Levels >-10 dBm	±0.6	±0.6	±0.6
Power Levels >-60 dBm	±0.8	±0.8	±0.8
Power Levels ≤-60 dBm	±1.2	±1.2	±1.2
<b>Output Frequencies</b>			
<b>&gt;20.0 GHz</b>			
Power Levels >-10 dBm			±0.8
Power Levels >-60 dBm			±1.0
Power Levels ≤-60 dBm			±1.4

<sup>3</sup> Specifications apply over the 15 to 35°C temperature range for output frequencies <50 MHz. In models with a lower frequency limit of 2 GHz, specifications <2.3 GHz do not apply, and specifications ≥2.3 to ≤20.0 GHz apply over the range ≥2.0 to ≤20.0 GHz.

<sup>4</sup> Specifications apply over the 15 to 35°C temperature range and are degraded 0.3 dB outside of that range.



**Analog Power Sweep**

**Range:** -20 dBm to maximum available power, can be offset using step attenuator.

**External Leveling**

**Range**

At External HP 33330D/E Detector: -36 to +4 dBm

At External Leveling Input: -200  $\mu$ V to -0.5 volts

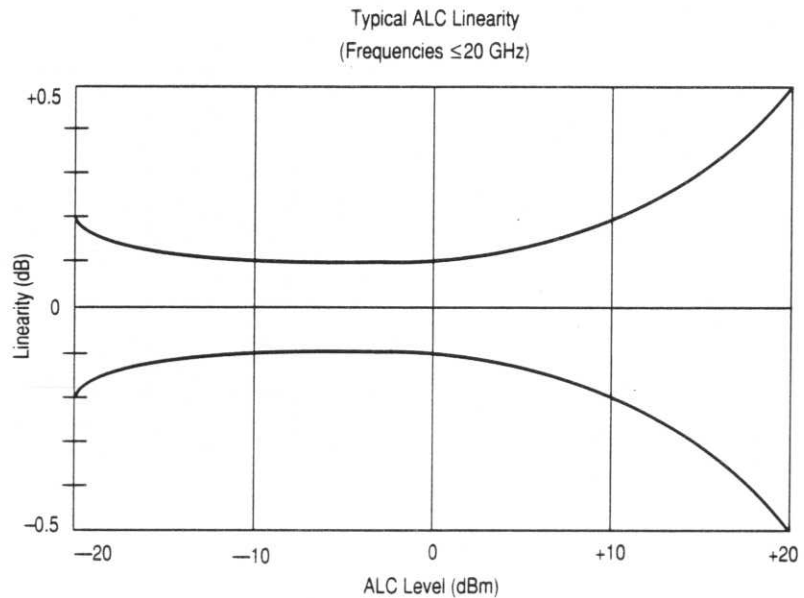
**Bandwidth**

External Detector Mode: 10 or 100 kHz (sweep speed and modulation mode dependent), nominal

Power Meter Mode: 0.7 Hz, nominal

**Source Match**

1.6:1 SWR (internally leveled), typical<sup>5</sup>



<sup>5</sup> Typically 1.8:1 SWR at frequencies below 2.3 GHz in HP 83640A/83642A.

