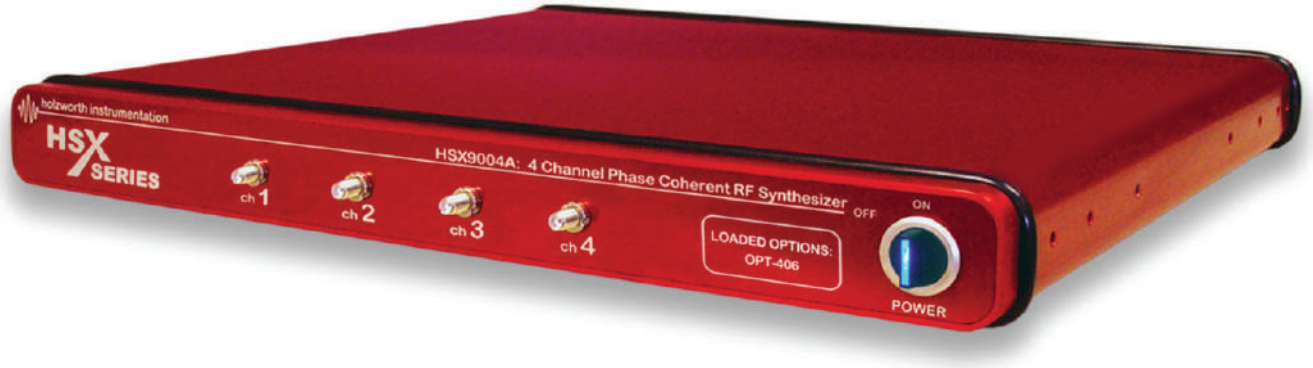
Holzworth

Datasheet

HSX9000 Series

LOW PHASE NOISE MULTI-CHANNEL RF SYNTHESIZERS



The HSX9000 Series offers exceptional phase noise and spectral purity performance as a multi-channel CW signal source. The compact 1U chassis allows for anywhere from 1 to 4 independently tunable channels (frequency / phase offset / amplitude) to optimize channel density within test system racks where real-estate is often crucial. Application specific frequency options can be configured to cover combinations of 10 MHz to **3 GHz, 6 GHz, 12 GHz, 20 GHz, and 40 GHz**. Each broadband channel output provides an accurate dynamic range of up to +20 dBm to -110 dBm. Holzworth's unique multi-loop architecture provides the ultimate in frequency accuracy, channel-to-channel stability and phase coherency.

HSX9000 Series Multi-Channel RF Synthesizers

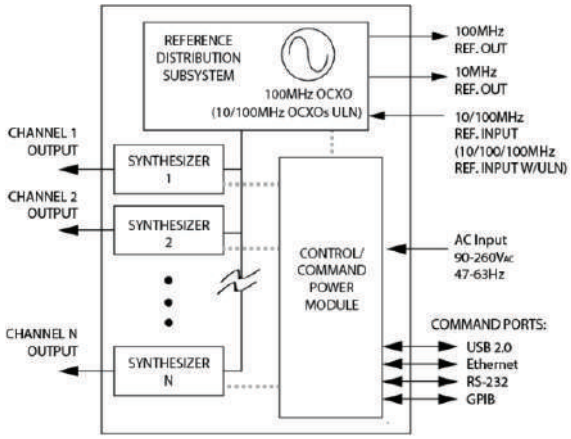
PHASE COHERENT CHANNELS: 3 GHz–6 GHz–12 GHz–20 GHz–40 GHz

FULLY INDEPENDENT CHANNELS

Each RF output is driven by a separate, internally loaded synthesizer/attenuator module. Up to 4 independently tunable synthesizers can be specified per 1U chassis allowing for the highest integrated channel density available in its class.

PHASE COHERENT CHANNELS

Holzworth HSX9000 Series synthesizers offer the performance benefits of a proprietary multi-loop architecture with a centralized reference distribution subsystem, which maintains a tight phase coherent relationship across all integrated channels.



THE ULTIMATE IN CHANNEL-TO-CHANNEL STABILITY

Different from traditional PLL-based synthesizers, Holzworth's proprietary multi-loop architecture creates precisely synthesized signals that exhibit both instantaneous and long-term stability. Temperature variations between the channels remain the only contribution to drift. The thermally optimized, fan-less chassis was specifically developed for maintaining the lowest possible thermal gradients from channel-to-channel. Channel specific thermal monitoring is available for tracking the relative channel temperature of each loaded synthesizer module.

HSX9000 Series Multi-Channel RF Synthesizers
FREQUENCY PERFORMANCE

The specified frequency performance parameters for the HSX9000 Series multi-channel RF synthesizers are fully verified at final performance test and 100% guaranteed for the full warranty period of the product.

PARAMETER	MIN[1]	TYPICAL[2]	MAX[1]	COMMENTS
Frequency Range	10 MHz 10 MHz 50 MHz 50 MHz 50 MHz		3 GHz 6 GHz 12 GHz 20 GHz 40 GHz	See page 4 for channel selection options
Switching Speed		5 ms	10 ms	
Frequency Step Size		0.001 Hz		
Phase Offset Resolution		0.1 °		Baseband 750-1500 MHz (N=1) 0.05 ° ±0.05 °
Phase Offset Range		0 to 359.88°, f > 750 MHz		At 100 MHz, 0 to 22.4988°
Internal Timebase Reference				
Adjust-to-Nominal			+/- 0.2 ppm	Uncertainty
Aging Rate		± 1 ppm/yr		1st year. ±0.5 ppm/yr each subsequent year
Temperature Effects		≤ ± 1 ppm		0 to 55 °C
10 MHz Reference Output				
Amplitude	+2 dBm		+6 dBm	Nominal
Impedance		50 Ω		Nominal
100 MHz Reference Output				
Amplitude	+2 dBm		+6 dBm	Nominal
Impedance		50 Ω		Nominal
External Reference Input (standard)				
Input Frequency		10/100 MHz		
Lock Range		± 4 ppm		
External Amplitude	0 dBm		+10 dBm	
Impedance		50 Ω		Nominal
Waveform				Sine or square
OPT-ULN Ext. Ref. Input (optional)				
Input Frequency Range		10/100/1000 MHz		
Lock Range		+/- 0.5 ppm		
External Amplitude		+10 dBm		Nominal
Impedance		50 Ω		Nominal
Waveform				Sine or square

1 All MIN/ MAX (Minimum/ Maximum) performance parameters are guaranteed and 100% verified during final performance test.
2 Typical performance is "by design" and consistent with field performance data.

HSX9000 Series Multi-Channel RF Synthesizers
HSX9000 SERIES CONFIGURATION GUIDE

The HSX9000 Series synthesizer platform is designed to be user/application defined. Follow four easy steps to determine the part number with the required options.

STEP 1: SELECT TOTAL NUMBER OF CHANNELS

Select the base part number, strictly calling out the total number of channels to be loaded into the multi-channel chassis.

No. Channels	1	2	3	4
Part Number	HSX9001A	HSX9002A	HSX9003A	HSX9004A

STEP 2: SELECT CHANNEL FREQUENCY OPTIONS

Select any combination of channel frequency options. Note that the total number of channels specified here must equal the number of channels selected under STEP 1.

