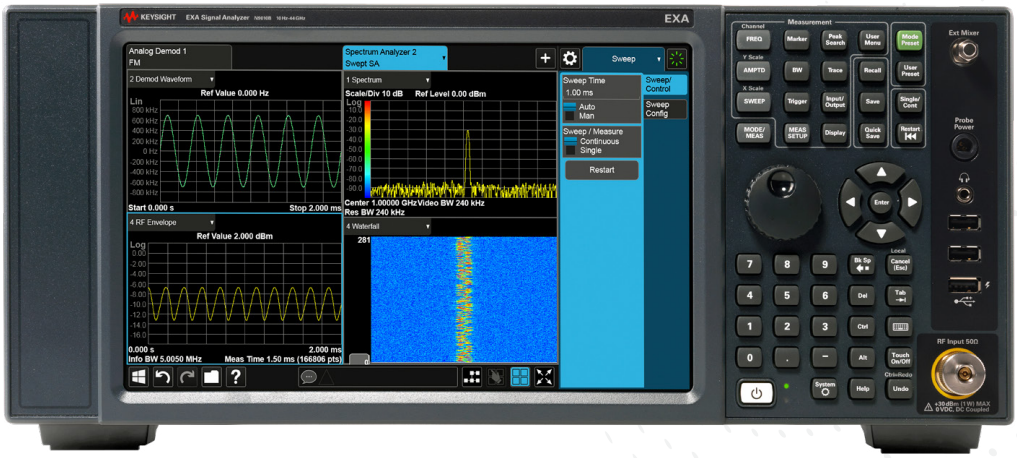
DATA SHEET

N9010B EXA X-Series Signal Analyzer, Multi-touch

10 Hz to 3.6, 7.0, 13.6, 26.5, 32, or 44 GHz



KEYSIGHT TECHNOLOGIES

Table of Contents

This data sheet is a summary of the specifications and conditions for EXA signal analyzers. For the complete specifications guide, visit:
www.keysight.com/find/exa_specifications

Cost-Effective Millimeter-Wave Signal Analysis

Whether you're focused on time-to-market, time-to-volume, or cost of test, your choice of economy class signal analyzer should help you save both time and money. That's the idea that drives the Keysight Technologies, Inc. EXA signal analyzer—your first, best choice when you need maximum value in signal analysis up to millimeter-wave frequencies. It helps you find the answer faster, whether you're seeking tighter design margins or shorter test times.

Definitions and Conditions

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 s) 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 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; 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

Get More Information

This EXA signal analyzer data sheet is a summary of the specifications and conditions for N9010B EXA signal analyzers. A full set of specifications are available in the EXA Signal Analyzer Specification Guide at www.keysight.com/find/exa_specifications.

For ordering information, refer to the N9010B EXA Signal Analyzer Configuration Guide literature number (5992-1253EN).

Frequency and Time Specifications

Frequency range		**DC coupled**	**AC coupled**
Option 503		10 Hz to 3.6 GHz	10 MHz to 3.6 GHz
Option 507		10 Hz to 7 GHz	10 MHz to 7 GHz
Option 513		10 Hz to 13.6 GHz	10 MHz to 13.6 GHz
Option 526		10 Hz to 26.5 GHz	10 MHz to 26.5 GHz
Option 532		10 Hz to 32 GHz	NA
Option 544		10 Hz to 44 GHz	NA
Band	**LO multiple (N)**		
0	1	10 Hz to 3.6 GHz	
1	1	3.5 to 7.0 GHz	
1	1	3.5 to 8.4 GHz	
2	2	8.4 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 44 GHz	
Frequency reference			
Accuracy		± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]	
Aging rate		Option PFR	Standard
		± 1 x 10^{-7} / year	± 1 x 10^{-6} / year
		± 1.5 x 10^{-7} / 2 years	
Temperature stability		Option PFR	Standard
– 20 to 30 °C		± 1.5 x 10^{-8}	± 2 x 10^{-6}
– Full temperature range		± 5 x 10^{-8}	± 2 x 10^{-6}
Achievable initial calibration accuracy		Option PFR	Standard
		± 4 x 10^{-8}	± 1.4 x 10^{-6}
Example frequency reference accuracy (with Option PFR)		= ± (1 x 10^{-7} + 5 x 10^{-8} + 4 x 10^{-8})	
– 1 year after last adjustment		= ± 1.9 x 10^{-7}	
Residual FM			
– Option PFR		≤ (0.25 Hz x N) p-p in 20 ms nominal	
– Standard		≤ (10 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 + 0.25 % 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			
– Swept		± (0.25 % x span + horizontal resolution)	
– FFT		± (0.10 % 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 ≥ 10 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 Hz or FFT	–150 to +500 ms
	Span ≥ 10 Hz, swept	0 to 500 ms
	Resolution	0.1 µs
Time gating		
Gate methods	Gated LO; gated video; gated FFT	
Gate length range (except method = FFT)	100.0 ns 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)		
– Standard	1 Hz to 3 MHz (10 % steps), 4, 5, 6, and 8 MHz	
– With one or more of Option B40, DP2, or MPB	1 Hz to 3 MHz (10 % steps), 4, 5, 6, 8, and 10 MHz	
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 to –0.2 dB nominal
	4 to 10 MHz (< 3.6 GHz CF)	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 461 compliant)	10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz	(Option EMC required)
Analysis bandwidth [1]		
Maximum bandwidth	Option B40	40 MHz
	Standard	25 MHz
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	

