



LUCID SERIES  
THINK RF THINK **LUCID**

## DATA SHEET

### Wideband STALO CSX

STALO Module

14 GHz

## Introduction

### Modular STALO, ultra-low phase noise, fast switching, signal generator

The Lucid-X is a small footprint modular signal generator platform that is available is configured as a stable local oscillator (STALO) for weather radar applications.

## Specification Notes

- Warranted specifications represent the tested and verified performance of the instrument at  $23\text{ °C} \pm 5\text{ °C}$  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
<b>Frequency Range</b>	50 kHz	8 GHz		LSX808xy <sup>(1)</sup>
	50 kHz	14 GHz		LSX149xy <sup>(1)</sup>
	50 kHz	20 GHz		LSX209xy <sup>(1)</sup>
	50 kHz	40 GHz		LSX409xy <sup>(1)</sup>
<b>Resolution</b>		0.001Hz		
<b>Phase Offset</b>	0 deg		360 deg	0.01 deg resolution
<b>Phase Resolution</b>		0.01 deg		
<b>Switching Speed</b>				
CW Mode				
Sweep / List Mode		500 μs		Standard
Sweep / List Mode		100 μs		FS Option
Sweep / List Mode		10 μs		UFS Option

<sup>(1)</sup> x = Number of channels, y=X/R/B/D/P=PXle/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
<b>Carrier Frequency</b>									
<b>100 MHz</b>	-68	-90	-112	-142	-148	-149	-149	-149	-150
<b>1 GHz</b>	-49	-70	-92	-123	-133	-138	-140	-145	-157
<b>4 GHz</b>	-36	-58	-80	-111	-121	-127	-128	-134	-154
<b>8 GHz</b>	-31	-52	-74	-105	-115	-121	-122	-128	-155
<b>10 GHz</b>	-29	-50	-72	-103	-114	-119	-120	-126	-139
<b>20 GHz</b>	-23	-44	-66	-97	-108	-113	-114	-121	-142