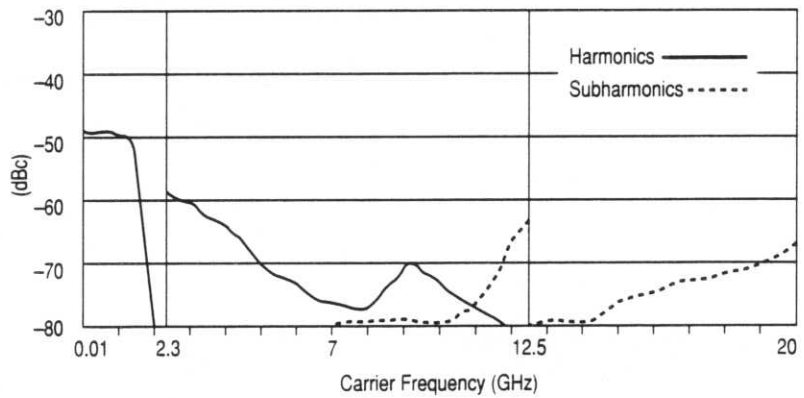
# Spectral Purity

## Spurious Signals (dBc)

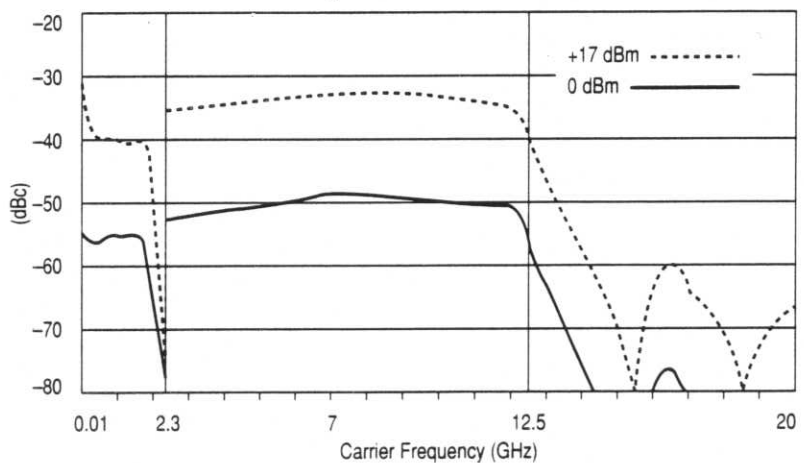
Specifications apply in CW, Step, List and Manual Sweep Modes of operation.

	HP 83620A	HP 83623A	HP 83640A
	HP 83622A	HP 83624A	HP 83642A
<b>Harmonics</b>			
<b>Output Frequencies &lt;1.8 GHz</b>			
Standard	-35	-25 <sup>6</sup>	-30 <sup>6</sup>
Option 006	-25		-25 <sup>6</sup>
<b>Output Frequencies ≥1.8 GHz</b>			
Standard	-50	-25	-50
Option 006	-20		-20

Typical HP 83620A Harmonics & Subharmonics



Typical HP 83623A Harmonics



<sup>6</sup> Specification is degraded 5 dB below 50 MHz.

	HP 83620A HP 83622A	HP 83623A HP 83624A	HP 83640A HP 83642A
<b>Subharmonics</b>			
<b>Output Frequencies</b> <b>&lt;7.0 GHz</b>	None	None	None
<b>Output Frequencies</b> <b>≥7.0 and ≤20.0 GHz</b>	-50	-50	-50
<b>Output Frequencies</b> <b>&gt;20.0 GHz</b>			-40
<b>Non-Harmonically-Related</b>			
<b>Output Frequencies</b> <b>&lt;2.3 GHz<sup>7</sup></b>	-60	-60	-54
<b>Output Frequencies</b> <b>≥2.3 and ≤20.0 GHz</b>	-60	-60	-60
<b>Output Frequencies</b> <b>&gt;20.0 GHz</b>			-54

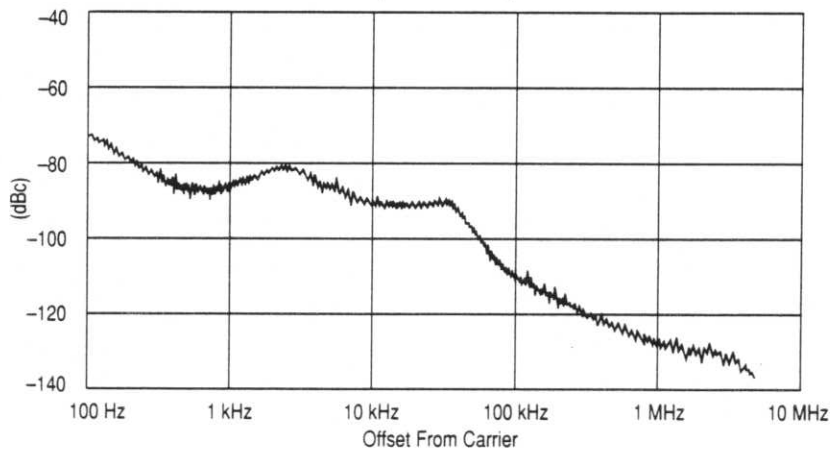
**Power-Line-Related (<300 Hz offset from carrier)**