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	**Displayed average noise level (DANL) to +23 dBm**
Input attenuator range (10 Hz to 44 GHz)	
– Standard	0 to 60 dB in 10 dB steps
– Option FSA	0 to 60 dB in 2 dB steps
Electronic attenuator (Option EA3)	
Frequency range	10 Hz to 3.6 GHz
Attenuation range	
– Electronic attenuator range	0 to 24 dB, 1 dB steps
– Full attenuation range (mechanical + electronic)	0 to 84 dB, 1 dB steps
Maximum safe input level	
Average total power (with and without preamp)	+30 dBm (1 W)
Peak pulse power	< 10 µs pulse width, < 1 % duty cycle +50 dBm (100 W) and input attenuation ≥ 30 dB
DC volts	
– DC coupled	± 0.2 Vdc
– AC coupled	± 100 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

Frequency response		Specification	95th percentile (≈ 2σ)
(10 dB input attenuation, 20 to 30 °C, preselector centering applied, σ = nominal standard deviation)			
RF/MW (Option 503, 507, 513, 526)	9 kHz to 10 MHz	± 0.8 dB	± 0.4 dB
	10 MHz [1] to 3.6 GHz	± 0.6 dB	± 0.21 dB
	3.5 to 7.0 GHz	± 2.0 dB	± 0.69 dB
	7.0 to 13.6 GHz	± 2.5 dB	± 0.48 dB
	13.5 to 22.0 GHz	± 3.0 dB	± 0.79 dB
	22.0 to 26.5 GHz	± 3.2 dB	± 1.10 dB
Millimeter-wave (Option 532, 544)	9 kHz to 10 MHz	± 0.6 dB	± 0.28 dB
	10 to 50 MHz	± 0.45 dB	± 0.21 dB
	50 MHz to 3.6 GHz	± 0.45 dB	± 0.20 dB
	3.5 to 5.2 GHz	± 1.7 dB	± 0.91 dB
	5.2 to 8.4 GHz	± 1.5 dB	± 0.61 dB
	8.3 to 13.6 GHz	± 2.0 dB	± 0.61 dB
	13.5 to 17.1 GHz	± 2.0 dB	± 0.67 dB
	17.0 to 22.0 GHz	± 2.0 dB	± 0.78 dB
	22.0 to 26.5 GHz	± 2.5 dB	± 0.72 dB
	26.4 to 34.5 GHz	± 2.5 dB	± 1.11 dB
	34.4 to 44 GHz	± 3.2 dB	± 1.42 dB
Preamp on (P03, P07, P13, P26)			
RF/MW (Option 503, 507, 513, 526)	100 kHz to 3.6 GHz		± 0.28 dB nominal
	3.6 to 7.0 GHz		± 0.67 dB nominal
	7.0 to 26.5 GHz		± 0.80 dB nominal
Preamp on (P03, P07, P32, P44)			
Millimeter-wave (Option 532, 544)	100 kHz to 3.6 GHz		± 0.28 dB nominal
	3.5 to 8.4 GHz		± 0.67 dB nominal
	8.4 to 26.5 GHz		± 0.80 dB nominal
	26.4 to 44 GHz		± 0.80 dB nominal

1. DC coupling required to meet specifications below 50 MHz. With AC coupling, specifications apply at frequencies of 50 MHz and higher. Statistical observations at 10 MHz with AC coupling show that most instruments meet the DC-coupled specifications, however, a small percentage of instruments are expected to have errors exceeding 0.5 dB at 10 MHz at the temperature extreme. The effect at 20 to 50 MHz is negligible but not warranted.

