5

Specifications

Specifications- HP 70340A/41A

This chapter contains the specifications, supplemental characteristics, and electrical options for both the HP 70340A and the HP 70340A/41A . Refer to the *HP 70340A/41A User's Guide* for mechanical, documentation, and warranty options for the HP 70340A. Refer to the "Options" entry in this chapter for mechanical, documentation, and warranty options for the HP 70341A.

Specifications describe the instruments warranted performance over the 0° to 55° temperature range unless otherwise noted. Supplemental characteristics, *indicated by italics*, are intended to provide information useful in estimating instrument capability in your application by describing typical, but not warranted, performance.

Frequency

Range: HP 70340A Modular Signal Generator, 1.0 to 20.0 GHz
HP 70341A Frequency Extension Module, 10 MHz to 1 GHz
HP 70341A can only be used in combination with the HP 70340A.
Resolution: 1 kHz (1 Hz with Option 1E8)
Stability (with external high stability timebase):

Aging Rate: same as external reference.
Temperature Effects: same as external reference.

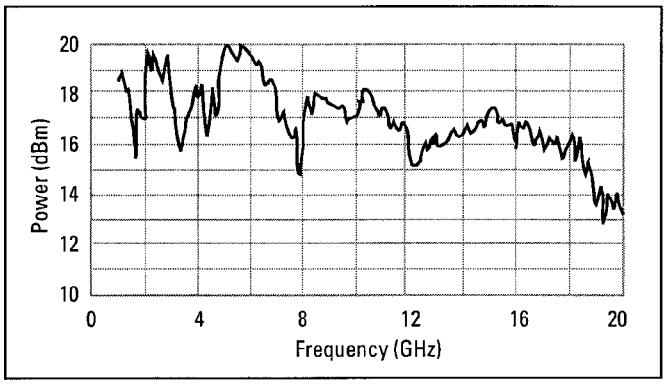
Stability (without external high stability timebase):

Aging Rate: $<1.0\times10^{-8}$/day after 72-hours at 25° C±10° C
Temperature Effects: $<5\times10^{-6}$ over 0 to 55° C, referenced to 25° C
Frequency Switching Time: < 50 ms to within 1 kHz, 1 - 20 GHz.
<100 ms to within 1 kHz, 10 MHz - 1 GHz.

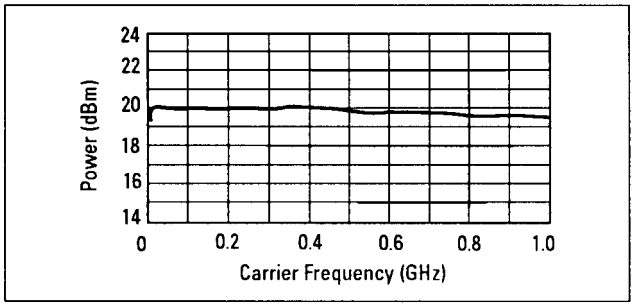
RF Output

Maximum Leveled Output Power:

Frequency	Standard	with Option 1E1
0.01–1 GHz	+13 dBm	+13 dBm
1–18 GHz	+11 dBm	+10 dBm
18–20 GHz	+10 dBm	+8 dBm



Typical maximum available output power from 1 to 20 GHz, at 25°C with output step attenuator (Option 1E1) installed.



Typical maximum available output power from 0.01 to 1 GHz at 25°C.

Display Resolution: 0.01 dB

Minimum Leveled Output Power (without Option 1E1): −4 dBm
Minimum Leveled Output Power (with Option 1E1): −90 dBm

Accuracy: (−4 dBm to specified maximum leveled output power)

10 MHz to 50 MHz: ±1.3 dB
50 MHz to 20 GHz ±1.0 dB

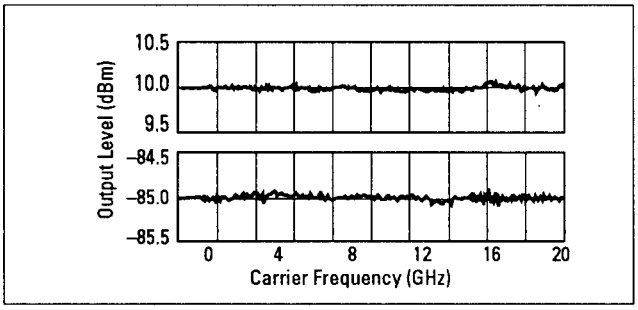
Accuracy: (over all specified temperatures and power levels)

10 MHz to 50 MHz: ±2.3 dB
50 MHz to 20 GHz: ±2.0 dB

The use of Type-N RF connectors above 18.0 GHz degrades specification typically by 0.2 dB.