Frequency Range	Number of Channels per Frequency Range			
	1x	2x	3x	4x
10 MHz – 3 GHz	OPT-103-X	OPT-203-X	OPT-303-X	OPT-403-X
10 MHz – 6 GHz	OPT-106-X	OPT-206-X	OPT-306-X	OPT-406-X
50 MHz – 12 GHz	OPT-112-X	OPT-212-X	OPT-312-X	OPT-412-X
50 MHz – 20 GHz	OPT-120-X	OPT-220-X	OPT-320-X	OPT-420-X
50 MHz – 40 GHz	OPT-140-X	OPT-240-X	N/A	N/A

STEP 3: SELECT OPTIONS AND ACCESSORIES

TYPE	Part Number	Description
OPTION	OPT-ULN	Ultra-Low Noise: improves close-in phase noise (offsets up to ≤ 100 Hz) and expands external reference options to include 1000 MHz
ACCESSORY	RACK-1U	19” Rack Mount Bracket Kit, 90º rear bracket, 24 in max. depth
ACCESSORY	RACK2-1U	19” Rack Mount Bracket Kit, straight rear bracket, 24 in max. depth
ACCESSORY	RACK-1U-L	19" Rack Mount Bracket Kit, 90º rear bracket, 29 in max. depth
ACCESSORY	RACK2-1U-L	19" Rack Mount Bracket Kit, straight rear bracket, 29 in max. depth
ACCESSORY	CASE-1U	Carrying/storage case

PART NUMBER EXAMPLE

Ordering a 4 channel HSX9000 synthesizer with 1x 10 MHz-6 GHz channel, 2x 50 MHz-12 GHz channels, and 1x 50 MHz-20 GHz channel would result in the following configuration:

Part Number	Description
HSX9004A	4 channel HSX9000 RF Synthesizer
Options	
OPT-106-X	1x 6 GHz Channel
OPT-212-X	2x 12 GHz Channels
OPT-120-X	1x 20 GHz Channel

HSX9000 Series Multi-Channel RF Synthesizers
3 GHz / 6 GHz AMPLITUDE PERFORMANCE

This section contains performance specifications and data for OPT-n03-X (3 GHz) and OPT-n06-X (6 GHz) channels. The specified parameters for the HSX9000 Series RF Synthesizers are fully verified at final performance test and 100% guaranteed for the full warranty period of the product.

PARAMETER	MIN[1]	TYPICAL[2]	MAX[1]	COMMENTS
Output Power (Calibrated)				
10 MHz ≤ f ≤ 200 MHz	-110 dBm		+15 dBm	
200 MHz < f ≤ 5.0 GHz	-110 dBm		+18 dBm	Settable from -115 dBm to +20 dBm
5.0 GHz < f ≤ 6.0 GHz	-110 dBm		+16 dBm	
Maximum Output Power (unleveled)				
10 MHz ≤ f ≤ 6.0 GHz		See plot on page 6		
Resolution		0.01 dB		
Connector		50 Ω		SMA (Jack)
Switching Speed (Amplitude)		5 ms		
Absolute Level Accuracy				
10 MHz ≤ f ≤ 6.0 GHz				
MAX to +10 dBm			± 1.0 dB	
+10 to -10 dBm			± 0.7 dB	35 °C to 45 °C case temperature
-10 to -60 dBm			± 1.0 dB	
-60 to -90 dBm			± 1.3 dB	
<-90 dBm			± 2.0 dB	

SSB Phase Noise		**Offset** (typical)			**Offset** (max)	
f_c; Output +10 dBm	**1 Hz**	**10 kHz**	**10 MHz**	**1 Hz**	**10 kHz**	**1 MHz**
10 MHz	≤ -78 dBc/Hz	≤ -160 dBc/Hz	≤ -161 dBc/Hz	≤ -72 dBc/Hz	≤ -154 dBc/Hz	≤ -155 dBc/Hz
100 MHz	≤ -60 dBc/Hz	≤ -156 dBc/Hz	≤ -156 dBc/Hz	≤ -54 dBc/Hz	≤ -150 dBc/Hz	≤ -150 dBc/Hz
500 MHz	≤ -47 dBc/Hz	≤ -146 dBc/Hz	≤ -140 dBc/Hz	≤ -41 dBc/Hz	≤ -140 dBc/Hz	≤ -134 dBc/Hz
1 GHz	≤ -46 dBc/Hz	≤ -141 dBc/Hz	≤ -134 dBc/Hz	≤ -40 dBc/Hz	≤ -135 dBc/Hz	≤ -138 dBc/Hz
3 GHz	≤ -34 dBc/Hz	≤ -131 dBc/Hz	≤ -129 dBc/Hz	≤ -28 dBc/Hz	≤ -125 dBc/Hz	≤ -123 dBc/Hz
6 GHz	≤ -23 dBc/Hz	≤ -125 dBc/Hz	≤ -123 dBc/Hz	≤ -17 dBc/Hz	≤ -119 dBc/Hz	≤ -117 dBc/Hz

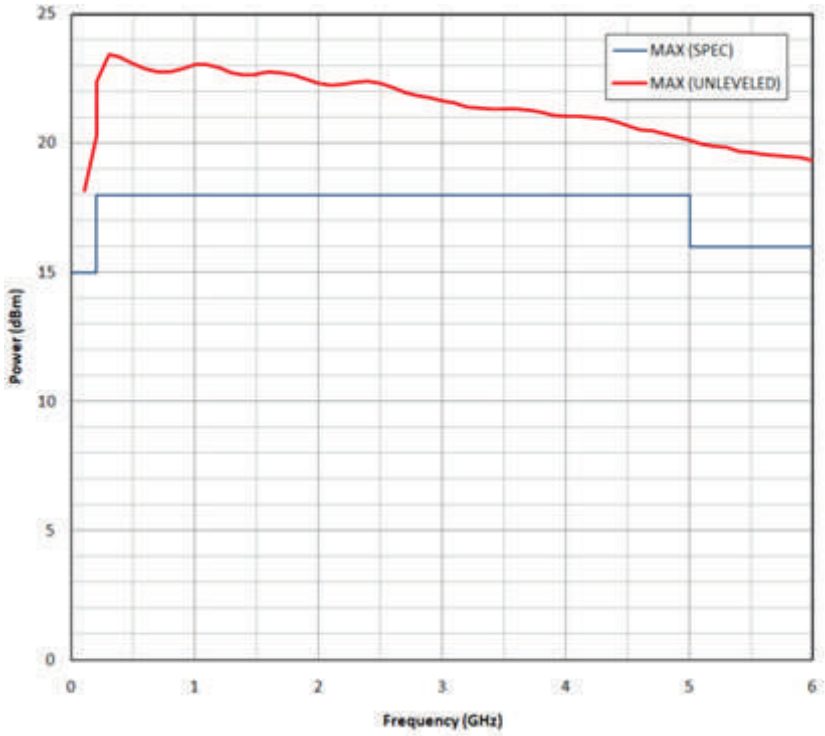
OPT-ULN SSB Phase Noise		**Offset** (typical)	
f_c; Output +10 dBm	**1 Hz**	**10 kHz**	**10 MHz**
10 MHz	≤ -109 dBc/Hz	≤ -160 dBc/Hz	≤ -161 dBc/Hz
100 MHz	≤ -87 dBc/Hz	≤ -156 dBc/Hz	≤ -151 dBc/Hz
500 MHz	≤ -78 dBc/Hz	≤ -148 dBc/Hz	≤ -140 dBc/Hz
1 GHz	≤ -73 dBc/Hz	≤ -145 dBc/Hz	≤ -134 dBc/Hz
3 GHz	≤ -61 dBc/Hz	≤ -138 dBc/Hz	≤ -129 dBc/Hz
6 GHz	≤ -57 dBc/Hz	≤ -131 dBc/Hz	≤ -122 dBc/Hz

Harmonics[3]		**(2ND / 3RD)**	**(2ND / 3RD)**	Output set to +10 dBm
10 MHz ≤ f ≤ 6.0 GHz		-35 / -45 dBc	-20 / -30 dBc	
Sub-Harmonics[4]				
10 MHz ≤ f ≤ 1.5 GHz		< -70 dBc	< -55 dBc	Output set to +10 dBm
1.5 GHz < f ≤ 3.0 GHz		-70 dBc	-55 dBc	
3.0 GHz < f ≤ 6.0 GHz		-60 dBc	-45 dBc	
Non-Harmonics / Spurious[4]				
10 MHz ≤ f ≤ 1.5 GHz		-88 dBc	-76 dBc	Output set to 10 dBm
1.5 GHz < f ≤ 3.0 GHz		-83 dBc	-70 dBc	
3.0 GHz < f ≤ 6.0 GHz			-64 dBc	

1 All MIN/ MAX (Minimum/ Maximum) performance parameters are guaranteed and 100% verified during final performance test.
2 Typical performance is "by design" and consistent with field performance data.
3 RBW: 1.8 kHz, VBW:1.8 kHz, Span 1 MHz
4 RBW: 10 kHz, VBW: 10 kHz, Span 10 MHz

