DATA SHEET

N9021B MXA Signal Analyzer

10 Hz to 50 GHz

KEYSIGHT TECHNOLOGIES

Table of Contents

Definition and Terms

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

95th percentile values indicate the breadth of the population (approx. 2 σ) 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 values describe 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 are not covered by the product warranty.

The analyzer will meet its specifications when:

- It is within its calibration cycle
- Under auto couple control, except when Auto Sweep Time Rules = Accy
- Signal frequencies < 10 MHz, with 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
- 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

Quickly adapt to evolving test requirements

Industries from wireless to satellite communications require wider analysis bandwidth to meet demands for higher data throughput. As higher bandwidth technologies such as 5G NR move into mainstream use, engineers need tools for design validation and manufacturing that offer the accuracy, speed, and bandwidth to accelerate device development. Keysight’s new **N9021B MXA Signal Analyzer** offers best-in-class bandwidth and phase noise for accurate and repeatable signal analysis across millimeter-wave and 5G NR frequencies.

This data sheet is a summary of the specifications and conditions for the N9021B MXA signal analyzer. For the complete specifications guide, visit:

www.keysight.com/find/N9021B

Frequency and Time Specifications

Frequency range		DC coupled	
Option 532		10 Hz to 32 GHz	
Option 544		10 Hz to 44 GHz	
Option 550		10 Hz to 50 GHz	
Band	LO Multiple (N)	Swept or FFT, with FFT width ≤ 40 MHz	FFT, with FFT width > 40 MHz
0	1	10 Hz to 3.6 GHz	10 Hz – 3.4 GHz
1	1	3.5 to 8.4 GHz	3.4 – 8.2 GHz
2	2	8.3 to 13.6 GHz	8.2 – 13.2 GHz
3	2	13.5 to 17.1 GHz	13.2 – 17.1 GHz
4	4	17.0 to 26.5 GHz	17.1 – 26.5 GHz
5	4	26.4 to 34.5 GHz	26.5 – 34.5 GHz
6	8	34.4 to 50 GHz	34.5 – 50 GHz
Frequency reference			
Accuracy		± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]	
Aging rate		Option PFR	Standard
		± 1 × 10^{-7} / year	± 1 × 10^{-6} / year
		± 1.5 × 10^{-7} / 2 years	
Temperature stability		Option PFR	Standard
20 to 30 °C		± 1.5 × 10^{-8}	± 2 × 10^{-6}
Full temperature range		± 5 × 10^{-8}	± 2 × 10^{-6}
Achievable initial calibration accuracy		Option PFR	Standard
		± 4 × 10^{-8}	± 1.4 × 10^{-6}
Residual FM (with option PFR)		≤ $(0.25\ \text{Hz} \times N)_{p\text{-}p}$ in 20 ms (nominal)	
Residual FM (Standard)		≤ $(10\ \text{Hz} \times N)_{p\text{-}p}$ in 20 ms (nominal)	
Frequency readout accuracy (start, stop, center, marker)			
± (marker frequency x frequency reference accuracy + 0.25 % x span + 5 % x RBW + 2 Hz + 0.5 x horizontal resolution[1])			
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			
Stepped/Swept		± (0.25 % x span + horizontal resolution)	
FFT		± (0.1% x span + horizontal resolution)	

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

Sweep time and triggering		
Range	Span = 0 Hz	1 µs to 6000 s
	Span ≥ 10 Hz	1 ms to 4000 s
Accuracy	Span = 0 Hz, swept	± 0.01 % (nominal)
	Span ≥ 10 Hz, FFT	± 40 % (nominal)
	Span = 0 Hz	± 0.01 % (nominal)
Trigger	Free run, line, video, external 1, external 2, RF burst, periodic timer	
Trigger delay	Span = 0 or FFT	-150 to +500 ms
	Span ≥ 10 Hz, swept	0 µs to 500 ms
	Resolution	0.1 µs
Time gating		
Gate methods	Gated LO; gated video; gated FFT	
Gate length range	100.0 ns to 5.0 s (Except method = FFT)	
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 40,001	
Resolution bandwidth (RBW)		
EMI bandwidths (CISPR compliant)		200 Hz, 9 kHz, 120 kHz, 1 MHz
EMI bandwidths (Mil STD 461 compliant)		10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz
Range (with -3 dB bandwidth, standard)		1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz
With option B2X/B5X 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)		
1 Hz to 750 kHz		± 1.0 % (± 0.044 dB)
820 kHz to 1.2 MHz (< 3.6 GHz CF)		± 2.0 % (± 0.088 dB)
1.3 to 2 MHz (< 3.6 GHz CF)		± 0.07 dB (nominal)
2.2 to 3 MHz (< 3.6 GHz CF)		± 0.15 dB (nominal)
4 to 8 MHz (< 3.6 GHz CF)		± 0.25 dB (nominal)
Bandwidth accuracy (-3 dB)	1 Hz to 1.3 MHz	± 2% (nominal)
Selectivity (-60 dB/-3 dB)		4.1: 1 (nominal)
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	

Analysis bandwidth [1]		
Maximum bandwidth	Option B2X	255 MHz
	Option B5X	510 MHz

