

Keysight Technologies

# UXA X-Series Signal Analyzer, Multi-touch N9040B

2 Hz to 8.4, 13.6, 26.5, 44, or 50 GHz

Data Sheet



For more information:

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This data sheet is a summary of the specifications and conditions for the UXA signal analyzers. For the complete specifications guide, visit:  
[www.keysight.com/find/uxa\\_specifications](http://www.keysight.com/find/uxa_specifications)

## Definitions and Conditions

Specifications describe the performance of parameters covered by the product warranty and apply to temperature ranges 0 to 55 °C, unless otherwise noted.

95th percentile values indicate the breadth of the population (approx.  $2\sigma$ ) of performance tolerances expected to be met in 95 percent of the cases with a 95 percent confidence, for any ambient temperature in the range of 20 to 30 °C. In addition to the statistical observations of a sample of instruments, these values include the effects of the uncertainties of external calibration references. These values are not warranted. These values are updated occasionally if a significant change in the statistically observed behavior of production instruments is observed.

Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 80 percent of the units exhibit with a 95 percent confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.

Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

The analyzer will meet its specifications when:

- The analyzer is within its calibration cycle.
- Under auto couple control, except that Auto Sweep Time Rules = Accy.
- For signal frequencies < 10 MHz, DC coupling applied.
- The analyzer has been stored at an ambient temperature within the allowed operating range for at least two hours before being turned on, if it had previously been stored at a temperature range inside the allowed storage range but outside the allowed operating range.
- The analyzer has been turned on at least 30 minutes with Auto Align set to Normal, or if Auto Align is set to Off or Partial, alignments must have been run recently enough to prevent an Alert message. If the Alert condition is changed from "Time and Temperature" to one of the disabled duration choices, the analyzer may fail to meet specifications without informing the user. If Auto Align is set to Light, performance is not warranted, and nominal performance will degrade to become a factor of 1.4 wider for any specification subject to alignment, such as amplitude tolerances.
- The term "mixer level" is used as a condition for many specifications in this document. This term is a conceptual quantity that is defined as follows: Mixer Level (dBm) = RF Input Power Level (dBm) - (Electronic + Mechanical) Attenuation (dBm)

For instruments with option H1G, all standard instrument specifications apply for 0 to 40 °C, except as noted in document N9040-90026. Maximum operating temperature range is 40 °C when using the 1 GHz IF path.

## Frequency and Time Specifications

Frequency range	DC coupled	AC coupled
Option 508	2 Hz to 8.4 GHz	10 MHz to 8.4 GHz
Option 513	2 Hz to 13.6 GHz	10 MHz to 13.6 GHz
Option 526	2 Hz to 26.5 GHz	10 MHz to 26.5 GHz
Option 544	2 Hz to 44 GHz	NA
Option 550	2 Hz to 50 GHz	NA
Frequency band	LO multiple (N)	Frequency range
0	1	2 Hz to 3.6 GHz
1	1	3.5 to 8.4 GHz
2	2	8.3 to 13.6 GHz
3	2	13.5 to 17.1 GHz
4	4	17 to 26.5 GHz
5	4	26.4 to 34.5 GHz
6	8	34.4 to 50 GHz
Frequency reference		
Accuracy	$\pm$ [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]	
Aging rate	$\pm 3 \times 10^{-8}$ / year	
Temperature stability		
Full temperature range	$\pm 4.5 \times 10^{-9}$	
Achievable initial calibration accuracy	$\pm 3.1 \times 10^{-8}$	
Example frequency reference accuracy	$= \pm (3 \times 10^{-8} + 4.5 \times 10^{-9} + 3.1 \times 10^{-8})$	
1 year after last adjustment	$= \pm 6.6 \times 10^{-8}$	
Residual FM	$\leq (0.25 \text{ Hz} \times N)$ p-p in 20 ms nominal	
(Center frequency = 1 GHz 10 Hz RBW, 10 Hz VBW)	See band table above for N (LO multiple)	
Frequency readout accuracy (start, stop, center, marker)		
$\pm$ (marker frequency x frequency reference accuracy + 0.10% x span + 5 % x RBW + 2 Hz + 0.5 x horizontal resolution <sup>1</sup> )		
Marker frequency counter		
Accuracy	$\pm$ (marker frequency x frequency reference accuracy + 0.100 Hz)	
Delta counter accuracy	$\pm$ (delta frequency x frequency reference accuracy + 0.141 Hz)	
Counter resolution	0.001 Hz	
Frequency span (FFT and swept mode)		
Range	0 Hz (zero span), 10 Hz to maximum frequency of instrument	
Resolution	2 Hz	
Accuracy		
Swept	$\pm (0.1\% \times \text{span} + \text{horizontal resolution})$	
FFT	$\pm (0.1\% \times \text{span} + \text{horizontal resolution})$	

1. Horizontal resolution is span/(sweep points -1).

## Frequency and Time Specifications (continued)

<b>Sweep time and triggering</b>		
Range	Span = 0 Hz Span ≥ 10 Hz	1 μs to 6000 s 1 ms to 4000 s
Accuracy	Span ≥ 10 Hz, swept Span ≥ 10 Hz, FFT Span = 0 Hz	± 0.01% nominal ± 40% nominal ± 0.01% nominal
Sweep trigger	Free run, line, video, external 1, external 2, RF burst, periodic timer	
Trigger Delay	Span = 0 Hz or FFT Span ≥ 10 Hz, swept Resolution	-150 to +500 ms 0 to 500 ms 0.1 μs
<b>Time gating</b>		
Gate methods	Gated LO; gated video; gated FFT	
Gate length range (except method = FFT)	1 μs to 5.0 s	
Gate delay range	0 to 100.0 s	
Gate delay jitter	33.3 ns p-p nominal	
<b>Sweep (trace) point range</b>		
All spans	1 to 40,001	
<b>Resolution bandwidth (RBW)</b>		
Range (-3.01 dB bandwidth)		
Standard	1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz	
With Option B2X, B5X, or H1G and Option RBE	10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 100, 133, 150, 200, and 212 MHz, in Spectrum Analyzer mode and zero span	
Bandwidth accuracy (power)		
RBW range	1 Hz to 100 kHz 110 kHz to 1.0 MHz (< 3.6 GHz CF) 1.1 to 2 MHz (< 3.6 GHz CF) 2.2 to 3 MHz (< 3.6 GHz CF) 4 to 8 MHz (< 3.6 GHz CF)	± 0.5% (± 0.022 dB) ± 1.0% (± 0.044 dB) ± 0.07 dB nominal 0 to -0.2 dB nominal 0 to -0.4 dB nominal
Bandwidth accuracy (-3.01 dB)		
RBW range	1 Hz to 1.3 MHz	± 2% nominal
Selectivity (-60 dB/-3 dB)	4.1:1 nominal	
EMI bandwidth (CISPR compliant)	200 Hz, 9 kHz, 120 kHz, 1 MHz	(Option EMC required)
EMI bandwidth (MIL STD 461E compliant)	10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz	(Option EMC required)
<b>Analysis bandwidth<sup>1</sup></b>		
Maximum bandwidth	Option B25 (standard) Option B40 Option B2X Option B5X Option H1G	25 MHz 40 MHz 255 MHz 510 MHz 1 GHz
<b>Video bandwidth (VBW)</b>		
Range	1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz, and wide open (labeled 50 MHz)	
Accuracy	± 6% nominal (in swept mode and zero span)	

1. Analysis bandwidth is the instantaneous bandwidth available around a center frequency over which the input signal can be digitized for further analysis or processing in the time, frequency, or modulation domain.

