



LUCID SERIES
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DATA SHEET

LSX Analog Signal Generator

Modular RF and MW signal generators

LSX4081B 9kHz to 4GHz

Introduction

The Lucid-X is a small footprint modular signal generator that is available in multiple form factors including PXIe module, benchtop, rackmount, and portable. It has been designed to provide low phase noise, fast frequency switching with a frequency range all the way up to 40GHz.

Specification Notes

- Warranted specifications represent the tested and verified performance of the instrument at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ after a minimum 30-minute warm-up.
- Typical values indicate the expected average performance of most units under nominal conditions; they are not guaranteed and may vary.
- Minimum and maximum limits define the design-verified operating range, established through design validation and/or production testing.
- Warranted limits include appropriate guard bands to account for statistical performance variations, measurement uncertainty, and environmental effects.
- Specifications and performance characteristics are subject to change without notice as part of ongoing product improvement.

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Specifications & Graphs

Frequency Parameters / Range

Parameter	Min	Typical	Max	Note
Frequency Range	9 kHz		4 GHz	LSX408xy ⁽¹⁾
	50 kHz		14 GHz	LSX149xy ⁽¹⁾
	50 kHz		20 GHz	LSX209xy ⁽¹⁾
	50 kHz		40 GHz	LSX409xy ⁽¹⁾
Resolution		0.001Hz		
Phase Offset	0 deg		360 deg	0.01 deg resolution
Phase Resolution		0.01 deg		
Switching Speed				
CW Mode				
Sweep / List Mode		500 μ s		Standard
Sweep / List Mode		100 μ s		FS Option
Sweep / List Mode		10 μ s		UFS Option

⁽¹⁾ x = Number of channels, y=X/R/B/D/P=PXIe/Rackmount/Benchtop/Desktop/Portable.



Figure 1: Frequency Switching Option FS Option

SSB Phase Noise

Typical Values (dBc/Hz), CW Level 0 dBm

	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz	100 MHz
Carrier Frequency									
100 MHz	-68	-90	-112	-142	-148	-149	-149	-149	-150
1 GHz	-49	-70	-92	-123	-133	-138	-140	-145	-157
4 GHz	-36	-58	-80	-111	-121	-127	-128	-134	-154
8 GHz	-31	-52	-74	-105	-115	-121	-122	-128	-155
10 GHz	-29	-50	-72	-103	-114	-119	-120	-126	-139
20 GHz	-23	-44	-66	-97	-108	-113	-114	-121	-142