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		
Measurement range	Preamp Off	Displayed average noise level (DANL) to +30 dBm
	Preamp On	Displayed average noise level (DANL) to +20 dBm
Input attenuator range	0 to 70 dB in 2 dB steps	
Maximum safe input level		
Average total power	+30 dBm (1 W)	
Peak pulse power	+50 dBm (100 W)	< 10 µs pulse width, < 1% duty cycle, and input attenuation ≥ 30 dB
DC volts	± 0.2 Vdc	
Display range		
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, dBuV/m, dBuA/m, dBpT, dBG, dBpW	
Electronic attenuator (option EA3)		
Frequency range	10 Hz to 3.6 GHz [1]	
Attenuation range		
Electronic attenuator range	0 to 24 dB, 1 dB steps	
Full attenuation range	0 to 94 dB, 1 dB steps (Mechanical + Electronic)	

1. Frequency range of option EA3 varies according to sweep types. Please refer to the frequency band definition on page 4

Preamplifier		
Frequency range	Option P32	100 kHz to 32 GHz
	Option P44	100 kHz to 44 GHz
	Option P50	100 kHz to 50 GHz
Gain	100 kHz to 3.6 GHz	+20 dB nominal
	3.6 to 26.5 GHz	+35 dB, nominal
	26.5 to 50 GHz	+40 dB, nominal
Noise figure	100 kHz to 3.6 GHz	11 dB, nominal
	3.6 to 8.4 GHz	9 dB, nominal
	8.4 to 13.6 GHz	10 dB, nominal
	13.6 to 50 GHz	DANL + 176.24 dB, nominal

Frequency response		Specification	95th percentile
20 to 30°, preselector centering applied above 3.6 GHz			
Preamp Off	20 Hz to 10 MHz	±0.43 dB	±0.23 dB
10 dB attenuation	10 to 50 MHz	±0.43 dB	±0.21 dB
	50 to 3.6 GHz	±0.36 dB	±0.22 dB
	3.5 to 5.2 GHz	±1.5 dB	±0.76 dB
	5.2 to 8.4 GHz	±1.3 dB	±0.56 dB
	8.3 to 13.6 GHz	±1.8 dB	±0.67 dB
	13.5 to 17.1 GHz	±1.8 dB	±0.62 dB
	17.0 to 22.0 GHz	±1.8 dB	±0.73 dB
	22.0 to 26.5 GHz	±2.3 dB	±0.76 dB
	26.4 to 34.5 GHz	±2.3 dB	±0.82 dB
	34.4 to 50 GHz	±3.0 dB	±1.21 dB
Preamp On	100 kHz to 50 MHz	±0.7 dB	±0.31 dB
0 dB attenuation	50 MHz to 3.6 GHz	±0.55 dB	±0.25 dB
	3.5 to 5.2 GHz	±1.8 dB	±0.78 dB
	5.2 to 8.4 GHz	±1.8 dB	±0.63 dB
	8.3 to 13.6 GHz	±2.1 dB	±0.51 dB
	13.5 to 17.1 GHz	±2.3 dB	±0.8 dB
	17.0 to 22.0 GHz	±2.6 dB	±0.94 dB
	22 to 26.5 GHz	±3.3 dB	±0.96 dB
	26.4 to 34.5 GHz	±2.8 dB	±1.04 dB
	34.4 to 50 GHz	±3.9 dB	±1.37 dB
Input attenuation switching uncertainty			
Attenuation > 2 dB, Preamp off, Relative to 10 dB			
	50 MHz (ref frequency)	± 0.20 dB	± 0.08 dB, typical
	20 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
Total absolute amplitude accuracy			
10 dB attenuation, 20 to 30 °C, 1 Hz ≤ RBW ≤ 1 MHz, input signal –10 to –50 dBm, RF preselector Off, Preamp Off and On, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale, σ = nominal standard deviation)			
Preamp Off	At 50 MHz	± 0.45 dB,	± 0.19 dB (95% percentile)
	At all frequencies	Specification:	± (0.45 dB + freq response)
		95% percentile:	± (0.19 dB + freq response@ 95% percentile)
Preamp On	At all frequencies	± (0.49 dB + frequency response)	

Input voltage standing wave ratio (VSWR)		95% percentile
Preamp Off, Input atten 10 dB	10 MHz to 3.6 GHz	1.125
	3.5 to 8.4 GHz	1.162
	8.3 to 13.6 GHz	1.217
	13.5 to 17.1 GHz	1.262
	17.0 to 26.5 GHz	1.319
	26.4 to 34.5 GHz	1.546
	34.4 to 50 GHz	1.676
Preamp On, Input atten 0 dB	10 MHz to 3.6 GHz	1.386
	3.5 to 8.4 GHz	1.539
	8.3 to 13.6 GHz	1.385
	13.5 to 17.1 GHz	1.345
	17.0 to 26.5 GHz	1.372
	26.4 to 34.5 GHz	1.571
	34.4 to 50 GHz	1.725
RBW switching uncertainty (reference to 30 kHz RBW)		
1 Hz to 1.5 MHz RBW	± 0.05 dB	
1.6 to 3 MHz RBW	± 0.10 dB	
4, 5, 6, 8 MHz RBW	± 1.0 dB	
Reference level		
Range	Log scale	–170 to +30 dBm in 0.01 dB steps
	Linear scale	Same as log (707 pV to 7.07 V)
Accuracy	0 dB	
Display scale switching uncertainty		
Switching between linear and log	0 dB	
Log scale/div switching	0 dB	
Display scale fidelity		
-10 dBm < mixer level < -80 dBm	± 0.10 dB total	
Detector type		
Normal, peak, sample, negative peak, log power average, RMS average, and voltage average		

Dynamic Range Specifications

1 dB gain compression (two-tone)	
(At 1 kHz RBW with 100 kHz tone spacing, 20 to 30°C)	
Preamp Off	
20 MHz to 3.6 GHz	+5 dBm, nominal
3.6 to 16 GHz	+8 dBm, nominal
16 to 26.5 GHz	+7 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	-20 dBm, nominal
26.5 to 50 GHz	-30 dBm, nominal

