Keysight Technologies

UXA X-Series Signal Analyzer, Multi-touch N9041B

3 Hz to 90, or 110 GHz

Data Sheet



KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

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This data sheet is a summary of the specifications and conditions for N9041B UXA signal analyzers.

Definitions and Conditions

Specifications describe the performance of parameters covered by the product warranty and apply to room temperature range 20 to 30 °C, unless otherwise noted.

95th percentile values indicate the breadth of the population (approx. 2σ) of performance tolerances expected to be met in 95 percent of the cases with a 50 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.
- 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)

Frequency and Time Specifications

Frequency Range		**Input 1**	**Input 2**
Option 590		3 Hz to 50 GHz	3 Hz to 90 GHz[1]
Option 5CX		3 Hz to 50 GHz	3 Hz to 110 GHz
Frequency Band	**LO Multiple (N)**	**Frequency Range**	**Additional Information**
0	1	3 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	
7	8/12	49.9 to 75 GHz	For Input 2 only
8	12/14	74.9 to 110 GHz	For Input 2 only
Frequency Reference			
Accuracy	± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]		
Aging rate	± 3 x 10^{-8} / year		
Temperature stability Full temperature range	 ± 4.5 x 10^{-9}		
Achievable initial calibration accuracy	± 3.1 x 10^{-8}		
Example frequency reference accuracy 1 year after last adjustment	= ± (3 x 10^{-8} + 4.5 x 10^{-9} + 3.1 x 10^{-8}) = ± 6.6 x 10^{-8}		
Residual FM (Center frequency = 1 GHz 10 Hz RBW, 10 Hz VBW)	≤ (0.25 Hz x N) p-p in 20 ms nominal See band table above for N (LO multiple)		
Frequency Readout Accuracy (Start, Stop, Center, Marker)			
± (marker frequency x frequency reference accuracy + 0.10% x span + 5 % x RBW + 2 Hz + 0.5 x horizontal resolution[2])			
Marker Frequency Counter			
Accuracy	± (marker frequency x frequency reference accuracy + 0.100 Hz)		
Delta counter accuracy	± (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 FFT	 ± (0.1% x span + horizontal resolution)[3] ± (0.1% x span + horizontal resolution)[3]		

1. The exact maximum frequency for Option 590 depends on the analysis bandwidth option chosen: Max frequency = (90 - 1/2x (analysis bandwidth in GHz))
2. Horizontal resolution is span/(sweep point-1)
3. Nominal for Input 2 above 50 GHz

Frequency and Time Specifications (continued)

Sweep Time And Triggering		
Range	Span = 0 Hz Span ≥ 10 Hz	1 µs to 6000 s, nominal 1 ms to 4000 s, nominal
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
Time Gating		
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	
Sweep (Trace) Point Range		
All spans	1 to 100,001	
Resolution Bandwidth (RBW)		
Range (–3.01 dB bandwidth)	1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz	
Bandwidth accuracy (power) RBW range	 1 Hz to 100 kHz 110 kHz to 1.0 MHz (CF < 3.6 GHz) 1.1 to 2 MHz (CF < 3.6 GHz) 2.2 to 3 MHz (CF < 3.6 GHz) 4 to 8 MHz (CF < 3.6 GHz)	 ± 0.5% (± 0.022 dB) ± 1.0% (± 0.044 dB) ± 0.07 dB, nominal ± 0.10 dB, nominal ± 0.20 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, qualified for Input 1 only)
EMI bandwidth (MIL STD 461E compliant)	10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz	(Option EMC required, qualified for Input 1 only)
Analysis Bandwidth[1]		
Maximum bandwidth	Option B25 (standard) Option B40 Option H1G	25 MHz 40 MHz 1 GHz (Automatically includes 255 MHz IF hardware (Option B2X))
Video Bandwidth (VBW)		
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

Amplitude Range	**Input 1 Specifications**	**Input 2 (≤ 50 GHz) Nominal**	**Input 2 (> 50 GHz) Nominal**
Measurement range			
Preamp Off	DANL[1] to +30 dBm	DANL[1] to +30 dBm	DANL[1] to +10 dBm
Preamp On (Option P50)	DANL[1] to +20 dBm	DANL[1] to +20 dBm	DANL[1] to +10 dBm
Input Mechanical Attenuators (Standard)			
Attenuation range			
Attenuator 1 (Frequency: 3 Hz to 50 GHz)	0 to 70 dB, in 2 dB steps	0 to 70 dB, in 2 dB steps	NA
Attenuator 2 (Frequency: 3 Hz to 110 GHz)	NA	0/6/14/20 dB, fixed steps	0/6/14/20 dB, fixed steps
Electronic Attenuator (Opt EA3)			
Attenuation range (Frequency: 3 Hz to 3.6 GHz)	0 to 24 dB, in 1 dB steps		NA
Maximum Safe Input Level	**Input 1 Specifications**	**Input 2 Nominal**	
Average total power (with or without preamp)			
Input 1 frequency ≤ 50 GHz	+30 dBm (1 W)	NA	
Input 2 frequency ≤ 40 GHz	NA	+25 dBm (0.32 W)	For all attenuator settings
Input 2 frequency > 40 GHz	NA	+25 dBm (0.32 W)	Attenuator 2 setting = 20 dB
Input 2 frequency > 40 to ≤ 65 GHz	NA	+13 dBm (0.02 W)	Attenuator 2 setting = 0 dB
Input 2 frequency > 65 GHz	NA	+5 dBm (0.003 W)	Attenuator 2 setting = 0 dB
Peak pulse power (< 10 µs pulse width, < 1% duty cycle, and ≥ 30 dB input attenuation)	+50 dBm (100 W)	NA	
DC volts	± 0.2 Vdc	± 0.2 Vdc	
Display Range		**Inputs 1 and 2**	
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	
Frequency Response		**Input 1 Specifications**	**Input 1 95th percentile**
Preselector centering applied above 3.6 GHz			
Preamp Off (10 dB input attenuation)	3 Hz to 20 MHz	± 0.50 dB	
	20 to 50 MHz	± 0.40 dB	± 0.24 dB
	50 MHz to 3.6 GHz	± 0.35 dB	± 0.14 dB
	3.5 to 5.2 GHz	± 1.7 dB	± 0.79 dB
	5.2 to 8.4 GHz	± 1.5 dB	± 0.58 dB
	8.3 to 13.6 GHz	± 2.0 dB	± 0.49 dB
	13.5 to 17.1 GHz	± 2.0 dB	± 0.56 dB
	17.0 to 22 GHz	± 2.0 dB	± 0.70 dB
	22.0 to 26.5 GHz	± 2.5 dB	± 0.58 dB
	26.4 to 34.5 GHz	± 2.5 dB	± 0.90 dB
	34.4 to 50 GHz	± 4.0 dB	± 2.30 dB
Preamp On (0 dB attenuation) (Option P50)	9 kHz to 1 MHz		± 0.35 dB
	1 to 50 MHz	± 0.68 dB	± 0.27 dB
	50 MHz to 3.6 GHz	± 0.60 dB	± 0.25 dB
	3.5 to 5.2 GHz	± 2.0 dB	± 0.91 dB
	5.2 to 8.4 GHz	± 2.0 dB	± 0.69 dB
	8.3 to 13.6 GHz	± 2.3 dB	± 0.72 dB
	13.5 to 17.1 GHz	± 2.5 dB	± 0.69 dB
	17.0 to 22 GHz	± 3.0 dB	± 0.79 dB
	22.0 to 26.5 GHz	± 3.5 dB	± 0.91 dB
	26.4 to 34.5 GHz	± 3.0 dB	± 1.36 dB
	34.4 to 50 GHz	± 4.1 dB	± 2.34 dB