## Amplitude Accuracy and Range Specifications

<b>Amplitude range</b>			
Measurement range	Displayed average noise level (DANL) to +30 dBm (for preamp Off) DANL to +24 dBm (for frequency opts ≤ 526 with preamp On) DANL to +20 dBm (for frequency opts > 526 with preamp On)		
Input mechanical attenuator range (2 Hz to 50 GHz)	0 to 70 dB in 2 dB steps		
<b>Electronic attenuator (Option EA3)</b>			
Frequency range	2 Hz to 3.6 GHz		
Attenuation range			
Electronic attenuator range	0 to 24 dB, 1 dB steps		
Full attenuation range (mechanical + electronic)	0 to 94 dB, 1 dB steps		
<b>Maximum safe input level</b>			
Average total power (with and without preamp)	+30 dBm (1 W)		
Peak pulse power (< 10 μs pulse width, < 1% duty cycle, and input attenuation ≥ 30 dB)	+50 dBm (100 W)		
DC volts			
DC coupled	± 0.2 Vdc		
AC coupled	± 100 Vdc (For frequency Option 508, 513, or 526)		
<b>Display range</b>			
Log scale	0.1 to 1 dB/division in 0.1 dB steps 1 to 20 dB/division in 1 dB steps (10 display divisions)		
Linear scale	10 divisions		
Scale units	dBm, dBmV, dBμV, dBmA, dBμA, V, W, A		
<b>Frequency response</b>	<b>Specifications</b>	<b>95th percentile (≈ 2σ)</b>	
(10 dB input attenuation, 20 to 30 °C, preselector centering applied above 3.6 GHz)			
RF/MW (Option 508, 513, 526)	3 Hz to 10 MHz	± 0.46 dB	
	10 to 50 MHz	± 0.35 dB	± 0.19 dB
	50 MHz to 3.6 GHz	± 0.35 dB	± 0.14 dB
	3.5 to 5.2 GHz	± 1.5 dB	± 0.50 dB
	5.2 to 8.4 GHz	± 1.5 dB	± 0.42 dB
	8.3 to 13.6 GHz	± 2.0 dB	± 0.51 dB
	13.5 to 17.1 GHz	± 2.0 dB	± 0.57 dB
	17.0 GHz to 22 GHz	± 2.0 dB	± 0.65 dB
	22.0 to 26.5 GHz	± 2.5 dB	± 0.87 dB
mmW (Option 544, 550)	3 Hz to 20 MHz	± 0.46 dB	
	20 to 50 MHz	± 0.35 dB	± 0.20 dB
	50 MHz to 3.6 GHz	± 0.35 dB	± 0.16 dB
	3.5 to 5.2 GHz	± 1.7 dB	± 0.69 dB
	5.2 to 8.4 GHz	± 1.5 dB	± 0.42 dB
	5.2 to 8.4 GHz	± 1.5 dB	± 0.42 dB
	8.3 to 13.6 GHz	± 2.0 dB	± 0.39 dB
	13.5 to 17.1 GHz	± 2.0 dB	± 0.54 dB
	17.0 GHz to 22 GHz	± 2.0 dB	± 0.62 dB
	22.0 to 26.5 GHz	± 2.5 dB	± 0.59 dB
	26.4 to 34.5 GHz	± 2.5 dB	± 0.93 dB
	34.4 to 50 GHz	± 3.2 dB	± 1.28 dB

## Amplitude Accuracy and Range Specifications (continued)

Frequency response		Specifications	95th percentile ( $\approx 2\sigma$ )
Preamp on (0 dB attenuation)			
RF/MW (Option P08, P13, P26)	9 kHz to 1 MHz		$\pm 0.38$ dB
	1 to 50 MHz	$\pm 0.68$ dB	$\pm 0.32$ dB
	50 MHz to 3.6 GHz	$\pm 0.55$ dB	$\pm 0.28$ dB
	3.5 to 8.4 GHz	$\pm 2.0$ dB	$\pm 0.64$ dB
	8.3 to 13.6 GHz	$\pm 2.3$ dB	$\pm 0.69$ dB
	13.5 to 17.1 GHz	$\pm 2.5$ dB	$\pm 0.84$ dB
	17.0 to 22.0 GHz	$\pm 3.0$ dB	$\pm 1.13$ dB
	22.0 to 26.5 GHz	$\pm 3.5$ dB	$\pm 1.48$ dB
mmW (Option P44, P50)	9 kHz to 1 MHz		$\pm 0.45$ dB
	1 to 50 MHz	$\pm 0.68$ dB	$\pm 0.27$ dB
	50 MHz to 3.6 GHz	$\pm 0.60$ dB	$\pm 0.29$ dB
	3.5 to 5.2 GHz	$\pm 2.0$ dB	$\pm 0.75$ dB
	5.2 to 8.4 GHz	$\pm 2.0$ dB	$\pm 0.52$ dB
	8.3 to 13.6 GHz	$\pm 2.3$ dB	$\pm 0.61$ dB
	13.5 to 17.1 GHz	$\pm 2.5$ dB	$\pm 0.61$ dB
	17.0 to 22.0 GHz	$\pm 3.0$ dB	$\pm 0.73$ dB
	22.0 to 26.5 GHz	$\pm 3.5$ dB	$\pm 0.63$ dB
	26.4 to 34.5 GHz	$\pm 3.0$ dB	$\pm 1.11$ dB
34.4 to 50 GHz	$\pm 4.1$ dB	$\pm 1.47$ dB	
Input attenuation switching uncertainty		Specifications	Supplemental information
Relative to 10 dB and preamp off			
At 50 MHz (reference frequency)	attenuation 12 to 40 dB	$\pm 0.14$ dB	$\pm 0.04$ dB typical
	attenuation 2 to 8 dB	$\pm 0.18$ dB	$\pm 0.06$ dB typical
	attenuation 0 dB		$\pm 0.05$ dB nominal
Attenuation > 2 dB			
	3 Hz to 3.6 GHz		$\pm 0.3$ dB nominal
	3.5 to 8.4 GHz		$\pm 0.5$ dB nominal
	8.3 to 13.6 GHz		$\pm 0.7$ dB nominal
	13.5 to 26.5 GHz		$\pm 0.7$ dB nominal
	26.4 to 50 GHz		$\pm 1.0$ dB nominal
Total absolute amplitude accuracy		Specifications	
(10 dB attenuation, 20 to 30°C, 1 Hz $\leq$ RBW $\leq$ 1 MHz, input signal -10 to -50 dBm, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale, $\sigma$ = nominal standard deviation)			
		At 50 MHz	$\pm 0.24$ dB
		At all frequencies	$\pm (0.24 \text{ dB} + \text{frequency response})$
		0.01 to 3.6 GHz	$\pm 0.16$ dB (95th Percentile approx. $2\sigma$ )
Preamp on (Option P08, P13, P26, P44, P50)	At all frequencies	$\pm (0.36 \text{ dB} + \text{frequency response})$	
Input voltage standing wave ratio (VSWR)		95th percentile	
(10 dB input attenuation)		Freq Opt 508, 513, 526	Freq Opt 544, 550
	50 MHz	1.07 nominal	1.025 nominal
	10 MHz to 3.6 GHz	1.101	1.116
	3.5 to 8.4 GHz	1.278	1.144
	8.3 to 13.6 GHz	1.341	1.158
	13.5 to 17.1 GHz	1.58	1.258
	17.0 to 26.5 GHz	1.60	1.233
	26.4 to 34.5 GHz	NA	1.363
	34.4 to 50 GHz	NA	1.55

## Amplitude Accuracy and Range Specifications (continued)

Input voltage standing wave ratio (VSWR)		95th percentile	
		Freq Opt 508, 513, 526	Freq Opt 544, 550
Preamp on	10 MHz to 3.6 GHz	1.56	1.40 nominal
(Option P08, P13, P26, P44, or P50)	3.5 to 8.4 GHz	1.47	1.53
(0 dB input attenuation)	8.3 to 13.6 GHz	1.57	1.389
	13.5 to 17.1 GHz	1.72	1.316
	17.0 to 26.5 GHz	1.70	1.337
	26.4 to 34.5 GHz	NA	1.42
	34.4 to 50 GHz	NA	1.62
Resolution bandwidth switching uncertainty (referenced to 30 kHz RBW)			
1 Hz to 1.5 MHz RBW	± 0.03 dB		
1.6 MHz to 2.7 MHz RBW	± 0.05 dB		
3 MHz RBW	± 0.10 dB		
4, 5, 6, 8 MHz RBW	± 0.30 dB		
Reference level			
Range			
Log scale	-170 to +30 dBm in 0.01 dB steps		
Linear scale	707 pV to 7.07 V with 0.11% (0.01 dB) resolution		
Accuracy	0 dB <sup>1</sup>		
Display scale switching uncertainty			
Switching between linear and log	0 dB <sup>1</sup>		
Log scale/div switching	0 dB <sup>1</sup>		
Display scale fidelity			
Between -10 dBm and -18 dBm input mixer level	± 0.10 dB total	± 0.04 dB typical	
Below -18 dBm input mixer level	± 0.07 dB	± 0.02 dB typical	
Trace detectors			
Standard	Normal, peak, sample, negative peak, log power average, RMS average, and voltage average		
With Option EMC	Add quasi-peak to above		
Preamplifier			
Frequency range <sup>2</sup>	Option P08	9 kHz to 8.4 GHz	
	Option P13	9 kHz to 13.6 GHz	
	Option P26	9 kHz to 26.5 GHz	
	Option P44	9 kHz to 44 GHz	
	Option P50	9 kHz to 50 GHz	
Gain	9 kHz to 3.6 GHz	+20 dB nominal	
	3.6 to 26.5 GHz	+35 dB nominal (for freq opts ≤ 526)	
	3.6 to 50 GHz	+40 dB nominal (for freq opts > 526)	

1. Only affects the display, not the measurement, so it causes no additional error in measurement results from trace data or markers.