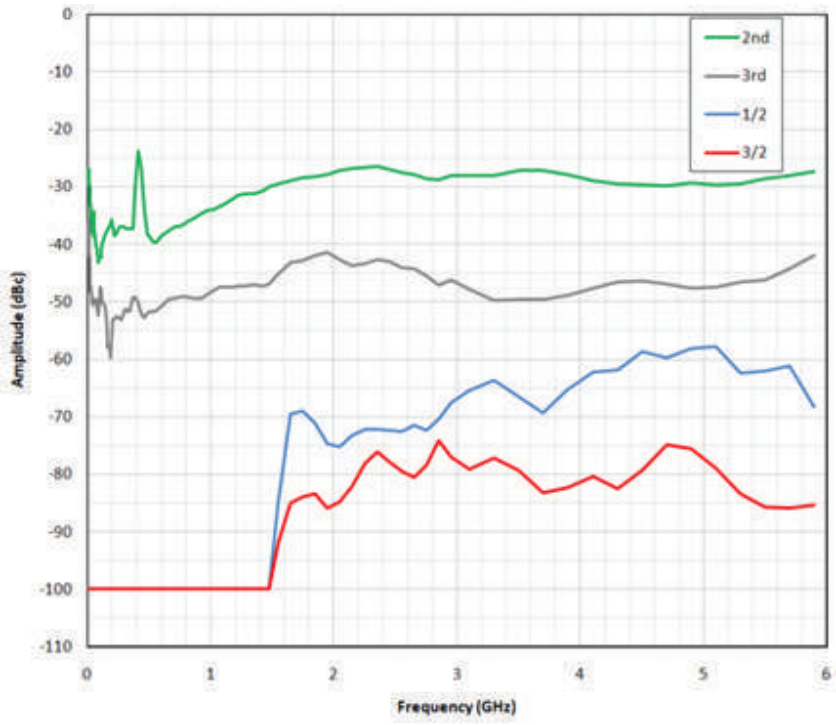
3 GHz / 6 GHz MAXIMUM OUTPUT POWER

The data shown here represents typical unleveled performance.

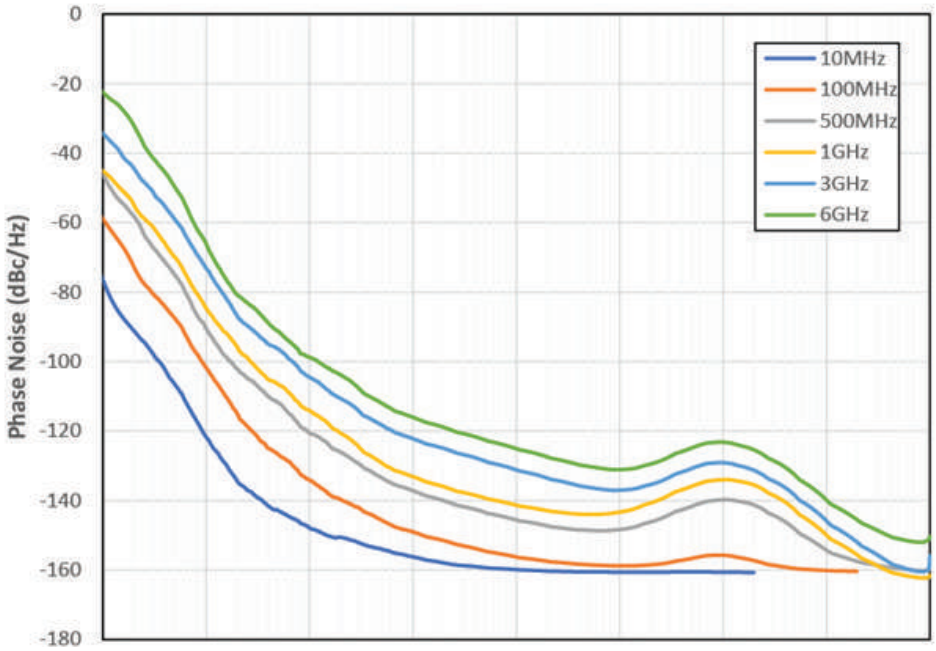


3 GHz / 6 GHz HARMONICS & SUB-HARMONICS

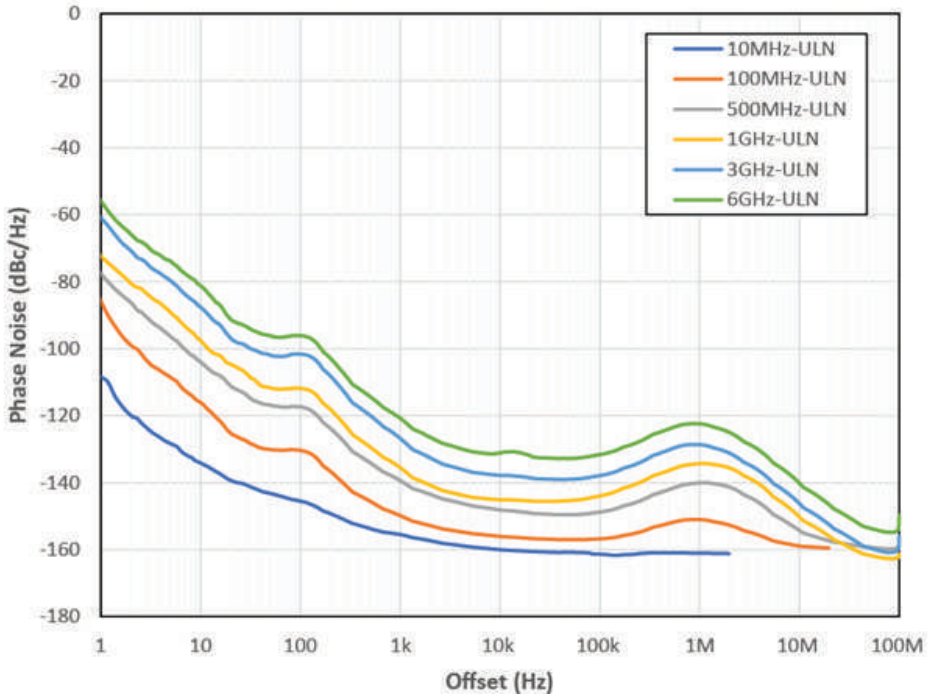
Harmonic and sub-harmonic data taken at +10 dBm carrier power level



3 GHz / 6 GHz PHASE NOISE PERFORMANCE *(P_{out} = +10 dBm)*



3 GHz / 6 GHz OPT-ULN PHASE NOISE PERFORMANCE *(P_{out} = +10 dBm)*



HSX9000 Series Multi-Channel RF Synthesizers
12 GHz / 20 GHz AMPLITUDE PERFORMANCE

This section contains performance specifications and data for OPT-n12-X (12 GHz), and OPT-n20-X (20 GHz) channels. The specified parameters for the HSX9000 Series RF Synthesizers are fully verified at final performance test and 100% guaranteed for the full warranty period of the product.

PARAMETER	MIN[1]	TYPICAL[2]	MAX[1]	COMMENTS
Output Power (Calibrated)				
50 MHz ≤ f ≤ 16.0 GHz	-50 dBm		+18 dBm	
16.0 GHz < f ≤ 20.0 GHz	-50 dBm		+16 dBm	Settable from -60 dBm to +20 dBm
Maximum Output Power (unleveled)		See plot on page 9		
50 MHz ≤ f ≤ 20 GHz				
Resolution		0.01 dB		
Connector		50 Ω		OPT-n12-X: SMA (Jack) OPT-n20-X: Super SMA (Jack)
Switching Speed (Amplitude)		5 ms		
Absolute Level Accuracy				
50 MHz ≤ f ≤ 20 GHz				
MAX to +10 dBm			± 1.4 dB	
+10 to -10 dBm			± 0.7 dB	35 °C to 45 °C case temperature
-10 to -50 dBm			± 1.4 dB	

