Table 1-1. Model HP 8341A Specifications and Supplemental Performance Characteristics (1 of 15)

NOTE

HP 8341A Specifications are the performance standards, or limits, against which the instrument may be tested; specifications are shaded in this table. The following Specifications apply for temperatures between 0 and −55°C except where noted. Specifications apply with the PEAK function ON in the CW and MANUAL modes of operation, and with periodic use of AUTO TRACKING CALIBRATION in swept operation.

Supplemental Performance Characteristics are not shaded in this table and are intended to provide information useful in applying the instrument by giving typical, but non-warranted, performance parameters. These are denoted as "typical", "nominal", or "approximate".

FREQUENCY

CW MODE

Range: 0.01 to 20.0 GHz

Resolution: n X 1 Hz
Where n = harmonic multiplication number (1 to 3). Refer to Frequency ranges and Bandswitch Points description below.

Accuracy: Same as Time Base Accuracy

Time Base

Frequency: 10 MHz

Aging Rate:
1×10^{-9} per day, 2.5×10^{-7} per year after 72 hour warm up if HP 8341A has been disconnected from ac power for less than 24 hours. Aging rate is achieved after 7 to 30 days warm up if HP 8341A has been disconnected from ac power for greater than 24 hours.

Temperature Coefficient: Typically $< 1 \times 10^{-10}$ per °C

Change due to 10% line voltage change: Typically $< 1 \times 10^{-1}$

Accuracy:
Overall accuracy of internal time base is a function of time base calibration ± aging rate ± temperature effects ± line effects.

Switching Time: <50 msec (PEAK function off)
(Fast Phase Lock Mode reduces typical switching time to <20 msec.)

CENTER FREQUENCY/SWEEP WIDTH MODE (CF/ΔF)

Range: 10.00005 MHz to 19.99999995 GHz (**center frequency**)
100 Hz to 19.99 GHz (**sweep width**)

Resolution: Approximately 0.1% of sweep width (ΔF)

Readout Accuracy with respect to sweep out voltage (sweep time > 100 msec):
$\Delta \leq n \times 5$ MHz: ± 1% of indicated sweep width (ΔF) ± time base accuracy*
$\Delta > n \times 5$ MHz to $< n \times 100$ MHz: ± 2% of indicated sweep width (ΔF)
$\Delta \geq n \times 100$ MHz: ± 1% of indicated sweep width (ΔF), or ± 50 MHz, whichever is less.

Where n = harmonic multiplication number (1 to 3). Refer to Frequency Ranges and Bandswitch Points description below.

*Time Base affects Center Frequency accuracy only, not sweep width accuracy.

Specifications are shaded; Supplemental Performance Characteristics are not.

Table 1-1. Model HP 8341A Specifications and Supplemental Performance Characteristics (2 of 15)

FREQUENCY (Cont'd)

START/STOP MODE

Range
Start: 10 MHz to 19.9999999
Stop: 10.000 MHz to 20.0 GHz

Resolution: Typically, the same as Center Frequency/Sweep Width mode.

Readout Accuracy with respect to sweep out voltage (sweep time > 100 msec):
Same as Center Frequency/Sweep Width Mode.

FREQUENCY MARKERS

All 5 markers are independently variable and have the same specifications.

Range: 10 MHz to 20.0 GHz

Resolution: Approximately 0.1% of sweep width (ΔF)

Readout Accuracy (sweep time > 100 msec):
$\Delta \leq n \times 5$ MHz: ± 1% of indicated sweep width (ΔF) ± time base accuracy*.
$\Delta > n \times 5$ MHz to $< n \times 100$ MHz: ± 2% of indicated sweep width (Δ).
$\Delta \geq n \times 100$ MHz: ± 1% of indicated sweep width (ΔF) or ± 50 MHz, whichever is less.

Where n = harmonic multiplication number (1 to 3). Refer to Frequency Ranges and Bandswitch Points Description below.

*Time base accuracy is not a factor in MKRΔ Mode.

TYPICAL FREQUENCY RANGES AND BANDSWITCH POINTS

For bands 0 and 1, the HP 8341A's output is derived from the fundamental frequency of its internal 2.3 to 7.0 GHz YIG-tuned oscillator (n = 1). For bands 2 and 3, the output is derived from the 2nd or 3rd harmonic of the oscillator (n = 2 or 3).