2. Below 100 kHz, only 95th percentile (approx. 2s) value for frequency response is provide

## Dynamic Range Specifications

1 dB gain compression (two-tone)		Maximum power at input mixer	
(At 1 kHz RBW with 100 kHz tone spacing)			
Preamp Off	20 to 40 MHz	2 dBm nominal	
	40 MHz to 2 GHz	5 dBm nominal	
	2 to 26.5 GHz	10 dBm nominal	
	26.5 to 50 GHz	0 dBm nominal	
Preamp On	10 MHz to 3.6 GHz	-14 dBm nominal	
	3.6 to 26.5 GHz		
	Tone spacing 100 kHz to 20 MHz	-28 dBm nominal	
	Tone spacing > 70 MHz		
	Freq Opt ≤ 526	-10 dBm nominal	
	Freq Opt > 526	-20 dBm nominal	
26.5 to 50 GHz	-30 dBm nominal		
Displayed average noise level (DANL) <sup>1</sup>	Specifications	Typical	
(Input terminated, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 1 Hz RBW, 20 to 30 °C)			
RF/MW (Option 508, 513, 526)	LNP Off/LNP On <sup>2</sup>	LNP Off/LNP On <sup>2</sup>	
Preamp Off	3 to 10 Hz	-100 dBm/NA nominal	
	10 to 100 Hz	-125 dBm/NA nominal	
	100 Hz to 1 kHz	-130 dBm/NA nominal	
	1 to 9 kHz	-137 dBm/NA nominal	
	9 to 100 kHz	-141 dBm/NA	-146 dBm/NA typical
	100 kHz to 1 MHz	-150 dBm/NA	-155 dBm/NA typical
	1 to 10 MHz	-155 dBm/NA	-157 dBm/NA typical
	10 MHz to 1.2 GHz	-155 dBm/NA	-156 dBm/NA typical
	1.2 to 2.1 GHz	-153 dBm/NA	-155 dBm/NA typical
	2.1 to 3.0 GHz	-152 dBm/NA	-153 dBm/NA typical
	3.0 to 3.6 GHz	-151 dBm/NA	-152 dBm/NA typical
	3.5 to 4.2 GHz	-149 dBm/-154 dBm	-152 dBm/-155 dBm typical
	4.2 to 8.4 GHz	-150 dBm/-155 dBm	-152 dBm/-156 dBm typical
	8.3 to 13.6 GHz	-149 dBm/-155 dBm	-151 dBm/-156 dBm typical
	13.5 to 16.9 GHz	-145 dBm/-152 dBm	-147 dBm/-155 dBm typical
	16.9 to 20.0 GHz	-143 dBm/-151 dBm	-146 dBm/-154 dBm typical
20.0 to 26.5 GHz	-136 dBm/-148 dBm	-139 dBm/-151 dBm typical	
Preamp On <sup>3</sup>	100 to 200 kHz	-152 dBm	-159 dBm
	200 to 500 kHz	-155 dBm	-161 dBm
	0.5 to 1 MHz	-159 dBm	-164 dBm
	1 to 10 MHz	-161 dBm	-166 dBm
	10 MHz to 2.1 GHz	-165 dBm	-166 dBm
	2.1 to 3.6 GHz	-163 dBm	-164 dBm
	3.5 to 8.4 GHz	-164 dBm	-166 dBm
	8.3 to 13.6 GHz	-163 dBm	-165 dBm
	13.5 to 16.9 GHz	-161 dBm	-163 dBm
	16.9 to 20.0 GHz	-159 dBm	-161 dBm
20.0 to 26.5 GHz	-155 dBm	-158 dBm	

1. With Option NF2 (Noise Floor Extension) "Off".

2. LNP (Low Noise Path) is standard for the UX A.

3. At higher frequency bands (beyond 3.6 GHz), Preamp "On" supersedes "LNP enabled". LNP cannot operate simultaneously with preamp.

## Dynamic Range Specifications (continued)

### DANL with Noise Floor Extension Improvement (Option NF2)

DANL improvement exceeds 9 dB with 95% confidence in the average of all bands, paths (normal, preamp, low noise path and microwave preselector bypass), frequency options and signal path options (LNP and MPB).

Frequency	95th percentile		
	Preamp Off	Preamp On	LNP On <sup>2</sup>
Band 0, f > 20 MHz	-163 dBm	-174 dBm	NA
Band 1	-162 dBm	-174 dBm	-166 dBm
Band 2	-162 dBm	-174 dBm	-167 dBm
Band 3	-159 dBm	-172 dBm	-165 dBm
Band 4	-148 dBm	-166 dBm	-162 dBm

Displayed average noise level (DANL) <sup>1</sup>	Specifications	Typical	
(Input terminated, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 1 Hz RBW, 20 to 30 °C)			
mmW (Option 544, 550)	LNP Off/LNP On <sup>2</sup>	LNP Off/LNP On <sup>2</sup>	
Preamp Off	3 to 10 Hz	-95 dBm/NA nominal	
	10 to 100 Hz	-114 dBm/NA nominal	
	100 Hz to 1 kHz	-128 dBm/NA nominal	
	1 to 9 kHz	-136 dBm/NA nominal	
	9 to 100 kHz	-141 dBm/NA	-144 dBm/NA typical
	100 kHz to 1 MHz	-150 dBm/NA	-154 dBm/NA typical
	1 to 10 MHz	-154 dBm/NA	-156 dBm/NA typical
	10 MHz to 1.2 GHz	-153 dBm/NA	-155 dBm/NA typical
	1.2 to 2.1 GHz	-151 dBm/NA	-153 dBm/NA typical
	2.1 to 3.0 GHz	-150 dBm/NA	-152 dBm/NA typical
	3.0 to 3.6 GHz	-149 dBm/NA	-151 dBm/NA typical
	3.5 to 4.2 GHz	-145 dBm/-151 dBm	-148 dBm/-154 dBm typical
	4.2 to 6.6 GHz	-144 dBm/-152 dBm	-148 dBm/-154 dBm typical
	6.6 to 13.6 GHz	-147 dBm/-153 dBm	-149 dBm/-155 dBm typical
	13.5 to 14 GHz	-144 dBm/-150 dBm	-148 dBm/-153 dBm typical
	14 to 17 GHz	-145 dBm/-151 dBm	-148 dBm/-153 dBm typical
	17 to 22.5 GHz	-141 dBm/-149 dBm	-146 dBm/-152 dBm typical
	22.5 to 26.5 GHz	-139 dBm/-146 dBm	-143 dBm/-150 dBm typical
	26.4 to 34 GHz	-138 dBm/-146 dBm	-143 dBm/-150 dBm typical
	33.9 to 37 GHz	-134 dBm/-142 dBm	-140 dBm/-148 dBm typical
37 to 40 GHz	-132 dBm/-141 dBm	-139 dBm/-146 dBm typical	
40 to 46 GHz	-130 dBm/-141 dBm	-137 dBm/-146 dBm typical	
46 to 49 GHz	-130 dBm/-139 dBm	-137 dBm/-145 dBm typical	
49 to 50 GHz	-128 dBm/-139 dBm	-135 dBm/-145 dBm typical	

1. With Option NF2 (Noise Floor Extension) "Off".
2. LNP (Low Noise Path) is standard for the UX A.

## Dynamic Range Specifications (continued)

mmW (Option 544, 550)	LNP Off/LNP On <sup>2</sup>	Specifications	Typical
		LNP Off/LNP On <sup>2</sup>	LNP Off/LNP On <sup>2</sup>
Preamp On <sup>1</sup>	100 to 200 kHz	-157 dBm	-159 dBm typical
	200 to 500 kHz	-159 dBm	-161 dBm typical
	0.5 to 1 MHz	-162 dBm	-164 dBm typical
	1 to 2.1 GHz	-164 dBm	-165 dBm typical
	2.1 to 3.6 GHz	-162 dBm	-164 dBm typical
	3.5 to 13.6 GHz	-161 dBm	-162 dBm typical
	13.5 to 17.1 GHz	-161 dBm	-164 dBm typical
	17.0 to 20.0 GHz	-160 dBm	-163 dBm typical
	20.0 to 26.5 GHz	-158 dBm	-161 dBm typical
	26.4 to 30 GHz	-157 dBm	-160 dBm typical
	30 to 34 GHz	-155 dBm	-159 dBm typical
	33.9 to 37 GHz	-153 dBm	-158 dBm typical
	37 to 40 GHz	-152 dBm	-156 dBm typical
	40 to 46 GHz	-149 dBm	-155 dBm typical
	46 to 50 GHz	-146 dBm	-152 dBm typical
Displayed average noise level (DANL) with Noise Floor Extension (Option NF2) on		95th percentile	
DANL improvement	Preamp Off	Preamp On	LNP On
Band 0, f > 20 MHz	10 dB	9 dB	NA
Band 1	8 dB	9 dB	9 dB
Band 2	8 dB	8 dB	9 dB
Band 3	9 dB	8 dB	10 dB
Band 4	10 dB	8 dB	11 dB
Band 5	11 dB	8 dB	11 dB
Band 6	11 dB	7 dB	11 dB
DANL with Noise Floor Extension	Preamp Off	Preamp On	LNP On
Band 0, f > 20 MHz	-163 dBm	-174 dBm	NA
Band 1	-157 dBm	-173 dBm	-163 dBm
Band 2	-159 dBm	-174 dBm	-164 dBm
Band 3	-160 dBm	-174 dBm	-164 dBm
Band 4	-155 dBm	-171 dBm	-163 dBm
Band 5	-156 dBm	-169 dBm	-162 dBm
Band 6	-148 dBm	-161 dBm	-156 dBm

1. At higher frequency bands (beyond 3.6 GHz), Preamp "On" supersedes "LNP enabled". LNP cannot operate simultaneously with preamp.