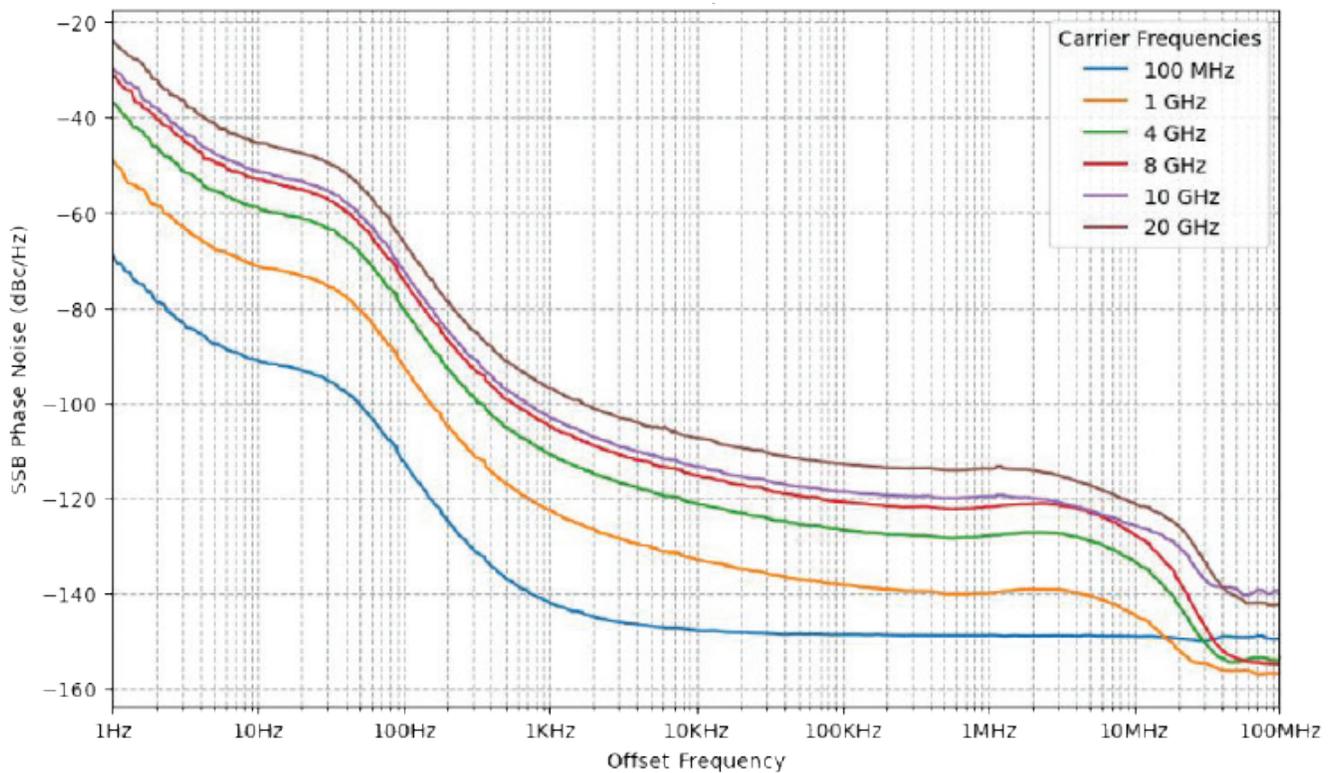


Figure 2: Phase Noise vs. Frequencies at 0 dBm

## Spectral Purity

Parameter	Min	Typical	Max	Note
<b>Harmonics @ 0 dBm Output Power</b>				
<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	
<b>Harmonics @ +10 dBm Output Power</b>				
<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	
<b>Sub Harmonics</b>				
Up to 20 GHz		-75 dBc		
<b>Non-Harmonic Spurious</b>				
Up to 20 GHz		-90 dBc	-60 dBc	Max is defined by boundary spurs that may appear @ -100 MHz to +100 MHz offset from CW