Displayed average noise level (DANL)

Input terminated, 1 Hz RBW, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 20 to 30 °C, with wideband options (MPB, B2X, or B5X)

Preamp Off	10 Hz		-123 dBm, nominal
	20 Hz		-129 dBm, nominal
	100 Hz		-126 dBm, nominal
	1 kHz		-146 dBm, nominal
	9 kHz to 5 MHz		-147 dBm, typical
	5 to 10 MHz	-155 dBm	-158 dBm, typical
	10 MHz to 1.2 GHz	-154 dBm	-157 dBm, typical
	1.2 to 2.1 GHz	-152 dBm	-155 dBm, typical
	2.1 to 3 GHz	-151 dBm	-154 dBm, typical
	3 to 3.6 GHz	-150 dBm	-153 dBm, typical
	3.5 to 4.2 GHz	-143 dBm	-147 dBm, typical
	4.2 to 6.6 GHz	-144 dBm	-148 dBm, typical
	6.6 to 8.4 GHz	-147 dBm	-149 dBm, typical
	8.3 to 13.6 GHz	-147 dBm	-149 dBm, typical
	13.5 to 14 GHz	-143 dBm	-147 dBm, typical
	14 to 17.1 GHz	-145 dBm	-148 dBm, typical
	17 to 22.5 GHz	-141 dBm	-146 dBm, typical
	22.5 to 26.5 GHz	-139 dBm	-143 dBm, typical
	26.4 to 30 GHz	-140 dBm	-143 dBm, typical
	30 to 34.5 GHz	-138 dBm	-143 dBm, typical
	34.4 to 37 GHz	-134 dBm	-139 dBm, typical
	37 to 40 GHz	-132 dBm	-138 dBm, typical
	40 to 49 GHz	-130 dBm	-136 dBm, typical
	49 to 50 GHz	-128 dBm	-135 dBm, typical

Displayed average noise level (continued)			
Preamp On	100 kHz to 5 MHz		-159 dBm, typical
	5 to 10 MHz	-163 dBm	-167 dBm, typical
	10 MHz to 1.2 GHz	-164 dBm	-166 dBm, typical
	1.2 to 2.1 GHz	-163 dBm	-165 dBm, typical
	2.1 to 3.6 GHz	-162 dBm	-164 dBm, typical
	3.5 to 8.4 GHz	-158 dBm	-161 dBm, typical
	8.3 to 13.6 GHz	-160 dBm	-162 dBm, typical
	13.5 to 17.1 GHz	-161 dBm	-163 dBm, typical
	17 to 20 GHz	-160 dBm	-162 dBm, typical
	20 to 26.5 GHz	-158 dBm	-160 dBm, typical
	26.4 to 30 GHz	-157 dBm	-159 dBm, typical
	30 to 34.5 GHz	-155 dBm	-158 dBm, typical
	34.5 to 37 GHz	-153 dBm	-157 dBm, typical
	37 to 40 GHz	-152 dBm	-155 dBm, typical
	40 to 44 GHz	-149 dBm	-154 dBm, typical
	44 to 46 GHz	-149 dBm	-154 dBm, typical
	46 to 50 GHz	-146 dBm	-151 dBm, typical

DANL with noise floor extension (option NF2)

DANL improvement exceeds 9 dB with 95% confidence in the average of all bands, paths, frequency options and signal path option (MPB).

Band	**Frequency**	**Preamp Off**	**Preamp On**
0, f > 20 MHz	10 Hz to 3.5 GHz	-163 dBm	-174 dBm
1	3.5 to 8.4 GHz	-159 dBm	-172 dBm
2	8.3 to 13.6 GHz	-159 dBm	-172 dBm
3	13.5 to 17.1 GHz	-159 dBm	-173 dBm
4	17.0 to 26.5 GHz	-154 dBm	-169 dBm
5	26.4 to 34.5 GHz	-153 dBm	-167 dBm
6	34.4 to 50 GHz	-144dBm	-158 dBm

Spurious response		
Residual responses	200 kHz to 8.4 GHz (swept)	-100 dBm
	Zero span or FFT or other frequencies	-100 dBm nominal
Images response	10 MHz to 3.6 GHz	-80 dBc, -108 dBc typical
f ±645 MHz,	3.5 to 13.6 GHz	-78 dBc, -87 dBc typical
Mixer level -10 dBm	13.5 to 17.1 GHz	-74 dBc, -85 dBc typical
	17.0 to 22 GHz	-70 dBc, -81 dBc typical
	22 to 26.5 GHz	-68 dBc, -77 dBc typical
	26.5 to 34.5 GHz	-70 dBc, -94 dBc typical
	34.4 to 42 GHz	-60 dBc, -79 dBc typical
	42 to 50 GHz	-75 dBc, nominal
LO related spurious (f >600 MHz from carrier)		
	10 MHz to 3.6 GHz	-90 dBc typical

Other spurious	Mixer level	Response
Carrier frequency ≤ 3 GHz		-80 dBc nominal
Carrier frequency 3 to 26.5 GHz		
First RF order (f ≥ 10 MHz from carrier)	-10 dBm	-80 dBc + 20log(N[1]), including IF feedthrough, LO harmonic mixing responses
Higher RF order (f ≥ 10 MHz from carrier)	-40 dBm	-80 dBc + 20log(N[1]), including higher order mixer response
Carrier frequency > 26.5 GHz		
First RF order (f ≥ 10 MHz from carrier)	-30 dBm	-90 dBc nominal
Higher RF order (f ≥ 10 MHz from carrier)	-30 dBm	-90 dBc nominal