SSB Phase Noise		**Offset** (typical)			**Offset** (max)	
f_c; Output +10 dBm	**1 Hz**	**10 kHz**	**1 MHz**	**1 Hz**	**10 kHz**	**1 MHz**
50 MHz	≤ -95 dBc/Hz	≤ -161 dBc/Hz	≤ -163 dBc/Hz	≤ 89 dBc/Hz	≤ -155 dBc/Hz	≤ -157 dBc/Hz
100 MHz	≤ -72 dBc/Hz	≤ -157 dBc/Hz	≤ -156 dBc/Hz	≤ -66 dBc/Hz	≤ -151 dBc/Hz	≤ -150 dBc/Hz
500 MHz	≤ -67 dBc/Hz	≤ -146 dBc/Hz	≤ -139 dBc/Hz	≤ -61 dBc/Hz	≤ -140 dBc/Hz	≤ -133 dBc/Hz
1 GHz	≤ -60 dBc/Hz	≤ -142 dBc/Hz	≤ -134 dBc/Hz	≤ -54 dBc/Hz	≤ -136 dBc/Hz	≤ -128 dBc/Hz
3 GHz	≤ -45 dBc/Hz	≤ -132 dBc/Hz	≤ -129 dBc/Hz	≤ -39 dBc/Hz	≤ -126 dBc/Hz	≤ -123 dBc/Hz
6 GHz	≤ -36 dBc/Hz	≤ -126 dBc/Hz	≤ -123 dBc/Hz	≤ -30 dBc/Hz	≤ -120 dBc/Hz	≤ -117 dBc/Hz
12 GHz	≤ -34 dBc/Hz	≤ -120 dBc/Hz	≤ -117 dBc/Hz	≤ -28 dBc/Hz	≤ -114 dBc/Hz	≤ -111 dBc/Hz
20 GHz	≤ -36 dBc/Hz	≤ -115 dBc/Hz	≤ -111 dBc/Hz	≤ -30 dBc/Hz	≤ -109 dBc/Hz	≤ -105 dBc/Hz

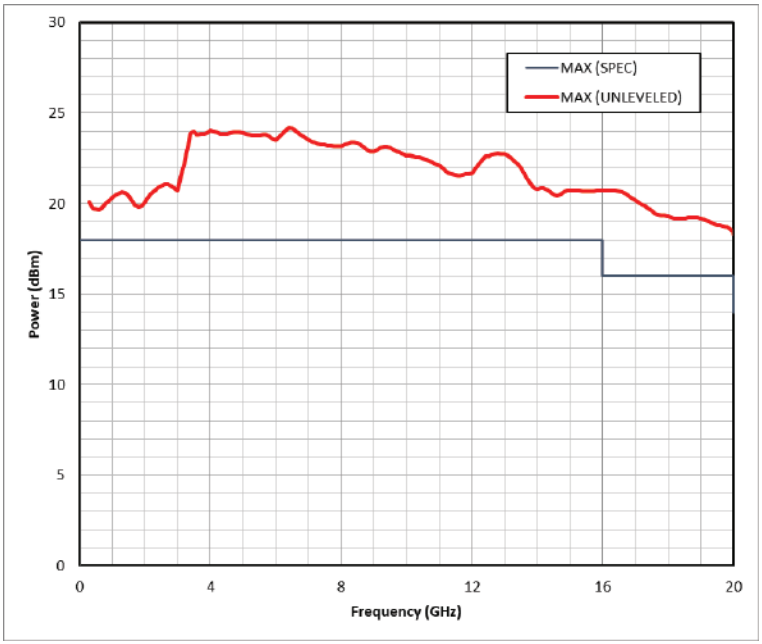
OPT-ULN SSB Phase Noise		**Offset** (typical)	
f_c; Output +10 dBm	**1 Hz**	**10 kHz**	**1 MHz**
50 MHz	≤ -105 dBc/Hz	≤ -158 dBc/Hz	≤ -159 dBc/Hz
100 MHz	≤ -87 dBc/Hz	≤ -156 dBc/Hz	≤ -151 dBc/Hz
500 MHz	≤ -73 dBc/Hz	≤ -148 dBc/Hz	≤ -140 dBc/Hz
1 GHz	≤ -67 dBc/Hz	≤ -145 dBc/Hz	≤ -135 dBc/Hz
3 GHz	≤ -57 dBc/Hz	≤ -138 dBc/Hz	≤ -130 dBc/Hz
6 GHz	≤ -56 dBc/Hz	≤ -132 dBc/Hz	≤ -123 dBc/Hz
12 GHz	≤ -52 dBc/Hz	≤ -126 dBc/Hz	≤ -117 dBc/Hz
20 GHz	≤ -47 dBc/Hz	≤ -121 dBc/Hz	≤ -113 dBc/Hz

Harmonics[3]		**(2^{ND} / 3^{RD})**	**(2^{ND} / 3^{RD})**	Output set to +10 dBm
50 MHz < f ≤ 5.0 GHz		-30 / -35 dBc	-20 / -30 dBc	See plot on page 9 for measured data.
Sub-Harmonics[4]				
50 MHz ≤ f ≤ 1.5 GHz		< -70 dBc	< -55 dBc	Output set to +10 dBm
1.5 GHz < f ≤ 3.0 GHz		-70 dBc	-55 dBc	
3.0 GHz < f ≤ 6.0 GHz		-60 dBc	-45 dBc	
6.0 GHz < f ≤ 12.0 GHz		-70 dBc	-60 dBc	
12.0 GHz < f ≤ 20.0 GHz		-60 dBc	-50 dBc	
Non-Harmonics / Spurious[4]				
50 MHz ≤ f ≤ 750 MHz		< -82 dBc		Output set to +10 dBm
750 MHz < f ≤ 1.5 GHz		-82 dBc	-76 dBc	
1.5 GHz < f ≤ 3.0 GHz		-76 dBc	-70 dBc	
3.0 GHz < f ≤ 6.0 GHz		-70 dBc	-64 dBc	
6.0 GHz < f ≤ 12.0 GHz		-64 dBc	-58 dBc	
12.0 GHz < f ≤ 20.0 GHz		-58 dBc	-52 dBc	

1 All MIN/ MAX (Minimum/ Maximum) performance parameters are guaranteed and 100% verified during final performance test.
2 Typical performance is "by design" and consistent with field performance data.
3 RBW: 1.8 kHz, VBW:1.8 kHz, Span 1 MHz
4 RBW: 10 kHz, VBW: 10 kHz, Span 10 MHz

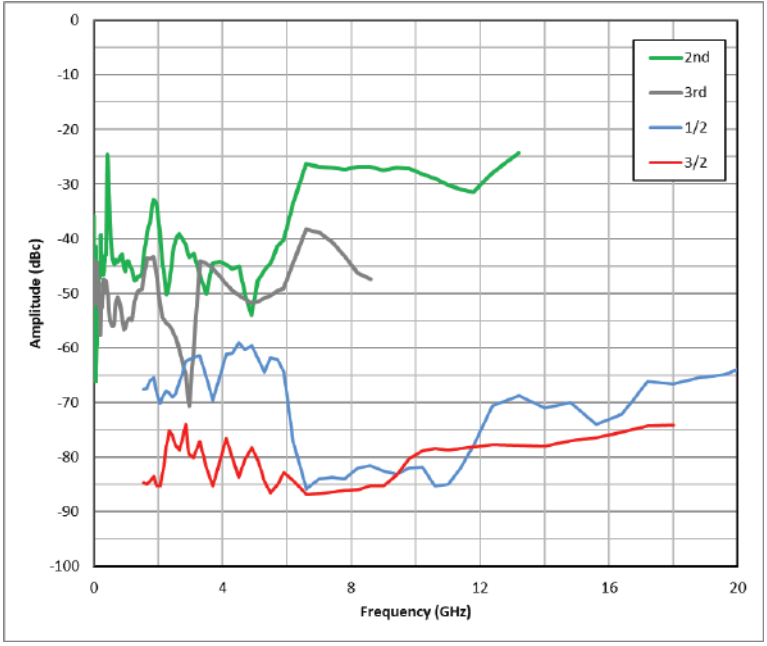
12 GHz / 20 GHz MAXIMUM OUTPUT POWER

The data shown here represents typical unleveled performance.