Input attenuation switching uncertainty		Specifications	Additional information
Attenuation > 2 dB, preamp off	50 MHz (reference frequency)	± 0.20 dB	± 0.08 dB typical
Relative to 10 dB (reference setting)	9 kHz to 3.6 GHz		± 0.3 dB nominal
	3.5 to 7.0 GHz		± 0.5 dB nominal
	6.9 to 13.6 GHz		± 0.7 dB nominal
	13.5 to 26.5 GHz		± 0.7 dB nominal
	> 26.5 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, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale, σ = nominal standard deviation)			
	At 50 MHz	± 0.40 dB	
	At all frequencies	± (0.40 dB + frequency response)	
	9 kHz to 3.6 GHz	± 0.27 dB (95th percentile ≈ 2 σ)	
Preamp on	100 kHz to 3.6 GHz	± (0.39 dB + frequency response)	
Input voltage standing wave ratio (VSWR) (≥ 10 dB input attenuation)			
	Options 503, 507, 513, 526	**Options 532, 544**	
10 MHz to 3.6 GHz	< 1.2:1 nominal	1.2:1 nominal	
3.6 to 26.5 GHz	< 1.9:1 nominal	1.5:1 nominal	
26.5 to 44 GHz	N/A	< 1.8:1 nominal	
Resolution bandwidth switching uncertainty (referenced to 30 kHz RBW)			
1 Hz to 3 MHz RBW	± 0.10 dB		
4, 5, 6, 8, 10 MHz RBW	± 1.0 dB		
Reference level			
Range			
– Log scale	–170 to +23 dBm in 0.01 dB steps		
– Linear scale	Same as Log (707 pV to 3.16 V)		
Accuracy	0 dB		
Display scale switching uncertainty			
Switching between linear and log	0 dB		
Log scale/div switching	0 dB		
Display scale fidelity			
Between –10 dBm and –80 dBm input mixer level	± 0.15 dB total		
Trace detectors			
Normal, peak, sample, negative peak, log power average, RMS average, and voltage average			
Preamplifier (Option P03, P07, P13, P26, P32, P44)			
Frequency range	Option P03	100 kHz to 3.6 GHz	
	Option P07	100 kHz to 7 GHz	
	Option P13	100 kHz to 13.6 GHz	
	Option P26	100 kHz to 26.5 GHz	
	Option P32	100 kHz to 32 GHz	
	Option P44	100 kHz to 44 GHz	
Gain	100 kHz to 3.6 GHz	+20 dB nominal	
	3.6 to 7.0 GHz	+35 dB nominal	
	> 7 GHz	+40 dB nominal	
Noise figure	100 kHz to 3.6 GHz	8 to 12 dB nominal (proportional to frequency)	
	3.6 to 8.4 GHz	9 dB nominal	
	8.4 to 13.6 GHz	10 dB nominal	
	> 13.6 GHz	DANL + 176.24 dB nominal	

Dynamic Range Specifications

1 dB gain compression (two-tone)			
		Total power at mixer input	
RF/MW (Option 503, 507, 513, 526)	20 MHz to 26.5 GHz	+9 dBm nominal	
		Total power at mixer input	
Millimeter-wave (Option 532, 544)	20 MHz to 26.5 GHz	+6 dBm nominal	
	26.5 to 44 GHz	0 dBm nominal	
		Total power at preamp input	
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 GHz	–30 dBm nominal	
Displayed average noise level (DANL)			
(Input terminated, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 20 to 30 °C)			
		Specification	Typical
RF/MW (Option 503, 507, 513, 526)	1 to 10 MHz	–147 dBm	–149 dBm
	10 MHz to 2.1 GHz	–148 dBm	–150 dBm
	2.1 to 3.6 GHz	–147 dBm	–149 dBm
	3.5 to 7.0 GHz	–147 dBm	–149 dBm
	7.0 to 13.6 GHz	–143 dBm	–147 dBm
	13.5 to 20 GHz	–137 dBm	–142 dBm
	20 to 26.5 GHz	–134 dBm	–140 dBm
Preamp on, RF/MW (Option 503, 507, 513, 526)	10 MHz to 2.1 GHz	–161 dBm	–163 dBm
	2.1 to 3.6 GHz	–160 dBm	–162 dBm
	3.5 to 7.0 GHz	–160 dBm	–162 dBm
	7.0 to 13.6 GHz	– 160 dBm	–163 dBm
	13.5 to 17.1 GHz	–157 dBm	–160 dBm
	17.0 to 20.0 GHz	–155 dBm	–159 dBm
	20.0 to 26.5 GHz	–150 dBm	–156 dBm
Millimeter-wave (Option 532, 544) [1]	9 kHz to 1 MHz	–	–130 dBm
	1 MHz to 1.2 GHz	–152 dBm	–155 dBm
	1.2 to 2.1 GHz	–151 dBm	–154 dBm
	2.1 to 3.6 GHz	–149 dBm	–152 dBm
	3.5 to 4.2 GHz	–144 dBm	–147 dBm
	4.2 to 8.4 GHz	–145 dBm	–150 dBm
	8.3 to 13.6 GHz	–147 dBm	–150 dBm
	13.5 to 20 GHz	–145 dBm	–148 dBm
	20 to 26.5 GHz	–142 dBm	–145 dBm
	26.4 to 34 GHz	–140 dBm	–144 dBm
	34.4 to 44 GHz	–135 dBm	–140 dBm