Bandswitch points in CW Mode (only) always occur at the following points:

Band 0 to 1: 2.3 GHz
Band 1 to 2: 7.0 GHz
Band 2 to 3: 13.5 GHz

Bandswitch points in each of the swept modes (CF/ΔF, START/STOP) and the MANUAL SWEEP mode normally occur at the following points (with the exception listed below):

Band 0 to 1: 2.4 GHz
Band 1 to 2: 7.0 GHz
Band 2 to 3: 13.5 GHz

The swept mode bandswitch points are illustrated in Figure 1.

Specifications are shaded; Supplemental Performance Characteristics are not.

Table 1-1. Model HP 8341A Specifications and supplemental Performance Characteristics (3 of 15)

FREQUENCY (Cont'd)

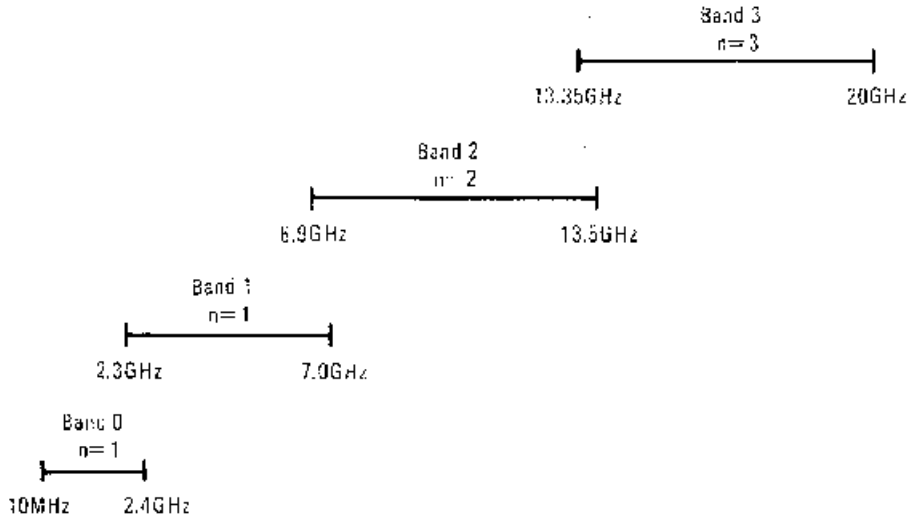

Figure 1. Typical Frequency Ranges and Bandswitch Points in Swept Modes

Note that the bands overlap. However, any sweep will be executed with the minimum number of bandswitch points. If the start frequency is above the lower limit for a given band, the sweep will start in that band and not the next lower one. If the stop frequency exceeds the upper limit of a given band by an amount greater than 0.004 x ΔF, a bandswitch will occur at that band's upper limit.

SPECTRAL PURITY

(Spectral Purity specifications apply for CW mode and all swept modes, unless otherwise stated.)

SPURIOUS SIGNALS (Expressed in dB relative to the carrier level (dBc) at ALC level of 0 dBm)	**Bands and Approximate Frequency Ranges (GHz)** (See Frequency Ranges and Bandswitch Points for complete description.)			
	Band 0 0.01 to <2.3	**Band 1 2.3 to <7.0**	**Band 2 7.0 to <13.5**	**Band 3 13.5 to 20.0**
Harmonics (up to 20.0 GHz)	< −35	< −35	< −35	< −35
Subharmonics and multiples thereof (up to 20.0 GHz)	—	—	< −25	< −25
Non-harmonically related spurious (CW and Manual Sweep mode only)	< −50	< −70	< −60	< −60

Specifications are shaded; Supplemental Performance Characteristics are not.

Table 1-1. Model HP 8341A Specifications and Supplemental Performance Characteristics (4 of 15)

SPECTRAL PURITY (Cont'd)

SPURIOUS SIGNALS (Cont'd)

Power line related and spurious due to fan rotation within 5 Hz below line frequency, and multiples thereof

(CW mode only, all power levels)	Band 0 0.001 to <2.3	Band 1 2.3 to <7.0	Band 2 7.0 to <13.5	Band 3 13.5 to 20.0
Offset <300 Hz from carrier	< −50	< −50	< −44	< −40
Offset 300 Hz to 1 kHz from carrier	< −60	< −60	< −54	< −50
Offset > 1 kHz from carrier	< −65	< −65	< −59	< −55

SINGLE-SIDEBAND PHASE NOISE (dBc/1 Hz BW, CW Mode, all power levels)