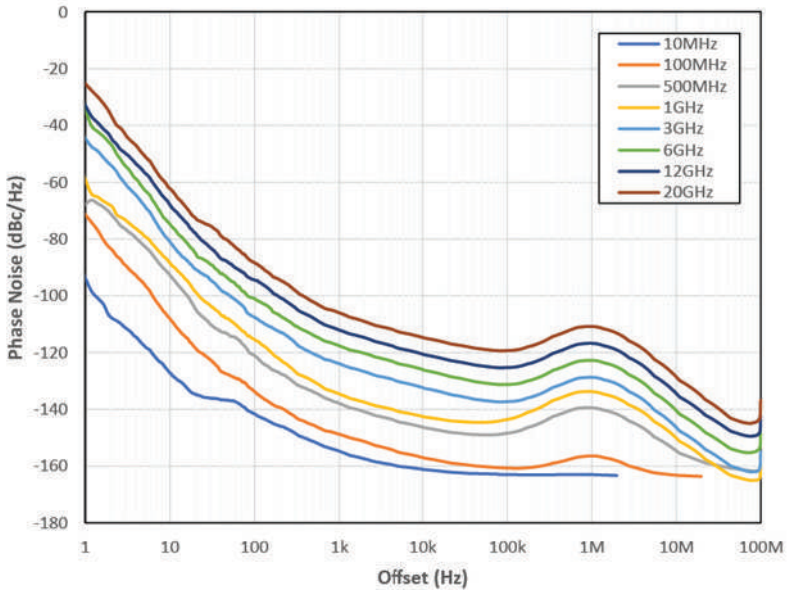


12 GHz / 20 GHz HARMONICS & SUB-HARMONICS

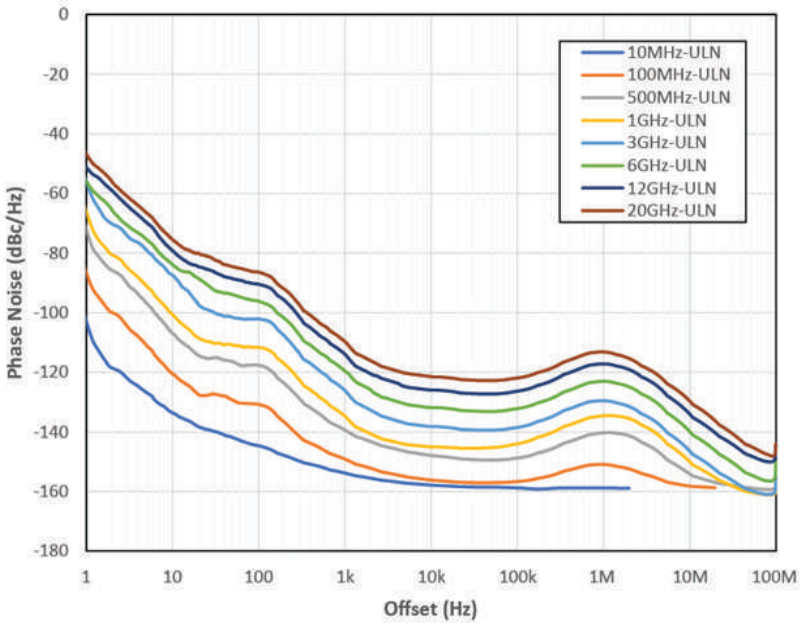
Harmonic and sub-harmonic data taken at +10 dBm carrier power level.



12 GHz / 20 GHz PHASE NOISE PERFORMANCE *(P_{out} = +10 dBm)*



12 GHz / 20 GHz OPT-ULN PHASE NOISE PERFORMANCE *(P_{out} = +10 dBm)*



HSX9000 Series Multi-Channel RF Synthesizers
40 GHz AMPLITUDE PERFORMANCE

This section contains performance specifications for channels that operate to 40 GHz. The specified parameters for the HSX9000 Series RF Synthesizers are fully verified at final performance test and 100% guaranteed for the full warranty period of the product.

PARAMETER	MIN[1]	TYPICAL[2]	MAX[1]	COMMENTS
Output Power (Calibrated)				
50 MHz ≤ f ≤ 35.0 GHz	0 dBm		+18 dBm	
35.0 GHz < f ≤ 40.0 GHz	0 dBm		+13 dBm	Settable from -5 dBm to +25 dBm
Maximum Output Power (unleveled)		See plot on page 12		
50 MHz ≤ f ≤ f ≤ 40.0 GHz				
Resolution		0.01 dB		
Connector		50 Ω		2.92 mm (Jack)
Switching Speed (Amplitude)		5 ms		
Absolute Level Accuracy				
50 MHz ≤ f ≤ 35.0 GHz +18 to 0 dBm			± 0.7 dB	35 °C to 45 °C case temperature
35.0 GHz < f ≤ 40.0 GHz +12 to 0 dBm			± 1.0 dB	

SSB Phase Noise		**Offset** (typical)			**Offset** (max)	
f_c; Output +10 dBm	**1 Hz**	**10 kHz**	**1 MHz**	**1 Hz**	**10 kHz**	**1 MHz**
50 MHz	≤ -96 dBc/Hz	≤ -158 dBc/Hz	≤ -159 dBc/Hz	≤ -90 dBc/Hz	≤ -152 dBc/Hz	≤ -153 dBc/Hz
100 MHz	≤ -81 dBc/Hz	≤ -156 dBc/Hz	≤ -155 dBc/Hz	≤ -75 dBc/Hz	≤ -150 dBc/Hz	≤ -149 dBc/Hz
500 MHz	≤ -61 dBc/Hz	≤ -134 dBc/Hz	≤ -140 dBc/Hz	≤ -55 dBc/Hz	≤ -128 dBc/Hz	≤ -134 dBc/Hz
1 GHz	≤ -50 dBc/Hz	≤ -142 dBc/Hz	≤ -134 dBc/Hz	≤ -44 dBc/Hz	≤ -136 dBc/Hz	≤ -128 dBc/Hz
3 GHz	≤ -47 dBc/Hz	≤ -133 dBc/Hz	≤ -128 dBc/Hz	≤ -41 dBc/Hz	≤ -127 dBc/Hz	≤ -122 dBc/Hz
6 GHz	≤ -40 dBc/Hz	≤ -127 dBc/Hz	≤ -122 dBc/Hz	≤ -34 dBc/Hz	≤ -121 dBc/Hz	≤ -116 dBc/Hz
12 GHz	≤ -33 dBc/Hz	≤ -121 dBc/Hz	≤ -116 dBc/Hz	≤ -27 dBc/Hz	≤ -115 dBc/Hz	≤ -110 dBc/Hz
24 GHz	≤ -27 dBc/Hz	≤ -144 dBc/Hz	≤ -110 dBc/Hz	≤ -21 dBc/Hz	≤ -138 dBc/Hz	≤ -104 dBc/Hz
40 GHz	≤ -21 dBc/Hz	≤ -109 dBc/Hz	≤ -104 dBc/Hz	≤ -15 dBc/Hz	≤ -103 dBc/Hz	≤ -98 dBc/Hz

