Keysight

EXA X-Series Signal Analyzer N9010A

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

Data Sheet



KEYSIGHT TECHNOLOGIES

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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

Balance the Challenges

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 EXA signal analyzer—and it's the fastest way to maximize throughput on the production line. From measurement speed to code compatibility, it makes every millisecond count and helps reduce your overall cost of test.

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 [1], 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 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

For the complete specifications guide, visit:
www.keysight.com/find/exa_specifications

1. *For earlier instruments (Serial number prefix < MY/SG/US5052), the full temperature ranges from 5 to 50 °C.*

Get More Information

This EXA signal analyzer data sheet is a summary of the specifications and conditions for N9010A EXA signal analyzers, which are available in the EXA Signal Analyzer Specification Guide (N9010-90025).

For ordering information, refer to the EXA Signal Analyzer Configuration Guide (5989-6531EN).

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] [1]		
Aging rate		Option PFR	Standard	w/ J7023A AFR
		± 1 x 10^{-7} / year	± 1 x 10^{-6} / year	± 1 x 10^{-9} / year
		± 1.5 x 10^{-7} / 2 years		
Temperature stability		Option PFR	Standard	w/ J7023A AFR
20 to 30 °C		± 1.5 x 10^{-8}	± 2 x 10^{-6}	± 5 x 10^{-10} / year
Full temperature range		± 5 x 10^{-8}	± 2 x 10^{-6}	
Achievable initial calibration accuracy		Option PFR	Standard	w/ J7023A AFR
		± 4 x 10^{-8}	± 1.4 x 10^{-6}	± 5 x 10^{-11} / year
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 [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		± (0.25 % x span + horizontal resolution)		
FFT		± (0.10 % x span + horizontal resolution)		

1. *When used with external frequency reference 1 pulse-per-second (PPS), such as the J7203A atomic frequency reference (AFR), the reference tracking accuracy needs to be taken into account for calculation of the overall frequency accuracy. Refer to the EXA signal analyzer specifications guide (part number: N9010-90025) for more details.*
2. *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 40001	
Resolution bandwidth (RBW)		
Range (–3.01 dB bandwidth)	1 Hz to 3 MHz (10 % steps), 4, 5, 6, 8 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)	± 0.15 dB nominal
	4 to 8 MHz (< 3.6 GHz CF)	± 0.25 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 or N6141A required)
EMI bandwidth (MIL STD 461E compliant)	10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz	(Option EMC or N6141A required)
Analysis bandwidth [1]		
Maximum bandwidth	Option B40	40 MHz
	Option B25 (standard)	25 MHz
	Standard	10 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	
Measurement speed [2]	**Standard nominal**	**Option PC4 nominal**
Local measurement and display update rate	11 ms (90/s)	4 ms (250/s)
Remote measurement and LAN transfer rate	6 ms (167/s)	5 ms (200/s)
Marker peak search	5 ms	1.5 ms
Center frequency tune and transfer (RF)	22 ms	20 ms
Center frequency tune and transfer (µW)	49 ms	47 ms
Measurement/mode switching	75 ms	39 ms

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.*
2. *Sweep points = 101.*

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
	6.9 to 13.6 GHz	± 2.5 dB	
	13.5 to 22.0 GHz	± 3.0 dB	
	22.0 to 26.5 GHz	± 3.2 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 ≈ 2σ)	
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	< 1.8:1 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 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
	3.6 to 7.0 GHz	–147 dBm	–149 dBm
	7.0 to 13.6 GHz	–143 dBm	–147 dBm
	13.6 to 17.1 GHz	–137 dBm	–142 dBm
	17.1 to 22 GHz	–137 dBm	–142 dBm
	22 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
	3.6 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)	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