1. Without Option B40, DP2, or MPB. When any of these options are installed, performance may change. Please refer to the EXA specifications guide for more details.

Displayed average noise level (DANL) (Continued)			
Preamp on, millimeter-wave (Option 532, 544) [1]	100 kHz to 1 MHz	–145 dBm	–148 dBm
	1 to 10 MHz	–161 dBm	–165 dBm
	10 MHz to 1.2 GHz	–164 dBm	–165 dBm
	1.2 to 2.1 GHz	–163 dBm	–164 dBm
	2.1 to 3.6 GHz	–162 dBm	–163 dBm
	3.5 to 7 GHz	–160 dBm	–162 dBm
	7 to 20 GHz	–160 dBm	–162 dBm
	20 to 26.5 GHz	–158 dBm	–160 dBm
	26.5 to 32 GHz	–156 dBm	–159 dBm
	32 to 34 GHz	–156 dBm	–159 dBm
	33.9 to 40 GHz	–153 dBm	–155 dBm
	40 to 44 GHz	–149 dBm	–153 dBm

DANL with Noise Floor Extension Improvement (Option NF2)

DANL improvement exceeds 7 dB with 95% confidence in the average of all bands, with and without the preamplifier

RF/MW (Option 503, 507, 513, 526)

Example of effective DANL at 18 to 30 °C

Frequency	Preamp Off	Preamp On
Mid-Band 0 (1.8 GHz)	–156 dBm	–170 dBm
Mid-Band 1 (5.9 GHz)	–155 dBm	–168 dBm
Mid-Band 2 (10.95 GHz)	–153 dBm	–168 dBm
Mid-Band 3 (15.3 GHz)	–147 dBm	–165 dBm
Mid-Band 4 (21.75 GHz)	–145 dBm	–157 dBm

Millimeter-Wave (Option 532, 544) [1]

Example of effective DANL at 18 to 30 °C

Frequency	Preamp Off	Preamp On
Mid-Band 0 (1.8 GHz)	–157 dBm	–169 dBm
Mid-Band 1 (5.9 GHz)	–152 dBm	–166 dBm
Mid-Band 2 (10.95 GHz)	–154 dBm	–165 dBm
Mid-Band 3 (15.3 GHz)	–153 dBm	–164 dBm
Mid-Band 4 (21.75 GHz)	–148 dBm	–164 dBm
Mid-Band 5 (30.4 GHz)	–145 dBm	–160 dBm
Mid-Band 6 (42.7 GHz)	–142 dBm	–154 dBm