Flatness: ±0.5 dB. The use of Type-N RF connectors above 18.0 GHz degrades specification typically by 0.2 dB.

Level Switching Time: <15 ms (without step attenuator range change. Attenuator range changes occur at −4 dBm, −14 dBm, −24 dBm, etc.)
Output SWR: <2.0 : 1 nominal



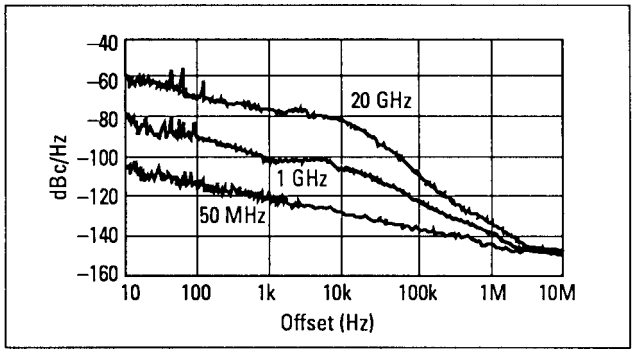
Typical output level accuracy and flatness at +10 and −85 dBm

Spectral Purity

SSB Phase Noise (dBc/Hz):

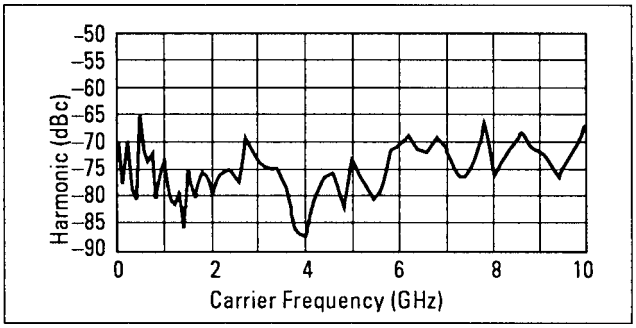
	Offsets			
Carrier Freq.	**100 Hz**	**1 kHz**	**10 kHz**	**100 kHz**
500 MHz	−70	−86	−103	−119
2 GHz	−66	−74	−91	−107
10 GHz	−69	−75	−79	−101
18 GHz	−63	−70	−73	−99

Phase noise decreases 6 dB/octave below 500 MHz and reaches a floor of <−140 dBc/Hz.



Typical single-sideband phase noise at 50 MHz, 1 GHz and 20 GHz, 25°C, CW mode. Offsets less than 100 Hz require use of external high stability timebase.

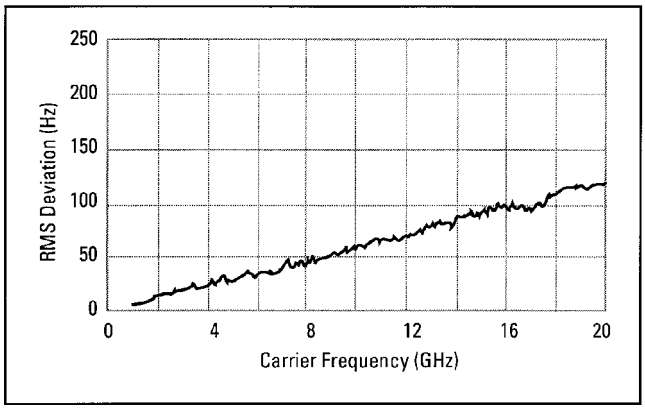
Harmonics: <-55 dBc at output levels $<+6$ dBm, 0.01 to 20 GHz



Typical 2nd harmonic levels measured at output power of +6 dBm

Non-Harmonic Spurious ($\geq$3 kHz): <-60 dBc (includes power supply and frequency synthesis spurious).
Non-Harmonic Spurious (<3 kHz): < -50 *dBc*
Sub-Harmonics: None

Residual FM:



Typical residual FM measured in 50 Hz - 15 kHz bandwidth, CW mode.

At 1 GHz, <15 Hz in 50 Hz - 15 kHz bandwidth.
Residual FM decreases 6 dB per octave below 1 GHz.