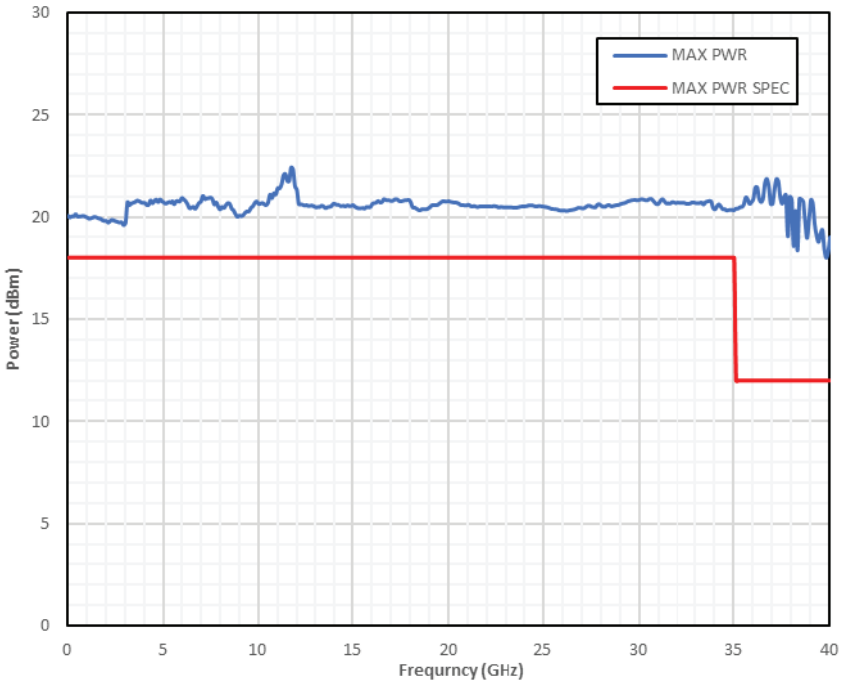
OPT-ULN SSB Phase Noise		**Offset** (typical)	
f_c; Output +10 dBm	**1 Hz**	**10 kHz**	**1 MHz**
50 MHz	≤ -104 dBc/Hz	≤ -156 dBc/Hz	≤ -157 dBc/Hz
100 MHz	≤ -91 dBc/Hz	≤ -155 dBc/Hz	≤ -151 dBc/Hz
500 MHz	≤ -79 dBc/Hz	≤ -147 dBc/Hz	≤ -140 dBc/Hz
1 GHz	≤ -70 dBc/Hz	≤ -144 dBc/Hz	≤ -134 dBc/Hz
3 GHz	≤ -61 dBc/Hz	≤ -138 dBc/Hz	≤ -128 dBc/Hz
6 GHz	≤ -58 dBc/Hz	≤ -132 dBc/Hz	≤ -123 dBc/Hz
12 GHz	≤ -49 dBc/Hz	≤ -126 dBc/Hz	≤ -117 dBc/Hz
24 GHz	≤ -47 dBc/Hz	≤ -120 dBc/Hz	≤ -113 dBc/Hz
40 GHz	≤ -45 dBc/Hz	≤ -115 dBc/Hz	≤ -107 dBc/Hz

Harmonics[3]	**(2^{ND} / 3^{RD})**	**(2^{ND} / 3^{RD})**	
50 MHz < f ≤ 25.0 GHz	-30 / -35 dBc	-20 / -30 dBc	Output set to +10 dBm
> 25.0 GHz	-30 / -35 dBc		See plot on page 12 for measured data.
Sub-Harmonics[3]			
50 MHz ≤ f ≤ 1.5 GHz	< -70 dBc	< -55 dBc	Output set to +10 dBm
1.5 GHz < f ≤ 3.0 GHz	-70 dBc	-55 Bc	
3.0 GHz < f ≤ 6.0 GHz	-60 dBc	-45 dBc	See plot on page 12 for
6.0 GHz < f ≤ 12.0 GHz	-70 dBc	-60 dBc	measured data.
12.0 GHz < f ≤ 24.0 GHz	-60 dBc	-50 dBc	
24.0 GHz < f ≤ 40.0 GHz	-60 dBc	-60 dBc	
Non-Harmonics / Spurious[4]			
50 MHz ≤ f ≤ 750 MHz	< -82 dBc		Output set to +10 dBm
750 MHz < f ≤ 1.5 GHz	-82 dBc	-76 dBc	
1.5 GHz < f ≤ 2.0 GHz	-76 dBc	-70 dBc	
2.0 GHz < f ≤ 6.0 GHz	-70 dBc	-64 dBc	
6.0 GHz < f ≤ 12.0 GHz	-64 dBc	-58 dBc	
12.0 GHz < f ≤ 24.0 GHz	-58 dBc	-52 dBc	
24.0 GHz < f ≤ 40.0 GHz	-52 dBc	-46 dBc	

1 All MIN/ MAX (Minimum/ Maximum) performance parameters are guaranteed and 100% verified during final performance test.
2 Typical performance is "by design" and consistent with field performance data.
3 RBW: 1.8 kHz, VBW:1.8 kHz, Span 1 MHz
4 RBW: 10 kHz, VBW: 10 kHz, Span 10 MHz

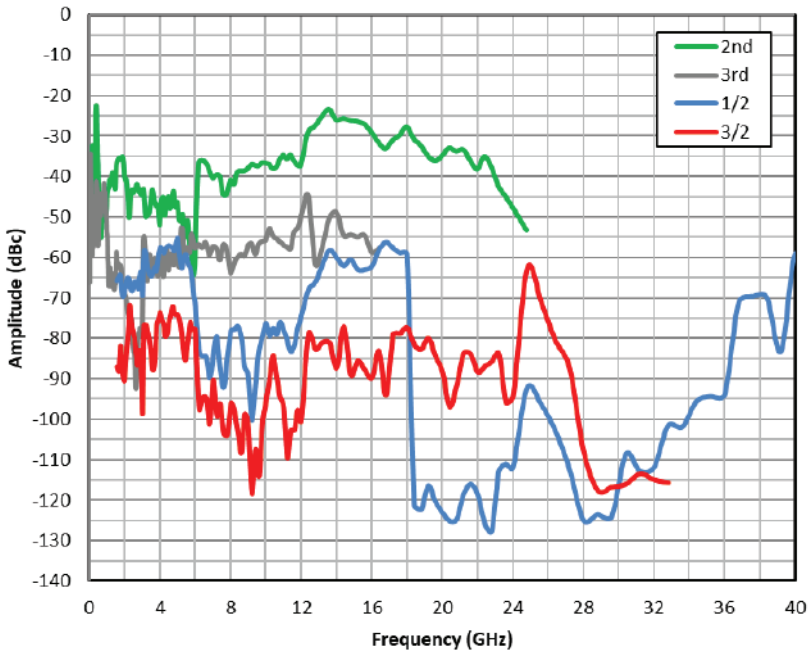
40 GHz MAXIMUM OUTPUT POWER

The data shown here represents typical unleveled performance.