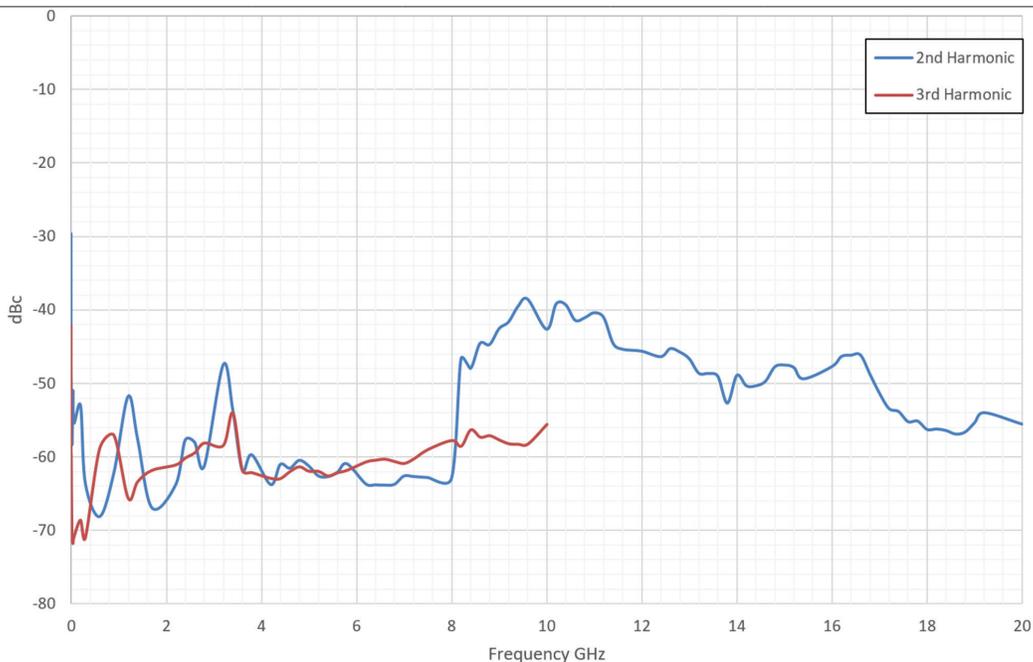


Figure 4: Harmonics at 5 dBm

### Spectral Purity (continued)

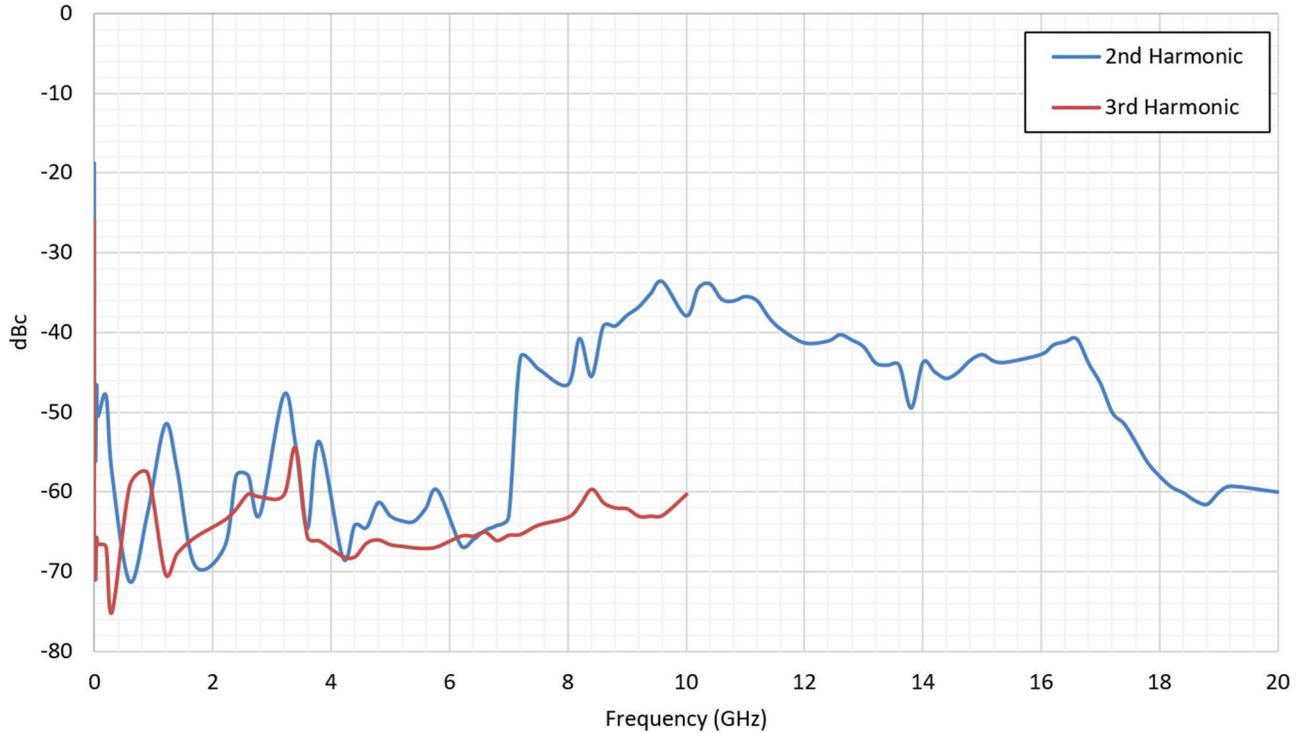


Figure 4: Harmonics at 5 dBm

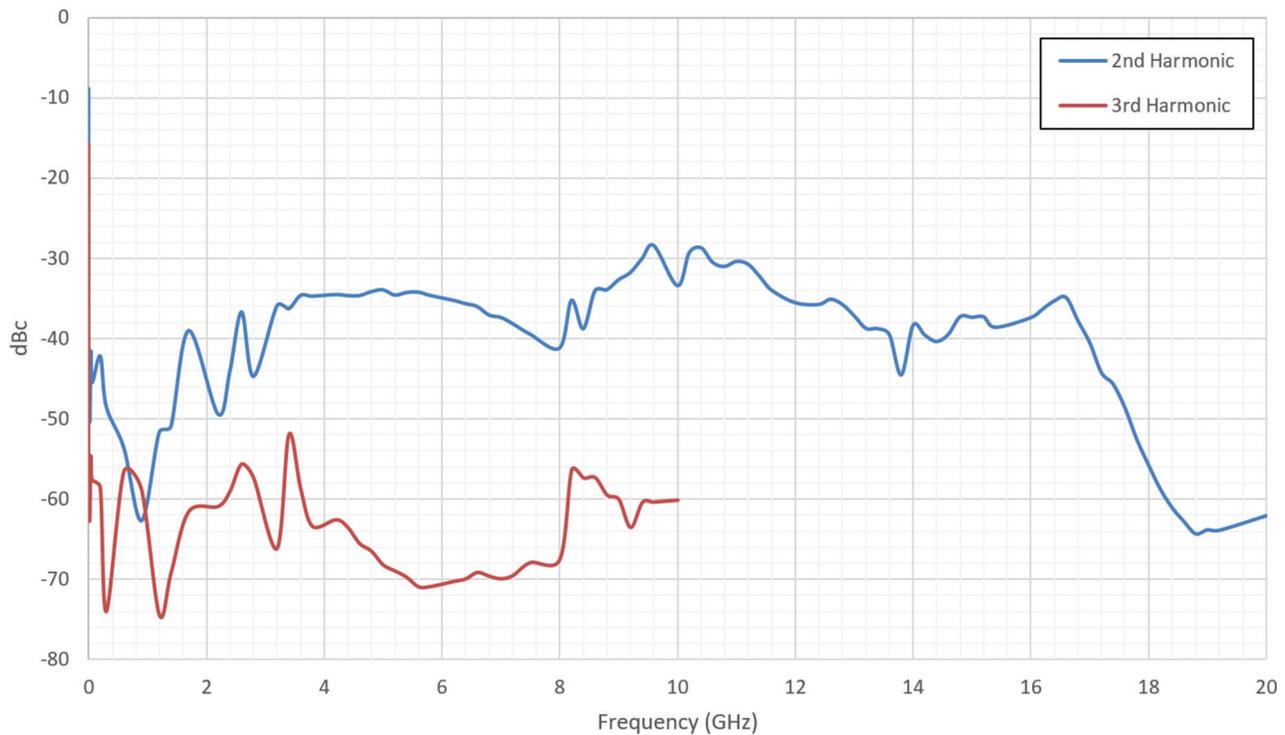


Figure 5: Harmonics at 10 dBm

## Level Performance

Parameter	Min	Typical	Max	Note
<b>Output Power Level</b>				
Settable	-80 dBm		+20 dBm	
Calibrated	-70 dBm		+15 dBm	
<b>Power Resolution</b>		0.01 dB		
<b>Power Mute</b>		-100 dB	-70 dB	