1. N is the LO multiplication factor. Refer to page 4 for the N value verses frequency ranges.

Second harmonic distortion (SHI)

Preamp Off	Source frequency		Distortion	SHI
Mixer level at -15 dBm	10 MHz to 1.0 GHz		-63 dBc	+48 dBm, +55 dBm typical
	1.0 to 1.8 GHz		-60 dBc	+45 dBm, +57 dBm typical
	1.75 to 3 GHz		-69 dBc	+54 dBm, +60 dBm typical
	3 to 6.5 GHz		-74 dBc	+59 dBm, +67 dBm typical
	6.5 to 10 GHz		-72 dBc	+57 dBm, +70 dBm typical
	10 to 13.25 GHz		-65 dBc	+50 dBm, +61 dBm typical
	13.2 to 25 GHz		-70 dBc nominal	+55 dBm nominal
Preamp On	Source frequency	Preamp level [2]	Distortion	SHI
	10 MHz to 1.8 GHz	-45 dBm	-78 dBc	+33 dBm nominal
	1.8 to 13.25 GHz	-50 dBm	-60 dBc	+10 dBm nominal
	13.25 to 25 GHz	-50 dBm	-50 dBc	0 dBm nominal

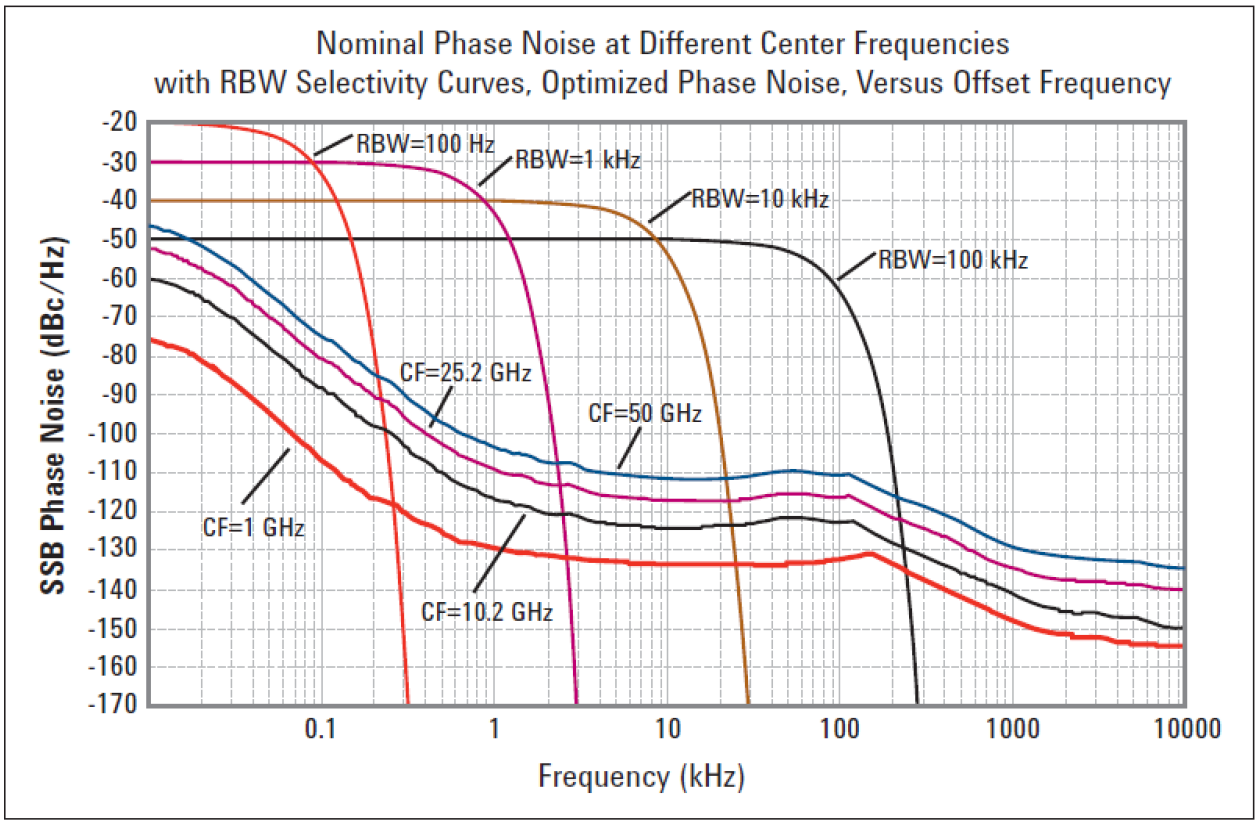
2. Preamp level = Input level – Input Attenuation

Third-order intermodulation distortion (TOI)

Two –18 dBm tones at input at input mixer with tone separation at 100 kHz, 20 to 30 °C		
Preamp Off	10 to 150 MHz	+14.5 dBm, +19.5 dBm typical
	150 to 300 MHz	+16 dBm, +20 dBm typical
	300 MHz to 1.1 GHz	+17 dBm, +21 dBm typical
	1.1 to 3.6 GHz	+21 dBm, +22.5 dBm typical
	3.5 to 8.4 GHz	+18 dBm, +20 dBm typical
	8.3 to 13.6 GHz	+18 dBm, +23 dBm typical
	13.5 to 17.1 GHz	+13 dBm, +16.5 dBm typical
	17.0 to 26.5 GHz	+13 dBm, +16 dBm typical
	26.4 to 34.5 GHz	+12 dBm, +19 dBm typical
	34.4 to 50 GHz	+8 dBm, +12 dBm typical
Preamp On Two tone at preamp input		
Two -45 dBm	10 MHz to 500 MHz	+4 dBm nominal
	500 MHz to 3.6 GHz	+4.5 dBm nominal
Two -50 dBm	3.6 to 26.5 GHz	-15 dBm nominal [3]