## Dynamic Range Specifications (continued)

Residuals, images, and spurious responses						
Residual responses (Input terminated and 0 dB attenuation)	200 kHz to 8.4 GHz					-100 dBm
	Zero span or FFT or other frequencies					-100 dBm nominal
Image responses	Tuned Freq (f)	Excitation Freq	Response RF/MW (Opt 508, 513, 526)		mmW (Opt 544, 550)	
(Mixer level at -10 dBm)	10 MHz to 26.5 GHz	f+45 MHz	-80 dBc	-105 dBc typical	-80 dBc	-104 dBc typical
	10 MHz to 3.6 GHz	f+10,245 MHz	-80 dBc	-106 dBc typical	-80 dBc	-106 dBc typical
	10 MHz to 3.6 GHz	f+645 MHz	-80 dBc	-101 dBc typical	-80 dBc	-101 dBc typical
	3.5 to 13.6 GHz	f+645 MHz	-78 dBc	-86 dBc typical	-80 dBc	-106 dBc typical
	13.5 to 17.1 GHz	f+645 MHz	-74 dBc	-84 dBc typical	-80 dBc	-106 dBc typical
	17.0 to 22 GHz	f+645 MHz	-70 dBc	-78 dBc typical	-80 dBc	-101 dBc typical
	22 to 26.5 GHz	f+645 MHz	-66 dBc	-75 dBc typical	-70 dBc	-102 dBc typical
(Mixer level at -30 dBm)	26.5 to 50 GHz	f+45 MHz				-90 dBc nominal
	26.5 to 34.5 GHz	f+645 MHz			-70 dBc	-98 dBc typical
	34.4 to 42 GHz	f+645 MHz			-60 dBc	-84 dBc typical
	42 to 50 GHz	f+645 MHz				-75 dBc nominal
Other spurious responses	Mixer level	Response				
Carrier frequency $\leq$ 26.5 GHz						
First RF order (f $\geq$ 10 MHz from carrier)	-10 dBm	-80 dBc + 20log(N <sup>2</sup> ) Including IF feedthrough, LO harmonic mixing responses				
Higher RF order (f $\geq$ 10 MHz from carrier)	-40 dBm	-80 dBc + 20log(N <sup>2</sup> ) Including higher order mixer responses				
Carrier frequency > 26.5 GHz						
(f $\geq$ 10 MHz from carrier)	-30 dBm	-90 dBc nominal				
LO-related spurious responses (200 Hz $\leq$ f < 10 MHz from carrier)	-10 dBm	-68 dBc <sup>1</sup> + 20log(N <sup>2</sup> )				
Line-related spurious responses		-73 dBc <sup>1</sup> + 20log(N <sup>2</sup> ) (nominal)				
Second harmonic distortion (SHI)	Source frequency	Mixer level	Distortion (LNP Off/LNP On)		SHI (LNP Off/LNP On)	
RF/MW (Opt 508, 513, 526)	10 MHz to 1.8 GHz	-15 dBm	-60 dBc/NA		+45 dBm/NA	
	1.75 to 2.5 GHz	-15 dBm	-77 dBc/-95 dBc		+62 dBm/+80 dBm	
	2.5 to 4 GHz	-15 dBm	-77 dBc/-101 dBc		+62 dBm/+86 dBm	
	4 to 6.5 GHz	-15 dBm	-77 dBc/-105 dBc		+62 dBm/+90 dBm	
	6.5 to 10 GHz	-15 dBm	-70 dBc/-105 dBc		+55 dBm/+90 dBm	
	10 to 13.25 GHz	-15 dBm	-62 dBc/-105 dBc		+47 dBm/+90 dBm	
mmW (Opt 544, 550)	10 MHz to 1.8 GHz	-15 dBm	-60 dBc/NA		+45 dBm/NA	
	1.75 to 2.5 GHz	-15 dBm	-72 dBc/-95 dBc		+57 dBm/+80 dBm	
	2.5 to 4 GHz	-15 dBm	-72 dBc/-99 dBc		+57 dBm/+84 dBm	
	4 to 6.5 GHz	-15 dBm	-77 dBc/-105 dBc		+62 dBm/+90 dBm	
	6.5 to 10 GHz	-15 dBm	-70 dBc/-105 dBc		+55 dBm/+90 dBm	
	10 to 13.25 GHz	-15 dBm	-62 dBc/-105 dBc		+47 dBm/+90 dBm	
	13.25 to 25 GHz	-15 dBm	-65 dBc/-105 dBc (nom)		+50/+90 dBm (nom)	
	Source frequency	Preamp level	Distortion		SHI	
Preamp On (Option P08, P13, P26, P44, P50)	10 MHz to 1.8 GHz	-45 dBm	-78 dBc nominal		+33 dBm nominal	
	1.8 to 13.25 GHz	-50 dBm	-60 dBc nominal		+10 dBm nominal	
	13.25 to 25 GHz	-50 dBm	-50 dBc nominal		0 dBm nominal	

1. Nominally -40 dBc under large magnetic (0.38 Gauss rms) or vibrational (0.21 g rms) environmental stimuli.

2. N is the LO multiplication factor. Refer to page 3 for the N value versus frequency ranges.

## Dynamic Range Specifications (continued)

### Third-order intermodulation distortion (TOI)

(two -16 dBm tones at input mixer with tone separation > 5 times IF prefilter bandwidth, 20 to 30 °C)

RF/MW (Opt 508, 513, 526)	10 to 300 MHz	+13.5 dBm	+16 dBm typical
	300 to 600 MHz	+18 dBm	+21 dBm typical
	0.6 to 1.5 GHz	+20 dBm	+22 dBm typical
	1.5 to 3.6 GHz	+21 dBm	+23 dBm typical
	3.5 to 8.4 GHz	+19 dBm	+22 dBm typical
	8.3 to 13.6 GHz	+19 dBm	+23 dBm typical
	13.5 to 17.1 GHz	+18 dBm	+23 dBm typical
	17.0 to 26.5 GHz	+19 dBm	+24 dBm typical
mmW (Opt 544, 550)	10 to 300 MHz	+13.5 dBm	+16 dBm typical
	300 to 600 MHz	+18 dBm	+21 dBm typical
	0.6 to 1.5 GHz	+20 dBm	+22 dBm typical
	1.5 to 3.6 GHz	+21 dBm	+23 dBm typical
	3.5 to 13.6 GHz	+16 dBm	+23 dBm typical
	13.5 to 17.1 GHz	+13 dBm	+17 dBm typical
	17.0 to 26.5 GHz	+13 dBm	+20 dBm typical
	26.5 to 50 GHz		+13 dBm nominal
Preamp On (Option P08, P13, P26, P44, P50)	Tones at preamp input		
	(two -45 dBm)	10 to 500 MHz	+4 dBm nominal
	(two -45 dBm)	500 MHz to 3.6 GHz	+4.5 dBm nominal
	(two -50 dBm)	3.6 to 26.5 GHz	-15 dBm nominal

## Dynamic Range Specifications (continued)

Phase noise	Offset	Specifications	Typical
Noise sidebands (20 to 30 °C, CF = 1 GHz)	10 Hz		-93 dBc/Hz typical <sup>1</sup>
	100 Hz	-107 dBc/Hz	-112 dBc/Hz typical
	1 kHz	-124 dBc/Hz	-127 dBc/Hz typical
	10 kHz	-134 dBc/Hz	-135 dBc/Hz typical
	100 kHz	-139 dBc/Hz	-141 dBc/Hz typical
	1 MHz	-145 dBc/Hz	-147 dBc/Hz typical
	10 MHz	-155 dBc/Hz	-157 dBc/Hz typical

