Frequency

Range

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 83630A: 10 MHz to 26.5 GHz
HP 83640A: 10 MHz to 40 GHz
HP 83650A: 10 MHz to 50 GHz

Resolution

Standard: 1 kHz
Option 008: 1 Hz

Frequency Bands (for CW signals)

Band	Frequency Range	n
0	10 MHz to < 2 GHz	1
1	2 GHz to < 7 GHz	1
2	7 GHz to < 13.5 GHz	2
3	13.5 GHz to < 20 GHz	3
4	20 GHz to < 26.5 GHz	4
5	26.5 GHz to < 33.4 GHz	6
6	33.4 GHz to < 38[1] GHz	6
7	38 GHz to 50 GHz	8

Frequency Modes:

CW and Manual Sweep

Accuracy: Same as time base

Switching Time
For Steps Within a Frequency Band: 15 ms + 5 ms/GHz step size
Maximum, or Across Band Switch Points: 50 ms
Step or List Modes within a frequency band: 5 ms + 5 ms/GHz step size

[1] This band is 33.4 GHz to 40 GHz on the HP 83640A.

Synthesized Step Sweep

Accuracy: Same as time base
Minimum Step Size: Same as frequency resolution
Number of Points: 2 to 801
Switching Time: Same as CW
Dwell Time: 100 μs to 3.2 s

Synthesized List Mode

Accuracy: Same as time base
Minimum Step Size: Same as frequency resolution
Number of Points: 1 to 801
Switching Time: Same as CW
Dwell Time: 100 μs to 3.2 s

Ramp Sweep Mode

Accuracy[2] (sweep time $\geq$ 100 ms and $\leq$ 5 s):
Sweep Widths $\leq$ n x 10 MHz: 0.1% of sweep width $\pm$ time base accuracy.
Sweep Widths > n x 10 MHz: Lesser of 1% of sweep width or n x 1 MHz + 0.1% of sweep width.
Sweep Time: 10 ms to 100 seconds, 300 MHz/ms maximum rate

Internal 10 MHz Time Base

Accuracy: Calibration $\pm$ Aging Rate $\pm$ Temperature Effects $\pm$ Line Voltage Effects
Stability
Aging Rate: 5 x 10^{-10}/day, 1 x 10^{-7}/year
With Temperature: 1 x 10^{-10}/°C, typical
With Line Voltage: 5 x 10^{-10} for line voltage change of 10%, typical

[2] **Sweeptime $\geq$ 150 ms and $\leq$ 5 s for Option 006 instruments.**

RF Output

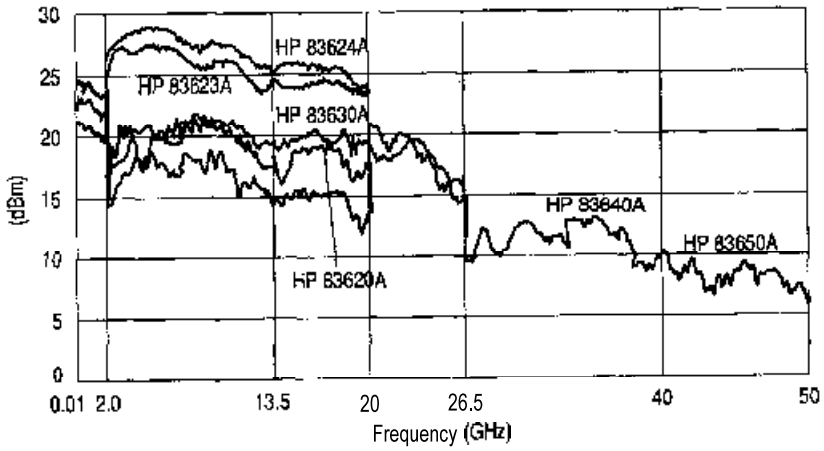
Output Power

Maximum Leveled[3]	Standard	Option 006
HP 83620A, 83622A	+13	+13
HP 83623A	+17	+17
HP 83624A	+20	+17
HP 83630A		
Output Frequencies < 20 GHz	+13	+13
Output Frequencies ≥ 20 GHz	+10	+10
HP 83640A		
Output Frequencies < 26.5 GHz	+10	+10
Output Frequencies > 26.5 GHz	+6	+6
HP 83650A		
Output Frequencies < 26.5 GHz	+10	+10
Output Frequencies ≥ 26.5 GHz and < 40 GHz	+5	+5
Output Frequencies ≥ 40 GHz	+2.5	+2.5

With attenuator (Option 001): Minimum settable output power is -110 dBm. Maximum leveled output power is reduced by 1.5 dB to 20 GHz, 2.0 dB above 20 GHz, and 2.5 dB above 40 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

Typical Maximum Available Power



[3] **Specification applies over the 0 to 35°C temperature range (0 to 25°C for output frequencies > 20 GHz). Maximum leveled output power over the 35 to 55°C temperature range typically degrades by less than 2 dB.**

Accuracy (dB)[4]

Specifications apply in CW, step, list, manual sweep, and ramp sweep modes of operation.