Bands 0,1: -55  
 Band 2: -49  
 Band 3: -45  
 Band 4: -43  
 Bands 5,6: -39

**Single-Sideband  
 Phase Noise**  
 (dBc/Hz)

Band(s)	Offset from Carrier			
	100 Hz	1 kHz	10 kHz	100 kHz
0,1	-70	-78	-86	-107
2	-64	-72	-80	-101
3	-60	-68	-76	-97
4	-58	-66	-74	-95
5,6	-54	-62	-70	-91

Typical Phase Noise  
 (10 GHz Carrier)



**Residual FM**  
 (RMS, 50 Hz to 15 kHz bandwidth)

CW Mode or Sweep Widths ≤ n × 10 MHz: n × 60 Hz, typical  
 Sweep Widths > n × 10 MHz: n × 15 kHz, typical

<sup>7</sup> Specification applies at output levels 0 dBm and below.

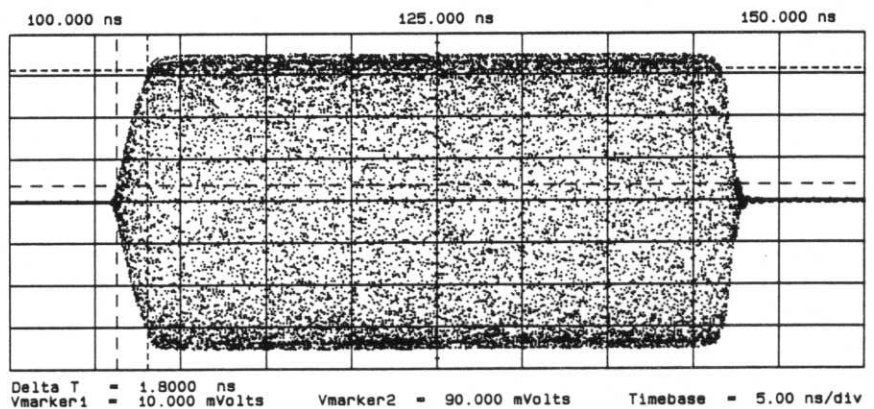
# Modulation

## Pulse

Pulse modulation specifications apply for output frequencies 400 MHz and above.

	Standard	Option 006
<b>On/Off Ratio</b>	80 dB <sup>8</sup>	80 dB
<b>Rise/Fall Times</b>	50 ns	10 ns
<b>Minimum Width</b>		
Internally Leveled	1 μs	1 μs
Unleveled		
Output Frequencies <2.3 GHz	100 ns	50 ns
Output Frequencies ≥2.3 GHz	100 ns	20 ns
<b>Minimum Repetition Frequency</b>		
Internally Leveled	10 Hz	10 Hz
Unleveled	DC	DC
<b>Level Accuracy</b> (dB, relative to CW level)		
Widths ≥1 μs	±0.3, leveled	±0.3, leveled
Widths <1 μs (Search mode)	±0.5, typical	±0.5, typical
<b>Video Feedthrough</b>		
Output Frequencies <2.3 GHz		
Power Levels ≤10 dBm	2%	2%
Power Levels >10 dBm	5%	5%
Output Frequencies		
≥2.3 GHz and ≤20.0 GHz	2 mv	20 mv
Output Frequencies >20.0 GHz	0.3%	2%
<b>Overshoot, Ringing</b>	15%, typical	10%, typical
<b>Delay</b>		
Output Frequencies <2.3 GHz	65 ns, typical	65 ns, typical
Output Frequencies ≥2.3 GHz	95 ns, typical	30 ns, typical
<b>Compression</b>	±10 ns, typical	±5 ns, typical