1. DANL: Displayed Average Noise Level

Amplitude Accuracy and Range Specifications (continued)

Input Attenuation Switching Uncertainty		**Input 1 Specifications**	**Input 1 Typical and Nominal**
Relative to 10 dB attenuation and preamp off			
At 50 MHz (reference frequency)	Attenuation 12 to 40 dB	± 0.14 dB	± 0.04 dB, typical
	Attenuation 2 to 8 dB	± 0.18 dB	± 0.06 dB, typical
	Attenuation 0 dB		± 0.05 dB, nominal
At other frequencies (attenuation > 2 dB)			
	3 Hz to 3.6 GHz		± 0.3 dB, nominal
	3.5 to 8.4 GHz		± 0.5 dB, nominal
	8.3 to 13.6 GHz		± 0.7 dB, nominal
	13.5 to 26.5 GHz		± 0.7 dB, nominal
	26.4 to 50 GHz		± 1.0 dB, nominal
Input 1 Total Absolute Amplitude Accuracy		**Input 1 Specifications**	
10 dB input attenuation, 1 Hz ≤ RBW ≤ 1 MHz, input signal -10 to -50 dBm, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale			
Preamp Off	At 50 MHz (reference frequency)	± 0.24 dB	
	At all frequencies	± (0.24 dB + frequency response)	
	0.05 to 3.6 GHz	± 0.19 dB (95th percentile)	
Preamp On (Option P50)	At all frequencies	± (0.28 dB + frequency response)	
Input 2 Total Absolute Amplitude Accuracy			**Input 2 Nominal**
10 dB attenuation, preselector centering applied for frequencies between 3.6 and 50 GHz	3 Hz to 3.6 GHz		± 0.3 dB
	3.5 to 26.5 GHz		± 1.0 dB
	26.4 to 50 GHz		± 1.5 dB
Any attenuator 2 setting	50 to 75 GHz		± 1.5 dB
	75 to 110 GHz		± 2.5 dB
Preamp On (Option P50)	9 kHz to 3.6 GHz		± 0.5 dB
	3.4 to 26.5 GHz		± 1.0 dB
	26.4 to 50 GHz		± 1.5 dB

Amplitude Accuracy and Range Specifications (continued)

Input Voltage Standing Wave Ratio (VSWR)		**Input 1** **95th percentile, 10 dB input attn**	**Input 2** **95th percentile, 14 dB input attn**
Preamp Off	50 MHz	1.07 , nominal	
	10 MHz to 3.6 GHz	1.11	1.08
	3.5 to 8.4 GHz	1.18	1.11
	8.3 to 13.6 GHz	1.18	1.10
	13.5 to 17.1 GHz	1.24	1.11
	17.0 to 26.5 GHz	1.45	1.22
	26.4 to 34.5 GHz	1.83	1.19
	34.4 to 50 GHz	1.65	1.43
	49.9 to 75 GHz	NA	1.48
	74.9 to 110 GHz	NA	1.64
		Input 1 **95th percentile, 0 dB input attn**	**Input 2** **95th percentile, 14 dB input attn**
Preamp On (Option P50)	10 MHz to 3.6 GHz	1.38	1.08
	3.5 to 8.4 GHz	1.54	1.11
	8.3 to 13.6 GHz	1.36	1.10
	13.5 to 17.1 GHz	1.31	1.11
	17.0 to 26.5 GHz	1.47	1.22
	26.4 to 34.5 GHz	1.84	1.19
	34.4 to 50 GHz	1.67	1.43
Resolution Bandwidth Switching Uncertainty (Reference to 30 kHz RBW)		**Input 1**	**Input 2**
	1 Hz to 1.5 MHz RBW	± 0.03 dB	± 0.03 dB, nominal
	1.6 to 2.7 MHz RBW	± 0.05 dB	± 0.05 dB, nominal
	3 MHz RBW	± 0.10 dB	± 0.10 dB, nominal
	4, 5, 6, 8 MHz RBW	± 0.30 dB	± 0.30 dB, nominal
Reference Level	**Input 1**	**Input 2**	
Range			
Log scale	-170 to +30 dBm in 0.01 dB steps	-170 to +25 dBm in 0.01 dB steps (Input frequency ≤ 50 GHz) -170 to +10 dBm in 0.01 dB steps (Input frequency > 50 GHz)	
Linear scale	707 pV to 7.07 V with 0.11% resolution	707 pV to 3.975 V with 0.11% resolution (Input frequency ≤ 50 GHz) 707 pV to 0.707 V with 0,11% resolution (Input frequency > 50 GHz)	
Accuracy		0 dB[1]	
Display Scale Switching Uncertainty	**Inputs 1 and 2**		
Switching between linear and log	0 dB[1]		
Log scale/div switching	0 dB[1]		
Display Scale Fidelity	**Input 1**		**Input 2 Nominal**
Between -10 and -18 dBm input mixer level	± 0.10 dB total	± 0.04 dB typical	± 0.07 dB
Below -18 dBm input mixer level	± 0.07 dB	± 0.02 dB typical	± 0.05 dB
Trace Detectors			
Standard	Normal, peak, sample, negative peak, log power average, RMS average, and voltage average		Apply to both Input 1 and Input 2
With Option EMC	Add quasi-peak to above		Qualified for Input 1 only
Preamplifier			
Frequency range	Option P50		9 kHz to 50 GHz
Gain	9 kHz to 3.6 GHz		+20 dB, nominal
	3.6 to 50 GHz		+40 dB, nominal

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

Dynamic Range Specifications

1-dB Gain Compression (Two-Tone), Maximum Power at Mixer		**Input 1**	**Input 2 (≤ 50 GHz)**
(At 1 kHz RBW with 100 kHz tone spacing)			Above 50 GHz, the gain compression at Input 2 is defined as "front-end gain compression" tested with single-tone input and characteristics are provided in section below.
Preamp Off	20 to 40 MHz	2 dBm, nominal	2 dBm, nominal
	40 MHz to 2 GHz	5 dBm, nominal	5 dBm, nominal
	2 to 26.5 GHz	10 dBm, nominal	10 dBm, nominal
	26.5 to 50 GHz	0 dBm, nominal	0 dBm, nominal
Preamp On (Option P50)	10 MHz to 3.6 GHz	-14 dBm, nominal	-14 dBm, nominal
	3.6 to 26.5 GHz Tone spacing 100 kHz to 20 MHz Tone spacing > 70 MHz	 -28 dBm, nominal -20 dBm, nominal	 -28 dBm, nominal -20 dBm, nominal
	26.5 to 50 GHz	-30 dBm, nominal	-30 dBm, nominal
Clipping (ADC over-range)		**Input 1**	**Input 2 (≤50 GHz)**
Any signal offset (with low frequency exception[1])		–10 dBm	Input 1 specifications nominally apply
Signal offset > 5 times IF prefilter bandwidth and IF Gain set to Low		+12 dBm, nominal	Same as Input 1
1-dB Front-End Gain Compression (Single Tone), Maximum Power at Mixer			**Input 2 (> 50 GHz)**
	50 to 75 GHz		+4 dBm, nominal
	75 to 110 GHz		-1 dBm, nominal