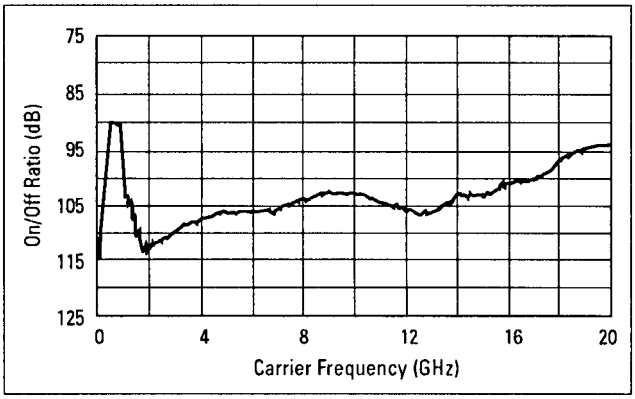
AM Noise Floor: (at 0 dBm and offsets greater than 5 MHz from carrier) <−150 dBm/Hz, 1 - 20 GHz.
<−140 dBm/Hz, 0.01 - 1 GHz.

Modulation

CARRIER FREQUENCY	<25 MHz	25 - <64 MHz	64 - <128 MHz	128 - <500 MHz	500 - <1000 MHz	1 - 20 GHz
Minimum Pulse Width	<1μs		<100 ns		<25 ns *Typically <10 ns*	
Rise/Fall Time	<500 ns	<350 ns	<50 ns	<35 ns	<20 ns	<10 ns
Video Feedthrough	*<2 mV peak-to-peak at 0 dBm*					*<20 mV peak-to- peak at 0 dBm*
Pulse Width Compression	*±150 ns*		*±15 ns*		*±5 ns*	
Pulse Delay (Video out to RF out)	*<1μs*		*<200 ns*		*<125 ns*	*<100 ns*

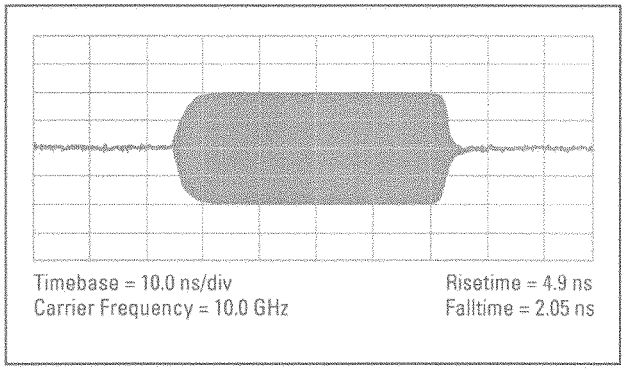
Pulse Modulation

On/Off Ratio: > 80 dB



Typical pulse modulation on/off ratio at +8 dBm

Maximum Pulse Repetition Frequency: > 3 MHz
Minimum Pulse Duty Cycle: No restrictions on duty cycle.
Pulse Level Accuracy (relative to CW): ±1.0 dB
Pulse Overshoot: < 10%
Input Impedance: 50Ω nominal; TTL drive levels
Maximum Leveled Output Power in Pulse Mode (relative to CW): −0.5 dB

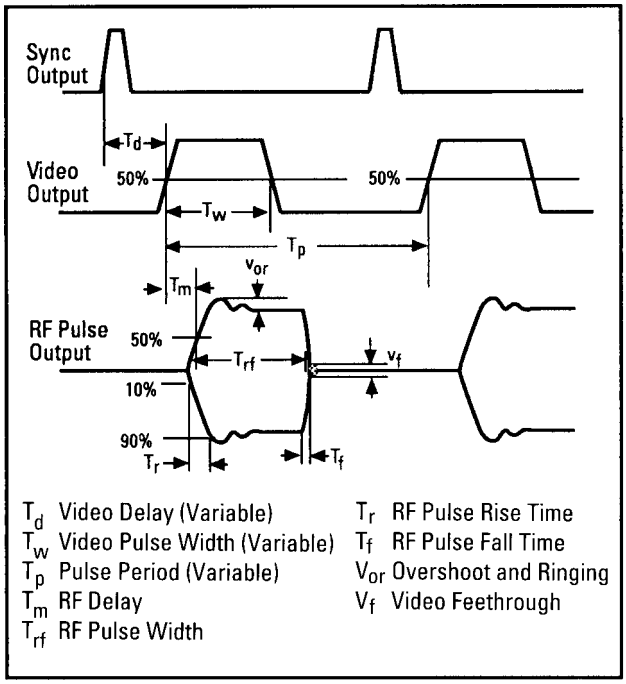


Typical pulse modulation envelope illustrates the fast rise and fall times, excellent flatness and pulse fidelity of the HP 70340A

Internal Pulse Source (Option 1E2)