Displayed average noise level (DANL) (continued)			
Preamp on, millimeter-wave (Option 532, 544)	100 kHz to 1 MHz	–145 dBm	–148 dBm
	1 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 (Option NFE) on RF/MW (Option 503, 507, 513, 526)			Improvement @ 95th percentile	
Frequency band			Preamp Off	Preamp On
Band 0, f > 20 MHz			9 dB	9 dB
Band 1			9 dB	8 dB
Band 2			9 dB	9 dB
Band 3			11 dB	9 dB
Band 4			9 dB	8 dB
Example of effective DANL @ 18-30 °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]				
Frequency band			Preamp Off	Preamp On
Band 0, f > 20 MHz			7 dB	9 dB
Band 1			8 dB	7 dB
Band 2			8 dB	7 dB
Band 3			8 dB	7 dB
Band 4			8 dB	6 dB
Band 5			9 dB	6 dB
Band 6			9 dB	5 dB
Example of effective DANL @ 18-30 °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. *When Option B40, DP2, or MPB is installed some aspects of the analyzer performance 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	–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 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 –30 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)

Nominal dynamic range for Options 503, 507, 513 and 526

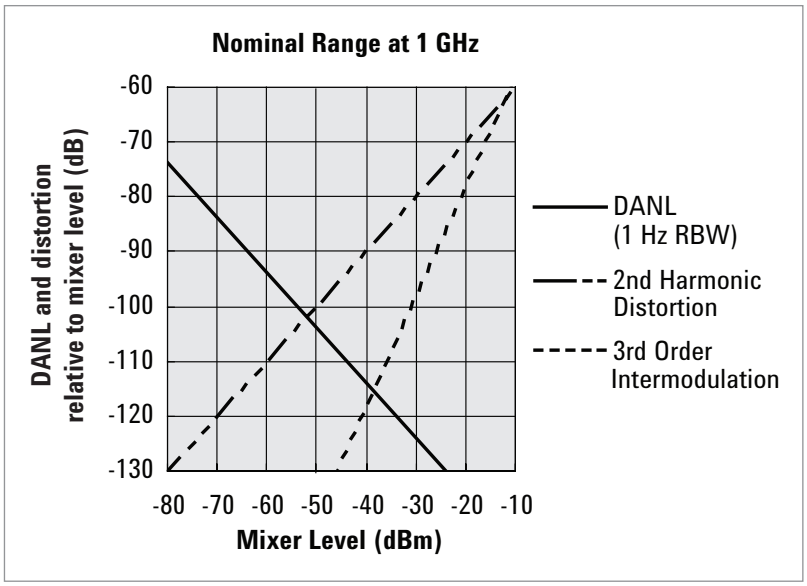


Figure 1. Nominal dynamic range – Band 0, for second and third order distortion, 9 kHz to 3.6 GHz

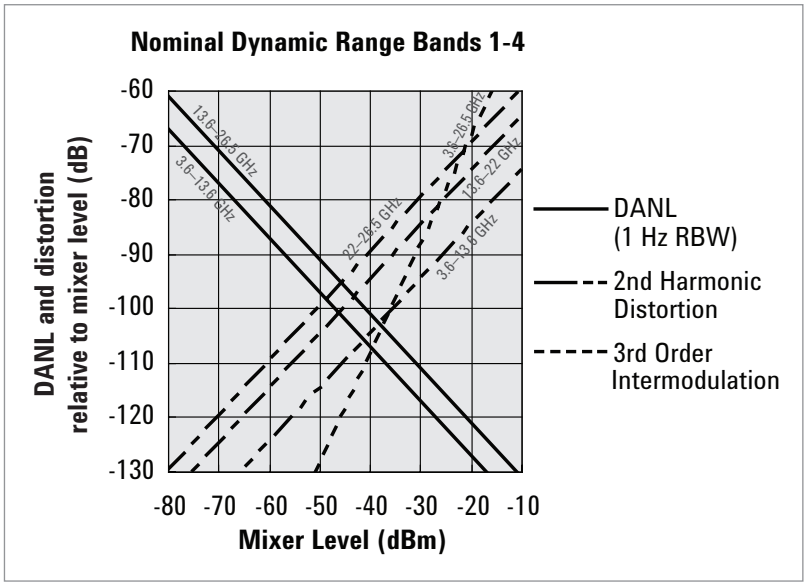


Figure 2. Nominal dynamic range – Bands 1 to 4, for second and third order distortion, 3.6 GHz to 26.5 GHz