Displayed Average Noise Level (DANL)

(Input terminated, sample or average detector, average type = Log, 0 dB input attenuation, IF Gain = High, 1 Hz RBW)

Preamp Off	**Input 1 Specifications**	**Input 1 Typical**	**Input 2 95th Percentile**
	LNP Off/LNP On	LNP Off/LNP On	LNP Off/LNP On
3 to 10 Hz		-85 dBm/NA, nominal	
10 to 100 Hz		-108 dBm/NA, nominal	
100 Hz to 1 kHz		-125 dBm/NA, nominal	
1 to 9 kHz		-133 dBm/NA, nominal	
9 to 100 kHz	-138 dBm/NA	-141 dBm/NA, typical	-141 dBm/NA
100 kHz to 1 MHz	-148 dBm/NA	-152 dBm/NA, typical	-152 dBm/NA
1 to 10 MHz	-151 dBm/NA	-154 dBm/NA, typical	-153 dBm/NA
10 MHz to 1.2 GHz	-151 dBm/NA	-153 dBm/NA, typical	-152 dBm/NA
1.2 to 2.1 GHz	-149 dBm/NA	-151 dBm/NA, typical	-150 dBm/NA
2.1 to 3.0 GHz	-147 dBm/NA	-149 dBm/NA, typical	-148 dBm/NA
3.0 to 3.6 GHz	-146 dBm/NA	-148 dBm/NA, typical	-147 dBm/NA
3.5 to 4.2 GHz	-145 dBm/-151 dBm	-148 dBm/-154 dBm, typical	-147 dBm/-153 dBm
4.2 to 6.6 GHz	-145 dBm/-152 dBm	-148 dBm/-155 dBm, typical	-147 dBm/-154 dBm
6.6 to 8.4 GHz	-147 dBm/-152 dBm	-149 dBm/-155 dBm, typical	-147 dBm/-154 dBm
8.3 to 13.6 GHz	-147 dBm/-153 dBm	-149 dBm/-155 dBm, typical	-147 dBm/-154 dBm
13.5 to 14 GHz	-144 dBm/-150 dBm	-146 dBm/-152 dBm, typical	-144 dBm/-151 dBm
14 to 17 GHz	-145 dBm/-150 dBm	-147 dBm/-152 dBm, typical	-145 dBm/-151 dBm
17 to 22.5 GHz	-141 dBm/-148 dBm	-143 dBm/-151 dBm, typical	-141 dBm/-148 dBm
22.5 to 34 GHz	-138 dBm/-146 dBm	-140 dBm/-149 dBm, typical	-137 dBm/-146 dBm
34 to 37 GHz	-134 dBm/-143 dBm	-136 dBm/-146 dBm, typical	-133 dBm/-144 dBm
37 to 40 GHz	-134 dBm/-141 dBm	-136 dBm/-145 dBm, typical	-133 dBm/-143 dBm
40 to 46 GHz	-130 dBm/-141 dBm	-134 dBm/-144 dBm, typical	-129 dBm/-140 dBm
46 to 47 GHz	-130 dBm/-139 dBm	-134 dBm/-142 dBm, typical	-129 dBm/-134 dBm
47 to 50 GHz	-127 dBm/-139 dBm	-132 dBm/-142 dBm, typical	-124 dBm/-134 dBm

1. The ADC clipping level declines at low frequencies (below 50 MHz) when the LO feedthrough (the signal that appears at 0 Hz) is within 5 times the prefilter bandwidth (see table) and must be handled by the ADC. For example, with a 300 kHz RBW and prefilter bandwidth at 966 kHz, the clipping level declines for signal frequencies below 4.83 MHz. For signal frequencies below 2.5 times the prefilter bandwidth, there will be additional reduction due to the presence of the image signal (the signal that appears at the negative of the input signal frequency) at the ADC.

Dynamic Range Specifications (continued)

	Input 1 Specifications	Input 1 Typical	Input 2 95th Percentile
50 to 55 GHz	NA	NA	-147 dBm/NA
55 to 70 GHz	NA	NA	-149 dBm/NA
70 to 82 GHz	NA	NA	-144 dBm/NA
82 to 100 GHz	NA	NA	-147 dBm/NA
100 to 110 GHz	NA	NA	-145 dBm/NA
Preamp On (Option P50)	**Input 1 Specifications**	**Input 1 Typical**	**Input 2 95th Percentile**
100 to 200 kHz	-156 dBm	-158 dBm	-158 dBm
200 to 500 kHz	-158 dBm	-160 dBm	-160 dBm
500 to 1 MHz	-161 dBm	-163 dBm	-163 dBm
1 to 10 MHz	-163 dBm	-164 dBm	-164 dBm
10 MHz to 2.1 GHz	-162 dBm	-164 dBm	-163 dBm
2.1 to 3.6 GHz	-160 dBm	-162 dBm	-161 dBm
3.5 to 8.4 GHz	-159 dBm	-162 dBm	-160 dBm
8.3 to 13.6 GHz	-160 dBm	-162 dBm	-160 dBm
13.5 to 16.9 GHz	-161 dBm	-163 dBm	-161 dBm
16.9 to 20.0 GHZ	-160 dBm	-162 dBm	-159 dBm
20.0 to 26.5 GHz	-158 dBm	-160 dBm	-157 dBm
26.4 to 30 GHz	-157 dBm	-159 dBm	-156 dBm
30.0 to 34 GHz	-155 dBm	-158 dBm	-155 dBm
34 to 37 GHz	-153 dBm	-157 dBm	-154 dBm
37 to 40 GHz	-152 dBm	-156 dBm	-152 dBm
40 to 46 GHz	-150 dBm	-154 dBm	-150 dBm
46 to 47 GHz	-150 dBm	-154 dBm	-149 dBm
47 to 50 GHz	-146 dBm	-151 dBm	-142 dBm
Displayed Average Noise Level (DANL) with Noise Floor Extension (Option NF2) On		**Input 1 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	-161 dBm	-174 dBm	NA
Band 1	-159 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	-155 dBm	-169 dBm	-162 dBm
Band 6	-148 dBm	-162 dBm	-156 dBm
Residuals, Images, and Spurious Responses		**Input 1**	**Input 2**
Residual responses	200 kHz to 8.4 GHz	-100 dBm	-100 dBm, nominal
(Input terminated and 0 dB attenuation)	Zero span or FFT or other frequencies	-100 dBm, nominal	-100 dBm, nominal

Dynamic Range Specifications (continued)

