N9032B PXA X-Series Signal Analyzer, Multi-Touch

2 Hz to 8.4, 13.6, 26.5, 44, 50, or 55 GHz

KEYSIGHT

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Data Sheet Definitions and Conditions

This data sheet provides performance information for Keysight N9032B Signal Analyzers.

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

95th percentile values indicate the breadth of the population (approx. 2 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 (typ) 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 (nom) 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 that Auto Sweep Time Rules = Accy
- For signal frequencies < 10 MHz, DC coupling applied.
- Analyzer is used in environment that falls within allowed operating range; and has been in that environment at least 2 hours before being turned on.
- Analyzer has been turned on at least 30 minutes with AutoAlign 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. Note that factory default is with the AutoAlign set to Light, which (compared to Normal) allows wider temperature changes before causing Alignments to run automatically. The benefit is that Alignments interrupt less frequently. The user can change AutoAlign to Normal if desired, and this setting will persist after power cycle or PRESET. 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. In practice, the impact of such choices is primarily on Absolute Amplitude Accuracy. If temperature changes are small, the impact of Light vs Normal is negligible. Also, the user may invoke Align All at any time, to get the best possible accuracy.
- The term “mixer level” is used as a condition for many specifications in this document. This term is a conceptual quantity that is defined as follows: Mixer Level (dBm) = RF Input Power Level (dBm) - (Mechanical Attenuation) (dB) - (Electronic Attenuation) (dB).
- The term “attenuation” is used for many specifications in this document; this refers to the Mechanical Attenuator, unless otherwise stated.

Common abbreviations

BW	bandwidth
FBP	full bypass path
FFT	fast Fourier transform
IQ	in-phase quadrature-phase (sample data)
IVL	Individual validated license (for export to restricted countries)
LNA	low-noise amplifier
LNP	low-noise path
LO	local oscillator
PA	pre-amplifier
MPB	microwave preselector bypass
RBW	resolution bandwidth (filter)
VBW	video bandwidth (filter)

Frequency and Time Specifications

Frequency option	Frequency range DC coupled	
508	2 Hz to 8.4 GHz	
513	2 Hz to 13.6 GHz	
526	2 Hz to 26.5 GHz	
544	2 Hz to 44 GHz	
550	2 Hz to 50 GHz	
555	2 Hz to 55 GHz	
Minimal frequency	**DC coupled**	**AC coupled (option 508, 513 and 526)**
PA off, LNA off	2 Hz	10 MHz
PA on	9 kHz	10 MHz
LNA on	20 MHz	20 MHz
Swept spectrum analysis (these bands are not applicable to wide-bandwidth IQ analysis)		
Swept frequency band	LO multiple (N)	Frequency range
0	1	2 Hz to 3.6 GHz
1	1	3.5 to 8.4 GHz
2	2	8.3 to 13.6 GHz
3	2	13.5 to 17.1 GHz
4	4	17.0 to 26.5 GHz
5	4	26.4 to 34.5 GHz
6	8	34.4 to 55 GHz
Frequency reference		
Accuracy (total)	± [(Initial accuracy) + (aging rate x time since last adjustment) + (temperature stability)]	
Aging rate	± 3 x 10^{-8} / year	
Temperature stability	± 4.5 x 10^{-9} over full temperature range	
Achievable initial calibration accuracy	± 3.1 x 10^{-8}	
Example frequency reference accuracy 1 year after last adjustment	= ± (3 x 10^{-8} + 4.5 x 10^{-9} + 3.1 x 10^{-8}) = ± 6.6 x 10^{-8}	
Residual FM		
Center frequency = 1 GHz, 10 Hz RBW, 10 Hz VBW	≤ (0.25 Hz x N) p–p in 20 ms nominal (N = LO multiple, see band table above)	
Frequency readout accuracy (start, stop, center, marker)		
± (marker frequency x frequency reference accuracy + 0.10 % x span + 5 % x RBW + 2 Hz + 0.5 x horizontal resolution) where horizontal resolution is span/(sweep points-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	± (0.1 % x span + horizontal resolution) where horizontal resolution is span/(sweep points –1)	
FFT	± (0.1 % x span + horizontal resolution) where 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 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)	1 µs to 5.0 s
Gate delay range	0 to 100.0 s
Gate delay jitter	33.3 ns p-p (nom)
Sweep trace) point range	
All spans	1 to 100,001
Resolution bandwidth (RBW) filters (see also IQ Analysis section)	
Range (with –3 dB bandwidth, standard)	1 Hz to 3 MHz (10% steps), 4, 5, 6, 8, and 10 MHz
Bandwidth accuracy (power)	
RBW range	**Accuracy**
1 Hz to 100 kHz	± 0.5% (± 0.022 dB)
110 kHz to 1.0 MHz (< 3.6 GHz CF)	± 1.0% (± 0.044 dB)
1.1 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 dB)	
RBW range	**Accuracy**
1 Hz to 1.3 MHz	± 2% (nominal)
1.5 MHz to 3 MHz	
(≤ 3.6 GHz center frequency)	± 7% (nominal)
(> 3.6 GHz center frequency)	± 8% (nominal)
4 MHz to 10 MHz	
(≤ 3.6 GHz center frequency)	± 15% (nominal)
(> 3.6 GHz center frequency)	± 20% (nominal)
Selectivity (–60 dB/–3 dB)	4.1: 1 (nominal)
EMI bandwidths (CISPR 16-1-1; requires N90EMEMCB or N6141EM0E)	200 Hz, 9 kHz, 120 kHz, 1 MHz
EMI bandwidths (MIL-STD-461; requires N90EMEMCB or N6141EM0E)	10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz

Preselector bandwidth

The preselector can have a significant passband ripple. To avoid ambiguous results, the -4dB bandwidth is characterized

Center frequency	Mean bandwidth (- 4 dB)		
	Option 508, 513 and 526	**Option 544 and 550**	**Option 555**
5 GHz	58 MHz	46 MHz	39 MHz
10 GHz	57 MHz	52 MHz	46 MHz
15 GHz	59 MHz	53 MHz	47 MHz
20 GHz	64 MHz	55 MHz	48 MHz
25 GHz	74 MHz	56 MHz	52 MHz
35 GHz	N/A	62 MHz	57 MHz
44 GHz		70 MHz	64 MHz
50 GHz		76 MHz	72 MHz
55 GHz		N/A	80 MHz

Video bandwidth (VBW) filters	
Range	1 Hz to 3 MHz (10% steps), 4, 5,6, 8 MHz, and wide open (labeled 50 MHz)
Accuracy	± 6%, nominal
Detector types	
Normal, peak, sample, negative peak, log power average, RMS average, and voltage average	
With N90EMEMCB or N6141EM0E	Add quasi-peak and EMI average to above

Triggers and Gating

Trigger/Gate sources				
	Swept trigger	**Gate source**	**Wide bandwidth IQ trigger**	**Supplemental information**
Free Run	Y		Y	
External 1	Y	Y	Y	Jitter up to ~33 ns p-p (nominal)
External 2	Y	Y	Y	
External 3			Y	Jitter < 20 ps (nominal)
RF Burst	Y	Y		IF Path ≤ 40 MHz only
Video (IF Mag)	Y		Y	In 255 MHz IF Path only; at greater bandwidths, ADC trigger is similar
ADC			Y	Similar to Video, but operates digitally on mag[I,Q], prior to decimation, filtering, and corrections. Available for bandwidth > 255 MHz.
Line	Y	Y	Y	
Periodic	Y	Y	Y	Repetitive “frame” trigger, at precise interval, following an External or RF Burst trigger
TV	Y	Y		

Triggers		
Video (independent of Display Scaling and Reference Level)	**Specifications**	**Supplemental information**
Minimum settable level	-170 dBm	Useful range limited by noise
Maximum usable level		Highest allowed mixer level (the highest allowed mixer level depends on the IF Gain. It is nominally –10 dBm for Preamp Off and IF Gain = Low) + 2 dB (nominal)