Frequency (GHz)

Power	< 2.0	> 2.0 and ≤ 20	> 2.0 and ≤ 40	> 40
> +10 dBm	±1.2	±1.3		
> -10 dBm[5]	±0.6	±0.7	±0.9	±1.7
> -60 dBm	±0.9	±1.0	±1.2	±2.0
< -60 dBm	±1.4	±1.5	±1.7	±2.5

Flatness (dB)

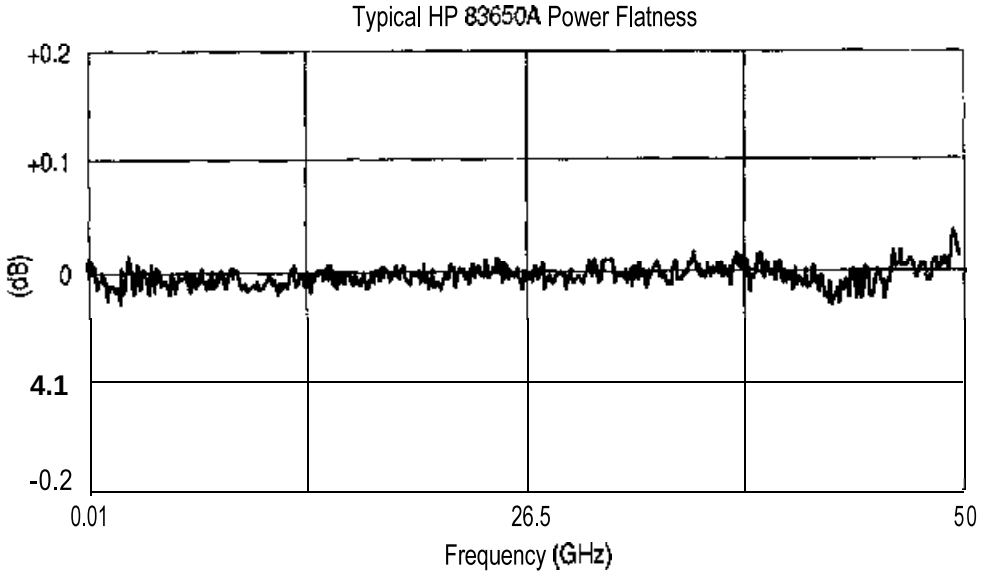
Specifications apply in CW, step, list, manual sweep, and ramp sweep modes of operation.

Frequency (GHz)

Power	< 2.0	≥ 2.0 and < 20	> 2.0 and < 40	> 40
> $10 dBm	±0.9	±1.0		
> -10 dBm[5]	±0.5	±0.6	±0.8	±1.5
> -60 dBm	±0.7	±0.8	fl.O	±1.7
< -60 dBm	±1.1	±1.2	±1.4	±2.1

[4] **Specification applies over the 15 to 35°C temperature range for output frequencies < 50 MHz.**

[5] **Specification applies 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 μV to -0.5 volts