Image Responses	Tuned Frequency (f)	Excitation Frequency	Input 1		Input 2
(Mixer level at -10 dBm)	10 MHz to 26.5 GHz	f+45 MHz	-80 dBc	-104 dBc, typical	Input 1 response nominally applies
	10 MHz to 3.6 GHz	f+10,245 MHz	-80 dBc	-106 dBc, typical	Input 1 response nominally applies
	10 MHz to 3.6 GHz	f+645 MHz	-80 dBc	-101 dBc, typical	Input 1 response nominally applies
	3.5 to 13.6 GHz	f+645 MHz	-80 dBc	-106 dBc, typical	Input 1 response nominally applies
	13.5 to 17.1 GHz	f+645 MHz	-80 dBc	-106 dBc, typical	Input 1 response nominally applies
	17.0 to 22 GHz	f+645 MHz	-80 dBc	-101 dBc, typical	Input 1 response nominally applies
	22 to 26.5 GHz	f+645 MHz	-70 dBc	-102 dBc, typical	Input 1 response nominally applies
(Mixer level at -30 dBm)	26.5 to 50 GHz	f+45 MHz		-90 dBc, nominal	Input 1 response applies
	26.5 to 34.5 GHz	f+645 MHz	-70 dBc	-98 dBc, typical	Input 1 response nominally applies
	34.4 to 42 GHz	f+645 MHz	-60 dBc	-84 dBc, typical	Input 1 response nominally applies
	42 to 50 GHz	f+645 MHz		-75 dBc, nominal	Input 1 response applies
(Mixer level at -15 dBm, RBW ≤ 3 kHz)	49.9 to 75 GHz[1]	f±10,245 MHz	NA		-70 dBc, nominal
	74.9 to 110 GHz[1]	f±10,245 MHz	NA		-70 dBc, nominal

Other Spurious Responses	Mixer Level	Input 1 Response	Input 2 Response
Carrier frequency ≤ 26.5 GHz			
First RF order (f ≥ 10 MHz from carrier)	-10 dBm	-80 dBc + 20log(N^2) including IF feedthrough, LO harmonic mixing responses	Input 1 response nominally applies
Higher RF order (f ≥ 10 MHz from carrier)	-40 dBm	-80 dBc + 20log(N^2) including higher order mixer responses	Input 1 response nominally applies
Carrier frequency > 26.5 GHz and <50 GHz (f ≥ 10 MHz from carrier)	-30 dBm	-90 dBc, nominal	-90 dBc, nominal
Carrier frequency > 50 GHz[1] (f ≥ 10 MHz from carrier, RBW ≤ 3 kHz))	-15 dBm	NA	-70 dBc, nominal
LO-related spurious responses (200 Hz < f < 10 MHz from carrier)	-10 dBm	-68 dBc[3] + 20log(N^2), nominal	Input 1 response applies
Line-related spurious responses		-73 dBc[3] + 20log(N^2), nominal	Input 1 response applies

Second Harmonic Distortion (SHI)		Input 1			Input 2
	Source frequency	Mixer level	Distortion (LNP Off/LNP On, nom.)	SHI (LNP Off/LNP On, nom.)	
Preamp Off	10 MHz to 1.8 GHz	-15 dBm	-60 dBc/NA	+45 dBm/NA	Input 1 response nominally applies
	1.75 to 2.5 GHz	-15 dBm	-72 dBc/-95 dBc	+57 dBm/+80 dBm	Input 1 response nominally applies
	2.5 to 4 GHz	-15 dBm	-72 dBc/-99 dBc	+57 dBm/+84 dBm	Input 1 response nominally applies
	4 to 6.5 GHz	-15 dBm	-77 dBc/-105 dBc	+62 dBm/+90 dBm	Input 1 response nominally applies
	6.5 to 10 GHz	-15 dBm	-70 dBc/-105 dBc	+55 dBm/+90 dBm	Input 1 response nominally applies
	10 to 13.25 GHz	-15 dBm	-62 dBc/-105 dBc	+47 dBm/+90 dBm	Input 1 response nominally applies
	13.25 to 25 GHz	-15 dBm	-65 dBc/-105 dBc, nominal	+50 dBm/+90 dBm, nominal	Input 1 response applies

1. Software preselection in its preset state (enabled). When not enabled, image rejection is nominally 0 dB.
2. N is the LO multiplication factor. Refer to page 4 for the N value verses frequency ranges.
3. Nominally -40 dBc under large magnetic (0.38 Gauss rms) or vibrational (0.21 g rms) environmental stimuli.

Dynamic Range Specifications (continued)

Second Harmonic Distortion (SHI)			**Input 1**		**Input 2**
	Source frequency	**Preamp level**	**Distortion**	**SHI**	
Preamp On (Option P50)	10 MHz to 1.8 GHz	-45 dBm	-78 dBc, nominal	+33 dBm, nominal	Input 1 response applies
	1.8 to 13.25 GHz	-50 dBm	-60 dBc, nominal	+10 dBm, nominal	Input 1 response applies
	13.25 to 25 GHz	-50 dBm	-50 dBc, nominal	0 dBm, nominal	Input 1 response applies
Third-Order Intermodulation Distortion (TOI)			**Input 1 (Specifications)**	**Input 1 (Typical/Nominal)**	**Input 2**
(Two -16 dBm tones at input mixer with tone separation > 5 times IF prefilter bandwidth)					
Preamp Off	10 to 300 MHz		+13.5 dBm	+16 dBm, typical	+16 dBm, nominal
	300 to 600 MHz		+18 dBm	+21 dBm, typical	+21 dBm, nominal
	0.6 to 1.5 GHz		+20 dBm	+22 dBm, typical	+22 dBm, nominal
	1.5 to 3.6 GHz		+21 dBm	+23 dBm, typical	+23 dBm, nominal
	3.5 to 13.6 GHz		+16 dBm	+23 dBm, typical	+23 dBm, nominal
	13.5 to 17.1 GHz		+13 dBm	+17 dBm, typical	+17 dBm, nominal
	17.0 to 26.5 GHz		+13 dBm	+20 dBm, typical	+20 dBm, nominal
	26.5 to 50 GHz			+13 dBm, nominal	+13 dBm, nominal
Preamp On (Option P50)	Tones at preamp input				
	(two -45 dBm)		10 to 500 MHz	+4 dBm, nominal	+4 dBm, nominal
	(two -45 dBm)		500 MHz to 3.6 GHz	+4.5 dBm, nominal	+4.5 dBm, nominal
	(two -50 dBm)		3.6 to 26.5 GHz	-15 dBm, nominal	-15 dBm, nominal
Phase Noise			**Input 1**		**Input 2**
	Offset		**Specifications**	**Typical**	**Nominal**
Noise sidebands (CF = 1 GHz)	10 Hz		See note[1,2]	-93 dBc/Hz, typical[1]	-92 dBc/Hz, nominal[1]
	100 Hz		-107 dBc/Hz	-112 dBc/Hz, typical	-112 dBc/Hz, nominal
	1 kHz		-124 dBc/Hz	-127 dBc/Hz, typical	-127 dBc/Hz, nominal
	10 kHz		-134 dBc/Hz	-135 dBc/Hz, typical	-135 dBc/Hz, nominal
	100 kHz		-139 dBc/Hz	-141 dBc/Hz, typical	-141 dBc/Hz, nominal
	1 MHz		-145 dBc/Hz	-147 dBc/Hz, typical	-147 dBc/Hz, nominal
	10 MHz		-155 dBc/Hz	-156 dBc/Hz, typical	-156 dBc/Hz, nominal

1. For wide reference loop bandwidth.
2. Keysight measures 100% of the signal analyzers for Input 1 phase noise at 10 Hz offset from a 1 GHz carrier in the factory production process. This measurement requires a signal of exceptionally low phase noise that is characterized with specialized processes. It is impractical for field and customer use. Because field verification is impractical, Keysight only gives a typical result. More than 80% of prototype instruments met this “typical” specification; the factory test line limit is set commensurate with an on-going 80% yield to this typical. Like all typical specifications, there is no guardbanding for measurement uncertainty. The factory test line limit is consistent with a warranted specification of –89 dBc/Hz.