Detector and sweep type relationships	
	Supplemental information
Sweep Type = Swept	
Detector = Normal, Peak, Sample or Negative Peak	Triggers on the signal before detection, which is similar to the displayed signal
Detector = Average	Triggers on the signal before detection, but with a single-pole filter added to give similar smoothing to that of the average detector
Sweep Type = FFT	Triggers on the signal envelope in a bandwidth wider than the FFT width

RF Burst	Specifications	Supplemental information
Level range	−40 to −10 dBm plus attenuation (nominal)	Noise will limit trigger level range at high frequencies, such as above 15 GHz
Level accuracy		
With positive slope trigger. Trigger level with negative slope is nominally 1 to 4 dB lower than positive slope.		
Absolute	± 2 dB + Absolute Amplitude Accuracy (nominal)	
Relative	± 2 dB (nominal)	
Bandwidth (-10 dB)		
Most cases (including RF Burst Level Type = Relative)	> 80 MHz (nominal)	
Start Freq < 300 MHz RF Burst Level Type = Absolute		
Sweep Type = Swept	16 MHz (nominal)	
Sweep Type = FFT		
FFT Width > 25 MHz	> 80 MHz (nominal)	
FFT Width 8 to 25 MHz	30 MHz (nominal)	
FFT Width < 8 MHz	16 MHz (nominal)	
Frequency Limitations		If the start or center frequency is too close to zero, LO feedthrough can degrade or prevent triggering. How close is too close depends on the bandwidth listed above.
Amplitude Requirements		–65 dBm minimum video carrier power at the input mixer, nominal

Amplitude Accuracy and Range Specifications

Amplitude characteristics vary by user-selectable front-end path. Swept SA measurements are normally made with preselector on (in circuit). These settings impact amplitude accuracy and range.

Front end settings			
1a	Standard path	Preselector	Default selection following power-on, boot-up, or PRESET. Settings provide best dynamic range and lowest internally-generated distortion. Suitable for harmonics, IMD, spurious in presence of large signals, etc. unless noise-limited.
1b		Preselector, LNA on	Requires P08, P13, P26, P44, P4L, P50, P5L, P55, or P5N. Settings provide lower DANL, compared to 1a, while preserving very good dynamic range. Suitable for distortion measurements (harmonics, IMD, etc.) when a lower noise floor is needed.
1c		Preselector, PA on	Requires P08, P13, P26, P44, P4L, P50, P5L, P55, or P5N. Settings provide lower DANL, compared to 1b.
1d		Preselector, LNA on, PA on	Requires P08, P13, P26, P44, P4L, P50, P5L, P55, or P5N. Settings provide lowest possible DANL, compared to 1c. Best for finding low-level spurs, oscillations, etc. near the noise floor. Allows use of wider RBW setting to achieve equivalent noise floors, so can make spur searching faster.
2a	Low-noise path (LNP)	Preselector, LNP	Bypasses the preamplifier. Settings provide the lowest distortion and best dynamic range, yet with lower DANL at higher frequencies, when compared with 1a. Path not active below 3.6 GHz.
2b		Preselector, LNP, LNA on	Bypasses the preamplifier. Requires P08, P13, P26, P44, P4L, P50, P5L, P55, or P5N. Settings provide the lower DANL, compared to 2a, while preserving very good dynamic range. Path not active at below 3.6 GHz.
3a	Microwave Preselector Bypass path (MPB)	MPB	Bypasses preselector. Settings provide very good EVM floor at mid-high input power region (using attenuation), including below 3.6 GHz. Good for wideband digitizer and FFT measurements. Recommend using path 4a if above 3.6 GHz.
3b		LNA on	Bypasses preselector. Requires P08, P13, P26, P44, P4L, P50, P5L, P55, or P5N. Settings provide best EVM at low input power for below 3.6 GHz. Good for wideband digitizer and FFT measurements. Otherwise use path 4b if above 3.6 GHz.
3c		PA on	Bypasses preselector. Requires P08, P13, P26, P44, P4L, P50, P5L, P55, or P5N. Good for wideband digitizer and FFT measurements. Settings allowed only for very low power levels since preselector is bypassed. Not generally recommended for digital demodulation.
3d		LNA on, PA on	Bypasses preselector. Requires P08, P13, P26, P44, P4L, P50, P5L, P55, or P5N. Good sensitivity for narrowband swept measurements only. Not generally recommended for digital demodulation.
4a	Full Bypass path (FBP)	LNP, MPB	Bypasses both preamplifier and preselector. Settings provide best EVM floor for mid-high input power region (using attenuation) for above 3.6 GHz. Best for wideband digitizer and FFT measurements. Otherwise use path 3a if below 3.6 GHz.
4b		LNP, MPB, LNA on	Bypasses both preamplifier and preselector. Requires P08, P13, P26, P44, P4L, P50, P5L, P55, or P5N. Settings provide best EVM floor for low input power region (using attenuation) for above 3.6 GHz. Best for wideband digitizer and FFT measurements. Otherwise use path 3b if below 3.6 GHz.