Typical Option 006 Pulse Envelope



### Internal Pulse Generator

Width Range: 1 μs to 65 ms  
Period Range: 2 μs to 65 ms  
Resolution: 1 μs

<sup>8</sup> In the HP 83623A/83624A, specification applies at ALC levels 0 dBm and above and over the 20 to 55°C temperature range. Specification degrades 5 dB below 20°C, and 1 dB per dB below ALC level 0 dBm in those models.

## AM and Scan

Bandwidth (3 dB)	Standard	Option 006
HP 83620A, 83622A	DC to 250 kHz	DC to 100 kHz
HP 83623A, 83624A	DC to 100 kHz	
HP 83640A, 83642A		
Output Frequencies $\leq 20$ GHz	DC to 250 kHz	DC to 100 kHz
Output Frequencies $> 20$ GHz	DC to 100 kHz	DC to 100 kHz

### Dynamic Range

(ALC levels noted, can be offset using step attenuator)

Normal Mode:  $-20$  dBm to 1 dB below maximum available power

Deep Mode<sup>9</sup>:  $-50$  dBm to 1 dB below maximum available power

Unleveled Mode<sup>10</sup>:  $-50$  dBm to 1 dB below maximum available power

### Sensitivity

Linear: 100%/volt

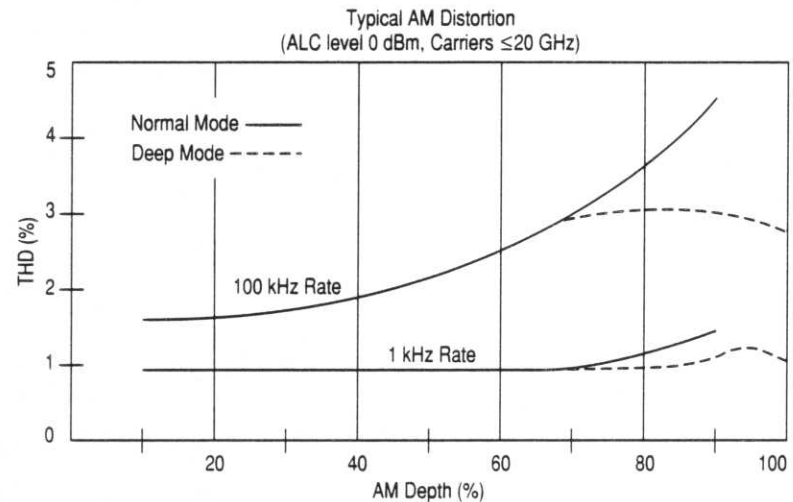
Accuracy (1 kHz rate, 30% depth): 5%

Exponential: 10 dB/volt

Accuracy:  $0.25$  dB  $\pm$  5% of depth in dB

Incidental Phase Modulation: 0.2 radians peak, typical

Incidental FM: Incidental phase modulation  $\times$  modulation rate, typical



<sup>9</sup> Deep mode offers reduced distortion for very deep AM. Waveform is DC-coupled and feedback-leveled at ALC levels above  $-13$  dBm. At ALC levels below  $-13$  dBm, output is DC-controllable, but subject to typical sample-and-hold drift of 0.25 dB/second.

<sup>10</sup> The HP 8360 has two unleveled modes, ALC Off and Search. In ALC Off mode, modulator drive can be controlled from the front panel to vary quiescent RF output level. In Search mode, the instrument microprocessor momentarily closes the ALC loop to find the modulator drive setting necessary to make the quiescent RF output level equal an entered value, then opens the ALC loop while maintaining that modulator drive setting. Neither of these modes is feedback leveled.