General Specifications

Temperature range	
Operating	0 to 40 °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 Pub 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 a la norme NMB-001 du Canada.
The N9041B is in full compliance with CISPR 11, Class A emission limits and is declared as such. In addition, the N9041B has been type tested and shown to meet CISPR 11, Class B emission limits. The use of USB accessories, or the enabling of the digital bus, may affect the UXA's conformance to Class B emissions. Information regarding the Class B emission performance of the N9041B is provided as a convenience to the user and is not intended to be a regulatory declaration.

South Korean Class A EMC declaration

This equipment has been conformity assessed for use in business environments. In a residential environment this equipment may cause radio interference.
※ This EMC statement applies to the equipment only for use in business environment.

사용자 안내문

이 기기는 업무용 환경에서 사용할 목적으로 적합성 평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

※ 사용자 안내문은 "업무용 방송통신기자재"에만 적용한다.

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

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	100/120 V, 50/60/400 Hz 220/240 V, 50/60 Hz
Power consumption	
On	850 W (Maximum)[1]
Standby	25 W

1. The actual power consumption depends on the configuration of the instrument. For example, power consumption of an N9041B with Option H1G installed is nominally 620 W.

General Specifications (continued)

Display	
Resolution	1280 x 800
Size	357 mm (14.1 in.) diagonal (nominal) capacitive multi-touch screen
Data Storage	
Internal	Removable solid state drive (≥ 80 GB standard, or replaced with an 800 GB removable SSD by ordering N9094AKS8D) and secure digital (SD) memory device
External	Supports USB 3.0/2.0 compatible memory devices
Weight (Basic Configuration)	
Net	34.9 kg (76.9 lb) nominal
Shipping	41 kg (90 lb) nominal
Dimensions	
Height	270 mm (10.6 in)
Width	427 mm (16.8 in)
Length	500 mm (19.8 in)[1]
Warranty	
The UXA signal analyzer is supplied with a 3-year standard warranty	
Calibration Cycle	
The recommended calibration cycle is one year. Calibration services are available through Keysight service centers	

1. 584 mm (23 in) when the front handles are included.

Inputs and Outputs

Front Panel	
RF input connector	
Standard (for Input 1)	2.4 mm male, 50 Ω nominal
Standard (for Input 2)	1.0 mm male ruggedized, 50 Ω nominal
Probe power	
Voltage/current	+15 Vdc, ± 7% at 150 mA max nominal –12.6 Vdc, ± 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 Ω nominal
Functions	Triplexed for mixer bias, IF input and LO output
Mixer bias range	± 10 mA in 10 uA step
IF center frequency	
≤ 25 MHz IF path	322.5 MHz
40 MHz BW IF path	250.0 MHz
255 MHz BW IF path	750.0 MHz
1 GHz BW IF path	750.0 MHz
LO output frequency range	3.75 to 14.1 GHz
Rear Panel	
10 MHz out	
Connector	BNC female, 50 Ω nominal
Output amplitude	≥ 0 dBm nominal
Frequency	10 MHz + (10 MHz x frequency reference accuracy)
Ext Ref In	
Connector	BNC female, 50 Ω nominal
Input amplitude range	–5 to 10 dBm nominal
Input frequency	1 to 50 MHz nominal (selectable to 1 Hz resolution)
Frequency lock range	± 2 x 10^{-6} of specified external reference input frequency
Trigger 1 and 2 inputs	
Connector	BNC female
Impedance	> 10 kΩ nominal
Trigger level range	–5 to +5 V (TTL) factory preset
Trigger 1 and 2 outputs	
Connector	BNC female
Impedance	50 Ω 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)

Rear Panel (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 with Options CRP/ALV, labeled as “AUX IF OUT”	
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 (automatically included in Option H1G)	
with Option H1G	750 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 1 GHz	1 GHz nominal	
High band, with preselector bypassed	Up to 800 MHz (nominal); expandable to 1200 MHz with corrections	
IF2 output (Option H1G)		
Connector	SMA female	Labeled as “IF2 OUT”
Impedance	50 Ω nominal	
Center frequency	750 MHz	
Trigger 3 input for 1 GHz digitizer (Option H1G)		
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, Rear Panel

Option ALV log video out

General Port Specifications		
Connector	SMA female	Shared with Options CR3/CRP, labeled as "AUX IF OUT"
Impedance	50 Ω nominal	
Fast Log Video Output		
Output voltage	Open-circuit voltages shown	
Maximum	1.6 V at –10 dBm nominal	
Slope	25 ± 1 mV/dB nominal	
Log fidelity		
Range	49 dB (nominal) with input frequency at 1 GHz	
Accuracy within range	± 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 Options CR3/ALV, labeled as "AUX IF OUT"
Impedance	50 Ω 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	≤ –88 dBm (nominal)	

Option CRW IF output, ultra-wide bandwidth[1]

General Port Specifications		
Connector	SMA female	Labeled as "EXT IF OUT"
Impedance	50 Ω nominal	
IF Output, Ultra-Wide Bandwidth		
Center frequency	5 GHz	
Bandwidth	Up to 9.6 GHz	
IF flatness		
At –4.8 GHz from center of IF bandwidth	+2 dB nominal	
At +4.8 GHz from center of IF bandwidth	–6 dB nominal	
Conversion gain[2]	–8 to –3 dB (nominal)	

1. For input frequency > 50 GHz only.
2. At the IF center frequency of 5 GHz

Other Optional Outputs (continued)

Option YAV Y-axis video output

General port specifications		
Connector Impedance	BNC female	Shared with other options 50 Ω 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	± 1% of full scale nominal	
Gain accuracy	± 1% of output voltage nominal	
Log video (Log envelope) output		
Amplitude range (terminated with 50 Ω)		
Maximum	1.0 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 Ω)		
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 Specifications

Frequency		
Frequency span		
Option B25 (standard)	10 Hz to 25 MHz	
Option B40	10 Hz to 40 MHz	
Option H1G	10 Hz to 1 GHz	Automatically includes Option B2X (255 MHz BW)
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 H1G	10 Hz to 1 GHz	Automatically includes 255 MHz analysis bandwidth hardware

IF Frequency Response, 10 MHz IF path (Standard)			**Input 1**				**Input 2**	
Demodulation and FFT Response Related to the Center Frequency								
Frequency (GHz)	**Span (MHz)**	**Preselector**	**Max error**	**Midwidth error (95th percentile)**	**Slope (dB/MHz)**	**RMS (nominal)**	**Max error (nominal)**	**RMS (nominal)**
≤ 3.6	≤ 10	NA	± 0.20 dB	± 0.12 dB	±0.10 dB	0.02 dB	Input 1 specifications nominally apply	
3.6 to <26.5	≤ 10	Off	± 0.25 dB	± 0.12 dB			Input 1 specifications nominally apply	
26.5 to ≤ 50	≤ 10	Off	± 0.30 dB	± 0.12 dB			Input 1 specifications nominally apply	
>50	≤ 10	NA	NA	NA	NA	NA	± 0.4 dB	0.02 dB