1. For wide reference loop bandwidth.

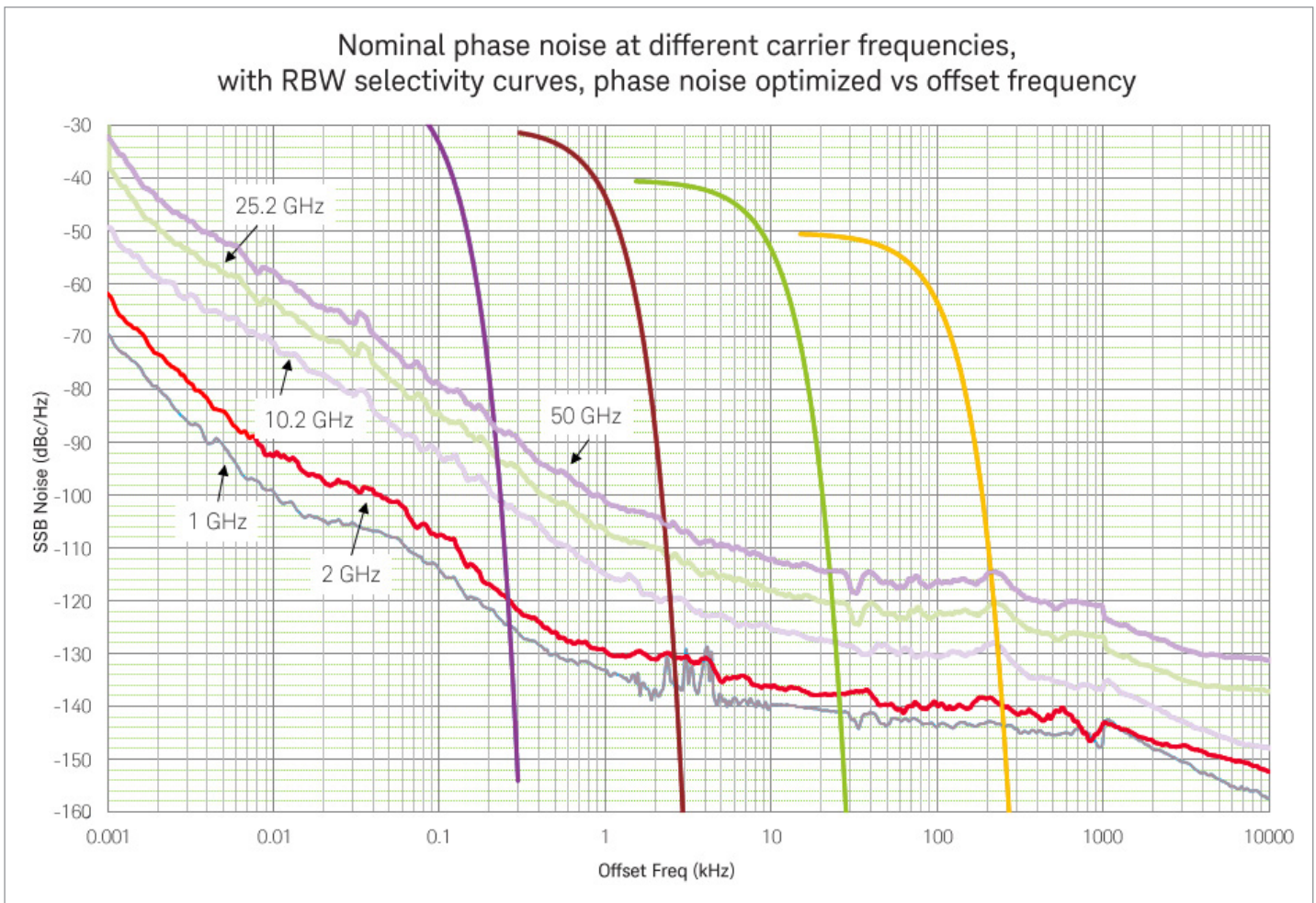


Figure 1. Nominal UXA phase noise at various center frequencies. 50 GHz curve is the predicted phase noise computed from the 25.2 GHz observation.

## General Specifications

### Temperature range

Operating <sup>1</sup>	0 to 55 °C
Storage	-40 to +70 °C

### Altitude

4,500 meters (approx. 15,000 feet)

### EMC

Complies with the essential requirements of the European EMC Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61326-1
- CISPR 11 Group 1, Class A
- AS/NZS CISPR 11
- ICES/NMB-001

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme à la norme NMB-001 du Canada.

### South Korean Class A EMC declaration

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

A 급 기기 (업무용 방송통신기자재)이 기 기는 업무용 (A 급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주 의하시기 바라 며, 가 정외의 지역에서 사용하는 것을 목 적으 로 합 니 다.

### Safety

Complies with the essential requirements of the European Low Voltage Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61010-1
- Canada: CSA C22.2 No. 61010-1
- USA: UL std no. 61010-1

### Acoustic statement (European Machinery Directive)

Acoustic noise emission

LpA < 70 dB

Operator position

Normal operation mode per ISO 7779

### Acoustic noise - more information

Values given are per ISO 7779 standard in the "Operator Sitting" position

Ambient temperature

< 35 °C

Nominally under 55 dBA Sound Pressure. 55 dBA is generally considered suitable for use in quiet office environment

≥ 35 °C

Nominally under 65 dBA Sound Pressure. 65 dBA is generally considered suitable for use in noisy office environment

### Environmental stress

Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation, and end-use; those stresses include, but are not limited to, temperature, humidity, shock, vibration, altitude, and power line conditions; test methods are aligned with IEC 60068-2 and levels are similar to MILPRF-28800F Class 3.

### Power requirements

Voltage and frequency	100 to 120 V, 50/60/400 Hz 220 to 240 V, 50/60 Hz
-----------------------	--

Power consumption

On 850 W (Maximum)

Standby 25 W

1. Operating temperature range when option H1G is installed is 0 to 40 °C.

## General Specifications (continued)

<b>Display</b>	
Resolution	1280 x 800
Size	357 mm (14.1 in.) diagonal (nominal) capacitive multi-touch screen
<b>Data storage</b>	
Internal	Removable solid state drive (≥ 80 GB) and secure digital (SD) memory device
External	Supports USB 3.0/2.0 compatible memory devices
<b>Weight (Basic configuration)</b>	
Net	30.9 kg (68 lbs) nominal
Shipping	39.5 kg (87 lbs) nominal
<b>Dimensions</b>	
Height	280 mm (11 in)
Width	459 mm (18 in)
Length	500 mm (19.8 in)
<b>Calibration cycle</b>	
The recommended calibration cycle is one year. Calibration services are available through Keysight service centers	

## Inputs and Outputs

Front panel	
RF input connector	
Standard (for Opt 508, 513, 526)	Type-N female, 50 $\Omega$ nominal
Standard (for Opt 544, 550)	2.4 mm male, 50 $\Omega$ nominal
Option C35 (with Option 526 only)	APC 3.5 mm male, 50 $\Omega$ nominal
Probe power	
Voltage/current	+15 Vdc, $\pm$ 7% at 150 mA max nominal -12.6 Vdc, $\pm$ 10% at 150 mA max nominal
USB ports	
Master (3 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	0.5 A nominal
Headphone jack	Miniature stereo audio jack (3.5 mm, also known as "1/8 inch")
External mixing	
Connection port	
Connector	SMA, female
Impedance	50 $\Omega$ nominal
Functions	Triplexed for mixer bias, IF input and LO output
Mixer bias range	$\pm$ 10 mA in 10 $\mu$ A step
IF center frequency	
$\leq$ 25 MHz IF path	322.5 MHz
40 MHz BW IF path	250.0 MHz
255 MHz BW IF path	750.0 MHz
510 MHz BW IF path	877.1484375 MHz
LO output frequency range	3.75 to 14.1 GHz
Rear panel	
10 MHz out	
Connector	BNC female, 50 $\Omega$ nominal
Output amplitude	$\geq$ 0 dBm nominal
Frequency	10 MHz + (10 MHz x frequency reference accuracy)
Ext Ref In	
Connector	BNC female, 50 $\Omega$ nominal
Input amplitude range	-5 to 10 dBm nominal
Input frequency	1 to 50 MHz nominal (selectable to 1 Hz resolution)
Frequency lock range	$\pm$ 2 x 10 <sup>-6</sup> of specified external reference input frequency
Trigger 1 and 2 inputs	
Connector	BNC female
Impedance	> 10 k $\Omega$ nominal
Trigger level range	-5 to +5 V (TTL) factory preset
Trigger 1 and 2 outputs	
Connector	BNC female
Impedance	50 $\Omega$ nominal
Level	0 to 5 V (CMOS) nominal
Sync (reserved for future use)	
Connector	BNC female
Monitor output 1	
Connector	VGA compatible, 15-pin mini D-SUB
Format	XGA (60 Hz vertical sync rates, non-interlaced) Analog RGB
Resolution	1280 x 800
Monitor output 2	
Connector	Mini DisplayPort
Resolution	1280 x 800

