Table 1-1. Specifications (1 of 6)

Electrical Characteristics	Performance Limits	Conditions
FREQUENCY		
Range		
8642A	100 kHz to 1057.5 MHz	
8642B	100 kHz to 2115 MHz	
Carrier Frequency		
Band[1]		
10 (8642B only)	1057.500001–2115.000000 MHz	
9	528.750001–1057.500000 MHz[2]	
8	264.375001– 528.750000 MHz	
7	132.187501– 264.375000 MHz	
6	66.093751– 132.187500 MHz	
5	33.046876– 66.093750 MHz	
4	16.523438– 33.046875 MHz	
3	8.261719– 16.523437 MHz	
2	4.130860– 8.261718 MHz	
1	0.100000– 4.130859 MHz	
HET	0.100000– 132.187500 MHz	
Resolution	1 Hz (0.1 Hz with Special Function 240 or 241)	
Stability	Same as reference oscillator	
INTERNAL REFERENCE OSCILLATOR		
Standard	See Supplemental Characteristics	
Option 001 Aging Rate	<10^{9}/day	After 8-day warm-up
SPECTRAL PURITY		
SSB Phase Noise		CW, AM, or Angle Modulation <1/60 Maximum Peak Deviation
Band — SSB Phase Noise, 20 kHz offset from carrier — SSB Phase Noise Floor, 200 kHz offset from carrier		
10	−125 dBc/Hz — −134 dBc/Hz	
9	−134 dBc/Hz — −143 dBc/Hz	
8	137 dBc/Hz — −144 dBc/Hz	
7	−141 dBc/Hz — −144 dBc/Hz	
6	−144 dBc/Hz — −145 dBc/Hz	
5	−145 dBc/Hz — −145 dBc/Hz	
4	−146 dBc/Hz — −147 dBc/Hz	
3	147 dBc/Hz — −148 dBc/Hz	
2	−148 dBc/Hz — −149 dBc/Hz	
1	−137 dBc/Hz — 138 dBc/Hz	
HET	−125 dBc/Hz — −137 dBc/Hz	

[1]Both generators cover their ranges in one continuous span. However, many other specifications are dependent on carrier frequency. To simplify such specifications, the 8642A and 8642B carrier frequency ranges are divided into bands.

[2]Band 9, 8642B carrier frequency range is 528.7500005 MHz to 1057.500000 MHz.

Table 1-1. Specifications (2 of 6)

Electrical Characteristics	Performance Limits		Conditions
SPECTRAL PURITY (Cont'd)			
Residual FM			CW, AM, or Angle Modulation ≤⅓ Maximum Peak Deviation
	Post Detection Bandwidth		
Band	0.3 to 3.0 kHz	0.05 to 15.00 kHz	
10 (8642B only)	<5 Hz rms	<9 Hz rms	
9	<2 Hz rms	<5 Hz rms	
8	<1.2 Hz rms	<2 Hz rms	
1-7	<1 Hz rms	<1.2 Hz rms	
HET	<3.5 Hz rms	<5 Hz rms	
Residual AM	<0.01% AM rms		0.3 to 3.0 kHz Post Detection Bandwidth
Spurious Output Signals	8642A/B, Bands 1-9, HET	8642B, Band 10	
Harmonics	−30 dBc	−25 dBc	Output level ≤+10 dBm
	−20 dBc	−20 dBc	Output level ≤+16 dBm
Sub-harmonics	none	45 dBc	
Non-harmonics	−100 dBc[3]	−94 dBc	>10 kHz from the carrier
OUTPUT			
Level Range	From Maximum Level Available to −140 dBm (0.023 μV into 50 ohms)		
Maximum Level Available		8642A (except Opt. 003)	8642B and 8642A Opt. 003
	+20 dBm (2.24V)	bands 1 thru 7	bands 1 thru 7
	+19 dBm (2.00V)	DNA	band 8
	+18 dBm (1.78V)	band 8, HET	HET
	+17 dBm (1.59V)	n/a	band 9
	+16 dBm (1.41V)	band 9	band 10 (8642B)
Resolution	0.1 dB		
Absolute Level Accuracy[4]	±1 dB		Output levels ≥ −127 dBm
Flatness	<±0.75 dB		Output level, +10 dBm
Impedance	50 ohms nominal		
SWR	<1.5:1		Output levels <0 dBm
	<2.0:1		Output levels ≥0 dBm
⚠ Reverse Power Protection	50W, 25 Vdc, 8642A 25W, 50 Vdc, 8642B		
Third Order Intermodulation	<−50 dBc at +10 dBm. Typically decreases 10 dB for every 5 dB of combined level decrease		Two signal generators with frequencies spaced 25 kHz apart into a resistive combiner
Available Calibration Units	dBm, V, mV, μV, dBμV, EMF V, EMF mV, EMF μV, dB EMF μV, REL ZERO or REF SET can be used to obtain settings such as dBV or dBf.		