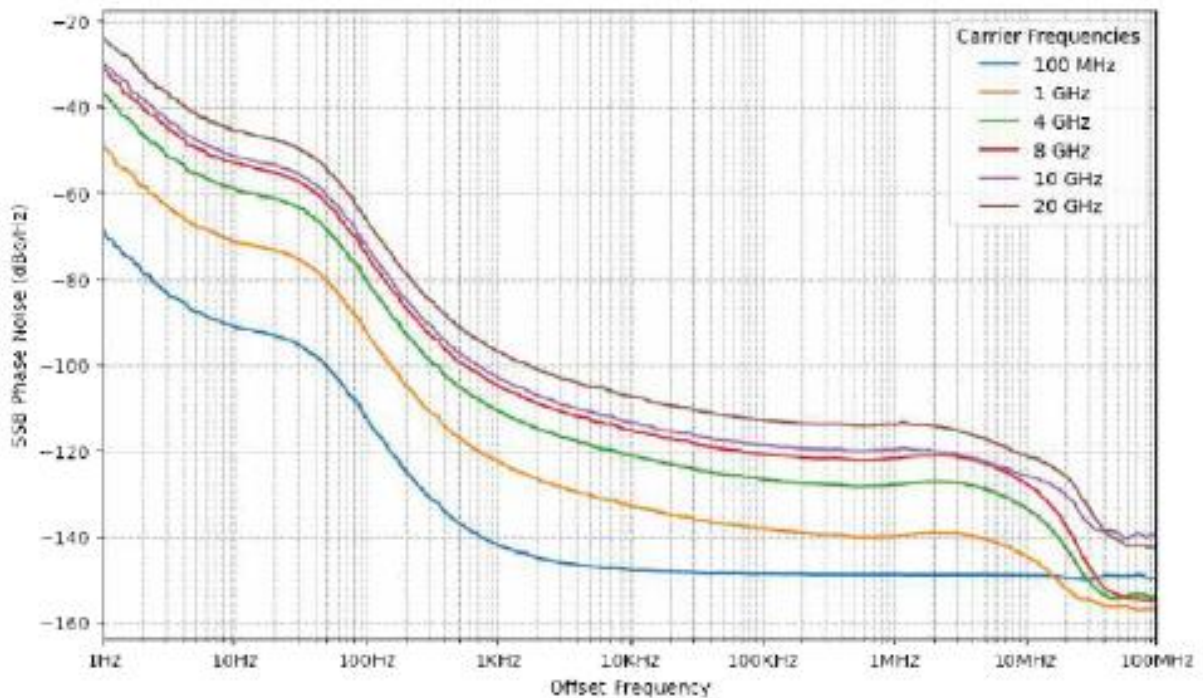


Figure 2: Phase Noise vs. Frequencies at 0 dBm

Spectral Purity

Parameter	Min	Typical	Max	Note
Harmonics @ 0 dBm Output Power				
<1.5 GHz		<-50 dBc		
1.5 GHz to 8 GHz		<-50 dBc	-45 dBc	
8 GHz to 12 GHz		<-40 dBc	-37 dBc	
12 GHz to 17 GHz		<-43 dBc	-40 dBc	
17 GHz to 20 GHz		<-55 dBc	-51 dBc	
Harmonics @ +10 dBm Output Power				
<1.5 GHz		-40 dBc		
1.5 GHz to 8 GHz		-35 dBc	-33 dBc	
8 GHz to 12 GHz		-32 dBc	-28 dBc	
12 GHz to 17 GHz		-35 dBc	-34 dBc	
17 GHz to 20 GHz		-50 dBc	-43 dBc	
Sub Harmonics				
Up to 20 GHz		-75 dBc		
Non-Harmonic Spurious				
Up to 20 GHz		-90 dBc	-55 dBc	Max is defined by boundary spurs that may appear @ -100 MHz to +100 MHz offset from CW

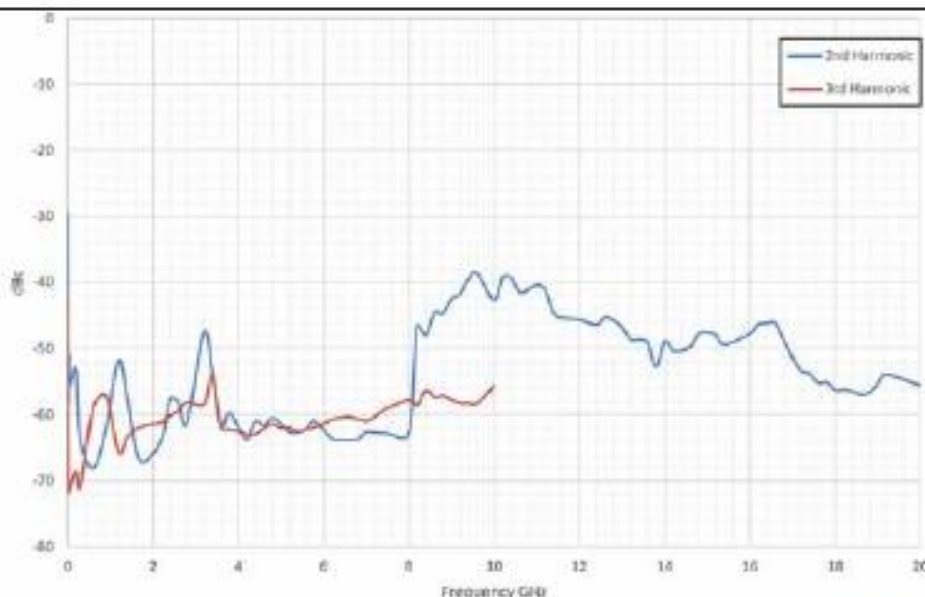


Figure 3: Harmonics at 0 dBm

Spectral Purity (continued)