3. Exception for frequencies between 13.6 to 17.6 GHz, TOI is -18 dBm nominal

Phase noise	Offset	Specification	Typical
20 to 30 °C, CF = 1 GHz	10 Hz		-80 dBc/Hz nominal
	100 Hz	-94 dBc/Hz	-100 dBc/Hz typical
	1 kHz	-121 dBc/Hz	-124 dBc/Hz typical
	10 kHz	-129 dBc/Hz	-130 dBc/Hz typical
	30 kHz	-130 dBc/Hz	-131 dBc/Hz typical
	100 kHz	-129 dBc/Hz	-130 dBc/Hz typical
	1 MHz	-145 dBc/Hz	-146 dBc/Hz typical
	10 MHz	-155 dBc/Hz	-158 dBc/Hz typical



Powersuite Specifications

Channel Power		
Amplitude accuracy, W-CDMA or IS95 (20 to 30 °C, attenuation = 10 dB)	± 0.82 dB	± 0.23 dB (95th percentile)
Occupied bandwidth		
Frequency accuracy		± [span/1000] nominal
Adjacent channel power	Adjacent	Alternate
Accuracy, W-CDMA (ACLR) (at specific mixer levels and ACLR ranges)		
MS	± 0.14 dB	± 0.18 dB
BTS	± 0.49 dB	± 0.42 dB
Dynamic range		
Without noise correction	-73 dB typical	-79 dB typical
With noise correction	-78 dB typical	-82 dB typical
Offset channel pairs measured	1 to 6	
ACP measurement and transfer time (fast method)	10 ms nominal (σ = 0.2 dB)	
Multiple number of carriers measured	Up to 12	
Power statistics CCDF		
Histogram resolution	0.01 dB	
Harmonic distortion		
Maximum harmonic number	10^{th}	
Result	Fundamental power (dBm), relative harmonics power (dBc), total harmonic distortion in %	
Intermod (TOI)		
	Measure the third-order products and intercepts from two tones	
Burst power		
Methods	Power above threshold, power within burst width	
Result	Single burst output power, average output power, max. power, minimum power within burst, burst width	
Spurious emission		
W-CDMA (1 to 3.6 GHz) table-driven spurious signals; search across regions		
Dynamic range	81.3 dB	82.2 dB typical
Absolute sensitivity	–84.5 dBm	-89.5 dBm typical
Spectrum emission mask (SEM)		
cdma2000® (750 kHz offset)		
Relative dynamic range (30 kHz RBW)	78.6 dB	84.8 dB typical
Absolute sensitivity	–99.7 dBm	-104.7 dBm typical
Relative accuracy	± 0.12 dB	
3GPP W-CDMA (2.515 MHz offset)		
Relative dynamic range (30 kHz RBW)	81.9 dB	88.1 dB typical
Absolute sensitivity	–99.7 dBm	-104.7 dBm typical
Relative accuracy	± 0.16 dB	

General Specifications

Temperature range		
Operating	0 to 55 °C	Altitude ≤2,300 m
	0 to 47 °C	Altitude =4,600 m
Storage	–40 to 70°C	
Altitude	4,600 m (approx. 15,000 feet)	
Relative humidity	95% relative humidity, non-condensing up to 40°C and decreasing linearly to 50% relative humidity at 55°C From 40°C to 50°C, the maximum % relative humidity follows the line of constant dew point	
Environment	Indoor use	

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

Safety

Complies with European Low Voltage Directive 2014/35/EU

- IEC/EN 61010-1: 2010 AMD1: 2016 / EN61010-1: 2010+A1: 2019; IEC61010-2-030: 2017 / EN 61010-2-030: 2010
- Canada: CAN/CSA-C22.2 No.61010-1-12, UPD1: 2015, UPD2: 2016, AMD1:2018; CAN/CSA-C22.2 No. 61010-2-030-18
- USA: ANSI/UL Std. No. 61010-1:2012 AMD1:2018; ANSI/UL Std No.61010-2-030:2018

Acoustic noise emission	Geraeuschemission
LpA < 70 dB	LpA < 70 dB
Operator position	Am Arbeitsplatz
Normal position	Normaler Betrieb
Per ISO 7779	Nach DIN 45635 t.19

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 MIL-PRF-28800F Class 3

Power requirements		
Voltage and frequency (nominal)	100/120 V, 50/60/400 Hz 220/240 V, 50/60 Hz	The instruments can operate with mains supply voltage fluctuations up to ± 10% of the nominal voltage
Power consumption		
On	630 W maximum	
Standby	45 W	

Display	
Resolution	1280 x 800
Size	269 mm (10.6 in.) diagonal (nominal) capacitive multi-touch screen
Data storage	
Internal	Removable solid state drive (≥ 256 GB) and secure digital SD memory device
External	Supports USB 3.0/2.0 compatible memory devices
Weight (without options)	
Net	25.5 kg (56.2 lbs) (nominal)
Shipping	37.5 kg (82.7 lbs) (nominal)
Dimensions	
Height	177 mm (7.0 in)
Width	426 mm (16.8 in)
Length	556 mm (21.9 in)
Calibration cycle	
The recommended calibration cycle is one year; calibration services are available through Keysight service centers	