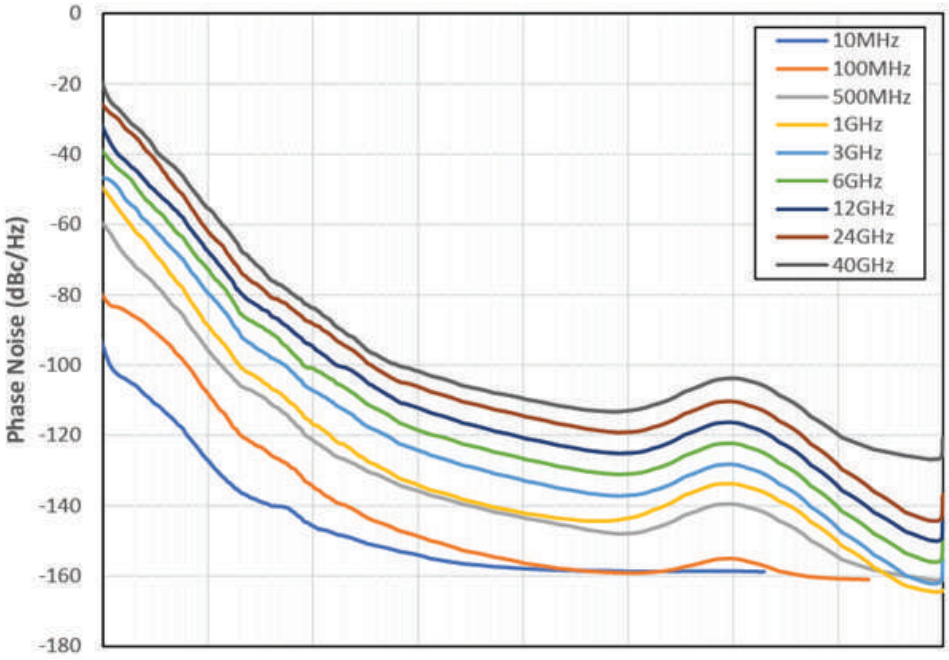


40 GHz HARMONICS & SUB-HARMONICS

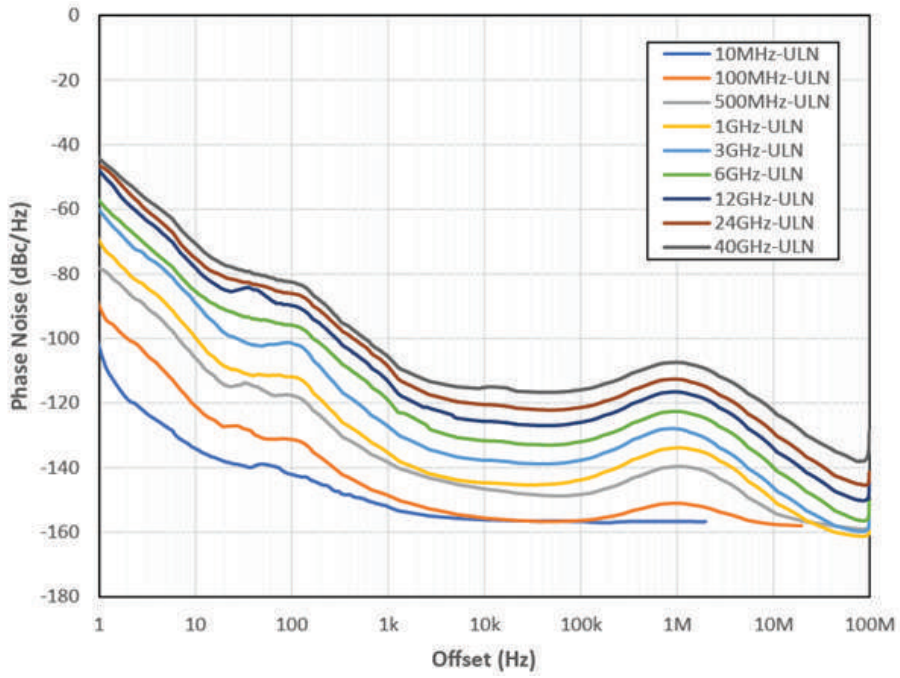
Harmonic and sub-harmonic data taken at +10 dBm carrier power level.



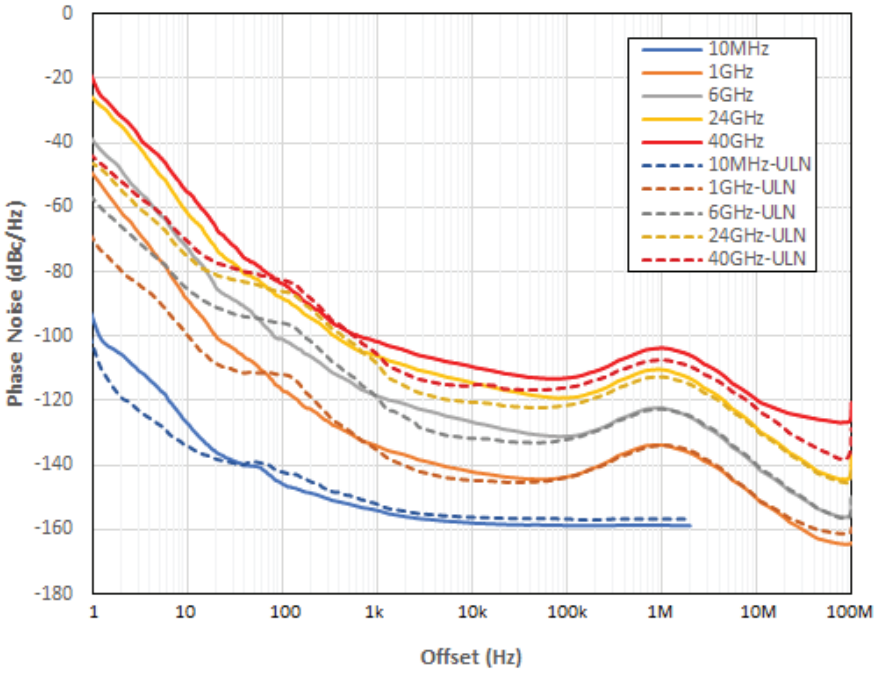
40 GHz PHASE NOISE PERFORMANCE (P_{out} = +10 dBm)



40 GHz OPT-ULN PHASE NOISE PERFORMANCE (P_{out} = +10 dBm)



STANDARD VS OPT-ULN REFERENCE PHASE NOISE COMPARISON *(P_{out} = +10 dBm)*



HSX9000 Series RF Synthesizers
ENVIRONMENTAL SPECIFICATIONS

THIS INSTRUMENT IS DESIGNED FOR INDOOR USE ONLY.

Environmental specifications are based on component margins, thermal verification testing and current draw tests. Production unit performance is verified at room temperature.

PARAMETER	MIN	TYPICAL[1]	MAX	COMMENTS
Operating Temperature	0 °C		+60 °C	Internal temperature
Temperature Monitor Range	-40 °C		+85 °C	Absolute, channel dedicated sensor
AC Power Supply				
Rated Voltage	100 VAC		240 VAC	
Voltage Range	90 VAC		264 VAC	
Rated Frequency	50 Hz		60 Hz	
Frequency Range	47Hz		63 Hz	
AC Power Consumption				Approximate values. May vary with loading and temperature. Chassis includes reference and communication module. HSX9003 (3 channel) Example: 14 W + (17 W * 3) = 65 W Total
Chassis		14-24 W		
3 or 6 GHz Channel (each)		17 W		
12 GHz Channel (each)		24 W		
20 GHz Channel (each)		24 W		
40 GHz Channel (each)		49 W		
Warm-Up Time		10 min		20 °C (ambient temp. dependent)

[1] Typical performance is "by design" and consistent with field performance data.

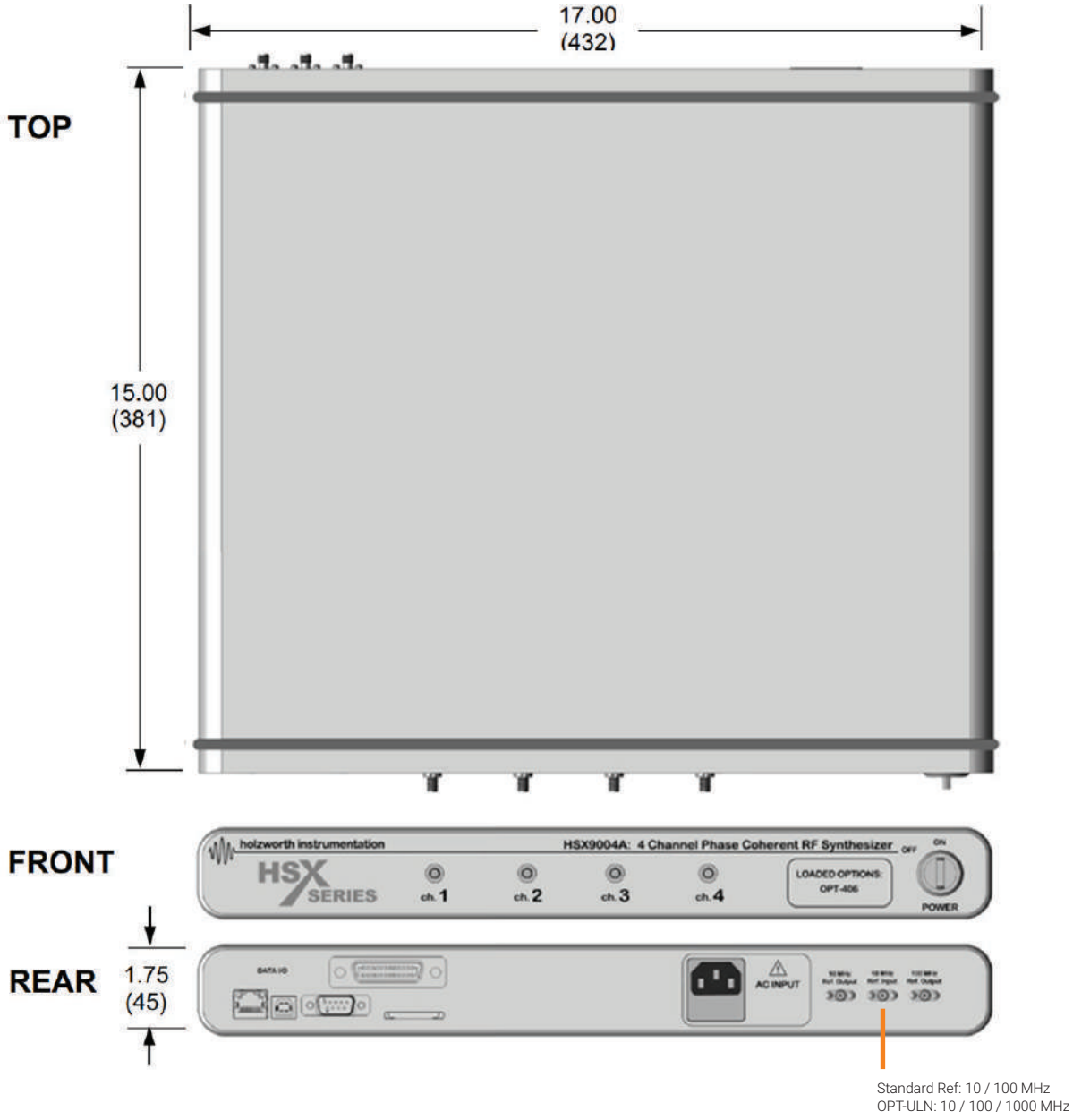
DESCRIPTION	Recommended Environmental Conditions
Operating Environment	
Humidity	Relative humidity 15% to 95%, <29 °C (non-condensing)
Altitude	0 to 3,048 m (0 to 10,000 feet)
Vibration	0.21 g RMS maximum, 5 Hz to 500 Hz
Storage (Non-Operating)	
Temperature	-10 °C to + 60 °C
Humidity	Relative humidity 0% to 90%, <40 °C (non-condensing)
Altitude	0 to 15,240 m (0 to 50,000 feet)
Vibration	0.5 g RMS maximum, 5Hz to 500Hz