IF Phase Linearity, 10 MHz IF path (Standard)			**Input 1**		**Input 2**	
Center frequency (GHz)	**Span (MHz)**	**Preselector**	**Peak-to-peak (nominal)**	**RMS (nominal)**	**Peak-to-peak (nominal)**	**RMS (nominal)**
≥ 0.02. < 3.6	≤ 10	NA	0.16°	0.031°	Same as Input 1	Same as Input 1
≥ 3.6, < 50	≤ 10	Off	0.27°	0.05°	Same as Input 1	Same as Input 1
> 50, 75		NA	NA	NA	0.7°	0.2°
≥ 75, ≤ 110		NA	NA	NA	2°	0.4°

Dynamic Range, 10 MHz IF path (Standard)	**Input 1**	**Input 2**
Clipping-to-noise dynamic range (Excluding residuals and spurious responses)		
Clipping level at mixer	Center frequency ≥ 20 MHz	
IF gain = Low	-7 dBm, nominal	Same as Input 1
IF gain = High	-18 dBm, nominal	Same as Input 1
Noise density at mixer at center frequency	(DANL + IF Gain effect) + 2.25 dB	Input 1 specifications nominally apply

I/Q Analyzer Specifications (continued)

Data Acquisition, 10 MHz IF path (Standard)			
Time record length			
Analysis tool			
IQ analyzer	8,000,000 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^{29}Sa)	268 MSa (2^{28}Sa)	2 GB total memory
Length (time units)	Samples/Sample rate (IQ pairs)		
Sample Rate, 10 MHz IF path (Standard)			
IQ pairs	1.25 x IFBW		
ADC resolution	16 bits		

I/Q Analyzer Specifications (continued)

IF Frequency Response, 25 MHz IF path (Standard)			**Input 1**		**Input 2**	
Demodulation and FFT Response Related to the Center Frequency						
Frequency (GHz)	**Span (MHz)**	**Preselector**	**Max error (nominal)**	**RMS (nominal)**	**Max error (nominal)**	**RMS (nominal)**
≤ 3.6	≤ 25	NA	± 0.60 dB	0.20 dB	Same as Input 1	Same as Input 1
3.6 to < 26.5	≤ 25	Off	± 0.60 dB	0.20 dB	Same as Input 1	Same as Input 1
26.5 to ≤ 50	≤ 25	NA	± 0.60 dB	0.20 dB	Same as Input 1	Same as Input 1
>50	≤ 25	NA	NA	NA	± 0.40 dB	0.03 dB
IF Phase Linearity, 25 MHz IF path (Standard)			**Input 1**		**Input 2**	
Center Frequency (GHz)	**Span (MHz)**	**Preselector**	**Peak-to-peak (nominal)**	**RMS (nominal)**	**Peak-to-peak (nominal)**	**RMS (nominal)**
≥ 0.02, < 3.6	≤ 25	NA	0.4°	0.09°	Same as Input 1	Same as Input 1
≥ 3.6, < 50	≤ 25	Off	0.8°	0.14°	Same as Input 1	Same as Input 1
> 50		NA	NA	NA	2°	0.4°
Dynamic Range, 25 MHz IF Path (Standard)			**Input 1**			**Input 2**
Full scale (ADC clipping)			Mixer level			Mixer level
Default settings (IF gain = Low), signal at CF						
Band 0			-7 dBm, nominal			Same as Input 1
Bands 1 through 4			-7 dBm, nominal			Same as Input 1
Bands 5 through 6			-7 dBm, nominal			-4 dBm, nominal
Bands 7			NA			-9 dBm, nominal
Bands 8			NA			-7 dBm, nominal
High gain setting (IF gain = High), signal at CF, subject to gain limitations						
Band 0			-18 dBm , nominal			Same as Input 1
Bands 1 through 5			-18 dBm, nominal			Same as Input 1
Band 6			-18 dBm, nominal			-14 dBm, nominal
Band 7			NA			-21 dBm, nominal
Band 8			NA			-16 dBm, nominal
Effect of signal frequency ≠ CF			Up to ±3 dB , nominal			Same as Input 1
Data Acquisition, 25 MHz IF path (Standard)						
Time record length						
Analysis tool						
IQ analyzer		8,000,000 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^{29}Sa)	268 MSa (2^{28}Sa)		2 GB total memory	
Length (time units)		Samples/Sample rate (IQ pairs)				
Sample Rate, 25 MHz IF path (Standard)						
IQ pairs		1.25 x IFBW				
ADC resolution		16 bits				

Option B40 40 MHz analysis bandwidth (Option B40 is automatically included in Option H1G)

IF frequency response, 40 MHz IF (Option B40)							
			Input 1			**Input 2**	
Frequency (GHz)	**Span (MHz)**	**Preselector**	**Max error**	**Typical**	**RMS (nominal)**	**Max error**	**RMS**
≥ 0.03, < 3.6	≤ 40	NA	± 0.37 dB	± 0.22 dB	0.07 dB	Input 1 specification nominally applies	
≥ 3.6, ≤ 8.4	≤ 40	Off	± 0.5 dB	± 0.15 dB	0.05 dB	Input 1 specification nominally applies	
> 8.4, ≤ 26.5	≤ 40	Off	± 0.7 dB	± 0.14 dB	0.05 dB	Input 1 specification nominally applies	
> 26.5, ≤ 34.4	≤ 40	Off	± 0.8 dB	± 0.25 dB	0.07 dB	Input 1 specification nominally applies	
> 34.4, ≤ 50	≤ 40	Off	± 1 dB	± 0.35 dB	0.07 dB	Input 1 specification nominally applies	
> 50	≤ 40	NA	NA	NA	NA	± 0.5 dB	0.02 dB
IF Phase Linearity, 40 MHz IF path (Option B40)			**Input 1**			**Input 2**	
Center Frequency (GHz)	**Span (MHz)**	**Preselector**	**Peak-to-peak (nominal)**	**RMS (nominal)**		**Peak-to-peak (nominal)**	**RMS (nominal)**
≥ 0.02, < 3.6	≤ 40	NA	0.4°	0.08°		Same as Input 1	Same as Input 1
≥ 3.6, < 50	≤ 40	Off	1.4°	0.3°		Same as Input 1	Same as Input 1
> 50		NA	NA	NA		3°	0.5°
Dynamic Range, 40 MHz IF path (Option B40)			**Input 1**			**Input 2**	
SFDR (Spurious-free dynamic range)							
Signal frequency within ±12 MHz of center			-80 dBc, nominal			Same as Input 1 up to 50 GHz	
Signal frequency anywhere within analysis BW							
Spurious response within ±18 MHz of center			-79 dBc, nominal			Same as Input 1 up to 50 GHz	
Response anywhere within analysis BW			-77 dBc, nominal			Same as Input 1 up to 50 GHz	
Full scale (ADC clipping)			Mixer level			Mixer level	
Default settings (IF gain = Low), signal at CF							
Band 0			-6 dBm, nominal			Same as Input 1	
Bands 1 through 4			-6 dBm, nominal			Same as Input 1	
Bands 5 through 6			-6 dBm, nominal			Same as Input 1	
Bands 7 through 8			NA			-6 dBm nominal	
High gain setting (IF gain = High), signal at CF, subject to gain limitations							
Band 0			-7 dBm, nominal			Same as Input 1	
Bands 1 through 4			-14 dBm, nominal			-12 dBm, nominal	
Bands 5 through 6			-9 dBm, nominal			-7 dBm, nominal	
Bands 7 through 8			NA			-7 dBm, nominal	
Effect of signal frequency ≠ CF			Up to ± 4 dB , nominal			Same as Input 1	