[3]Not specified in HET band.

[4]Absolute output accuracy consists of allowances for detector linearity, temperature, flatness, and attenuator accuracy.

Table 1-1. Specifications (part of 3 of 6)

Electrical Characteristics	Performance Limits	Conditions
FREQUENCY MODULATION		
Maximum FM Deviation		External dc coupled
Band		
10 (8642B only)	3 MHz	
9	1.5 MHz	
8	750 kHz	
7	375 kHz	
6	187.5 kHz[6]	
5	93.75 kHz[6]	
4	46.875 kHz[6]	
3	23.437 kHz[6]	
2	11.718 kHz[6]	
1	93.75 kHz[6]	
HET	1.5 MHz	
	(the smaller of:)	External ac coupled or internal
10 (8642B only)	3 MHz or $f_{mod} \times 2160$	
9	1.5 MHz or $f_{mod} \times 1080$	
8	750 kHz or $f_{mod} \times 540$	
7	375 kHz or $f_{mod} \times 270$	
6	187.5 kHz or $f_{mod} \times 135$[6]	
5	93.75 kHz or $f_{mod} \times 67.5$[6]	
4	46.875 kHz or $f_{mod} \times 33.75$[6]	
3	23.437 kHz or $f_{mod} \times 16.875$[6]	
2	11.718 kHz or $f_{mod} \times 8.4375$[6]	
1	93.75 kHz or $f_{mod} \times 67.5$[6]	
HET	1.5 MHz or $f_{mod} \times 1080$	
Resolution	0.7% of setting or 0.0004% of maximum deviation, whichever is larger	
Indicator Accuracy (Rates 20 Hz to 100 kHz)	±(5% of setting +10 Hz)	
FM Distortion (Rates 20 Hz to 100 kHz)	4%	For maximum dc-coupled deviation
	2%	For 1/2 max dc-coupled deviation
	0.4%	For 1/15 max dc-coupled deviation
FM 3 dB Bandwidth	dc to 200 kHz	External dc source
	20 Hz to 200 kHz	External ac source
	20 Hz to 100 kHz	Internal source

[6]Maximum deviation may be increased up to that shown for the HET band (0.1 MHz to 132.1875 MHz carrier frequency) by selecting deviation larger than the values shown here. HET band can also be selected with Special Function 6.

Table 1-1. Specifications (4 of 6)

Electrical Characteristics	Performance Limits		Conditions
FREQUENCY MODULATION (Cont'd)			
Incidental AM	0.3%		20 kHz peak deviation, 1 kHz rate, >400 kHz carrier frequency, output level ≤+15 dBm
Carrier Frequency Offset	none		ac and internal
When Entering FM or PM Modes	<500 Hz		dc, 8642A/B Bands 1-9, HET
	<1 kHz		dc, 8642B Band 10
PHASE MODULATION			
Maximum Phase Deviation			
Band			
10 (8642B only)	200 radians		
9	100 radians		
8	50 radians		
7	25 radians		
6	12.5 radians[7]		
5	6.25 radians[7]		
4	3.125 radians[7]		
3	1.5625 radians[7]		
2	0.78125 radians[7]		
1	6.25 radians[7]		
HET	100 radians		
Resolution	0.7% of setting or 0.0004% of maximum deviation, whichever is larger		
Indicator Accuracy	±(5% of setting +0.09 radians)		1 kHz rate
ΦM Distortion	<0.4%		1 kHz rate
ΦM 3 dB Bandwidth	20 Hz to 15 kHz		Internal and external ac
	dc to 15 kHz		External dc
PULSE MODULATION[8]	2509A to 2550A	2551A and above	Output levels ≤+15 dBm
Pulse On/Off Ratio	>30 dB	>40 dB	8642A/B Bands 1-9, HET
	>45 dB	>80 dB	8642B, Band 10
Rise/Fall Time	<3.5 μs	<400 ns	10% to 90%
Maximum Repetition Frequency	50 kHz	100 kHz	
Minimum Pulse Width	6 μs	2 μs	
Nominal Input Threshold Level	1.5V	1.5V	External dc
INTERNAL MODULATION OSCILLATOR			
Frequency Range	20 Hz to 100 kHz		
Frequency Resolution	1% of setting		
Frequency Accuracy	2% of setting		
Output Level Range	0 to 3.3 Vpk		Into 600 ohms
Output Level Resolution	4 mV		
Output Distortion (>0.5 Vpk)	<0.02%		0.02 kHz to 15.8 kHz
	<0.15%		>15.8 kHz
Output Level Accuracy	±(4% +15 mV)		Within 1s
Output Impedance	600 ohms ±10%		

[7]Maximum deviation may be increased up to that shown for the HET band (0.1 MHz to 132.1875 MHz carrier frequency) by selecting deviation larger than the values shown here. HET band can also be selected with Special Function 8.