Inputs and Outputs

Front panel	
RF input	
Option 532, 544, 550	2.4mm male, 50 Ω (nominal) (standard)
External Mixing (Option EXM)	
Connection port	
Connector	SMA, female
Impedance	50 Ω, nominal
Functions	Triplexed for LO output, IF input, and mixer bias
Mixer bias range	± 10 mA in 10 µA step
IF input center frequency	
IF BW path < 25 MHz	322.5 MHz
IF BW path = 40 MHz	250.0 MHz
IF BW path = 255 MHz	750 MHz
IF BW path = 510 MHz	877.148375 MHz
LO output frequency range	3.75 to 14.0 GHz
Probe power	
Voltage/current	+15 Vdc, ± 7% at 150 mA max (nominal) –12.6 Vdc, ± 10% at 150 mA max (nominal)
Probes supported	1130A, 1131A, 1132A, 1134A
Active probe	1161A
Passive probe	-5 dB (0-10 MHz, nominal)
Input return loss	-0 dB (10-40 MHz, nominal)
USB ports	
Host (3 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	
Port marked with lightning bolt	1.2 A (nominal)
Port not marked with lightning bolt	0.5 A (nominal)
Headphone jack	Miniature stereo audio jack 3.5 mm

Rear panel	
10 MHz out	
Connector	BNC female, 50 Ω (nominal)
Output amplitude	≥ 0 dBm (nominal)
Frequency	10 MHz × (1+ 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)
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
Trigger 1 and 2 outputs	
Connector	BNC female
Impedance	50 kΩ (nominal)
Trigger level range	0 to 5 V (CMOS)
Monitor output	
Connector	VGA compatible, 15-pin mini D-SUB
Format	XGA (60 Hz vertical sync rates, non-interlaced) Analog RGB
Resolution	1024 x 768
Noise source drive +28 V (pulsed)	
Connector	BNC female
SNS Series noise source	For use with Keysight Technologies' SNS series noise sources
Analog out	
Connector	BNC female (used by Option YAS and N9063EM0E analog demodulation measurement application)
USB ports	
Host (2 ports)	
Standard	Compatible with USB 3.0
Connector	USB Type-A female
Output current	0.5 A (nominal)
Device (1 port)	
Standard	Compatible with USB 3.0
Connector	USB Type-A 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 CR3, CRP
Impedance	50 Ω nominal

Rear panel	
2nd IF output, Option CR3	Center frequency
SA mode	322.5 MHz
IQ analyzer with IF BW ≤ 25 MHz	322.5 MHz
IQ analyzer with IF path 40 MHz	250 MHz
IQ analyzer with IF path 255 MHz	750 MHz
IQ analyzer with IF path 510 MHz	877.1484375 MHz
Conversion gain	-1 to +4 dB (nominal) plus RF frequency response
Bandwidth	
Low band	Up to 1 GHz nominal
High band, with preselector bypass	Depends on RF center frequency
Programmable IF output, Option CRP	
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	100 MHz nominal
Lower output frequencies	Subject to folding
Residual output signals	≤ -88 dBm nominal

IQ analyzer

Frequency				
Band	LO Multiple (N)	IF BW ≤ 40 MHz	IF BW > 40 MHz	
0	1	10 Hz to 3.6 GHz	10 Hz – 3.4 GHz	
1	1	3.5 to 8.4 GHz	3.4 – 8.2 GHz	
2	2	8.3 to 13.6 GHz	8.2 – 13.2 GHz	
3	2	13.5 to 17.1 GHz	13.2 – 17.1 GHz	
4	4	17.0 to 26.5 GHz	17.1 – 26.5 GHz	
5	4	26.4 to 34.5 GHz	26.5 – 34.5 GHz	
6	8	34.4 to 50 GHz	34.5 – 50 GHz	
Frequency span				
Option B2X	20 Hz – 255 MHz			
Option B5X	20 Hz – 510 MHz			
Resolution bandwidth	Overall	100 mHz to 3 MHz		
	Span = 1 MHz	50 Hz to 1 MHz		
(spectrum measurement)	Span = 10 kHz	1 Hz to 10 kHz		
	Span = 100 Hz	100 mHz to 100 Hz		
Window shapes	Flat top, Uniform, Hanning, Gaussian, Blackman, Blackman-Harris, Kaiser Bessel (K-B 70/90/110 dB)			
Analysis bandwidth				
	Option B2X	255 MHz		
	Option B5X	510 MHz		
IF frequency response (standard 10 MHz IF path)				
IF frequency response (demodulation and FFT response relative to the center frequency)				
Center frequency	Span	Preselector	Max. error	RMS
f < 3.6 GHz	≤ 10 MHz	NA	± 0.3 dB	0.04 dB, nominal
3.6 GHz ≤ f ≤ 26.5 GHz	≤ 10 MHz	Off	± 0.3 dB	0.02 dB, nominal
26.5 < f ≤ 50 GHz	≤ 10 MHz	Off	± 0.35 dB	0.026 dB, nominal
IF phase linearity (BW ≤ 10 MHz)				
Center frequency	Span	Preselector	Peak-to-Peak	RMS (nominal)
≤ 3.6 GHz	≤ 10 MHz	N/A	0.4° nominal	0.1°
> 3.6 GHz	≤ 10 MHz	Off	0.4° nominal	0.1°
Dynamic range				
Clipping level at mixer	Center frequency	≥ 20 MHz		
IF gain = Low	-10 dBm	-8 dBm nominal		
IF gain = High	-20 dBm	-17.5 dBm nominal		
Data acquisition (Standard 10 MHz IF path)				
Time record length				
IQ analyzer	4,999,999 IQ sample pairs		Waveform measurement	
Advanced tool	Data packing		89600 VSA software or fast capture	
	32-bit	64-bit		
Length (IQ 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				
IQ pairs	1.25 × IFBW			
ADC resolution	16 bits			