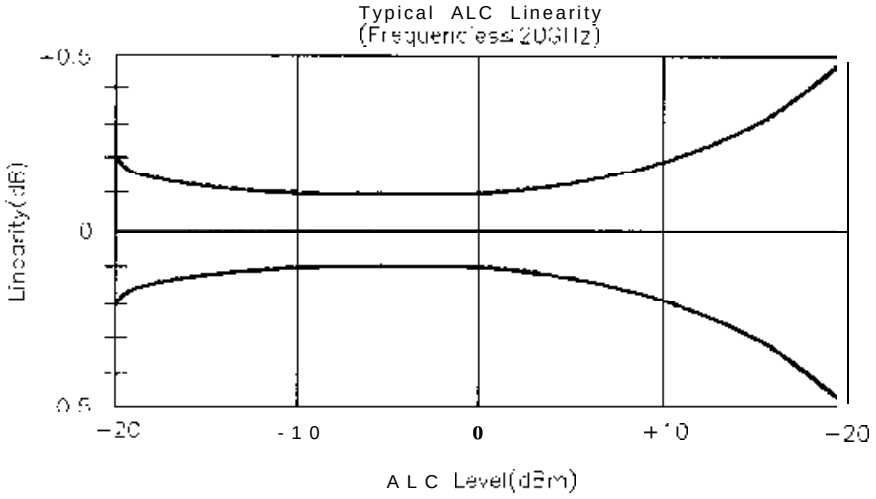
Bandwidth

External Detector Mode: 10 or 100 kHz (sweep speed and modulation mode dependent), nominal
Power Meter Mode: 0.7 Hz, nominal

Source Match

(internally leveled), typical[6]
< 20 GHz 1.6:1 SWR
< 40 GHz 1.8:1 SWR
< 50 GHz 2.0:1 SWR

[6] **Typically 2.0:1 SWR at frequencies below 50 MHz.**



Spectral Purity

Specifications apply in CW, step, list, and manual sweep modes of operation.

Spurious Signals

Harmonics

Output Frequencies	HP 83620A HP 83622A	HP 83623A HP 83624A	HP 83630A	HP 83640A	HP 83650A
< 2.2 GHz					
Standard	-30	−25[7]	-30	-307	-307
Option 006	−30[7]	−25[7]	-307	-307	-307
≥ 2.2 and < 26.5 GHz					
Standard	-50	-25	-50	-50	-50
Option 006	-60	-60	-60	-50	-50
≥ 26.5 GHz					
Standard				-40	-40
Option 006				-40	-40

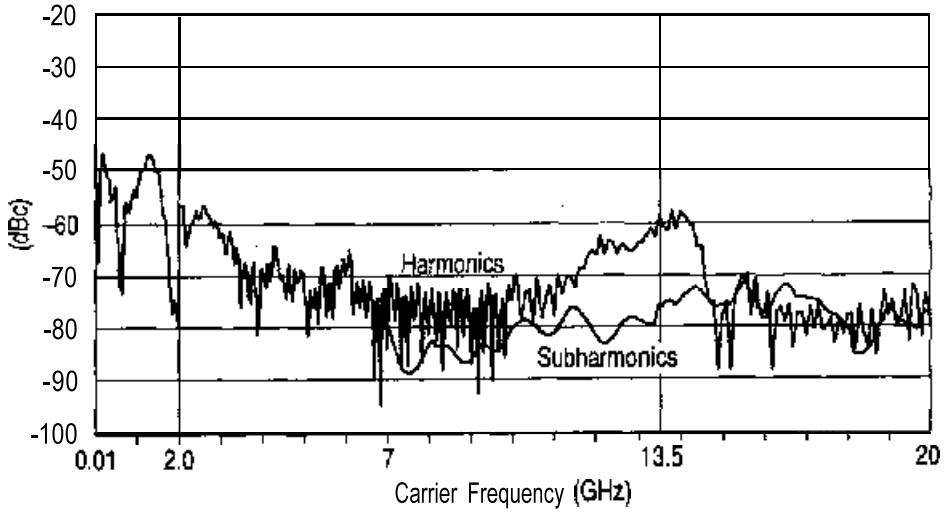
Subharmonics

output Frequencies	HP 83620A HP 83622A	HP 83623A HP 83624A	HP 83630A	HP 83640A	HP 83650A
< 7 GHz	None	None	None	None	None
≥7 and < 20 GHz	-50	-50	-50	-50	-50
> 20 and < 40 GHz			-50	−40[8]	−40[8]
> 40 GHz					−35[8]