## Inputs and Outputs (continued)

Noise source drive +28 V (pulsed)	
Connector	BNC female
Output voltage	On 28.0 ± 0.1 V (60 mA maximum) Off < 1 V
SNS series noise source	For use with the Agilent/Keysight SNS Series noise sources
Digital bus	
Connector	MDR-80
Analog out	
Connector	BNC female
USB ports	
Master (3 ports)	
Standard	Two ports (stacked with each other) are compatible with USB 3.0; one (stacked with LAN port) with USB 2.0
Connector	USB Type-A female
Output current	0.5 A nominal
Slave (1 port)	
Standard	Compatible with USB 3.0
Connector	USB Type-B female
GPIB interface	
Connector	IEEE-488 bus connector
GPIB codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3, C28, DT1, L4, C0
GPIB mode	Controller or device
LAN TCP/IP interface	
Standard	1000Base-T
Connector	RJ45 Ethertwist
IF output	
Connector	SMA female, shared by the second IF out (wideband, standard) and Opt CRP, and ALV
Impedance	50 Ω nominal
2nd IF output	
Center frequency	
SA mode or I/Q analyzer with IF BW ≤ 25 MHz	322.5 MHz
with Option B40	250 MHz
with Option B2X	750 MHz
with Option B5X	877.1484375 MHz
Conversion gain	1 dB nominal
Bandwidth	
Low band	
IF Path ≤ 40 MHz	Up to 160 MHz nominal
IF Path 255 MHz	255 MHz nominal
IF Path 510 MHz	510 MHz nominal
IF Path 1 GHz	1 GHz nominal
High band, with preselector bypassed	Up to 800 MHz (nominal); expandable to 1200 MHz with corrections
IF2 output for 1 GHz analog IF	
Connector	SMA female
Impedance	50 Ω nominal
Center frequency	750 MHz
IF2 input for 1 GHz digital section	
Connector	SMA female
Impedance	50 Ω nominal
Center frequency	750 MHz
Trigger 3 input for 1 GHz digitizer	
Connector	BNC female
Impedance	50 Ω, DC terminated
Trigger level range	± 5 V range (minimum amplitude 0.5 V pk-pk)
Trigger channel passband	DC to 2 GHz nominal

## Other Optional Outputs

### Option ALV log video out

General port specifications		
Connector	SMA female	Shared with other options
Impedance		50 $\Omega$ nominal
Fast log video output		
Output voltage	Open-circuit voltages shown	
Maximum	1.6 V at -10 dBm nominal	
Slope	25 $\pm$ 1 mV/dB nominal	
Log fidelity		
Range	49 dB (nominal) with input frequency at 1 GHz	
Accuracy within range	$\pm$ 1.0 dB nominal	
Rise time	15 ns nominal	
Fall time		
Bands 1-4 with Option MPB	40 ns nominal best case	
Other cases	Depends on bandwidth	

### Option CRP programmable IF output

General port specifications		
Connector	SMA female	Shared with other options
Impedance		50 $\Omega$ nominal
Programmable IF output		
Center frequency		
Range	10 to 75 MHz (user selectable)	
Resolution	0.5 MHz	
Conversion gain	-1 to +4 dB (nominal) plus RF frequency response	
Bandwidth		
Output at 70 MHz		
Low band or high band with preselector bypassed	100 MHz (nominal)	
Preselected band	Depends on RF center frequency	
Lower output frequencies	Subject to folding	
Residual output signals	$\leq$ -88 dBm (nominal)	

## Other Optional Outputs (continued)

### Option YAV Y-axis video output

General port specifications		
Connector Impedance	BNC female	Shared with other options 50 $\Omega$ nominal
Screen video		
Operating conditions		
Display scale types	Log or Lin	“Lin” is linear in voltage
Log scales	All (0.1 to 20 dB/div)	
Modes	Spectrum analyzer only	
Gating	Gating must be off	
Output scaling	0 to 1.0 V open circuit, representing bottom to top of screen	
Offset	$\pm 1\%$ of full scale nominal	
Gain accuracy	$\pm 1\%$ of output voltage nominal	
Log video (Log envelope) output		
Amplitude range (terminated with 50 $\Omega$ )		
Maximum	V nominal for -10 dBm at the mixer	
Scale factor	1 V per 192.66 dB	
Bandwidth	Set by RBW	
Operating conditions	Select Sweep Type = Swept	
Linear video output		
Amplitude range (terminated with 50 $\Omega$ )		
Maximum	1.0 V nominal for signal envelope at the reference level	
Minimum	0 V	
Scale factor	If carrier level is set to half the reference level in volts, the scale factor is 200% of carrier level per volt. Regardless of the carrier level, the scale factor is 100% of reference level per volt.	
Bandwidth	Set by RBW	
Operating conditions	Select Sweep Type = Swept	

## I/Q Analyzer

### Frequency

Frequency span	
Option B25 (standard)	10 Hz to 25 MHz
Option B40	10 Hz to 40 MHz
Option B2X	10 Hz to 255 MHz
Option B5X	10 Hz to 510 MHz
Option H1G	10 Hz to 1 GHz

### Resolution bandwidth (spectrum measurement)

Range	
Overall	100 mHz to 3 MHz
Span = 1 MHz	50 Hz to 3 MHz
Span = 10 kHz	1 Hz to 10 kHz
Span = 100 Hz	100 mHz to 100 Hz
Window shapes	Flat Top, Uniform, Hanning, Hamming, Gaussian, Blackman, Blackman-Harris, Kaiser Bessel (K-B 70 dB, K-B 90 dB and K-B 110 dB)

### Analysis bandwidth (waveform measurement)

Option B25 (standard)	10 Hz to 25 MHz
Option B40	10 Hz to 40 MHz
Option B2X	10 Hz to 255 MHz
Option B5X	10 Hz to 510 MHz
Option H1G	10 Hz to 1 GHz

### IF frequency response (standard 10 MHz IF path)

#### IF frequency response (demodulation and FFT response relative to the center frequency)

Frequency (GHz)	Span (MHz)	Preselector	Max error	Midwidth error (95th percentile)	Slope (dB/MHz) (95th percentile)	RMS (nominal)
≤ 3.6	≤ 10	NA	± 0.20 dB	± 0.12 dB	± 0.10 dB	0.02 dB
3.6 to < 26.5	≤ 10	Off <sub>12</sub>	± 0.25 dB	± 0.12 dB	± 0.10 dB	0.02 dB
≥ 26.5	≤ 10	Off <sub>12</sub>	± 0.30 dB	± 0.12 dB	± 0.10 dB	0.024 dB

### IF phase linearity

Center freq (GHz)	Span (MHz)	Preselector	Peak-to-peak (nominal)	RMS (nominal)
≥ 0.02, < 3.6	≤ 10	NA	0.14°	0.032°
≥ 3.6	≤ 10	Off <sup>1</sup>	0.27°	0.057°

### Dynamic range (standard 10 MHz IF path)

Clipping-to-noise dynamic range	Excluding residuals and spurious responses
Clipping level at mixer	Center frequency ≥ 20 MHz
IF gain = Low	-8 dBm nominal
IF gain = High	-17.5 dBm nominal
Noise density at mixer at center frequency	(DANL + IF Gain effect) + 2.25 dB

1. MPB (microwave preselector bypass) is enabled. All UXAs ship with MPB as a standard feature.

## I/Q Analyzer (continued)

Data acquisition (standard 10 MHz IF path)			
Time record length			
Analysis tool			
IQ analyzer	8,000,000 IQ sample pairs	Waveform measurement	
Advanced tool	Data packing		With 89600 VSA or fast capture
	32-bit	64-bit	
Length (IQ sample pairs)	536 MSa (2 <sup>29</sup> Sa)	268 MSa (2 <sup>28</sup> Sa)	2 GB total memory
Length (time units)	Samples/Sample rate (IQ pairs)		
Sample rate			
IQ pairs	1.25 x IFBW		
ADC resolution	16 bits		

IF frequency response (standard 25 MHz IF path)						
IF frequency response (demodulation and FFT response relative to the center frequency)						
Freq (GHz)	Span (MHz)	Preselector	Max error	Midwidth error (95th percentile)	Slope (dB/MHz) (95th percentile)	RMS (nominal)
< 3.6	≤ 25	NA	± 0.30 dB	± 0.12 dB	± 0.1 dB	0.02 dB
3.6 to < 26.5	≤ 25	Off <sup>1</sup>	± 0.40 dB	± 0.12 dB	± 0.1 dB	0.03 dB
≥ 26.5	≤ 25	Off <sup>1</sup>	± 0.40 dB			0.02 dB
IF phase linearity						
Center freq (GHz)	Span (MHz)	Preselector		Peak-to-peak (nominal)		RMS (nominal)
≥ 0.02, < 3.6	≤ 25	NA		0.41°		0.11°
≥ 3.6	≤ 25	Off <sup>1</sup>		1.0°		0.27°
Dynamic range (standard 25 MHz IF path)						
Full scale (ADC clipping)						
Default settings, signal at CF (IF gain = Low)						
Band 0				-8 dBm mixer level nominal		
Bands 1 through 4				-7 dBm mixer level nominal		
High gain setting, signal at CF (IF gain = High)						
Band 0				-18 dBm mixer level nominal, subject to gain limitations		
Bands 1 through 6				-17 dBm mixer level nominal, subject to gain limitations		
Effect of signal frequency ≠ CF				Up to ± 3 dB nominal		