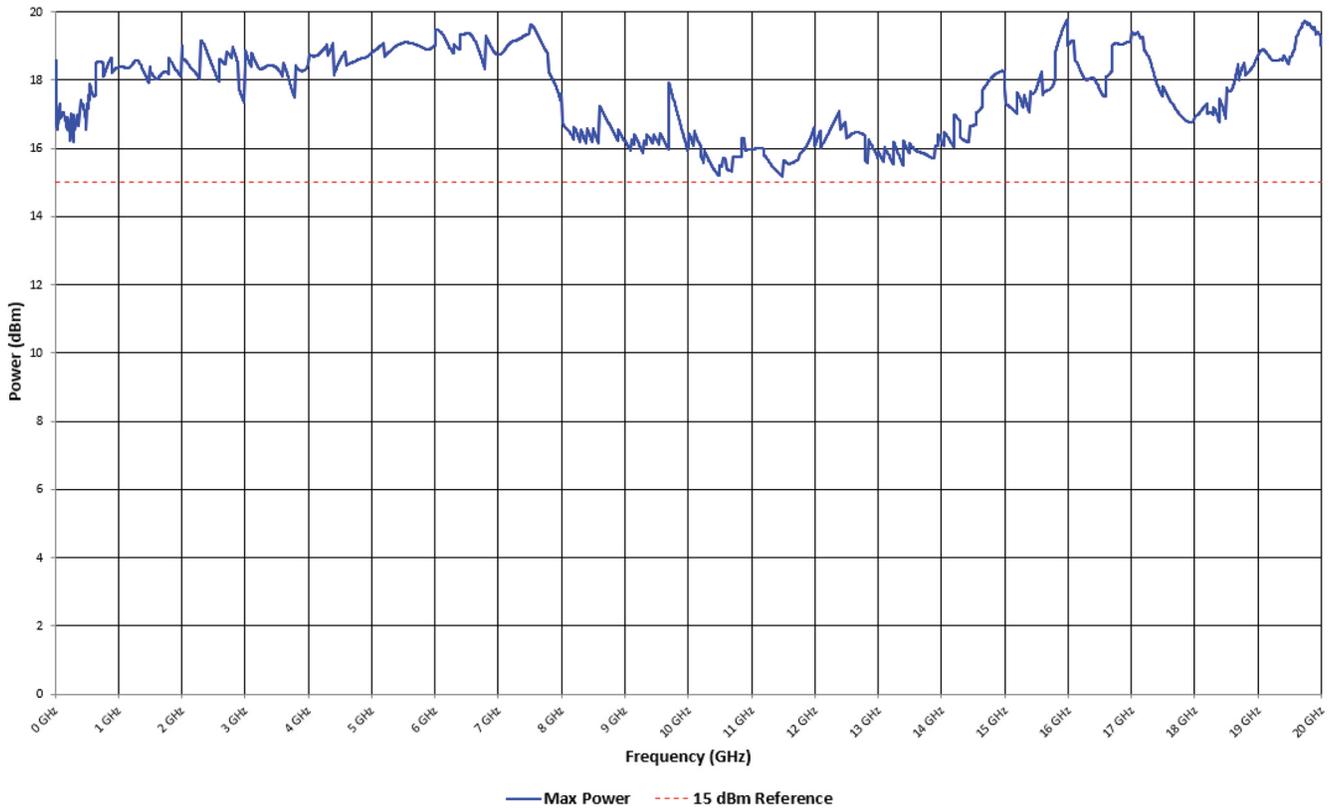


Figure 6: Max Power vs. Frequency up to 20 GHz

## Level Accuracy

Parameter	-5 dBm	0 dBm	5 dBm	10 dBm
<b>Frequency Range</b>				
0.0–1.5 GHz	0.6 dB (<0.1 dB)	0.5 dB (<0.1 dB)	0.5 dB (<0.1 dB)	0.7 dB (<0.2 dB)
1.5–8.0 GHz	0.8 dB (<0.1 dB)	0.6 dB (<0.1 dB)	0.8 dB (<0.1 dB)	0.5 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

Parameter	Min	Typical	Max	Note
<b>Frequency Range</b>				-20.0 to -8.3 dBm
100 MHz to 5.1 GHz		0.5 dB (<0.2 dB)		
5.1 GHz to 10 GHz		1.2 dB (<0.4 dB)		
10 GHz to 15 GHz		1 dB (<0.6 dB)		
15 GHz to 20 GHz		1 dB (<0.7 dB)		