[8]Output level accuracy is typically ±3 dB.

Table 1-1. Specifications (5 of 6)

Electrical Characteristics	Performance Limits	Conditions
GENERAL		
Operating Temperature Range	0° to 55°C	
Storage Temperature Range	−55° to +75°C	
Power Requirements		
Line Voltage	100V, 120V, 220V, or 240V	+5%, −10%
Line Frequency	47.5 to 440 Hz	
Power Dissipation	300 VA max	
Electromagnetic Interference (Leakage)	MIL STD 461B and FTZ 1115	Conducted and radiated interference is within the requirements of MIL STD 461B methods CE03 and RE02. Interference is also within the standards set by FTZ 1115. Also RF leakage of <0.5 μV is induced in a two-turn loop 2.5 cm in diameter, held 2.5 cm away from any surface, for output levels ≤0 dBm.
Net Weight	32.7 kg (71.5 lb)	
Shipping Weight	43 kg (95 lb)	
Dimensions		
Height	133 mm (5.25 in.) nominal	
Width	425 mm (16.75 in.) nominal	
Depth	617 mm (23.8 in.) nominal	
HP SYSTEM II		
Module Size	5¼H × 1W × 23D	

Electrical Characteristics	Features
FREQUENCY SWEEP	
Digitally Stepped Sweep	
Start and Stop Sweep	Sweeps between two selected end-points in a linear, step-wise manner. End-points can be anywhere within the frequency range of the instrument. In AUTO sweep mode, sweep must stay within the range of bands 2 through 9, or band 1, or band 10, or the HET band.
Time	Maximum sweep time: 999s. Minimum sweep time: 275 ms. A maximum number of distinct frequency points is automatically selected based on the end-points and sweep time.
Phase Continuous Sweep	
Start-Stop Sweep	Instrument sweeps between two selected end-points in a linear, phase continuous manner.
Maximum Sweep Span	End-points can be outside the band, but (Start Frequency + Stop Frequency) ÷ 2 must be within the band.
Band	
10 (8642B only)	800 kHz
9	400 kHz
8	200 kHz
7	100 kHz
6	50 kHz[9]
5	25 kHz[9]
4	12.5 kHz[9]
3	6.25 kHz[9]
2	3.125 kHz[9]
1	25 kHz[9]
HET	400 kHz

[9]Maximum sweep span may be increased up to that shown for the HET band (0.1 MHz to 132.1875 MHz carrier frequency) by selecting a frequency span larger than the span shown here. HET band can also be selected with Special Function 8.

Table 1-1. Specifications (6 of 6)

Electrical Characteristics	Features
FREQUENCY SWEEP (Cont'd)	
Phase Continuous Sweep (Cont'd)	
Sweep Time	Maximum sweep time: 999s. Minimum sweep time: 5 ms. Maximum and minimum sweep time are also dependent on end-point separation and frequency band selected.
X-Axis Output	0 to 10 Vdc, ±10%
Z-Axis Output	TTL positive true for crt display blanking during retrace.
REMOTE OPERATIONS	
HP-IB (IEEE 488-1978) Capability	
Interface	Hewlett-Packard Interface Bus (HP-IB). HP-IB is Hewlett-Packard's implementation of IEEE Standard 488-1978.
Functions Controlled	All functions controlled from the front panel, with the exception of the power switch and the knob, are programmable with the same accuracy and resolution as in manual mode.
HP-IB Address Select Code	Settable via the front panel or over HP-IB from 00 to 30 (5-bit decimal equivalent). (A listen-only mode is also available as 31.)
Interface Function	Listener, talker, and controller
IEEE-488 Functions Implemented	SH1, AH1, T6, TE0, L3, LE0, SR1, RL1, PP0, DC1, DT0, C1, C2, C3, C28, E2

Table 1-2. Supplemental Characteristics (1 of 2)

Supplemental characteristics are typical, but non-warranted performance parameters, intended to be useful in instrument applications.

FREQUENCY

Underrange: 10 to 100 kHz.

Heterodyne Mode (HET, Special Function 8): The 8642A/B can derive its output through a heterodyne mode in the carrier frequency range from 0.1 MHz to 132.1875 MHz. This improves modulation and some frequency sweep characteristics at lower carrier frequencies.