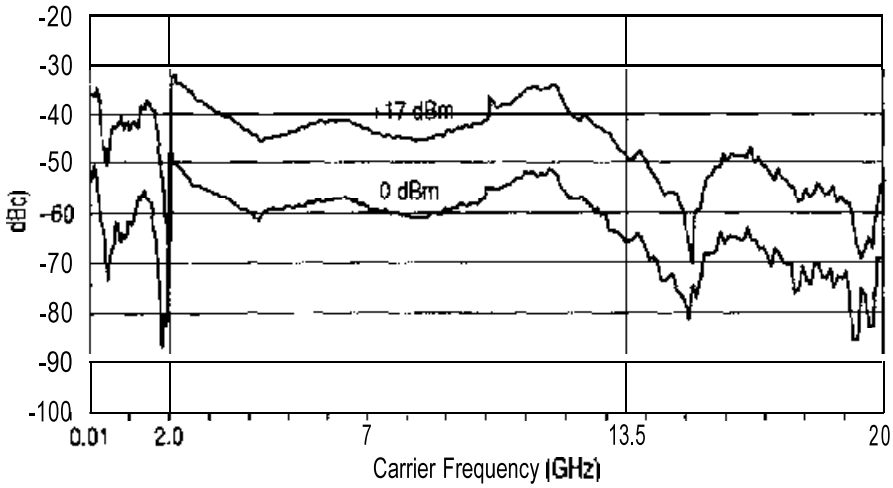
[7] Specification is -20 dBc below 60MHz.

[8] Specification typical below 0 dBm.

Typical HP 83620A Harmonics & Subharmonics



Typical HP 83623A Harmonics



Non-Harmonically Related

Output Frequencies:

< 2.0 GHz[9]	-60
≥ 2.0 and < 20 GHz	-60
≥ 20 GHz and ≤ 26.5 GHz	-58
> 26.5 and ≤ 40 GHz	-54
> 40 GHz	-52

[9] Specification applies at output levels 0 dBm and below.

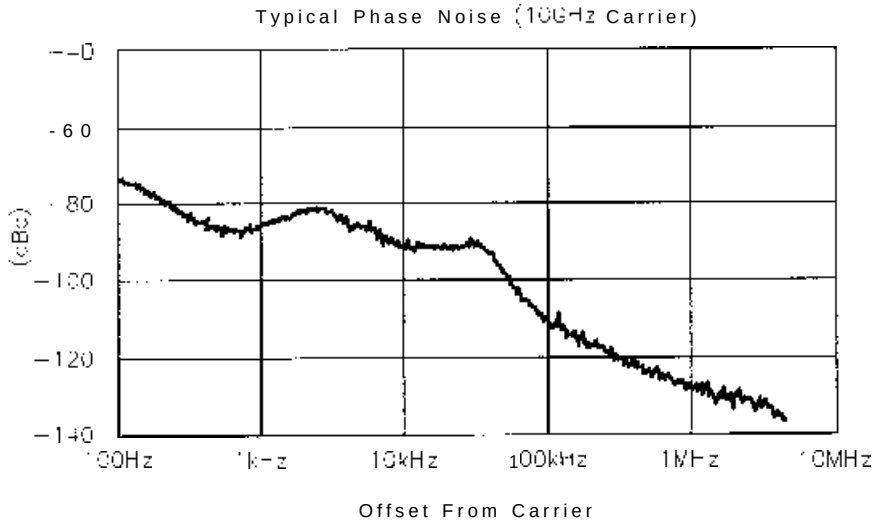
Power-Line Related (< 300 Hz offset from carrier)

10 MHz to < 7 GHz	-55
7 GHz to < 13.5 GHz	-49
13.5 GHz to 20 GHz	-45
> 20 GHz to < 26.5 GHz	-43
26.5 GHz to < 38 GHz[10]	-39
38 GHz to 50 GHz	-37

Single-Sideband Phase Noise (dBc/Hz)

Offset from Carrier

Band(s)	100 Hz	1 kHz	10 kHz	100 kHz
10 MHz to < 7 GHz	-70	-78	-86	-107
7 GHz to < 13.5 GHz	-64	-72	-80	-101
13.5 GHz to 20 GHz	-60	-68	-76	-97
> 20 GHz to < 26.5 GHz	-58	-66	-74	-95
26.5 GHz to < 38 GHz[10]	-54	-62	-70	-91
38 GHz to 50 GHz	-52	-60	-68	-89



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

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

[10] Frequency range is 26.5 GHz to 40 GHz on the HP 83640A.