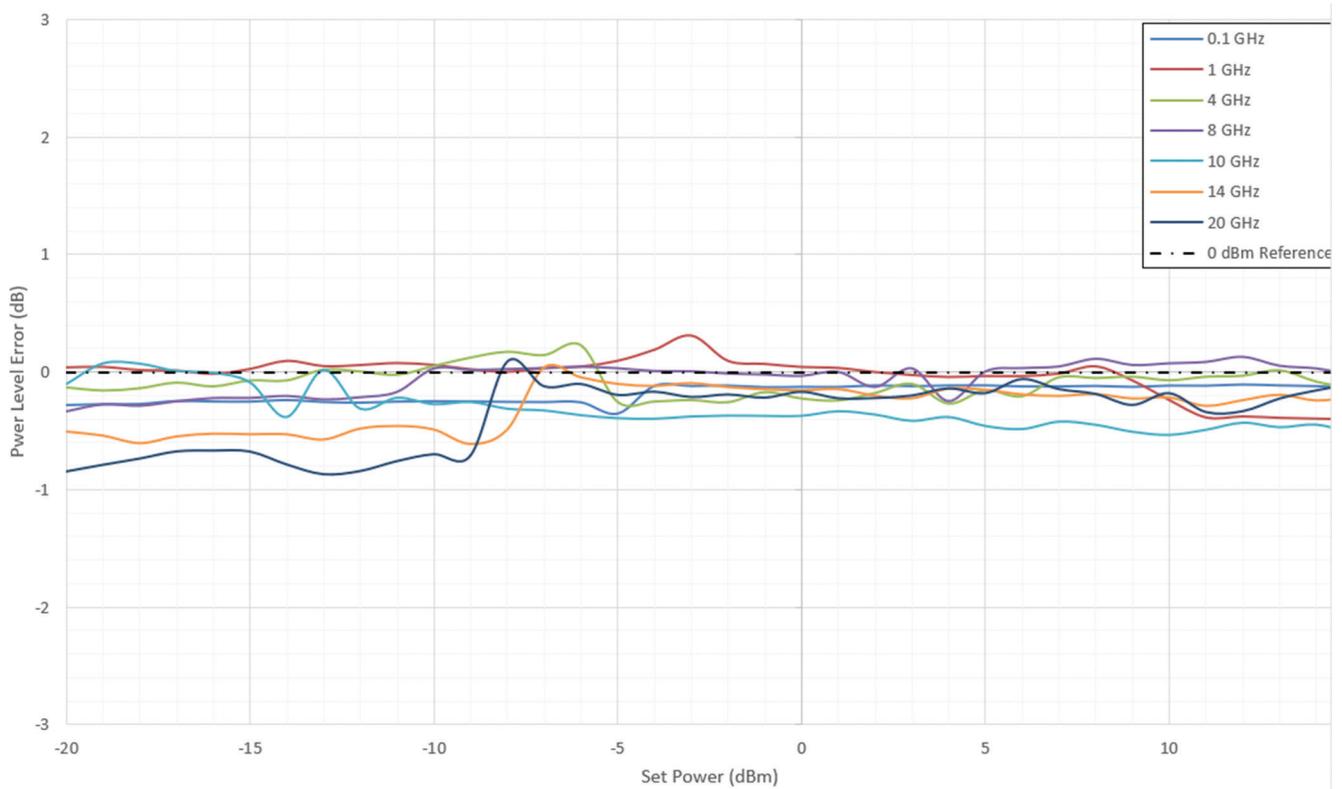


Figure 8: Power Linearity over Frequencies up to 20 GHz

## Modulation

### Pulse Modulation

Parameter	Min	Typical	Max	Note
<b>Pulse Modulation</b>				Opt PLS
Modulation Source				Internal / external
External Input Amplitude		TTL		50 Ohm
On / off ratio		70 dB		
Pulse rise / fall time			15 ns	10%-90%
Resolution		10 ns		
Width	32 ns		100 ms	
Repetition Frequency	DC		10MHz	
<b>Internal Pulse Generator</b>				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	
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

## Modulation - continued

### Phase Modulation

Parameter	Min	Typical	Max	Note
Modulation Source				Internal / External
Peak Deviation	0 deg		360 deg	
Modulation Rate	DC		100 kHz	
Modulation Waveforms				Sine

### Sweep

Parameter	Min	Typical	Max	Note
Range				Same as the device frequency range
Modes		Frequency step, Amplitude step, List		
Type		Linear		
Dwell Time	10 $\mu$ s		562,499 s	
Resolution		1 $\mu$ s		
Number of Points	2		4096	
Trigger		Free run, External, Bus, Timer		

## Modulation - continued

### 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		

### Reference Input

Connector Type		SMA		
Input Impedance		50 Ω		
Waveform		Sine or Square		
Frequency		10/100 MHz		
Power		-3 dBm to +10 dBm		
Absolute Max. Level		+15 dBm		

## Connectors

<b>RF Out</b>	
<b>Parameters</b>	<b>Typical Value</b>
Impedance	50 $\Omega$
<b>Connector Type</b>	
LSX8081xy	2.92 mm
LSX149xy	2.92 mm
LSX209xy	2.92 mm
LSX409xy	2.92 mm
<b>VSWR</b>	1:2.1
<b>Reverse Power</b>	0.2 W, 16 VDC
<b>Reference Out</b>	
Impedance	50 $\Omega$
Connector Type	SMA
Frequency	10 MHz or 100 MHz
Shape	Sine
Power	3 to 7 dBm
<b>Modulation Input</b>	
Connector Type	SMP
Input Impedance	50 $\Omega$
Max. Input Voltage	$\pm 1$ V
Input Damage Level	$\pm 3.5$ V
<b>Pulse / Trigger Input</b>	
Connector Type	SMP
Input Impedance	50 $\Omega$
Input Voltage	TTL, CMOS compatible
Threshold	1.5 V
Damage Level	-0.42 V min or 5.42 V max
<b>Reference Input</b>	
Connector Type	SMA
Input Impedance	50 $\Omega$
Waveform	Sine or Square
Frequency	10/100 MHz
Power	-3 dBm to +10 dBm
Absolute Max. Level	+15 dBm

## General

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### Common

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<b>Temperature</b>	
Operating	0°C to +40°C
Storage	-40°C to +70°C
<b>Warm up Time</b>	15 minutes
<b>Humidity</b>	85% RH, non-condensing
<b>Safety</b>	CE Marked, IEC61010-1:2010
<b>EMC</b>	IEC 61326-1:2013
<b>Calibration</b>	2 years
<b>Warranty</b>	3 years