Phase noise [1]	Offset	Specification	Typical
RF/MW (Option 503, 507, 513, 526) Noise sidebands (20 to 30 °C, CF = 1 GHz)	100 Hz	–84 dBc/Hz	–88 dBc/Hz
	1 kHz	–	–98 dBc/Hz nominal
	10 kHz	–103 dBc/Hz	–105 dBc/Hz
	100 kHz	–115 dBc/Hz	–117 dBc/Hz
	1 MHz	–135 dBc/Hz	–137 dBc/Hz
	10 MHz	–	–148 dBc/Hz nominal

1. *Apply for all the RF/MW instruments with Serial number prefix ≥ MY/SG/US5340. Those instruments ship standard with N9010A-EP3 as the identifier. For nominal phase noise values with the RF/MW EXA at other center frequencies refer to Figure 3. For earlier instruments refer to the EXA specifications guide.*

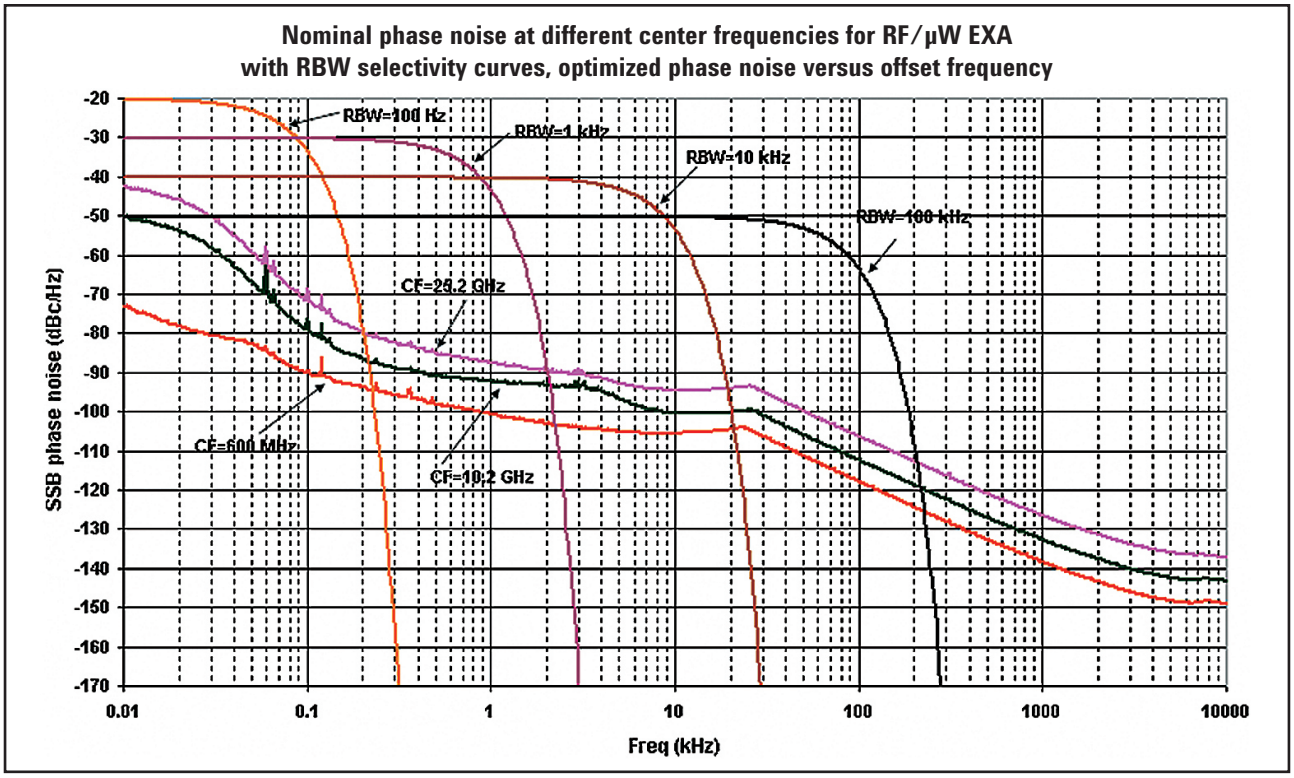


Figure 3. Nominal phase noise at different center frequencies for RF/MW EXA (Option 503, 507, 513, or 526) with SN prefix >/= MY/SG/US5340 that ships standard with N9010A-EP3.

Phase noise [1]	Offset	Specification	Typical
Millimeter-wave (Option 532, 544) Noise sidebands (20 to 30 °C, CF = 1 GHz)	100 Hz	–84 dBc/Hz	–88 dBc/Hz
	1 kHz	–	–101 dBc/Hz nominal
	10 kHz	–103 dBc/Hz	–106 dBc/Hz
	100 kHz	–115 dBc/Hz	–116 dBc/Hz
	1 MHz	–135 dBc/Hz	–137 dBc/Hz
	10 MHz	–	–149 dBc/Hz nominal