Option B40 40 MHz analysis bandwidth (Option B40 is automatically included in Option H1G) (continued)

IF Residual Responses Across the Full BW		**Input 1**	**Input 2**
Band 0		-110 dBFS nominal	Same as Input 1
Bands 1	Preselector Off	-110 dBFS nominal	Same as Input 1
Third-order Intermodulation Distortion			
(Two tones of equal level, 1 MHz separation, each tone -13 dB relative to the full scale (ADC clipping), IF gain = high)			
Band 0		-85 dBc nominal	Same as Input 1
Bands 1 through 5	Preselector Off	-84 dBc nominal	Same as Input 1
Bands 6	Preselector Off	-79 dBc nominal	-74 dBc nominal

Noise Density					
Band	Frequency (GHz)	IF gain = Low	IF gain = High	IF gain = Low	IF gain = High
0	1.8	-143 dBm/Hz	-143 dBm/Hz	Input 1 specification nominally applies	
1	6.00	-140 dBm/Hz	-140 dBm/Hz	Input 1 specification nominally applies	
2	10.80	-141 dBm/Hz	-141 dBm/Hz	Input 1 specification nominally applies	
3	15.15	-135 dBm/Hz	-135 dBm/Hz	Input 1 specification nominally applies	
4	21.80	-133 dBm/Hz	-133 dBm/Hz	Input 1 specification nominally applies	
5	30.5	-130 dBm/Hz	-130 dBm/Hz	Input 1 specification nominally applies	
6	42.25	-130 dBm/Hz	-130 dBm/Hz	Input 1 specification nominally applies	
7	62.5	NA	NA	-145 dBm/Hz (nominal)	-146 dBm/Hz (nominal)
8	92.5	NA	NA	-143 dBm/Hz (nominal)	-144 dBm/Hz (nominal)

Data Acquisition, 40 MHz IF path (Option B40)			
Time record length			
Analysis tool			
IQ analyzer	8,000,000 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^{29}Sa)	268 MSa (2^{28}Sa)	2 GB total memory
Length (time units)	Samples/Sample rate (IQ pairs)		

Sample Rate, 40 MHz IF path (Option B40)	
IQ pairs	1.25 x IFBW
ADC resolution	12 bits

Option B2X 255 MHz analysis bandwidth (Option B2X is automatically included in Option H1G)

IF Frequency Response, 255 MHz IF path (Included in Option H1G)							
Relative to the Center Frequency			**Input 1**			**Input 2**	
Frequency (GHz)	**Span (MHz)**	**Preselector**	**Max error**	**Typical**	**RMS (nominal)**	**Max error (nominal)**	**RMS (nominal)**
≥ 0.4, < 3.6	≤ 255	NA	± 0.74 dB	± 0.4 dB	0.1 dB	Input 1 specifications nominally apply	
≥ 3.6, ≤ 8.4	≤ 255	Off	± 0.82 dB	± 0.34 dB	0.1 dB	Input 1 specifications nominally apply	
> 8.4, ≤ 50	≤ 255	Off		± 0.8 dB nom.	0.2 dB	Input 1 specifications nominally apply	
> 50	≤ 255	NA	NA		NA	± 1 dB	0.2 dB
IF Phase Linearity, 255 MHz IF path (Included in Option H1G)			**Input 1**			**Input 2**	
Center Frequency (GHz)	**Span (MHz)**	**Preselector**	**Peak-to-peak (nominal)**		**RMS (nominal)**	**Peak-to-peak (nominal)**	**RMS (nominal)**
≥ 0.4, < 3.6	≤ 255	NA	2°		0.4°	Same as Input 1	Same as Input 1
≥ 3.6, < 50	≤ 255	Off	2°		0.3°	Same as Input 1	Same as Input 1
≥ 50		NA	NA		NA	2°	0.4°
Dynamic Range, 255 MHz IF path (Included in Option H1G)			**Input 1**			**Input 2**	
SFDR (Spurious-free dynamic range)							
Signal frequency anywhere within analysis BW			-78 dBc , nominal			Same as Input 1 up to 50 GHz	
Full scale (ADC clipping)			Mixer level			Mixer level	
Default settings (IF gain = Low), signal at CF							
Band 0			+3 dBm, nominal			Same as Input 1	
Bands 1 through 4			+3 dBm, nominal			Same as Input 1	
Bands 5 through 6			+1 dBm, nominal			Same as Input 1	
Bands 7 through 8			NA			+5 dBm, nominal	
High gain setting (IF gain = High), signal at CF, subject to gain limitations							
Band 0			+3 dBm, nominal			Same as Input 1	
Bands 1 through 2			-3 dBm, nominal			Same as Input 1	
Bands 3 through 4			-4 dBm, nominal			Same as Input 1	
Bands 5 through 6			+1 dBm, nominal			Same as Input 1	
Bands 7 through 8			NA			+5 dBm, nominal	
Effect of signal frequency ≠ CF			Up to ± 4 dB, nominal			Same as Input 1	
IF residual responses across the full BW							
Band 0			-110 dBFS, nominal			Same as Input 1	
Bands 1		Preselector Off	-108 dBFS, nominal			Same as Input 1	
Third-order intermodulation distortion							
(Two tones of equal level, 1 MHz separation, each tone -23 dB relative to the full scale (ADC clipping), IF gain = high)							
Band 0			-85 dBc , nominal			Same as Input 1	
Bands 1 through 4		Preselector Off	-85 dBc , nominal			Same as Input 1	
Band 5		Preselector Off	-80 dBc , nominal			Same as Input 1	
Band 6		Preselector Off	-73 dBc, nominal			Same as Input 1	
Noise density							
Band	Frequency (GHz)	IF gain = Low	IF gain = High			IF gain = Low	IF gain = High
0	1.8	-142 dBm/Hz	-141 dBm/Hz			Input 1 specifications nominally apply	
1	6.00	-141 dBm/Hz	-142 dBm/Hz			Input 1 specifications nominally apply	
2	10.80	-140 dBm/Hz	-141 dBm/Hz			Input 1 specifications nominally apply	
3	15.15	-137 dBm/Hz	-137 dBm/Hz			Input 1 specifications nominally apply	
4	21.80	-135 dBm/Hz	-135 dBm/Hz			Input 1 specifications nominally apply	
5	30.5	-130 dBm/Hz	-130 dBm/Hz			Input 1 specifications nominally apply	
6	42.25	-130 dBm/Hz	-130 dBm/Hz			Input 1 specifications nominally apply	
7	62.5	NA	NA			-140 dBm/Hz, nom.	-140 dBm/Hz, nom.
8	92.5	NA	NA			-139 dBm/Hz, nom.	-139 dBm/Hz, nom.