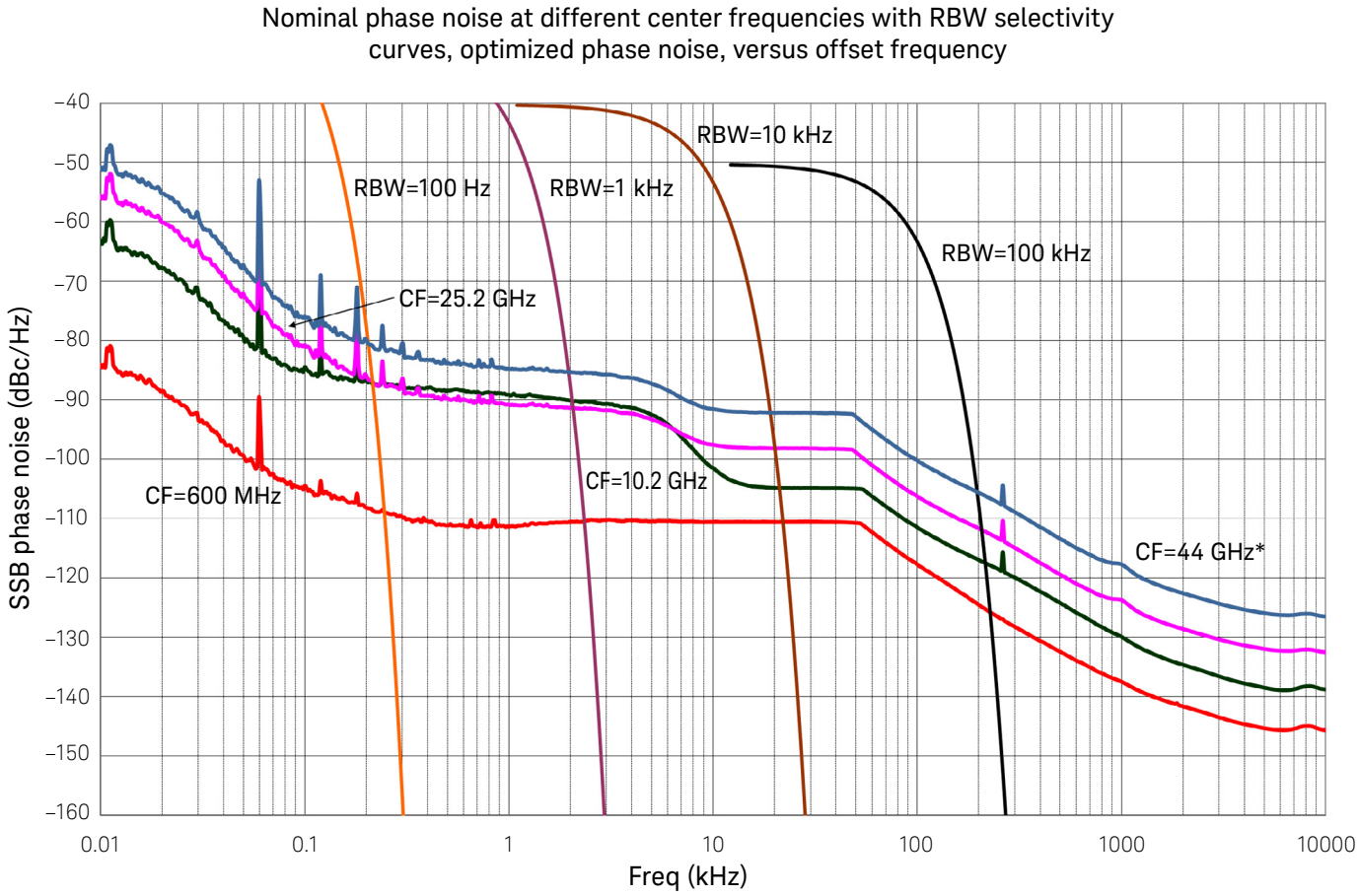
1. Without Option B40, DP2, or MPB. When any of these options are installed, performance may change. Please refer to the EXA specifications guide for more details.

Spurious responses			
Residual responses (input terminated and 0 dB attenuation)	200 kHz to 8.4 GHz (swept)	–100 dBm	
	Zero span or FFT or other frequencies	–100 dBm nominal	
	Tuned frequency (f)	**Mixer level**	**Response**
Image responses (Excitation freq. = f + 645 MHz)	10 MHz to 3.6 GHz	–10 dBm	–80 dBc (–107 dBc typical)
	3.6 to 13.6 GHz	–10 dBm	–75 dBc (–87 dBc typical)
	13.6 to 17.1 GHz	–10 dBm	–71 dBc (–85 dBc typical)
	17.1 to 22 GHz	–10 dBm	–68 dBc (–82 dBc typical)
	22 to 26.5 GHz	–10 dBm	–66 dBc (–78 dBc typical)
	26.5 to 34.5 GHz	–30 dBm	–70 dBc (–94 dBc typical)
	34.5 to 44 GHz	–30 dBm	–60 dBc (–79 dBc typical)
LO related spurious (f > 600 MHz from carrier, 10 MHz to 3.6 GHz)	10 MHz to 3.6 GHz		–90 dBc + 20 logN [1] typical
Other spurious response	**Mixer level**	**Response**	
Carrier frequency ≤ 26.5 GHz			
– First RF order (f ≥ 10 MHz from carrier)	–10 dBm	–68 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 responses	
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.