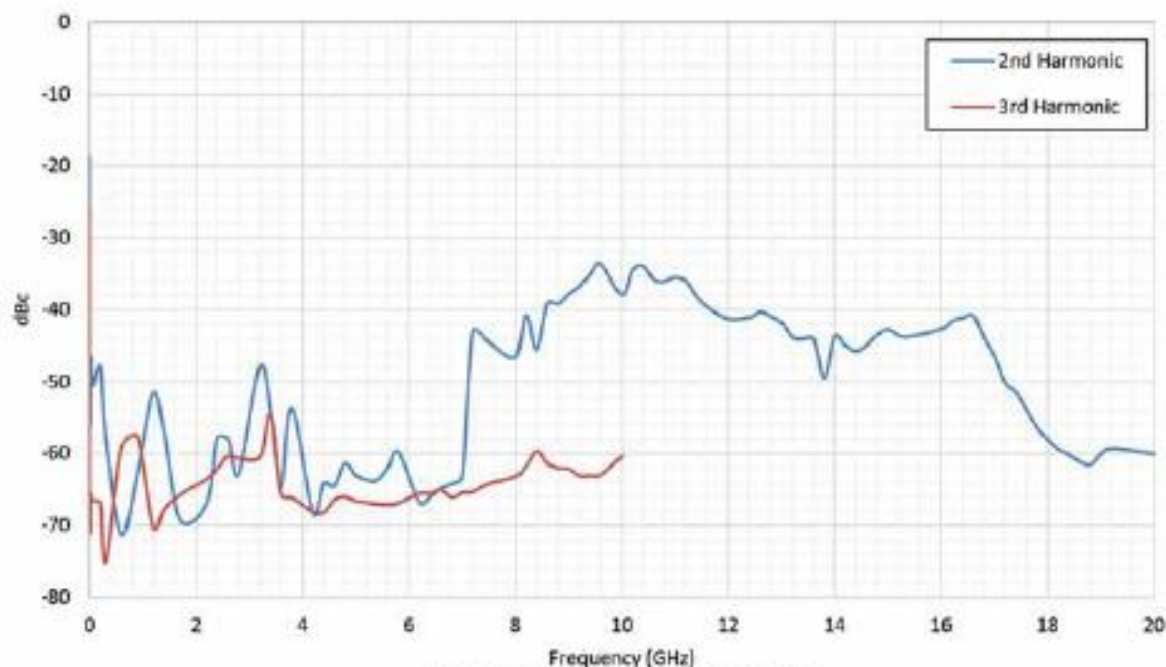


Figure 4: Harmonics at 5 dBm

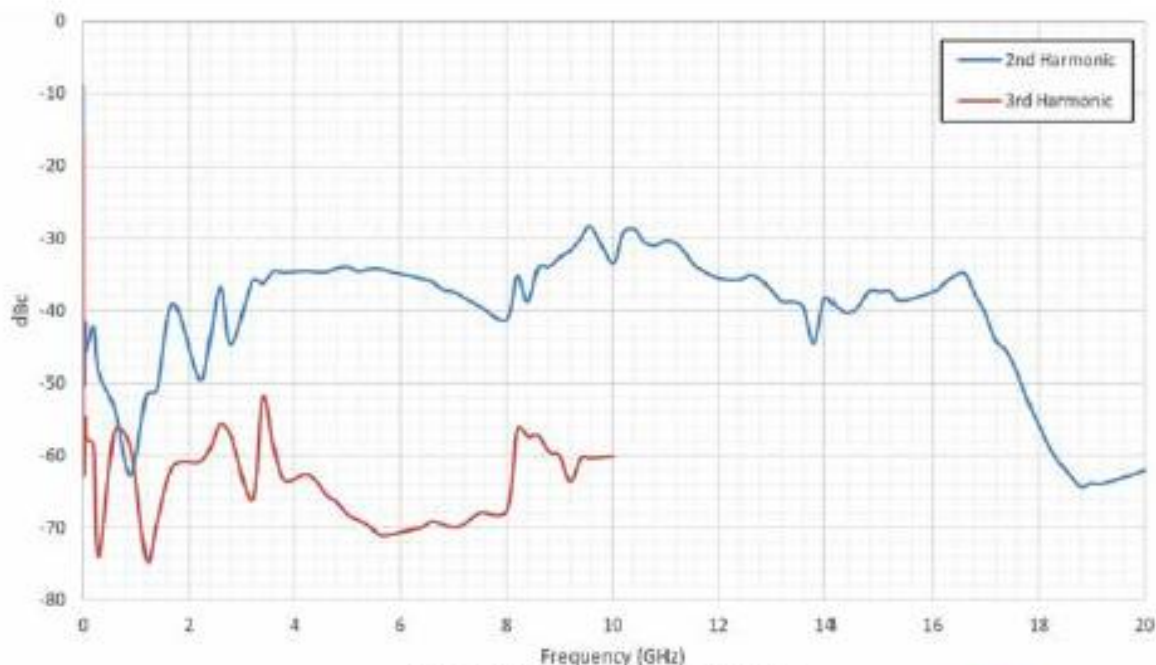


Figure 5: Harmonics at 10 dBm

Level Performance

Parameter	Min	Typical	Max	Note
Output Power Level				
Settable	-30 dBm		+20 dBm	
Calibrated	-20 dBm		+15 dBm	
Output Power Level				
Settable	-80 dBm		+20 dBm	LP Option
Calibrated	-70 dBm		+17dBm	
Power Resolution		0.01 dB		
Power Mute		-100 dB	-70 dB	