Frequency Switching Time to Within 100 Hz of Final Frequency:

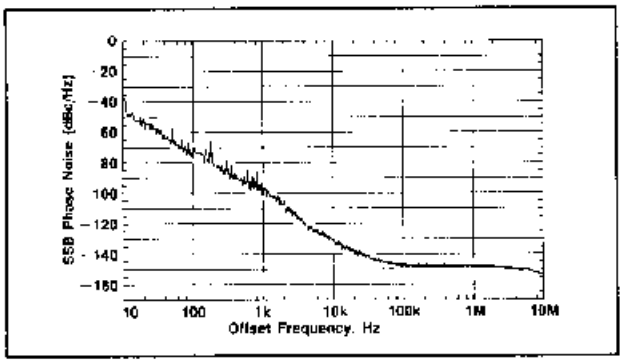
Processor Delay	Frequency Settling	Total Time
20 ms	65 ms	85 ms

SPECTRAL PURITY

SSB Phase Noise at 1 GHz Carrier Frequency (dBc in 1 Hz bandwidth):

10 Hz	100 Hz	1 kHz	10 kHz	20 kHz	100 kHz	200 kHz	1 MHz	10 MHz
−40	−75	−98	131	138	−146	−147	−147	−154

Measured SSB Phase Noise at 1 GHz:



SSB AM Noise Floor at 200 kHz Offset, +16 dBm:
<−157 dBc/Hz, band 2 through 9.
<−150 dBc/Hz, band 10.

MODULATION

External Input Impedance: 600 ohms, ±10%.

External Input Level Required: 1 Vpeak for specified accuracy. Front-panel annunciators indicate application of 1V peak signal ±5%, 20 Hz to 100 kHz. When greater accuracy is required, modulation drive voltage should be monitored externally.

Modulation Source Capability: All modulation types can be driven with either an internal or external modulation source. AM, FM, and ΦM can also be driven simultaneously by both internal and external modulation sources.

Mixed Modulation Types: Any two modulation types can be simultaneously selected except for FM + ΦM and AM + pulse modulation.

FREQUENCY MODULATION

Carrier Stability in FM Mode:
AC FM: Same as CW.
DC FM: <4 kHz/hour, 8642A/B bands 1-9, HET.
<8 kHz/hour, 8642B band 10.

FM Stereo Separation, Ext dc-Coupled, HET Band (Special Function 8): >50 dB, 1 kHz rate, 75 kHz deviation.

Low Distortion FM/ΦM (Special Function 5 or 112): Distortion in either FM or ΦM can be reduced with this function. FM stereo separation unaffected.

FM Distortion in Special Function 7: <0.03% THD, <1/15 maximum deviation, external rates <50 kHz and internal rates <15.8 kHz.

FM Pre-emphasis (Special Function 6): Provides pre-emphasis in FM with a 750 μs time constant. This is useful when testing FM communications receivers.

AMPLITUDE MODULATION (for VOR, ILS, Avionics Applications)

AM Phase Shift, DC Coupled, for Carrier Frequencies From 108 MHz to 118 MHz:
30 Hz rate: <±0.01°.
30 Hz to 10 kHz rate: <±3°.
Difference from 9 kHz to 11 kHz rates: <2°.

AM Flatness, DC Coupled External AM:
<0.04 dB, 90 to 150 Hz, 108 to 118 MHz and 329 to 335 MHz. (<0.00092 DDM @ 20% AM and <0.0019 DDM @ 40% AM.)
<0.1 dB, 9 to 11 kHz, 108 to 118 MHz.

OUTPUT

Absolute Accuracy: ±3 dB, output level <−127 dBm.

Output Level Switching Time: <100 ms from receipt of last controller command.

Amplitude Sweep, in CW and Angle Modulation Modes:
Range: 20 dB log (or linear with Special Function 122) sweep (10 dB underrange available).
Sweep Time: 20 ms minimum, 999s maximum.
Accuracy: ±1 dB over highest 10 dB, ±3 dB over second highest 10 dB.

Attenuator Range Hold (Special Function 9): The internal step attenuator can be fixed and the electronic level vernier varied up to 30 dB for monotonic level setting. This is useful in measuring of receiver squelch hysteresis.

Table 1-2. Supplemental Characteristics (2 of 2)

Supplemental characteristics are typical, but non-warranted performance parameters, intended to be useful in instrument applications.

INTERNAL REFERENCE OSCILLATOR

Characteristic	Standard	High Stability (opt. 001)
Aging rate	±2 ppm/year	See Table 1-1
Temperature	±4 ppm, 0° to 55°C	$\pm 7 \times 10^{-9}$, 0° to 55°C
Line voltage	±0.1 ppm. +5%, −10%	$\pm 3 \times 10^{-9}$, +5%, −10%

Output, rear panel:
Frequency: 10 MHz.
Level: >1.4 Vp-p into 50 ohms.
Impedance: 75 ohms.

EXTERNAL REFERENCE

Input, rear panel:
Frequency: 1, 2, 5, or 10 MHz, ±25 ppm.
Level: >0.5 Vp-p.
Impedance: 500 ohms.