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### Desktop

<b>Power Supply</b>	Input: 100 – 240 V AC, 1.5 A, 47-63 Hz. Output 12.0 V DC, 8.34 A, 100.0 W
<b>Power Consumption</b>	
LSX8081D	25 W typ., 35 W max.
LSX1491D	30 W typ., 45 W max.
LSX2091D	30 W typ., 45 W max.
LSX4091D	35 W typ., 55 W max.
<b>Interface</b>	USB TYPE C, SPI
<b>Dimensions</b>	145 x 95 x 30 mm (5.71 x 3.74 x 1.18 inches)
<b>Weight</b>	
Without Package	1.0 kg
Shipping Weight	1.5 kg

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### Portable

<b>Power Supply</b>	Input: 100 – 240 V AC, 1.5 A, 47-63 Hz. Output 12.0 V DC, 8.34 A, 100.0 W
<b>Power Consumption</b>	60 W max.
LSX8081P	25 W typ., 35 W max.
LSX1491P	30 W typ., 45 W max.
LSX2091P	30 W typ., 45 W max.
<b>Display Type</b>	10.1", 1280x800 TFT capacitive touch screen
<b>Battery</b>	
Type	4-cell, replaceable
Standby	Up to 2 hours
Maximum Load	Up to 1 hour
<b>Interface</b>	USB TYPE C, SPI
Host	2 x USB type A
Device	1 x USB type B, 1 x micro-USB for LAN adapter
<b>Storage</b>	16 GB removable SD card
<b>Dimensions (WxHxD)</b>	280 x 225 x 65 mm (11.0 x 8.86 x 2.56 inches)
<b>Weight</b>	
Without Package	3.0 kg
Shipping Weight	4.5 kg

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## General ~ continued

### PXIe

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<b>Voltage</b>	+12.0 to +12.6 VDC
<b>Power Consumption</b>	
LSX8081X	25 W typ., 35 W max.
LSX1491X	30 W typ., 45 W max.
LSX2091X	30 W typ., 45 W max.
LSX4091X	35 W typ., 55 W max.
<b>Current Consumption</b>	
+3.3 V	0.5 A max.
+12 V	5.5 A max.
<b>Interface</b>	PXIe Gen3 x8 Lanes
<b>Dimensions</b>	8HP PXIe (2 Slots)
<b>Weight</b>	
Without Package	1.0 kg
Shipping Weight	1.5 kg

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### Rackmount

<b>Voltage Range</b>	90 VAC to 264 VAC
<b>Frequency Range</b>	47 Hz to 63 Hz
<b>Power Consumption</b>	
LSX8081R	25 W typ., 35 W max.
LSX8082R	50 W typ., 70 W max.
LSX8084R	100 W typ., 140 W max.
LSX1491R	30 W typ., 45 W max.
LSX1492R	60 W typ., 90 W max.
LSX1494R	120 W typ., 180 W max.
LSX2091R	30 W typ., 45 W max.
LSX2092R	60 W typ., 90 W max.
LSX2094R	120 W typ., 180 W max.
LSX4091R	35 W typ., 55 W max.
LSX4092R	70 W typ., 110 W max.
LSX4094R	140 W typ., 220 W max.
<b>Interface</b>	
Host	2 x front panel USB type A 1 x rear panel USB type A
Device	1 x rear panel USB type B
LAN	1 x rear panel 1000/100/10 BASE-T
<b>Storage</b>	16 GB removable SD card
<b>Dimensions (WxHxD)</b>	450 x 43 x 500 mm (17.7 x 1.7 x 19.7 inches)
<b>Weight</b>	
Without Package	6 kg
Shipping Weight	7 kg

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## General ~ continued

### Benchtop

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<b>Voltage Range</b>	90 VAC to 264 VAC
<b>Frequency Range</b>	47 Hz to 63 Hz
<b>Power Consumption</b>	
LSX8081B	25 W typ., 35 W max.
LSX8082B	50 W typ., 70 W max.
LSX8084B	100 W typ., 140 W max.
LSX1491B	30 W typ., 45 W max.
LSX1492B	60 W typ., 90 W max.
LSX1494B	120 W typ., 180 W max.
LSX2091B	30 W typ., 45 W max.
LSX2092B	60 W typ., 90 W max.
LSX2094B	120 W typ., 180 W max.
LSX4091B	35 W typ., 55 W max.
LSX4092B	70 W typ., 110 W max.
LSX4094B	140 W typ., 220 W max.
<b>Display Type</b>	5", TFT capacitive touch screen
<b>Interface</b>	
Host	2 x front panel USB type A 1 x rear panel USB type A
Device	1 x rear panel USB type B
LAN	1 x rear panel 1000/100/10 BASE-T RJ45
<b>Storage</b>	32 GB removable SD card
<b>Dimensions (WxHxD)</b>	
With Feet	315 X 102 x 425 mm (12.40 x 4.02 x 16.73 inches)
Without Feet	315 X 88 x 425 mm (12.40 x 3.46 x 16.73 inches)
<b>Weight</b>	
Without Package	6 kg
Shipping Weight	6.5 kg