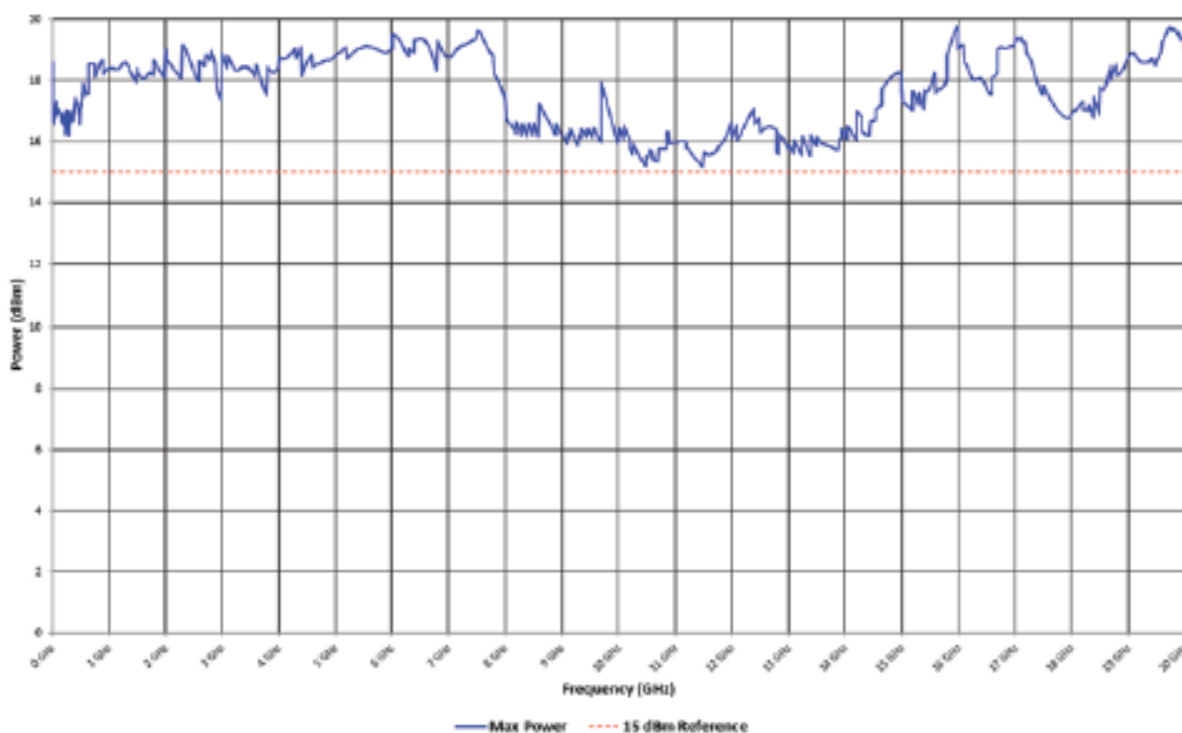


Figure 6: Max Power vs. Frequency up to 20 GHz

Level Accuracy

Parameter	-5 dBm	0 dBm	5 dBm	17 dBm
Frequency Range				
0.0–1.5 GHz	0.6 dB (<0.1 dB)	0.5 dB (<0.1 dB)	0.5 dB (<0.1 dB)	1.0 dB (<0.1 dB)
1.5–8.0 GHz	0.8 dB (<0.1 dB)	0.6 dB (<0.1 dB)	0.8 dB (<0.1 dB)	1.0 dB (<0.2 dB)
8.0–16.0 GHz	1.0 dB (<0.2 dB)	1.0 dB (<0.1 dB)	1.1 dB (<0.5 dB)	1.1 dB (<0.4 dB)
16.0–20.0 GHz	1.3 dB (<0.3 dB)	1.0 dB (<0.2 dB)	1.2 dB (<0.4 dB)	1.1 dB (<0.4 dB)