Second harmonic distortion (SHI)			
	Source frequency	**SHI (nominal)**	
RF/MW (Option 503, 507, 513, 526)	10 MHz to 1.8 GHz	+45 dBm	
	1.75 to 7.0 GHz	+65 dBm	
	7.0 to 11.0 GHz	+55 dBm	
	11.0 to 13.25 GHz	+50 dBm	
Millimeter-wave (Option 532, 544)	10 MHz to 1.8 GHz	+45 dBm	
	1.8 to 6.5 GHz	+65 dBm	
	6.5 to 10 GHz	+60 dBm	
	10 to 13.25 GHz	+55 dBm	
	13.25 to 22 GHz	+50 dBm	
Third-order intermodulation distortion (TOI)			
(Two –18 dBm tones at input mixer with tone separation > 5 times IF prefilter bandwidth, 20 to 30 °C, see Specifications Guide for IF prefilter bandwidths)			
		TOI	TOI (typical)
RF/MW (Option 503, 507, 513, 526)	100 to 400 MHz	+13 dBm	+17 dBm
	400 MHz to 3.6 GHz	+14 dBm	+18 dBm
	3.6 to 13.6 GHz	+14 dBm	+18 dBm
	13.6 to 26.5 GHz	+12 dBm	+16 dBm
Preamp on, RF/MW (Option 503, 507, 513, 526)	30 MHz to 3.6 GHz (two –45 dBm tones at preamp)		0 dBm nominal
	3.6 to 26.5 GHz (two –50 dBm tones at preamp)		–18 dBm nominal
Millimeter-wave (Option 532, 544)	10 to 100 MHz	+12 dBm	+17 dBm
	100 MHz to 3.95 GHz	+15 dBm	+19 dBm
	3.95 to 8.4 GHz	+15 dBm	+18 dBm
	8.3 to 13.6 GHz	+15 dBm	+18 dBm
	13.5 to 17.1 GHz	+11 dBm	+17 dBm
	17.0 to 26.5 GHz	+10 dBm	+17 dBm (nominal)
	26.5 to 44 GHz	–	+13 dBm (nominal)
Preamp on, millimeter-wave (Option 532, 544)	30 MHz to 3.6 GHz (two –45 dBm tones at preamp)		0 dBm (nominal)
	3.6 to 26.5 GHz (two –50 dBm tones at preamp)		–18 dBm (nominal)

Phase noise	Offset	Specification	Typical
Noise sidebands (20 to 30 °C, CF = 1 GHz)	100 Hz	–87 dBc/Hz	–102 dBc/Hz
	1 kHz	–	–110 dBc/Hz nominal
	10 kHz	–107 dBc/Hz	–109 dBc/Hz
	100 kHz	–115 dBc/Hz	–118 dBc/Hz
	1 MHz	–134 dBc/Hz	–136 dBc/Hz
	10 MHz	–	–147 dBc/Hz nominal



* Unlike other curves, which are measured results from the measurement of excellent sources, the CF = 44 GHz curve is predicted, not observed, phase noise computed from the 25.2 GHz observation. See the Frequency Stability section for the details of phase noise performance versus CF.

Figure 1. Nominal phase noise at different center frequencies.

Option MPB, microwave preselector bypass [1]	
Frequency range	
N9010B-507	3.6 to 7 GHz
N9010B-513	3.6 to 13.6 GHz
N9010B-526	3.6 to 26.5 GHz
N9010B-532	3.6 to 32 GHz
N9010B-544	3.6 to 44 GHz

1. When Option MPB is installed and enabled, some aspects of the analyzer performance changes. Please refer to the EXA specification guide for more details.

PowerSuite Measurement Specifications

Channel power		
Amplitude accuracy, W-CDMA or IS95 (20 to 30 °C, attenuation = 10 dB)	± 1.04 dB (± 0.27 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	± 0.17 dB	± 0.22 dB
– BTS	± 0.70 dB	± 0.57 dB
Dynamic range (typical)		
– Without noise correction	–68 dB	–74 dB
– With noise correction	–73 dB	–76 dB
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	10th	
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	
Results	Single burst output power, average output power, maximum 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	80.4 dB	82.9 dB typical
Absolute sensitivity	–82.5 dBm	–86.5 dBm typical
Spectrum emission mask (SEM)		
cdma2000® (750 kHz offset)		
– Relative dynamic range (30 kHz RBW)	76.2 dB	82.8 dB typical
– Absolute sensitivity	–97.7 dBm	–101.7 dBm typical
– Relative accuracy	± 0.12 dB	
3GPP W-CDMA (2.515 MHz offset)		
– Relative dynamic range (30 kHz RBW)	79.3 dB	84.9 dB typical
– Absolute sensitivity	–97.7 dBm	–101.7 dBm typical
– Relative accuracy	± 0.15 dB	