1. For nominal phase noise values with the millimeter-wave EXA (Option 532 or 544), refer to Figure 4.

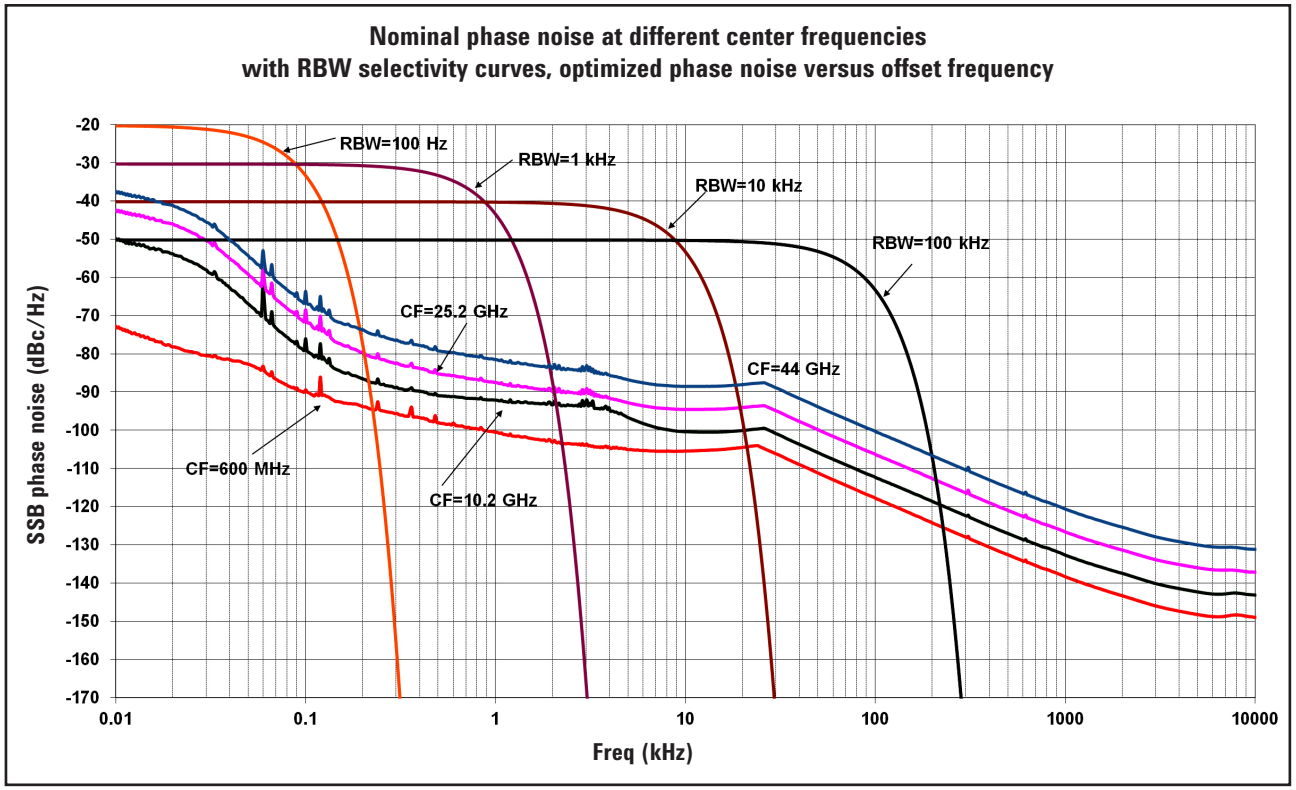


Figure 4. Nominal phase noise at different center frequencies for millimeter-wave EXA (Option 532 or 544)

Option MPB, microwave preselector bypass [1]	
Frequency range	
N9010A-507	3.6 to 7 GHz
N9010A-513	3.6 to 13.6 GHz
N9010A-526	3.6 to 26.5 GHz
N9010A-532	3.6 to 32 GHz
N9010A-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)	± 0.94 dB (±0.30 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	± 0.22 dB	± 0.34 dB
BTS	± 1.07 dB	± 1.00 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)	14 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	93.1 dB	98.4 dB typical
Absolute sensitivity	–79.4 dBm	–85.4 dBm typical
Spectrum emission mask (SEM)		
cdma2000 (750 kHz offset)		
Relative dynamic range (30 kHz RBW)	74.0 dB	81.0 dB typical
Absolute sensitivity	–94.7 dBm	–100.7 dBm typical
Relative accuracy	± 0.11 dB	
3GPP W-CDMA (2.515 MHz offset)		
Relative dynamic range (30 kHz RBW)	76.5 dB	83.9 dB typical
Absolute sensitivity	–94.7 dBm	–100.7 dBm typical
Relative accuracy	± 0.12 dB	

General Specifications

Temperature range	
Operating	0 to 55 °C
Storage	–40 to 70 °C
EMC	
Complies with European EMC Directive 2004/108/EC – IEC/EN 61326-1 or IEC/EN 61326-2-1 – CISPR Pub 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 European Low Voltage Directive 2006/95/EC – IEC/EN 61010-1 3rd Edition – Canada: CSA C22.2 No. 61010-1-12 – U.S.A.: UL 61010-1 3rd Edition	
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 to 120 V, 50/60/400 Hz
	220 to 240 V, 50/60 Hz
Power consumption On	350 W maximum
Standby	20 W
Display	
Resolution	1024 x 768, XGA
Size	213 mm (8.4 in.) diagonal (nominal)
Data storage	
Internal	≥ 80 GB nominal (removable solid-state drive)
External	Supports USB 2.0 compatible memory devices
Weight (without options)	
Net	16 kg (35 lbs) nominal
Shipping	28 kg (62 lbs) nominal
Dimensions	
Height	177 mm (7.0 in)
Width	426 mm (16.8 in)
Length	368 mm (14.5 in)
Warranty	
The EXA signal analyzer is supplied with a standard 3-year warranty	
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 2.0 ports	
Master (2 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	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 2.0 ports	
Master (4 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	0.5 A nominal
Slave (1 port)	
Standard	Compatible with USB 2.0
Connector	USB Type-B female
Output current	0.5 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	322.5 MHz
with 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
EXA X-Series Signal Analyzer N9010A – Brochure	5989-6527EN
N9010A EXA X-Series Signal Analyzer – Configuration Guide	5989-6531EN

For more information or literature resources please visit the web:
Product page: **www.keysight.com/find/N9010A**
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