**FM Locked Mode**

Maximum Deviation:  $\pm 8$  MHz

Rates (6 dB bandwidth, 1 MHz deviation): 50 kHz to 10 MHz

Maximum Modulation Index (deviation/rate):  $n \times 5$

**Unlocked Mode**

Maximum Deviation

At Rates  $\leq 100$  Hz:  $\pm 75$  MHz

At Rates  $> 100$  Hz:  $\pm 8$  MHz

Rates (6 dB bandwidth, 1 MHz deviation): DC to 10 MHz

**Sensitivity**

100 kHz, 1 MHz, or 10 MHz/volt, switchable.

Accuracy (1 MHz rate, 1 MHz deviation): 10%

**Simultaneous  
Modulations**

Full AM bandwidth and depth is typically available at any pulse rate or width. FM is completely independent of AM and pulse modulation.

# General

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

**EMC:** Within limits of VDE 0871/6.78 Level B, FTZ 1046/1984, and Mil-Std-461B Part 7 RE02

**Warm-Up Time**    **Operation:** Requires 30 minute warm-up from cold start at 0 to 55°C. Internal temperature equilibrium reached after 2 hour warm-up at stable ambient temperature.

**Frequency Reference:** Reference time base is kept at operating temperature with the instrument connected to AC power. Instruments disconnected from AC power for more than 24 hours require 30 days to achieve time base aging specification. Instruments disconnected from AC power for less than 24 hours require 24 hours to achieve time base aging specification.

**Power Requirements**    48 to 66 Hz; 115 volts (+10/-25%) or 230 volts (+10/-15%); 400 VA maximum (30 VA in STANDBY).

## Weight & Dimensions

Net Weight: 27 kg (60 lb)  
Shipping Weight: 36 kg (80 lb)  
Dimensions: 178 H x 425 W x 648 mm D (7.0 x 16.75 x 25.5 inches)

## Adapters Supplied

### HP 83620A, 83622A, 83623A, 83624A

Type N (female) - 3.5mm (female)	Part Number 1250-1745
3.5 mm (female) - 3.5 mm (female)	Part Number 5061-5311

### HP 83640A, 83642A

2.4 mm (female) - 2.92 mm (female)	Part Number 1250-2187
2.4 mm (female) - 2.4 mm (female)	Part Number 1250-2188

## Inputs & Outputs

### **RF Output**

Nominal output impedance 50 ohms. (Precision 3.5 mm male on 20 GHz models, 2.4 mm male on 40 GHz models, front panel.)

### **External ALC Input**

Used for negative external detector or power meter leveling. Nominal input impedance 100 kohms, damage level  $\pm 15$  volts. See RF Output specifications. (BNC female, front panel.)

### **Pulse Input/Output**

TTL-low-level signal turns RF off. When using internal pulse generator, a TTL-level pulse sync signal preceding the RF pulse by nominally 80 ns is output at this connector. Nominal input impedance 50 ohms, damage level +5.5, -0.5 volts. See Modulation specifications. (BNC female, front panel.)

### **AM Input**

Nominal input impedance 50 ohms (internally switchable to 2 kohms), damage level  $\pm 15$  volts. See Modulation specifications. (BNC female, front panel.)

### **FM Input**

Nominal input impedance 50 ohms (internally switchable to 600 ohms), damage level  $\pm 15$  volts. See Modulation specifications. (BNC female, front panel.)

### **Trigger Input**

Activated on a TTL rising edge. Used to externally initiate an analog sweep or to advance to the next point in step or list mode. Damage level +5.5, -0.5 volts. (BNC female, rear panel.)

### **Trigger Output**

Outputs a one-microsecond-wide TTL-level pulse at 1601 points evenly spaced across an analog sweep, or at each point in step or list mode. (BNC female, rear panel.)