Output Return Loss

Parameter	Min	Typical	Max	Note
Output Return Loss		-10 dBm		

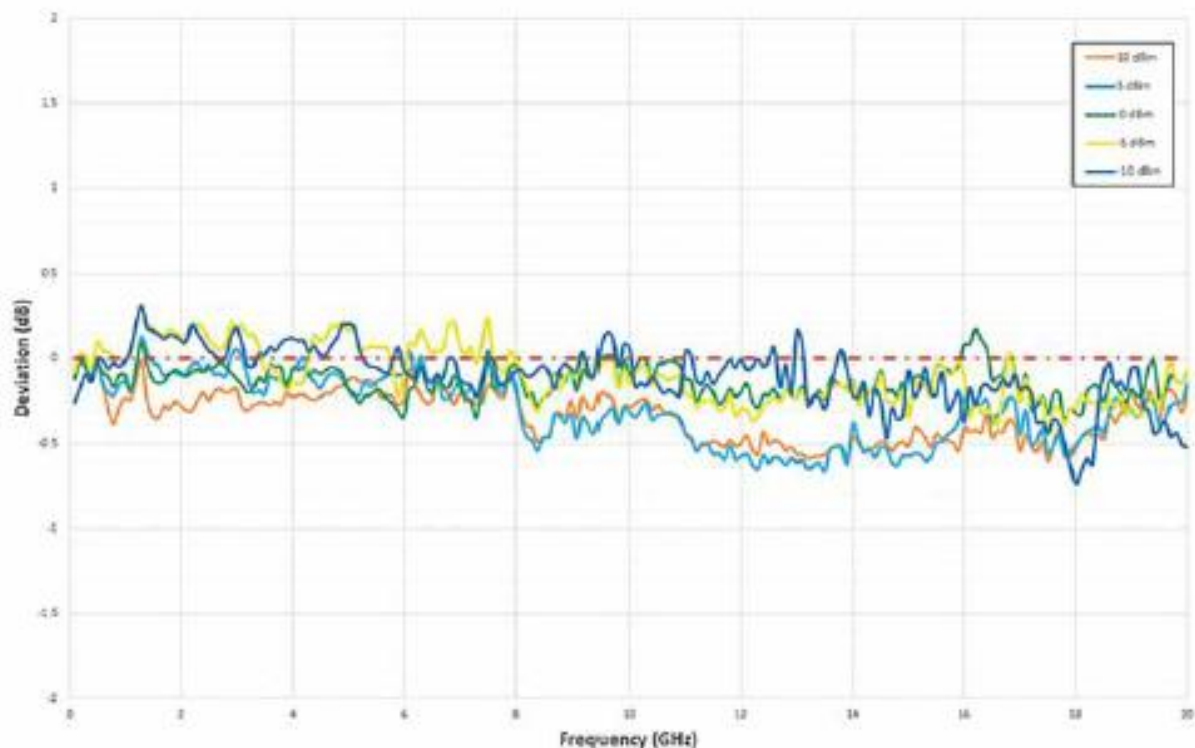


Figure 7: Level Accuracy over Frequency

Power Linearity

Frequency Range	-20.0 to -8.3 dBm	-8.3 to 3.3 dBm	-20.0 to -8.3 dBm
0.1-5.1 GHz	0.5 dB (<0.2 dB)	0.7 dB (<0.2 dB)	0.62 dB (<0.2 dB)
5.1-10.0 GHz	1.2 dB (<0.4 dB)	0.81 dB (<0.4 dB)	0.9 dB (<0.4 dB)
10.0-15.0 GHz	1 dB (<0.6 dB)	1 dB (<0.2 dB)	0.7 dB (<0.3 dB)
15-20 GHz	1 dB (<0.7 dB)	0.75 dB (<0.4 dB)	0.9 dB (<0.6 dB)