Option B2X 255 MHz analysis bandwidth (Option B2X is automatically included in Option H1G) (continued)

Data Acquisition, 255 MHz IF path (Included in Option H1G)			
Time record length			
Analysis tool			
IQ analyzer	8,000,000 sample pairs		Waveform measurement
Advanced tool	Data packing		With 89600 VSA or fast capture
	32-bit	64-bit	
Length (IQ sample pairs)	1073 MSa (2^{30}Sa)	536 MSa (2^{29}Sa)	4 GB total memory
Maximum IQ capture time (advanced tools)	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

Frequency Span and Analysis Bandwidth, 1 GHz IF path (Option H1G)[1]						
			Input 1		**Input 2**	
Frequency span			40 MHz to 1 GHz		Same as Input 1	
Analysis bandwidth (waveform measurement)			40 MHz to 1 GHz		Same as Input 1	
IF Frequency Response (Relative to the Center Frequency), 1 GHz IF path (Option H1G)						
			Input 1		**Input 2**	
Frequency (GHz)	**Span (MHz)**	**Preselector**	**Max error (nominal)**			
≥ 0.7, < 3.6	≤ 1000	NA	± 0.7 dB		Same as Input 1	
≥ 3.6, ≤ 8.4	≤ 1000	Off	± 0.7 dB		Same as Input 1	
> 8.4, ≤ 26.5	≤ 1000	Off	± 1.0 dB		Same as Input 1	
> 26.5, ≤ 50	≤ 1000	Off	± 1.5 dB		Same as Input 1	
> 50	≤ 1000	NA	NA		± 1.5 dB, nominal	
IF Phase Linearity), 1 GHz IF path (Option H1G)			**Input 1**		**Input 2**	
Center Frequency (GHz)	**Span (MHz)**	**Preselector**	**Peak-to-peak (nominal)**	**RMS (nominal)**	**Peak-to-peak (nominal)**	**RMS (nominal)**
≥ 0.7, < 3.6	≤ 1000	NA	7°	1.5°	Same as Input 1	Same as Input 1
≥ 3.6, < 50	≤ 1000	Off	7°	1.5°	Same as Input 1	Same as Input 1
≥ 50	≤ 1000	NA	NA	NA	10°	3°
Dynamic Range, 1 GHz IF path (Option H1G)			**Input 1**			**Input 2**
SFDR (Spurious-free dynamic range)[2]		Center frequency				
Signal frequency anywhere within analysis BW		< 3.1 GHz	-60 dBc, nominal			Same as Input 1
		≥ 3.1, ≤ 50 GHz	-61 dBc, nominal			Same as Input 1
Full scale (ADC clipping)			Mixer level			Mixer level
High gain setting (IF gain = High), signal at CF, subject to gain limitations						
Band 0			-4 dBm, nominal			Same as Input 1
Bands 1 through 2			-23 dBm, nominal			Same as Input 1
Bands 3 through 4			-22 dBm, nominal			-20 dBm, nominal
Bands 5 through 6			-20 dBm, nominal			-15 dBm, nominal
Bands 7 through 8			NA			-10 dBm, nominal
Effect of signal frequency ≠ CF			Up to ± 4 dB, nominal			Same as Input 1
IF residual responses across the full BW[3]			IF gain = Low			IF gain = Low
Band			-67 dBFS, nominal			Same as Input 1
Bands 1		Preselector Off	-69 dBFS, nominal			Same as Input 1
Noise density						
Band		Frequency (GHz)	IF gain = High (nominal)			IF gain = High (nominal)
0		1.8	-149 dBm/Hz			Same as Input 1
1		6.00	-153 dBm/Hz			Same as Input 1
2		10.80	-150 dBm/Hz			Same as Input 1
3		15.15	-148 dBm/Hz			Same as Input 1
4		21.80	-146 dBm/Hz			Same as Input 1
5		30.5	-143 dBm/Hz			Same as Input 1
6		42.25	-137 dBm/Hz			Same as Input 1
7		NA	NA			-150 dBm/Hz
8		NA	NA			-149 dBm/Hz

1. In the 1 GHz bandwidth path, the span and bandwidth will be 40 MHz minimum. Below 40 MHz, a narrower IF path is used.
2. Signal Level is -6 dB relative to full scale at the center frequency.
3. The residual performance is dominated by a single residual 50 MHz to the left of the center of the screen. It is an artifact of the ADC architecture. If residual performance is critical and span requirements are flexible, then reducing the span to 255 MHz and making use of the 255 MHz IF path will eliminate this residual.

Option H1G 1 GHz analysis bandwidth (continued)

		Input 1	Input 2
Spurious responses			
LO-related spurious responses (Offset from carrier 300 Hz to 10 MHz[1], mixer level -10 dBm)		-72 dBc[2] +20 x log(N[3]), nominal	Same as Input 1
Close-in sidebands (LO-related, offset <300 Hz, mixer level -10 dBm)		-60 dBc[2] +20 x log(N[3]), nominal	Same as Input 1
Data Acquisition, 1 GHz IF path (Option H1G)			
Time record length			
Analysis tool			
IQ analyzer	8,000,000 sample pairs	Waveform measurement	
Advanced tool	32-bit data packing	With 89600 VSA or fast capture	
IF bandwidth	Length (IQ sample pairs)		
1 GHz ≥ IFBW > 40 MHz	838,859,979 to 419,429,990		
Maximum IQ capture time (advanced tools)	Length of IQ sample pairs/Sample rate (IQ pairs)		
Sample rate (IQ pairs)	Minimum of (1.25 x IFBW, 300 Msa/s)		
ADC resolution	12 bits		

1. A noteworthy group of harmonically related sidebands is often present with a level of nominally -80 dBc at 300 Hz and envelope falling off (30 dB/decade) with increasing offsets.
2. Nominally -40 dBc under large magnetic (0.38 Gauss rms) or vibrational (0.21 g rms) environmental stimuli.
3. N is the LO multiplication factor. Refer to page 3 for the N value verses frequency ranges.

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 255 MHz	Analysis BW option determines the max real-time BW (max 255 MHz with H1G)
Option RT2	Up to 255 MHz	
Minimum detectable signal duration with > 60 dB StM[1] ratio		For Frequency Mask Triggering (FMT)
Option RT1	11.42 ns	
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 µs	
Option RT2	3.51 µs	
Minimum acquisition time	100 µs	
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	

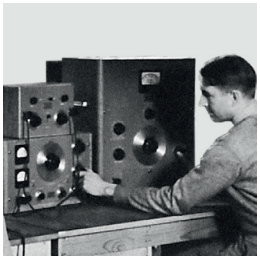
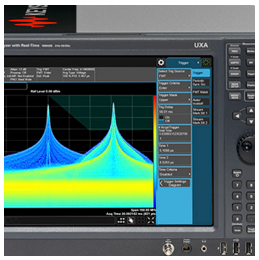
1. "StM" = "Signal-to-Mask"

Related Literature

UXA Configuration Guide, 5992-2112EN

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