### **10 MHz Reference Input**

Accepts 10 MHz  $\pm 100$  Hz, 0 to +10 dBm reference signal for operation from external time base. Nominal input impedance 50 ohms. Damage level +10, -5 volts. (BNC female, rear panel.)

### **10 MHz Reference Output**

Nominal signal level 0 dBm, nominal output impedance 50 ohms. (BNC female, rear panel.)

### **Sweep Output**

Supplies a voltage proportional to the sweep ranging from 0 volts at start of sweep to +10 volts at end of sweep, regardless of sweep width. In CW mode, voltage is proportional to percentage of full instrument frequency range. Minimum load impedance 3 kohms. Accuracy  $\pm 0.25\%$ ,  $\pm 10$  mv, typical. (BNC female, rear panel.)

### **Stop Sweep Input/Output**

Sweep will stop when grounded externally. TTL-high while sweeping, TTL-low when HP 8360 stops sweeping. Damage level +5.5, -0.5 volts. (BNC female, rear panel.)

### **Z-Axis Blanking/Markers Output**

Supplies positive rectangular pulse (approximately +5 volts into 2 kohms) during the retrace and band switchpoints of the RF output. Also supplies a negative pulse (-5 volts) when the RF is at a marker frequency (intensity markers only). (BNC female, rear panel.)

### **Volts/GHz Output**

Supplies voltage proportional to output frequency at 0.5 volts/GHz (internally switchable to 0.25 or 1 volt/GHz). Maximum output 18 volts. Minimum load impedance 2 kohms. Accuracy  $\pm 0.5\%$ ,  $\pm 10$  mv, typical. (BNC female, rear panel.)

## Inputs & Outputs

(continued)

### Source Module Interface

Provides bias, flatness correction, and leveling connections to HP 83550-series millimeter-wave Source Modules. (Special, front and rear panels.)

### Auxiliary Interface

Provides control signal connections to HP 8516A S-parameter Test Set. (25-pin D-subminiature receptacle, rear panel.)

## Models

**HP 83620A** 10 MHz to 20 GHz

**HP 83622A** 2 to 20 GHz

**HP 83623A** 10 MHz to 20 GHz High Power

**HP 83624A** 2 to 20 GHz High Power

**HP 83640A** 10 MHz to 40 GHz

**HP 83642A** 2 to 40 GHz

## Options

### Option 001 Add Step Attenuator

With this option, minimum settable output power is -110 dBm. Maximum leveled output power is lowered by 1.5 dB to 20 GHz, and 2 dB above 20 GHz.

### Option 003 Delete Keyboard/Display

For security, tamper-resistance, and cost savings in automated system applications, this option deletes the keyboard and display. Option 003 does NOT move the front panel connectors to the rear panel, however, so in most cases, Option 004 should be ordered in conjunction with Option 003.

### Option 004 Rear Panel RF Output

Moves RF Output, External ALC Input, Pulse Input/Output, AM Input, and FM Input connectors to the rear panel.

### Option 006 Fast Pulse Modulation

Improves pulse rise/fall time to 10 ns. Also affects maximum leveled output power and harmonic performance. Not available on HP 83623A and HP 83624A.

### Option 008 1 Hz Frequency Resolution

Provides frequency resolution of 1 Hz.

### Option 700 MATE System Compatibility

Provides CIIL programming commands for MATE system compatibility.

### Option 806 Rack Slide Kit

Used to rack mount HP 8360 while permitting access to internal spaces.

### Option 908 Rack Flange Kit

Used to rack mount HP 8360 without front handles.

### Option 910 Extra Operating & Service Manuals

Provides a second copy of Operating and Service manuals.

### Option 913 Rack Flange Kit

Used to rack mount HP 8360 with front handles. Front handles are standard on the HP 8360.

### Option W30 Two Years Additional Return-To-HP Service

Does not include bi-annual calibration.