25 MHz analysis bandwidth (Standard 25 MHz IF path, licensed as B25)

IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30°C

Center frequency	Span	Preselector	Max. error	RMS (nominal)
< 3.6 GHz	10 to ≤ 25 MHz	N/A	±0.45 dB	±0.04 dB
3.6 GHz ≤ f ≤ 26.5 GHz	10 to ≤ 25 MHz	On		±0.40 dB
3.6 GHz ≤ f ≤ 26.5 GHz	10 to ≤ 25 MHz	Off	±0.42 dB	±0.05 dB
26.5 GHz < f ≤ 50 GHz	10 to ≤ 25 MHz	On		±0.50 dB
26.5 GHz < f ≤ 50 GHz	10 to ≤ 25 MHz	Off	±0.44 dB	±0.03 dB

IF phase linearity

Center frequency	Span	Preselector	Peak-to-Peak (nominal)	RMS (nominal)
20 MHz ≤ f < 3.6 GHz	≤ 25 MHz	N/A	0.6°	0.14°
f ≥ 3.6 GHz	≤ 25 MHz	Off	1.9°	0.42°

Dynamic range

Full scale (ADC clipping)	Default settings, signal at CF	
IF gain = Low	Band	Mixer level
	0	-8 dBm nominal
	1 to 4	-7 dBm nominal
IF gain = High	Band	Mixer level
	0	-18 dBm nominal, subject to gain limitations
	1 to 6	-17 dBm nominal, subject to gain limitations
Effect of signal frequency ≠ CF		Up to ±3 dB nominal

Data Acquisition

Time record length

IQ analyzer	4,999,999 IQ sample pairs		Waveform measurement
Advanced tool	Data packing		89600 VSA software or fast capture
	32-bit	64-bit	
Length (IQ 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

IQ pairs	1.25 × IFBW
ADC resolution	16 bits

40 MHz analysis bandwidth (Standard 40 MHz IF path, licensed as B40)

IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30°C

Center frequency	Span	Preselector	Max. error	RMS (nominal)
30 MHz ≤ f < 3.6 GHz	≤ 40 MHz	N/A	±0.45 dB, ±0.30 dB typical	±0.08 dB
3.6 GHz ≤ f ≤ 8.4 GHz	≤ 40 MHz	Off	±0.35 dB, ±0.25 dB typical	±0.08 dB
8.4 GHz ≤ f ≤ 26.5 GHz	≤ 40 MHz	Off	±0.46 dB, ±0.33 dB typical	±0.08 dB
26.5 GHz < f ≤ 34.4 GHz	≤ 40 MHz	Off	±0.67 dB, ±0.25 dB typical	±0.1 dB
34.4 GHz < f ≤ 50 GHz	≤ 40 MHz	Off	±0.71 dB, ±0.35 dB typical	±0.1 dB

IF phase linearity

Center frequency	Span	Preselector	Peak-to-Peak (nominal)	RMS (nominal)
20 MHz ≤ f < 3.6 GHz	≤ 40 MHz	N/A	0.5°	0.10°
f ≥ 3.6 GHz	≤ 40 MHz	Off	3.6°	0.98°

Dynamic range

SFDR (spurious-free dynamic range)

Signal frequency within ±12 MHz of center	Band	SFDR
	0	-77 dBc nominal
	1 to 6	-80 dBc nominal
Signal frequency within ±18 MHz of center	Band	SFDR
	0	-74 dBc nominal
	1 to 6	-78 dBc nominal
Signal frequency anywhere within analysis BW	Band	SFDR
	0	-74 dBc nominal
	1 to 6	-77 dBc nominal

Full scale (ADC clipping)

Default settings, signal at CF

IF gain = Low	Band	Mixer level
	0	-8 dBm nominal
	1 to 4	-7 dBm nominal
	5 to 6	-11 dBm nominal
IF gain = High	Band	Mixer level
	0	-13 dBm
	1 to 2	-17 dBm
	3 to 4	-16 dBm
	5 to 6	-15 dBm
Effect of signal frequency ≠ CF		Up to ±4 dB nominal

Data Acquisition

Time record length (IQ pairs)

IQ analyzer	4,999,999 IQ sample pairs		Waveform measurement
Advanced tools	32-bit packing	64-bit packing	89600 VSA software or fast capture
Length (IQ sample pairs)	536 MSa	268 MSa	2 GB total memory
Length (Time units)	Samples/Sample rate (IQ pairs)		
Sample rate			
IQ pairs	IFBW x 1.25		
ADC resolution	12 bits		

IQ analyzer – Option B2X

255 MHz analysis bandwidth (Option B2X is automatically included with option B5X)

IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30°C

Center frequency	Span	Preselector	Max. error	RMS (nominal)
400 MHz ≤ f < 1 GHz	≤ 255 MHz	N/A	±0.8 dB, ±0.4 dB typical	±0.1 dB
1 GHz ≤ f < 3.4 GHz	≤ 255 MHz	N/A	±0.5 dB, ±0.3 dB typical	±0.1 dB
3.4 GHz ≤ f ≤ 8.2 GHz	≤ 255 MHz	Off	±0.5 dB, ±0.35 dB typical	±0.1 dB
8.2 GHz ≤ f ≤ 26.5 GHz	≤ 255 MHz	Off	±0.6 dB nominal	±0.2 dB
26.5 GHz ≤ f ≤ 50 GHz	≤ 255 MHz	Off	±0.8 dB nominal	±0.2 dB