Pulse Source Modes: Free-run, triggered with delay, doublet and gated. Triggered with delay, doublet and gated require external trigger source.
Pulse Repetition Frequency: 3 Hz to >3 MHz
Pulse Repetition Interval (PRI): 300 ns to 419 ms
Pulse Width (T_w): 25 ns to 419 ms
Variable Pulse Delay (free-run mode, T_d): ±419 ms from sync pulse to video modulation
Variable Pulse Delay (triggered with delay & doublet modes, T_d):
225 ns to 419 ms with ±25 ns jitter
Pulse Width/Delay/PRI Resolution: 25 ns
Pulse Delay (Video to RF, T_m): Nominally, <20 ns, 1 to 20 GHz

All pulse modulation specifications and supplemental characteristics apply during use of internal pulse source.



Frequency Modulation

Rates: 1 kHz to 1 MHz
Flatness: ±2 dB

CARRIER FREQUENCY		**256 - <500 MHz**	**500 MHz - <1 GHz**	**1 - 2 GHz**	**2 - 20 GHz**
Maximum Deviation[1]		1.25 MHz peak	2.5 MHz peak	5 MHz peak	10 MHz peak
Modulation Index		*>37*	*>75*	*>150*	*>300*
CARRIER FREQUENCY	**10 - 16 MHz**	**16 - 64 MHz**	**64 MHz - 256 MHz**	**256 MHz - 1 GHz**	**1 - 20 GHz**
FM Sensitivity	*40 kHz/V*	*80 kHz/V*	*320 kHz/V*	*1.25 kHz/V*	*5 MHz/V*
FM Sensitivity Accuracy	*±25% at 100 kHz.*				
Incidental AM	*<5%*				
FM Input Impedence	*600Ω nominal*				
Harmonic Distortion	*<1% (1 MHz peak deviation @ 100 kHz rate)*				

1 Maximum deviation decreases by a factor of 2 for each octave below 256 MHz

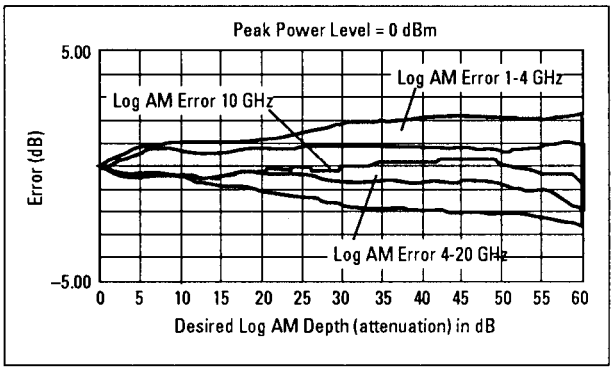
Logarithmic Amplitude Modulation (Scan Modulation)

Maximum Depth: > 60 dB
Sensitivity: —10 dB/V; (0 to +6V for 0 to —60 dBc)
Step Response (50 dB change in level):

	<1 GHz	*1 - 20 GHz*
rise time	*<10 µs*	*<5 µs*
fall time	*<20 µs*	*<5 µs*

Input Impedance: 5000Ω nominal
Maximum Leveled Output Power in Log AM Mode (relative to CW):

<1 GHz	*1 - 4 GHz*	*>4 GHz*
+0 dB	*—4.5 dB*	*—1.0 dB*



Typical log AM error (deviation from desired depth) at 25°C for carrier frequencies between 1.0 and 20 GHz

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

General

Programming

The HP 70340A and HP 70341A are fully compatible with the Standard Commands for Programmable Instruments (SCPI). SCPI programming complies with IEEE 488.2-1987. Optional CIIL programming compatibility is available. Please consult your HP sales representative for details.

Environmental

Operating Temperature Range: 0° to 55°C
EMC: Meets or exceeds EN 55011/CISPR 11/1990, Class A and Mil-Std-461C Part 2 RE02, CE03, CS02, RS03.

Physical Dimensions

Net Weight: HP 70340A, < 9 kg (20 lb).
HP 70341A, < 2.5 kg (5 lbs).
Shipping: HP 70340A, < 15 kg (30 lb)
HP 70341A, < 6 kg (12 lbs).
Size: HP 70340A, 4/8 MMS module width.
148.5 mm H × 192.8 mm W × 477.5 mm D.
HP 70341A, 1/8 MMS module width.
148 mm H × 48.2 mm W × 477.5 mm D.
Power Consumption: HP 70340A, < 80 Watts.
HP 70341A, <30 Watts.