Modulation

Pulse

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

	Standard	Option 006
On/Off Ratio[11]	80 dB	80 dB
Rise/Fall Times	25 ns	10 ns
Minimum Width		
Internally Leveled	1 μs	1 μs
Search Mode		
Output Frequencies < 2.0 GHz	50 ns	50 ns
Output Frequencies ≥ 2.0 GHz	50 ns	15 ns
ALC Off Mode		
Output Frequencies < 2.0 GHz	50 ns	50 ns
Output Frequencies ≥ 2.0 GHz	50 ns	15 ns
Minimum Repetition Frequency		
Internally leveled	10 Hz	10 Hz
Search Mode	DC	DC
ALC Off Mode	DC	DC
Level Accuracy		
(dB, relative to CW level)		
Widths ≥ 1 μs	±0.3	±0.3
Widths < 1 μs (Search Mode)	±0.5, typical	±0.5, typical
Video Feedthrough		
Output Frequencies < 2.0 GHz		
Power Levels ≤ 10 dBm	2%	2%
Power Levels > 10 dBm	5%	5%
Output Frequencies ≥ 2.0 GHz		
HP 83620A/22A/30A	0.2%	1%
HP 83623A/24A/40A/50A	1%	1%
Overshoot, Ringing	15%, typical	10%, typical
Delay[12]		
Output Frequencies < 2.0 GHz	80 ns, typical	80 ns, typical
Output Frequencies ≥ 2.0 GHz	80 ns, typical	60 ns, typical
Compression		
Output Frequencies < 2.0 GHz	±10 ns, typical	±10 ns, typical
Output Frequencies ≥ 2.0 GHz	±10 ns, typical	±5 ns, typical

[11] In the HP 83623A/24A, 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.

[12] Option 002 adds 30 ns delay and ±5 ns pulse compression for external pulse inputs.

Internal Pulse Generator
Width Range: 1 μs to 65 ms
Period Range: 2 μs to 65 ms
Resolution: 1 μs

AM and Scan

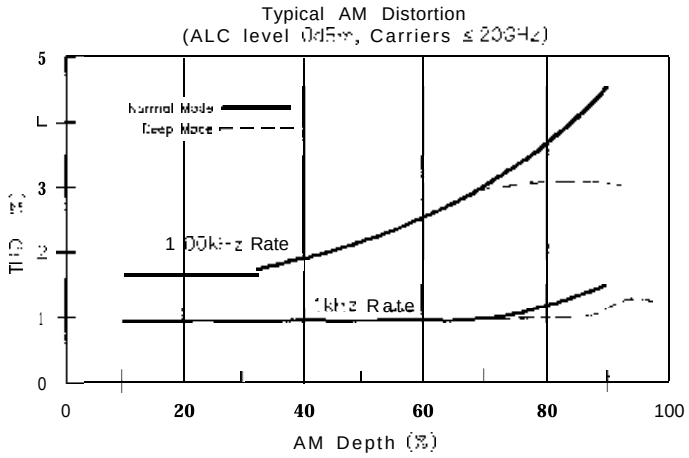
Bandwidth (3 dB, 30% depth, modulation peaks 3 dB below maximum rated power):
DC to 100 kHz (typically DC to 300 kHz)

Modulation Depth
(ALC levels noted, can be offset using step attenuator)
Normal Mode: -20 dBm to 1 dB below maximum available power
Deep Mode[13, 15]: 50 dB below maximum available power
Unleveled Mode[14, 15]: 50 dB below maximum available power

Sensitivity
Linear: lOO%/volt
Accuracy (1 kIIz rate, 30% depth, normal mode): 5%
Exponential: 10 dB/volt
Accuracy (Normal Mode): 0.25 dB ±5% of depth in dB

Incidental Phase Modulation (30% depth): 0.2 radians peak, typical

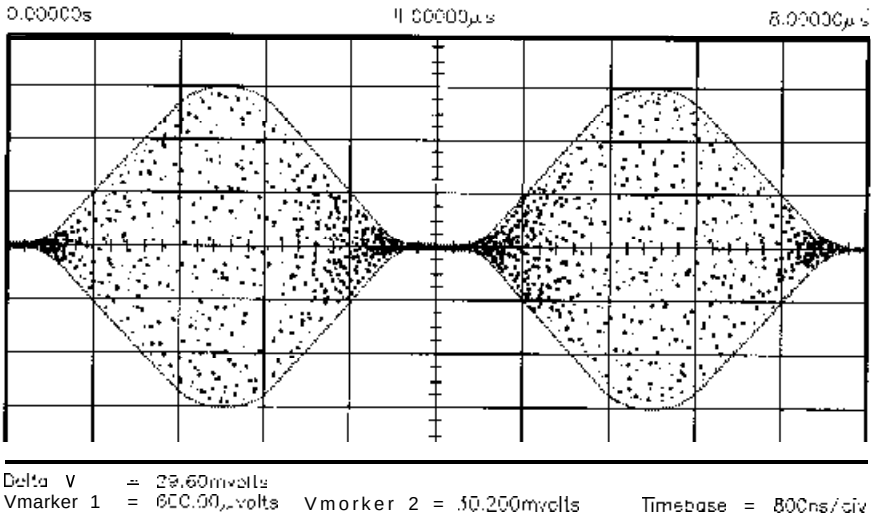
Incidental FM: Incidental phase modulation x modulation rate