Offset 100 Hz from carrier	< −67	< −67	< −61	< −57
Offset 1 kHz from carrier	< −75	< −75	< −69	< −65
Offset 10 kHz from carrier	< −83	< −83	< −77	< −73
Offset 100 kHz from carrier	< −107	< −107	< −101	< −97
OPTION 007, (Improved Phase Noise Specifications)				
Offset 30 Hz from carrier	< −64	< −64	< −58	< −54
Offset 100 Hz from carrier	< −70	< −70	< −64	< −60
Offset 1 kHz from carrier	< −78	< −78	< −72	< −68
Offset 10 kHz from carrier	< −86	< −86	< −80	< −76
Offset 100 kHz from carrier	< −107	< −107	< −101	< −97

TYPICAL FREQUENCY STABILITY, 50 Hz – 15 kHz post detection bandwidth

Typical Residual FM in CW Mode: < n x 60 Hz rms

Typical Residual FM in Swept Mode:

ΔF > n x 5 MHz: < n x 25 kHz rms
ΔF ≤ n x 5 MHz: Same as CW mode

Where n = harmonic multiplication number (1 to 3). Refer to Frequency Ranges and Bandswitch Points description above.

Specifications are shaded; Supplemental Performance Characteristics are not.

Table 1-1. Model HP 8341A Specifications and Supplemental Performance Characteristics (5 of 15)

RF OUTPUT

MAXIMUM LEVELED POWER (0°C to +35°C)[1]	**Bands and Approximate Frequency Ranges (GHz)** (see Frequency Ranges and Bandswitch Points for complete description)				
	Band 0 0.01 to <2.3	**Band 1 2.3 to <7.0**	**Band 2 7.0 to <13.5**	**Band 3 13.5 to <18.6**	**18.6 to 20.0**
STANDARD INSTRUMENT	+10.0 dBm	+10.0 dBm	+10.0 dBm	+10.0 dBm	+10.0 dBm
OPTION 001 (F.P. Out w/Atten.)	+10.0 dBm	+9.0 dBm	−8.0 dBm	+8.0 dBm	+8.0 dBm
OPTION 004 (R.P. Out w/Atten.)	+10.0 dBm	−9.0 dBm	+8.0 dBm	+7.0 dBm	+7.0 dBm
OPTION 005 (R.P. Out w/o Atten.)	+10.0 dBm	+10.0 dBm	−10.0 dBm	+9.0 dBm	+9.0 dBm
OPTION 002 (+13 dBm Output Power, 2.3 to 18.6 GHz)*	+10 dBm	+13 dBm	+13 dBm	+13 dBm	−10 dBm
OPTION 002 and OPTION 001 (Front Panel RF Output w/Atten.)	+10 dBm	+12 dBm	+11 dBm	+11 dBm	+8 dBm
OPTION 002 and OPTION 004 (Rear Panel RF Output w/Atten.)	−10 dBm	+11 dBm	+10 dBm	+10 dBm	+7 dBm
OPTION 002 and OPTION 005 (Rear Panel RF Output w/o Atten.)	−10 dBm	−12 dBm	+12 dBm	−12 dBm	+9 dBm

* Does not apply to instruments equipped with Options 001, 004, or 005

MINIMUM SETTABLE POWER

STANDARD and OPTION 005 (R.P. w/o Atten.): −20 dBm

OPTION 001 (F.P. Out w/Atten.) and 004 (R.P. Out w/Atten.): −110 dBm

RF OFF

When the RF key is turned OFF, the POWER dBm display will read OFF and a 0 dBm signal will typically be reduced to a level < −100 dBm.

OUTPUT POWER RESOLUTION

" ENTRY DISPLAY": 0.05 dB **"POWER dBm" Display:** 0.1 dB

OUTPUT POWER ACCURACY[2]	**Bands and Approximate Frequency Ranges (GHz)** (see Frequency Ranges and Bandswitch Points for complete description)	
	Band 0 0.01 to <2.3	**Bands 1 – 3 2.3 to 20**
STANDARD INSTRUMENT		
+18 to +10 dBm[4]	–	±1.6 dB
+10 to −10 dBm	±0.9 dB	±1.3 dB
−10 to −20 dBm	±1.7 dB	±2.1 dB
OPTION 004 (Rear Panel Output w/Atten.)		
+18 to +10 dBm[4]	–	±2.0 dB
+10 to −11.95 dBm	±1.0 dB	±1.7 dB
−12 to −21.95 dBm	±1.3 dB	±2.2 dB
−22 to −51.95 dBm	±1.6 dB	±2.5 dB
−52 to −81.95 dBm	±1.9 dB	±2.8 dB
−82 to −99.95 dBm	±2.2 dB	±3.1 dB
−100 to −110 dBm	±3.0 dB[3]	±3.9 dB[3]

Specifications are shaded; Supplemental Performance Characteristics are not