REGULATORY COMPLIANCE

CE compliance with the following European Union directives
Low Voltage Directive EU 2014/35
Electromagnetic Compatibility Directive (EMC) EU 2014/30
RoHS Directive EU 2015/863, WEEE Directive EU 2012/19

HSX9000 Series Multi-Channel RF Synthesizers
MECHANICAL CONFIGURATION

The HSX9000 Series comes in a 1U high, rack mountable chassis. The example shown is of a 4 channel unit (front panel configuration may vary). A universal rack mount bracket kit is an available accessory (Part No.: RACK-1U , RACK-1U-L, RACK2-1U, RACK2-1U-L). Mechanical dimensions are listed in inches (and millimeters).



HSX9000 Series Multi-Channel RF Synthesizers
CONNECTORS and PHYSICAL SPECIFICATIONS

FULLY INDEPENDENT CHANNELS

DESCRIPTION	Configuration
RF Output(s)	
Connector Type	SMA-J, 50 Ω: OPT-n03-X, OPT-n06-X, OPT-n12-X (n = number of channels = number of connectors) Super SMA-J, 50 Ω: OPT-n20-X (n = number of channels = number of connectors) 2.92mm-J, 50 Ω: OPT-n40-X (n = number of channels = number of connectors)

REAR PANEL

DESCRIPTION	Configuration
Reference Output Port	
Connector Type	SMA, 50 Ω
Output Frequency	10 MHz ±10 Hz and 100 MHz ±100 Hz
Output Level	+2 dBm to +6 dBm
Output Waveform	Sinusoid
Reference Input Port	
Connector Type	SMA, 50 Ω
Input Frequency	10/100 MHz
Input Frequency (OPT-ULN)	10/100/1000 MHz
Input Level	0 dBm to +10 dBm (sinusoid or square)
AC Power Input	
Connector Type	IEC 320-C13
AC Input Rating	100-240 VAC, 47-63 Hz. Specify country at time of order for proper power cord.
Data I/O Interface	
Connectivity	USB B-Type (virtual COM port), Ethernet, RS-232, GPIB

PHYSICAL

Dimensions (L x W x H)	1U high, 19" rack mount: 15 in x 17 in x 1.75 in (381 mm x 431.8 mm x 44.5 mm)
Weight	25 lbs. (11.34 kilograms) MAXIMUM

HSX9000 Series Multi-Channel RF Synthesizers
INCLUDED HARDWARE AND CERTIFICATIONS

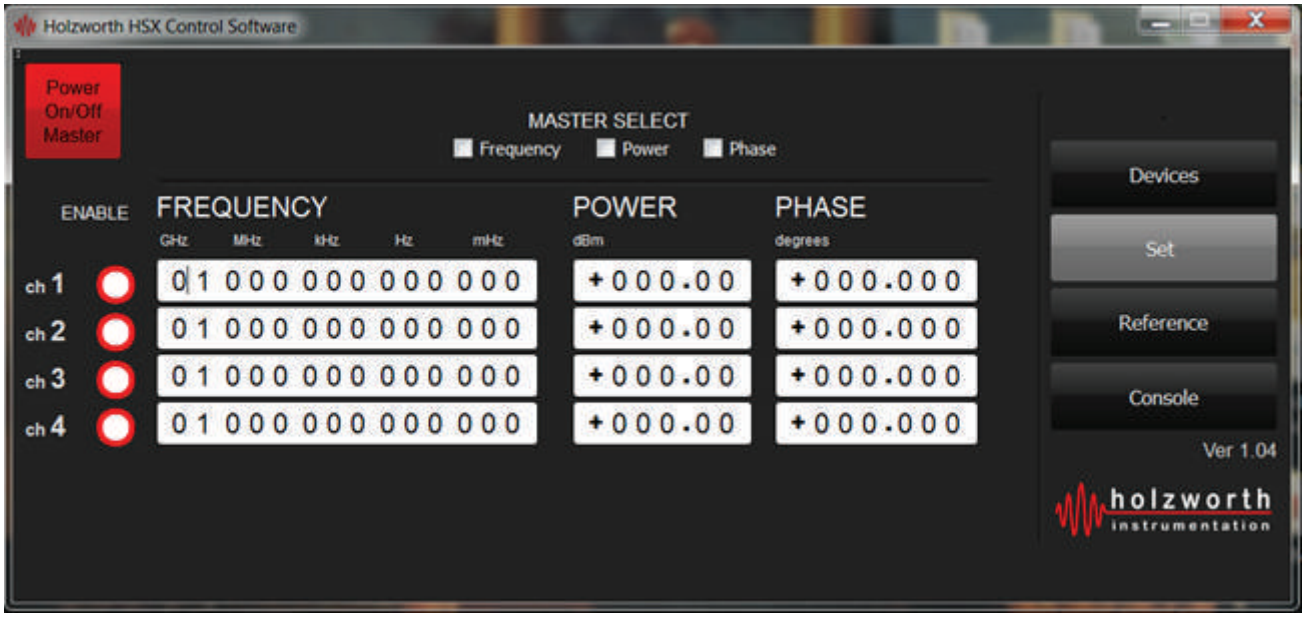
Each product delivery includes following hardware and certifications.

DESCRIPTION
HSX9000 SERIES SYNTHESIZER
AC Power Cord (7 ft/2.1 m)[1]
Ethernet Cable (10 ft/3 m)
USB Cable (6 ft/1.8 m)
CALIBRATION CERTIFICATION

[1] Specify final country of destination for shipment with proper power cord

HSX9000 Series Multi-Channel RF Synthesizers
INTERFACE - GUI

The HSX9000 Series hardware utilizes a virtual front panel as the control interface. Each unit comes with an open license to operate the application on any standard PC, including those equipped with touch screen monitors. The C++ based application GUI compliments the driver free instrument by being extremely reliable. The units can also be directly accessed via any data I/O interface for control via MATLAB™, LabVIEW™, C++ code, Python, VB code, etc.



HSX9000 Series Multi-Channel RF Synthesizers
WARRANTY

All Holzworth HSX9000 Series synthesizer products come with a standard 3 year 100% product warranty covering manufacturing defects. All product repairs and maintenance must be performed by Holzworth Instrumentation. Holzworth reserves the right to invalidate the warranty for any products that have been tampered with or used improperly. Refer to Holzworth Terms & Conditions of Sales for more details.

Holzworth products are proudly designed and assembled in the USA.

CONTACT INFORMATION

Contact Holzworth directly for a product quotation, a product demonstration, or for technical inquiries.

Holzworth Instrumentation Sales Support

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Phone: **+1.303.325.3473**
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