IF phase linearity

Center frequency	Span	Preselector	Peak-to-Peak (nominal)	RMS (nominal)
20 MHz ≤ f < 3.4 GHz	≤ 255 MHz	N/A	3°	0.6°
3.4 GHz ≤ f < 26.5 GHz	≤ 255 MHz	Off	2°	0.5°
26.5 GHz ≤ f ≤ 50 GHz	≤ 255 MHz	Off	4°	0.8°

Dynamic range

SFDR (spurious-free dynamic range)

Signal frequency anywhere within analysis BW: -78 dBc nominal

Full scale clipping

Default settings, signal at CF

IF gain = Low	Band	Mixer level
	0	+2 dBm nominal
	1 to 2	+3 dBm nominal
	3 to 4	0 dBm nominal
	5 to 6	-11 dBm nominal

IF gain = High	Band	Mixer level
IF gain offset = 0 dB	0	-3 dBm nominal
	1 to 2	-6 dBm nominal
	3 to 4	-9 dBm nominal
	5 to 6	-11 dBm nominal

Effect of signal frequency ≠ CF: Up to ±4 dB nominal

Data Acquisition

Time record length (IQ pairs)

IQ analyzer	4,999,999 IQ sample pairs		Waveform measurement
Advanced tools	32-bit packing	64-bit packing	89600 VSA or fast capture
Length (IQ sample pairs)	1073 MSa (230 Sa)	536 MSa (229 Sa)	4 GB total memory (option DP4)
Length (Time units)	Length of IQ sample pairs/sample rate (IQ pairs)		

Sample rate

IQ pairs	Minimum of (Span x 1.25, 300 MSa/s)
ADC resolution	14 bits

IQ analyzer – Option B5X

510 MHz analysis bandwidth				
IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30°C				
Center frequency	Span	Preselector	Max. error	RMS (nominal)
600 MHz ≤ f < 3.4 GHz	≤ 500 MHz	N/A	±0.75 dB, ±0.41 dB typical	±0.1 dB
3.4 GHz ≤ f < 8.2 GHz	≤ 500 MHz	Off	±0.5 dB, ±0.42 dB typical	±0.3 dB
8.2 GHz ≤ f ≤ 26.5 GHz	≤ 510 MHz	Off	±0.8 dB nominal	
26.5 GHz ≤ f ≤ 50 GHz	≤ 510 MHz	Off	±1.0 dB nominal	
IF phase linearity				
Center frequency	Span	Preselector	Peak-to-Peak (nominal)	RMS (nominal)
20 MHz ≤ f < 3.4 GHz	≤ 510 MHz	N/A	5°	1.0°
3.4 GHz ≤ f < 26.5 GHz	≤ 510 MHz	Off	6°	1.4°
26.5 GHz ≤ f ≤ 50 GHz	≤ 510 MHz	Off	7°	1.6°
Dynamic range				
SFDR (spurious-free dynamic range)				
Signal frequency anywhere within analysis BW		-75 dBc nominal		
Full scale clipping				
Default settings, signal at CF				
IF gain = Low	Band	Mixer level		
	0	+1 dBm nominal		
	1 to 2	+3 dBm nominal		
	3 to 4	0 dBm nominal		
	5 to 6	-11 dBm nominal		
IF gain = High	Band	Mixer level		
IF gain offset = 0 dB	0	-4 dBm nominal		
	1 to 2	-9 dBm nominal		
	3 to 4	-13 dBm nominal		
	5 to 6	-11 dBm nominal		
Effect of signal frequency ≠ CF		Up to ±4 dB nominal		
Data Acquisition **Time record length (IQ pairs)**				
IQ analyzer	4,999,999 IQ sample pairs		Waveform measurement	
Advanced tools	32-bit packing	64-bit packing	89600 VSA software or fast capture	
Length (IQ pairs)				
IFBW ≤ 255.176 MHz	1073 MSa (2^{30} Sa)	536 MSa (2^{29} Sa)	4 GB total memory (opt. DP4)	
IFBW > 255.176 MHz	2147 MSa (2^{31} Sa)	1073 MSa (2^{30} Sa)	8 GB total memory (opt. DP4)	
Length (Time units)	Length of IQ sample pairs/sample rate (IQ pairs)			
Sample rate				
IFBW ≤ 255.176 MHz	Minimum of (Span x 1.25, 300 MSa/s)			
IFBW > 255.176 MHz	Minimum of (Span x 1.25, 600 MSa/s)			
ADC resolution	14 bits			

Real-time spectrum analyzer

Option RT1 and RT2

Real-time analysis		
Real-time analysis bandwidth		
Option RT1	Up to 509.47 MHz	Analysis bandwidth determines the maximum real-time bandwidth
Option RT2	Up to 509.47 MHz	
Option DUA	Up to 2 x 255 MHz at same center frequency, requires Option B5X	
Minimum detectable signal duration with > 60 dB		3.33 ns, with option B2X or B5X
Minimum signal duration with 100% POI at full amplitude range		For frequency mask triggering (FMT)
Option RT1	17.3 µs	Signal is at mask level
Option RT2	3.57 µs	Signal is at mask level
Minimum acquisition time	104 µs	
FFT rate	292,969/s	