1. MPB (microwave preselector bypass) is enabled. All UXAs ship with MPB as a standard feature.

## I/Q Analyzer (continued)

Data acquisition (standard 25 MHz IF path)			
Time record length			
Analysis tool			
IQ analyzer	8,000,000 IQ sample pairs	Waveform measurement	
Advanced tool	Data packing		With 89600 VSA or fast capture
	32-bit	64-bit	
Length (IQ sample pairs)	536 MSa (2 <sup>29</sup> Sa)	268 MSa (2 <sup>28</sup> Sa)	2 GB total memory
Length (time units)	Samples/Sample rate (IQ pairs)		
Sample rate			
IQ pairs	1.25 x IF BW		
ADC resolution	16 bits		

## Option B40 40 MHz analysis bandwidth (Option B40 is automatically included in Option B2X, B5X, or H1G)

IF frequency response (40 MHz IF path)					
IF frequency response (relative to center)					
Freq (GHz)	Span (MHz)	Preselector	Specification	Typical	RMS (nominal)
≥ 0.03, < 3.6	≤ 40	NA	± 0.37 dB	± 0.22 dB	0.07 dB
≥ 3.6, ≤ 8.4	≤ 40	Off <sup>1</sup>	± 0.5 dB	± 0.13 dB	0.05 dB
> 8.4, ≤ 26.5	≤ 40	Off <sup>1</sup>	± 0.7 dB	± 0.14 dB	0.05 dB
> 26.5, ≤ 34.4	≤ 40	Off <sup>1</sup>	± 0.8 dB	± 0.25 dB	0.07 dB
> 34.4	≤ 40	Off <sup>1</sup>	± 1 dB	± 0.35 dB	0.07 dB
IF phase linearity					
Center freq (GHz)	Span (MHz)	Preselector	Peak-to-peak (nominal)	RMS (nominal)	
≥ 0.02, < 3.6	≤ 40	NA	0.36°	0.083°	
≥ 3.6	≤ 40	Off <sup>1</sup>	1.0°	0.24°	
Dynamic range (40 MHz IF path)					
SFDR					
(Spurious-free dynamic range)					
Signal frequency within ± 12 MHz of center			-80 dBc nominal		
Signal frequency anywhere within analysis BW					
Spurious response within ± 18 MHz of center			-79 dBc nominal		
Response anywhere within analysis BW			-77 dBc nominal		
Full scale (ADC clipping)			Mixer level		
Default settings, signal at CF (IF gain = Low)			RF/MW (Opt 508, 513, 526)		mmW (Opt 544, 550)
Band 0			-8 dBm nominal		-8 dBm nominal
Bands 1 through 4			-6 dBm nominal		-7 dBm nominal
Bands 5 through 6					-7 dBm nominal
High gain setting, signal at CF (IF gain = High)			subject to gain limitations		
Band 0			-16 dBm nominal		-12 dBm nominal
Bands 1 through 2			-9 dBm nominal		-16 dBm nominal
Bands 3 through 4			-6 dBm nominal		-16 dBm nominal
Bands 5 through 6					-15 dBm nominal
Effect of signal frequency ≠ CF			Up to ± 4 dB nominal		

1. MPB (microwave preselector bypass) is enabled. All UXAs ship with MPB as a standard feature.

## I/Q Analyzer (continued)

Data acquisition (40 MHz IF path)			
Time record length			
Analysis tool			
IQ analyzer	8,000,000 IQ sample pairs	Waveform measurement	
Advanced tool	Data packing		With 89600 VSA software or fast capture
	32-bit	64-bit	
Length (IQ sample pairs)	536 MSa (2 <sup>29</sup> Sa)	268 MSa (2 <sup>28</sup> Sa)	2 GB total memory
Length (time units)	Samples/Sample rate (IQ pairs)		
Sample rate			
IQ pairs	1.25 x IF BW		
ADC resolution	12 bits		

## Option B2X 255 MHz analysis bandwidth (Option B2X is automatically included with Option B5X or H1G)

IF frequency response (255 MHz IF path)					
Center Freq (GHz)	Span (MHz)	Preselector	Specification	Typical	RMS (nominal)
≥ 0.4, < 3.6	≤ 255	NA	± 0.74 dB	± 0.3 dB	0.1 dB
> 3.6, ≤ 8.4	≤ 255	Off <sup>1</sup>	± 0.82 dB	± 0.34 dB	0.1 dB
> 8.4	≤ 255	Off <sup>1</sup>		± 0.8 dB nominal	0.2 dB
IF phase linearity (255 MHz IF path)					
Center Freq (GHz)	Span (MHz)	Preselector		Pk-to-pk (nominal)	RMS (nominal)
≥ 0.4, < 3.6	≤ 255	NA		3°	0.6°
≥ 3.6, < 26.5	≤ 255	Off <sup>1</sup>		2°	0.5°
≥ 26.5	≤ 255	Off <sup>1</sup>		4°	0.8°
Dynamic range (255 MHz IF path)					
Spurious-free dynamic range (SFDR) Anywhere within the analysis BW				-78 dBc nominal	
Full scale (ADC clipping)			Mixer level		
Default setting, signal at CF			RF/MW (Opt 508, 513, 526)		mmW (Opt 544, 550)
Band 0			+2 dBm nominal		+3 dBm nominal
Bands 1 through 2			+4 dBm nominal		+3 dBm nominal
Bands 3 through 4			+4 dBm nominal		+1 dBm nominal
Bands 5 through 6					+1 dBm nominal
High gain setting, signal at CF					
Band 0			-4 dBm nominal		-1 dBm nominal
Bands 1 through 2			+2 dBm nominal		-4 dBm nominal
Bands 3 through 4			+4 dBm nominal		-6 dBm nominal
Bands 5 through 6					-5 dBm nominal
Effect of signal frequency ≠ CF			Up to ± 4 dB nominal		
IF residual responses across the full BW					
Band 0			Preselector off <sup>1</sup>		-110 dBFS nominal
Band 1					-108 dBFS nominal
Third-order intermodulation distortion (Two tones of equal level, 1 MHz separation, each tone -23 dB relative to full scale (ADC clipping), IF gain = high)					
Band 0					-85 dBc nominal
Bands 1 through 4			Preselector off <sup>1</sup>		-85 dBc nominal
Bands 5 through 6			Preselector off <sup>1</sup>		-80 dBc nominal

1. MPB (microwave preselector bypass) is enabled. All UXA ship with MPB as a standard feature

## I/Q Analyzer (continued)

Noise density			
Band	Frequency (GHz)	IF gain = Low	IF gain = High
0	1.80	-144 dBm/Hz	-145 dBm/Hz
1	6.00	-141 dBm/Hz	-142 dBm/Hz
2	10.80	-140 dBm/Hz	-141 dBm/Hz
3	15.15	-137 dBm/Hz	-137 dBm/Hz
4	21.80	-135 dBm/Hz	-135 dBm/Hz
5	30.50	-130 dBm/Hz	-130 dBm/Hz
6	42.25	-130 dBm/Hz	-130 dBm/Hz

Data acquisition (255 MHz IF path)			
Time record length			
IQ analyzer	8,000,000 IQ sample pairs	Waveform measurement	
Advanced tools	Data packing		89600 VSA or fast capture
	32-bit	64-bit	
Length (IQ sample pairs)	1073 MSa (2 <sup>30</sup> Sa)	536 MSa (2 <sup>29</sup> Sa)	4 GB total memory (Option DP4)
Maximum IQ capture time (89600 VSA and fast capture)	Length of IQ sample pairs/sample rate (IQ pairs)		
Sample rate (IQ pairs)	Minimum of (1.25 x IFBW, 300 Msa/s)		
ADC resolution	14 bits		

## Option B5X 510 MHz analysis bandwidth

IF frequency response (510 MHz IF path)					
Center Freq (GHz)	Span (MHz)	Preselector	Specification	Typical	RMS (nominal)
≥ 0.6, < 3.6	≤ 510	NA	± 1.0 dB	± 0.41 dB	0.06 dB
> 3.6, ≤ 8.4	≤ 510	Off <sup>1</sup>	± 1.25 dB	± 0.42 dB	0.3 dB
> 8.4, ≤ 26.5	≤ 510	Off <sup>1</sup>		± 0.8 dB nominal	
> 26.5	≤ 510	Off <sup>1</sup>		± 1 dB nominal	

IF phase linearity (510 MHz IF path)					
Center Freq (GHz)	Span (MHz)	Preselector		Pk-to-pk (nominal)	RMS (nominal)
≥ 0.4, < 3.6	≤ 510	NA		5°	1°
≥ 3.6, < 26.5	≤ 510	Off		6°	1.4°
≥ 26.5	≤ 510	Off		7°	1.6°