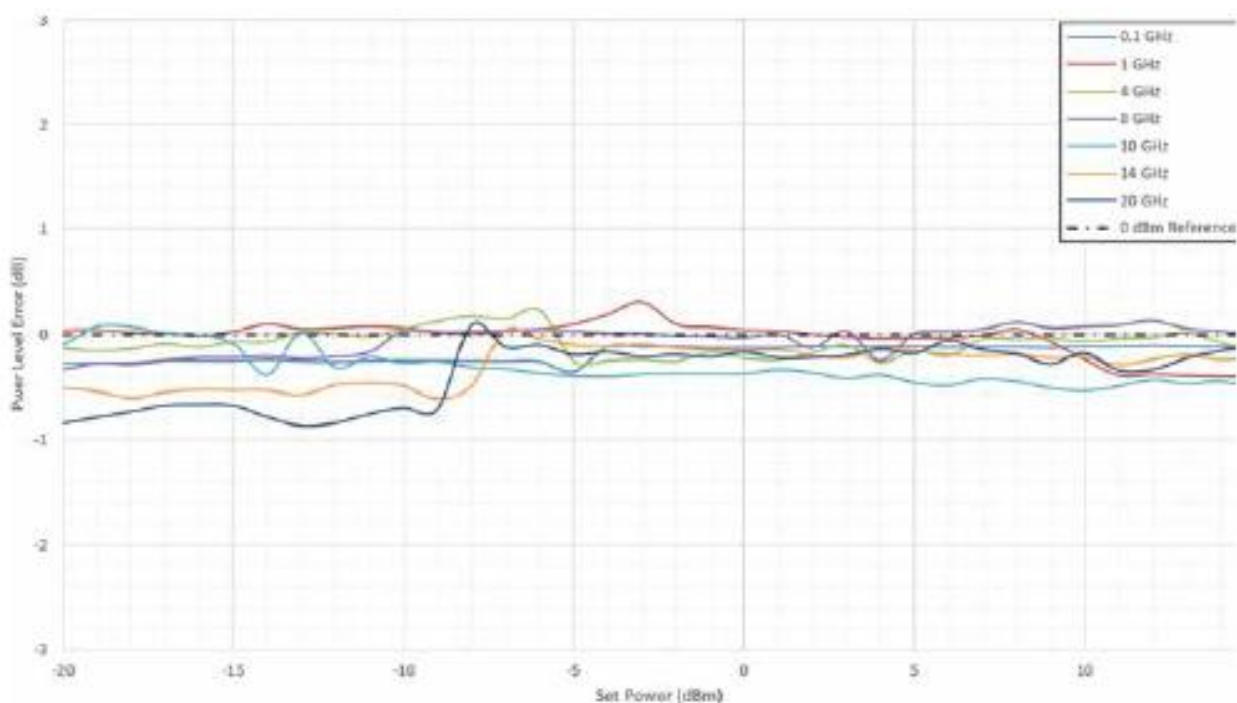


Figure 8: Power Linearity over Frequencies up to 20 GHz

Modulation (9kHz to 4GHz)

Pulse Modulation

Parameter	Min	Typical	Max	Note
Pulse Modulation				Opt PLS
Modulation Source				Internal / external
External Input Amplitude		TTL		50 Ohm
On / off ratio		80 dB		
Pulse rise / fall time			10 ns	10%-90%
Resolution		10 ns		
Width	32 ns		100 ms	
Repetition Frequency	DC		10MHz	
Internal Pulse Generator				Opt PAT
Number of Steps	1		2048	
Step Repetition	1		65535	
On/Off Time	32		20 days	

Amplitude Modulation

Parameter	Min	Typical	Max	Note
Modulation Source				Internal / External
Type				Linear
Depth	0%		100%	
Deviation Resolution		0.1% of depth		
Modulation Rate	DC		100 kHz	AM Dist <1.5% Max
Modulation Waveforms				Sine

Frequency Modulation

Parameter	Min	Typical	Max	Note
Modulation Source				Internal / External
Deviation	1 Hz		10 MHz	
Resolution		0.1% or 1Hz		The greater
Modulation Rate	1 Hz		1MHz	Internal
Modulation Waveforms				Sine
FM Distortion	<1%	<1%	<3%	3% Max Deviation



Modulation

Phase Modulation

Parameter	Min	Typical	Max	Note
Modulation Source				Internal
Peak Deviation	0 deg		360 deg	
Modulation Rate	DC		100 kHz	
Modulation Waveforms			10	Sine
PM Deviation Accuracy at 1 kHz		$\pm 4\%$		
PM Distortion		$<3\%$ at 10 radians at 1 kHz modulation rate		

Frequency Reference

Parameter	Min	Typical	Max	Note
Internal reference frequency		10 MHz		
Temperature stability		±10 ppb max.		Over range 0 to 50°C
Aging 1st year		± 0.3 ppm		
Aging 10 years		1.5 ppm		
Warm up Time		30 min		
Frequency Accuracy		±0.5ppm		

General ~ continued

Benchtop

Voltage Range	90 VAC to 264 VAC
Frequency Range	47 Hz to 63 Hz
Power Consumption	25 W typ., 35 W max.