General Specifications

Temperature range		
Operating	0 to 55 °C	
Storage	–40 to 70 °C	
EMC		
Complies with the essential requirements of the European EMC Directive and the UK Electromagnetic Compatibility Regulations 2016 as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity): – IEC/EN 61326-1 or IEC/EN 61326-2-1 – CISPR 11 Group 1, Class A – AS/NZS CISPR 11:2002 – 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 the essential requirements of the European Low Voltage Directive a 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 – U.S.A.: UL 61010-1		
Acoustic statement (European Machinery Directive 2002/42/EC, 1.7.4.2u)		
Acoustic noise emission		
LpA < 70 dB		
Operator position		
Normal position		
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	The instruments can operate with mains supply voltage fluctuations up to ± 10% of the nominal voltage
Power consumption		
– On	465 W maximum	
– Standby	20 W	
Display		
Resolution	1280 x 768	
Size	269 mm (10.6 in.) diagonal (nominal) capacitive multi-touch screen	
Data storage		
Internal	≥ 80 GB nominal (removable solid-state drive)	
External	Supports USB 2.0 or 3.0 compatible memory devices	
Weight (without options)		
Net	18 kg (40 lbs) nominal	
Shipping	30 kg (66 lbs) nominal	
Dimensions		
Height	177 mm (7.0 in)	
Width	426 mm (16.8 in)	
Length	368 mm (14.5 in)	
Calibration cycle		
The recommended calibration cycle is two years; calibration services are available through Keysight service centers		

Inputs and Outputs

Front panel	
RF input connector	
– Standard (Option 503, 507, 513, or 526)	Type-N female, 50 Ω nominal
– Standard (Option 532 or 544)	2.4 mm male, 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	
– 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
– Ports not marked with lightning bolt	0.5 A nominal
External mixing, Option EXM (available only with EXA millimeter wave, Option 532 or 544)	
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 µA step
IF input center frequency	
– Narrowband IF path	322.5 MHz
– 40 MHz IF path	250 MHz
LO output frequency range	3.75 to 14.0 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	10 MHz nominal
– Frequency lock range	± 5 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 Ω nominal
– Level	5 V TTL nominal
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

Rear panel	
Noise source drive +28 V (pulsed)	
– Connector	BNC female
SNS Series noise source connector	For use with Keysight SNS Series noise sources
Analog out	
– Connector	BNC female (used with N9063A analog demod app and Option YAS)
USB ports	
– Host, super speed 2 ports	
– Compatibility	USB 3.0
– Connector	USB Type-A female
– Output current	0.9 A nominal
– Host, stacked with LAN	1 port
– Compatibility	USB 2.0
– Connector	USB Type A female
– Output current	0.5 A nominal
– Device	1 port
– Standard	USB 3.0
– Connector	USB Type-B female
– Output current	0.9 A nominal
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 Option CR3 and CRP
– Impedance	50 Ω nominal
Wideband IF output, Option CR3	
Center frequency	
– SA mode or I/Q analyzer with IF BW ≤ 25 MHz with	322.5 MHz
Option B40	250 MHz
Conversion gain	–1 to +4 dB (nominal) plus RF frequency response
Bandwidth	
– Low band	Up to 140 MHz (nominal)
– High band, with preselector	Depends on center frequency
– High band, with preselector bypassed [1]	Up to 410 MHz (nominal)
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 center	
– Low band or high band with preselector bypassed [1]	100 MHz (nominal)
– Preselected band	Depends on RF center frequency
Lower output frequencies	Subject to folding
Residual output signals	≤ –88 dBm (nominal)