[13] **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.**

[14] **The HP 8360 has two unleveled modes, ALC off and search. In ALC off mode, the 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 to an entered value, then opens the ALC loop while maintaining that modulator drive setting. Neither of these modes is feedback leveled.**

[15] **Modulation depth is 40 dB below maximum available power for frequencies > 20 GIIz on HP 83640A and HP 83650A.**



FM

Locked Mode

Maximum Deviation: ±8 MHz
Rates (3 dB bandwidth, 500 kHz deviation): 100 kHz to 8 MHz
Maximum Modulation Index (deviation/rate): n x 5

Unlocked Mode

Maximum Deviation
At rates ≤ 100 Hz: ±75 MHz
At rates > 100 Hz: ±8 MHz
Rates (3 dB bandwidth, 500 kHz deviation): DC to 8 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.

Internal Modulation Generator Option 002

AM, FM

Internal Waveforms: sine, square, triangle, ramp, noise
Rate
Range
Sine: 1 Hz to 1 MHz
Square, triangle, ramp: 1 Hz to 100 kHz
Resolution: 1 Hz
Depth, deviation
Range: same as base instrument
Resolution: 0.1%
Accuracy: same as base instrument

Pulse

Modes: free-run, gated, triggered, delayed
Period range: 300 ns to 400 ms
Width Range: 25 ns to 400 ms
Resolution: 25 ns
Accuracy: 5 ns
Video delay
Internal sync pulse: 0 to 400 ms
Externally-supplied sync pulse: 225 to 400 ms

Modulation Meter

Accuracy (rates $\leq$ 100 kHz): 5% of range

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 over 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, 83630A

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

HP 83640A, 83650A

2.4 mm (female) – 2.92 (female)	Part number 1250-2187
2.4 mm (female) – 2.4 mm (female)	Part number 1250-2188

Inputs & Outputs

Auxiliary Output

Provides an unmodulated reference signal from 2 to 26.5 GHz at a typical minimum power level of -10 dBm. Nominal output impedance 50 ohms. (SMA female, rear panel.)

RF Output

Nominal output impedance 50 ohms. (Precision 3.5 mm male on 20 and 26.5 GHz models, 2.4 mm male on 40 and 50 GHz models, front panel.)

External ALC input

Used for negative external detector or power meter leveling. Nominal input impedance 120 kΩ, damage level ±15 volts. See RF output specifications. (BNC female, front panel.)

Pulse input/Output

TTL-low-level signal turns RF off. When using the standard 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 kΩ), damage level ±15 volts. See modulation specifications. (BNC female, front panel.)

FM Input

Nominal input impedance 50 ohms (internally switchable to 600 ohms), damage level ±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 ±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 kilohms. Accuracy ±0.25%, ±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 kΩ) during the retrace and bandswitch points 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 kΩ. Accuracy ±0.5%, ±10 mV, typical. (BNC female, rear panel.)

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.)

Pulse Video Output (Option 002 only)

Outputs the pulse modulation waveform that is supplied to the modulator. This can be either the internally or externally generated pulse modulation signal. (BNC female, rear panel.)

Pulse Sync Out (Option 002 only)

Outputs a 50 ns wide TTL pulse synchronized to the leading edge of the internally-generated pulse. (BNC female, rear panel.)

AM/FM Output (Option 002 only)

Outputs the internally-generated AM or FM waveform. This output can drive 50 ohms or greater. The AM output is scaled the same as it is generated, either 100%/V or 10 dB/V. The FM scaling depends on the FM deviation selected. (BNC female, 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 83630A: 10 MHz to 26.5 GHz
HP 83640A: 10 MHz to 40 GHz
HP 83650A: 10 MHz to 50 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, and 2.5 dB above 40 GHz.

Option 002 Add Internal Modulation Generator

Adds a digitally-synthesized internal modulation waveform source-on-a-card to the HP 8360. It provides signals that would otherwise be supplied to the external modulation inputs.

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 the 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 effects maximum leveled output power and harmonic performance.

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 013 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 biennial calibration.