Dynamic range (510 MHz IF path)	
Spurious-free dynamic range (SFDR) Anywhere within the analysis BW	-78 dBc nominal
Full scale (ADC clipping)	Mixer level
Default setting, signal at CF	RF/MW (Opt 508, 513, 526)
Band 0	+2 dBm nominal
Bands 1 through 2	+2 dBm nominal
Bands 3 through 4	+2 dBm nominal
Bands 5 through 6	+2 dBm nominal
High gain setting, signal at CF	mmW (Opt 544, 550)
Band 0	-1 dBm nominal
Bands 1 through 2	-7 dBm nominal
Bands 3 through 4	-9 dBm nominal
Bands 5 through 6	-9 dBm nominal

1. MPB (microwave preselector bypass) is enabled. All UXA ship with MPB as a standard feature

## I/Q Analyzer (continued)

Effect of signal frequency $\neq$ CF		Up to $\pm 4$ dB nominal	
IF residual responses across the full BW			
Band 0		Preselector off <sup>1</sup>	-110 dBFS nominal
Band 1			-108 dBFS nominal
Third-order intermodulation distortion (Two tones of equal level, 1 MHz separation, each tone -23 dB relative to full scale (ADC clipping), IF gain = high)			
Band 0			-85 dBc nominal
Bands 1 through 4		Preselector off <sup>1</sup>	-82 dBc nominal
Bands 5 through 6		Preselector off <sup>1</sup>	-79 dBc nominal
Noise density			
Band	Frequency (GHz)	IF gain = Low	IF gain = High
0	1.80	-144 dBm/Hz	-144 dBm/Hz
1	6.00	-140 dBm/Hz	-142 dBm/Hz
2	10.80	-140 dBm/Hz	-141 dBm/Hz
3	15.15	-137 dBm/Hz	-137 dBm/Hz
4	21.80	-135 dBm/Hz	-135 dBm/Hz
5	30.50	-130 dBm/Hz	-130 dBm/Hz
6	42.25	-130 dBm/Hz	-130 dBm/Hz
<b>Data acquisition (510 MHz IF path)</b>			
<b>Time record length</b>			
IQ analyzer		8,000,000 IQ sample pairs	Waveform measurement
Advanced tools		Data packing	
		32-bit	64-bit
			89600 VSA or fast capture
Length (IQ sample pairs)			
IFBW $\leq 255.176$ MHz		1073 MSa ( $2^{30}$ Sa)	536 MSa ( $2^{29}$ Sa)
IFBW $> 255.176$ MHz		2,147 MSa ( $2^{30}$ Sa)	1073 MSa ( $2^{30}$ Sa)
			4 GB total memory
			8 GB total memory (Option DP4)
Maximum IQ capture time (89600 VSA and fast capture)		Length of IQ sample pairs/sample rate (IQ pairs)	
Sample rate (IQ pairs)		Minimum of (1.25 x IFBW, 300 MSa/s)	
ADC resolution		14 bits	

## Option H1G 1 GHz analysis bandwidth

<b>IF frequency response (1 GHz IF path)</b>				
Center Freq (GHz)	Span (MHz)	Preselector	Max Error (nominal)	
$\geq 0.7, < 3.6$	$\leq 1000$	NA	0.7 dB	
$> 3.6, \leq 8.4$	$\leq 1000$	Off <sup>1</sup>	0.7 dB	
$> 8.4, \leq 26.5$	$\leq 1000$	Off <sup>1</sup>	1.0 dB	
$> 26.5$	$\leq 1000$	Off <sup>1</sup>	1.25 dB	
<b>IF phase linearity (510 MHz IF path)</b>				
Center Freq (GHz)	Span (MHz)	Preselector	Pk-to-pk (nominal)	RMS (nominal)
$\geq 0.7, < 3.6$	$\leq 1000$	NA	7°	1.5°
$> 3.6$	$\leq 1000$	Off <sup>1</sup>	6°	1.3°

1. MPB (microwave preselector bypass) is enabled. All UXA ship with MPB as a standard feature

## I/Q Analyzer (continued)

Dynamic range (1 GHz IF path)		Center frequency	
Spurious-free dynamic range (SFDR) anywhere within the analysis BW		< 3.1 GHz	-62 dBc nominal
		≥ 3.1 GHz	-56 dBc nominal
Effect of signal frequency ≠ CF		Up to ± 4 dB nominal	
IF residual responses across the full BW <sup>2</sup>		IF gain = Low	
Band 0			-67 dBFS nominal
Band 1	Preselector off <sup>1</sup>		-69 dBFS nominal
Noise density (preselector off above band 0)			
Band	Frequency (GHz)	IF gain = High (nominal)	
0	1.80	-152 dBm/Hz	
1	6.00	-153 dBm/Hz	
2	10.80	-151 dBm/Hz	
3	15.15	-151 dBm/Hz	
4	21.80	-149 dBm/Hz	
5	30.5	-147 dBm/Hz	
6	42.25	-142 dBm/Hz	
Data acquisition (1 GHz IF path)			
Time record length			
IQ analyzer		8,000,000 IQ sample pairs	Waveform measurement
Advanced tools		32-bit data packing	89600 VSA or fast capture
IF bandwidth		Length (IQ sample pairs)	
1 GHz ≥ IFBW > 500 MHz		838,859,979 to 419,429,990	
500 MHz ≥ IFBW > 250 MHz		838,859,979 to 419,429,990	
250 MHz ≥ IFBW > 125 MHz		838,859,979 to 419,429,990	
125 MHz ≥ IFBW > 62.5 MHz		838,859,979 to 419,429,990	
62.5 MHz ≥ IFBW > 40 MHz		838,859,979 to 419,429,990	
Maximum IQ capture time (89600 VSA and fast capture)		Length of IQ sample pairs/sample rate (IQ pairs)	
Sample rate (IQ pairs)		1.25 x IFBW	
ADC resolution		12 bits	

1. MPB (microwave preselector bypass) is enabled. All UXA ship with MPB as a standard feature.
2. The residual performance is dominated by a single residual 50 MHz to the left of the center of screen.

## Real-time Spectrum Analyzer (RTSA)

Option RT1 real-time spectrum analyzer, basic detection, or RT2 real-time spectrum analyzer, optimal detection

### Real-time analysis

Real-time analysis bandwidth		
Option RT1	Up to 509.47 MHz	Analysis BW option determines the max real-time BW (max 255 MHz with B2X or H1G, max 510 MHz with B5X) Requires Option B5X
Option RT2	Up to 509.47 MHz	
Option DUA	Up to 2 x 255 MHz at same center frequency	
Minimum detectable signal duration with > 60 dB StM <sup>1</sup> ratio		
Option RT1	11.42 ns	For Frequency Mask Triggering (FMT)
Option RT2	3.33 ns	
Minimum signal duration with 100% probability of intercept (POI) at full amplitude accuracy		Signal is at mask level Signal is at mask level, span > 85 MHz
Option RT1	17.17 $\mu$ s	
Option RT2	3.51 $\mu$ s	
Minimum acquisition time	100 $\mu$ s	
FFT rate	292,969/s	
Supported detectors	Peak, Negative Peak, Sample, Average	
Number of traces	6	
Number of markers	12	
Supported markers	Normal, Delta, Noise, Band Power	
Supported triggers	Level, Level with Time Qualified (TQT), Line, External, RF burst, Frame, Frequency Mask (FMT), FMT with TQT	

1. "StM" = "Signal-to-Mask"

## Option RTS Real-time I/Q Data Streaming

### Real-time streaming<sup>1</sup>

Output stream resolution	16-bit I + jQ	
IQ streaming bandwidth	255 MHz	
Electrical interface	LVDS	
Sample rate	varies continuously based on RTSA span setting	
Max IQ streaming bandwidth and sample rate		
B1X	160 MHz	200 Msamples/s
B2X, B5X, or H1G	255 MHz	300 Msamples/s
Supported data recorder	X-COM Systems IQC5255B	
Capture time	< 3 hours at 255 MHz bandwidth	
Data tagging	Event markers, IRIG-B GPS	

1. Use with X-COM Systems IQC5255B data recorder to capture rare events and play back at RF using integrated control software on the UXA.

## Related Literature

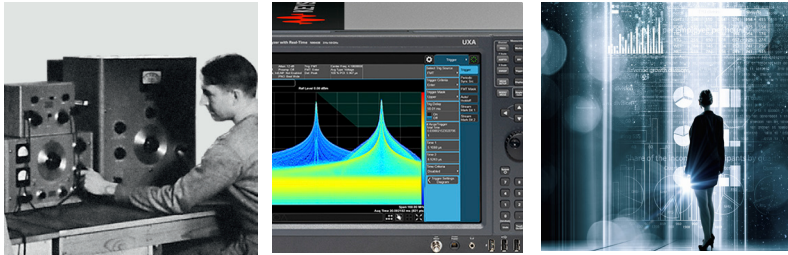
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