1. Option MPB installed and enabled.

I/Q Analyzer

Frequency				
Frequency span				
– Standard	10 Hz to 10 MHz			
– Option B25 (standard)	10 Hz to 25 MHz			
– Option B40	10 Hz to 40 MHz			
Resolution bandwidth (spectrum measurement)				
Range				
– Overall	100 MHz to 3 MHz			
– Span = 1 MHz	50 Hz to 1 MHz			
– 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 dB, K-B 90 dB and K-B 110 dB)				
Analysis bandwidth				
Standard	10 Hz to 10 MHz			
Option B25 (standard)	10 Hz to 25 MHz			
Option B40	10 Hz to 40 MHz			
IF frequency response (standard 10 MHz IF path)				
IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30 °C)				
Center frequency (GHz)	Span (MHz)	Preselector	Max. error	RMS
< 3.6	≤ 10	N/A	± 0.40 dB	0.04 dB nominal
≥ 3.6	≤ 10	On		0.25 dB nominal
≥ 3.6	≤ 10	Off [1]	± 0.45 dB	0.04 dB nominal
> 26.5 (Option 532 or 544)	≤ 10	On		0.35 dB nominal
IF phase linearity (deviation from mean phase linearity, nominal)				
Center frequency (GHz)	Span (MHz)	Preselector	Peak-to-peak	RMS
< 3.6	≤ 10	N/A	0.4°	0.1°
≥ 3.6	≤ 10	Off [1]	0.4°	0.1°
≥ 3.6 (Option ≤ 526)	≤ 10	On	1.0°	0.2°
Data acquisition (10 MHz IF path)				
Time record length IQ analyzer	4,000,000 IQ sample pairs			
Sample rate at ADC				
– Option DP2, B40 or MPB	100 MSa/s			
– None of the above	90 MSa/s			
ADC resolution				
– Option DP2, B40 or MPB	16 bits			
– None of the above	14 bits			
Option B25 (standard) 25 MHz analysis bandwidth				
IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30 °C)				
Center frequency (GHz)	Span (MHz)	Preselector	Max. error	RMS
≤ 3.6	10 to ≤ 25	N/A	± 0.45 dB	0.051 dB nominal
> 3.6	10 to ≤ 25	On		0.45 dB nominal
> 3.6	10 to ≤ 25	Off [1]	± 0.45 dB	0.071 dB nominal
IF phase linearity (deviation from mean phase linearity, nominal)				
Center frequency (GHz)	Span (MHz)	Preselector	Peak-to-peak	RMS
0.02 ≤ f < 3.6	≤ 25	N/A	0.6°	0.14°
≥ 3.6	≤ 25	Off [1]	1.9°	0.4°
≥ 3.6 (Option ≤ 526)	≤ 25	On	4.5°	1.2°

1. Option MPB is installed and enabled.

Data acquisition (25 MHz IF path)				
Time record length (IQ pairs) IQ Analyzer	**4,000,000 IQ sample pairs**			
89600 software	32-bit packing	64-bit packing		Memory
Option DP2, B40 or MPB	536 MSa	268 MSa		2 GB
None of the above	4,000,000 IQ sample pairs (independent of data packing)			
Sample rate at ADC				
– Option DP2, B40 or MPB	100 MSa/s			
– None of the above	90 MSa/s			
ADC resolution				
– Option DP2, B40 or MPB	16 bits			
– None of the above	14 bits			
Option B40 40 MHz analysis bandwidth				
IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30 °C), nominal				
Center frequency (GHz)	Span (MHz)	Preselector	Max. error	RMS
0.03 ≤ f < 3.6	≤ 40	N/A	± 0.3 dB	0.08 dB
3.6 ≤ f ≤ 26.5	≤ 40	Off [1]	± 0.25 dB	0.08 dB
> 26.5	≤ 40	Off [1]	± 0.25 dB	0.12 dB
IF phase linearity (deviation from mean phase linearity, nominal)				
Center frequency (GHz)	Span (MHz)	Preselector	Peak-to-peak	RMS
0.02 ≤ f < 3.6	40	N/A	0.2°	0.05°
≥ 3.6	40	Off [1]	5°	1.4°
Data acquisition (40 MHz IF path)				
Time record length (IQ pairs) IQ Analyzer	**4,000,000 samples (I/Q pairs)**			
89600 VSA software	32-bit packing	64-bit packing	2 GB total memory (nominal)	
Length (IQ sample pairs)	536 MSa	268 MSa		
Length (time units)			Samples/(span x 1.28) (nominal)	
Sample rate				
– At ADC	200 MSa/s			
– IQ pairs			Span x 1.28 (nominal)	
ADC resolution	12 bits			

1. Option MPB is installed and enabled.

Related Literature

Publication title	Publication number
X-Series Signal Analyzers – Brochure	5992-1316EN
N9010B EXA X-Series Signal Analyzer, Multi-touch – Configuration Guide	5992-1253EN

For more information or literature resources please visit the web:

- Product page: www.keysight.com/find/N9010B
- X-Series measurement applications: www.keysight.com/find/X-Series_Apps
- X-Series signal analyzers: www.keysight.com/find/X-Series

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

KEYSIGHT TECHNOLOGIES