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## Ordering Information & Options

### Desktop

Model	Description
LSX8081D	8 GHz, 1 channel, desktop analog RF signal generator
LSX1491D	14 GHz, 1 channel, desktop analog RF signal generator
LSX2091D	20 GHz, 1 channel, desktop analog RF signal generator
LSX4091D	40 GHz, 1 channel, desktop analog RF signal generator

### PXIe

Model	Description
LSX8081X	8 GHz, 1 channel, PXIe analog RF signal generator
LSX1491X	14 GHz, 1 channel, PXIe analog RF signal generator
LSX2091X	20 GHz, 1 channel, PXIe analog RF signal generator
LSX4091X	40 GHz, 1 channel, PXIe analog RF signal generator

### Rackmount

Model	Description
LSX8081R	8 GHz, 1 channel, rackmount analog RF signal generator
LSX8082R	8 GHz, 2 channels, rackmount analog RF signal generator
LSX8084R	8 GHz, 4 channels, rackmount analog RF signal generator
LSX1491R	14 GHz, 1 channel, rackmount analog RF signal generator
LSX1492R	14 GHz, 2 channels, rackmount analog RF signal generator
LSX1494R	14 GHz, 4 channels, rackmount analog RF signal generator
LSX2091R	20 GHz, 1 channel, rackmount analog RF signal generator
LSX2092R	20 GHz, 2 channels, rackmount analog RF signal generator
LSX2094R	20 GHz, 4 channels, rackmount analog RF signal generator
LSX4091R	40 GHz, 1 channel, rackmount analog RF signal generator
LSX4092R	40 GHz, 2 channels, rackmount analog RF signal generator
LSX4094R	40 GHz, 4 channels, rackmount analog RF signal generator

### Benchtop

Model	Description
LSX8081B	8 GHz, 1 channel, benchtop analog RF signal generator
LSX8082B	8 GHz, 2 channels, benchtop analog RF signal generator
LSX8084B	8 GHz, 4 channels, benchtop analog RF signal generator
LSX1491B	14 GHz, 1 channel, benchtop analog RF signal generator
LSX1492B	14 GHz, 2 channels, benchtop analog RF signal generator
LSX1494B	14 GHz, 4 channels, benchtop analog RF signal generator
LSX2091B	20 GHz, 1 channel, benchtop analog RF signal generator
LSX2092B	20 GHz, 2 channels, benchtop analog RF signal generator
LSX2094B	20 GHz, 4 channels, benchtop analog RF signal generator
LSX4091B	40 GHz, 1 channel, benchtop analog RF signal generator
LSX4092B	40 GHz, 2 channels, benchtop analog RF signal generator
LSX4094B	40 GHz, 4 channels, benchtop analog RF signal generator

## Ordering Information & Options ~ continued

### Portable

Model	Description
LSX8081P	8 GHz, 1 channel, portable analog RF signal generator
LSX1491P	14 GHz, 1 channel, portable analog RF signal generator
LSX2091P	20 GHz, 1 channel, portable analog RF signal generator

### Options

Options	Description	Models <sup>(1)</sup>
MOD	Modulation package (AM, FM, PM)	X/R/D/P
PLS	Pulse modulation	X/R/B/D/P
PAT	Pattern modulation	X/R/B/D/P
FS	Fast switching 100 $\mu$ s	X/R/B/D
UFS	Ultra-fast switching 10 $\mu$ s	R/B
BAT	4-cell, replaceable extra battery 39 Wh	P
BAT2	4-cell, replaceable extra battery 98 Wh	P
CHA	External charger	P
LAN	USB Ethernet adapter	P
W-Rack	Rack-mount kit	B/R
WE	1 year warranty extension (standard warranty 3 years)	X/R/B/D/P

### Accessories

PXE21100	21 slot PXIe chassis	X
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(1) X/R/B/D/P=PXIe/Rackmount/Benchtop/Desktop/Portable.



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