Amplitude range	
Measurement range	Displayed average noise level (DANL) to +30 dBm (for preamp Off) DANL to +24 dBm (for frequency opts ≤ 526 with preamp On) DANL to +20 dBm (for frequency opts > 526 with preamp On)
Input mechanical attenuator range (2 Hz to 55 GHz)	0 to 70 dB in 2 dB steps
Electronic attenuator (option EA3)	
Frequency range	2 Hz to 3.6 GHz
Attenuation range	
Electronic attenuator range	0 to 24 dB, 1 dB steps
Full attenuation range (mechanical + electronic)	0 to 94 dB, 1 dB steps
Maximum safe input level (max applied to RF input connector)	
Average total power (with and without preamp)	+30 dBm (1 W)
Peak pulse power (< 10 µs pulse width, < 1% duty cycle, and input attenuation ≥ 30 dB)	+50 dBm (100 W)
DC volts	
DC coupled	± 0.2 Vdc
AC coupled (Option 508,513 or 526)	± 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

1a. Standard path frequency response (swept, preselector on, LNA off, PA off) 10 dB input attenuation, relative to reference conditions (50 MHz), preselector centering applied above 3.6 GHz			
Frequency	**Full range**	**20 to 30° C**	**Typical, unless otherwise stated**
2 Hz to 30 MHz	± 0.50 dB	± 0.40 dB	± 0.15 dB
> 30 MHz to 50 MHz	± 0.40 dB	± 0.35 dB	± 0.20 dB
> 50 MHz to 3.6 GHz	± 0.60 dB	± 0.35 dB	± 0.20 dB
> 3.6 to 5.2 GHz	± 3.50 dB	± 1.70 dB	± 1.00 dB
> 5.2 to 8.4 GHz	± 2.50 dB	± 1.50 dB	± 0.60 dB
> 8.4 to 13.6 GHz	± 2.00 dB	± 1.50 dB	± 0.60 dB
> 13.6 to 17.1 GHz	± 2.20 dB	± 1.50 dB	± 0.60 dB
> 17.1 to 22.0 GHz	± 2.30 dB	± 1.50 dB	± 0.60 dB
> 22.0 to 26.5 GHz	± 2.50 dB	± 2.00 dB	± 0.70 dB
> 26.5 to 34.5 GHz	± 3.50 dB	± 2.30 dB	± 1.00 dB
> 34.5 to 36.5 GHz	± 5.20 dB	± 2.50 dB	± 1.50 dB
> 36.5 to 55.0 GHz	± 5.20 dB	± 3.10 dB	± 1.50 dB

1b. Standard path, LNA on frequency response (swept, preselector on, LNA on, PA off) 0 dB input attenuation, relative to reference conditions (50 MHz), preselector centering applied above 3.6 GHz			
Frequency	**Full range**	**20 to 30° C**	**Typical, unless otherwise stated**
30 MHz to 3.6 GHz	± 0.70 dB	± 0.50 dB	± 0.20 dB
> 3.6 to 5.2 GHz	± 3.50 dB	± 1.90 dB	± 1.10 dB
> 5.2 to 8.4 GHz	± 2.70 dB	± 1.70 dB	± 0.70 dB
> 8.4 to 13.6 GHz	± 2.30 dB	± 1.70 dB	± 0.70 dB
> 13.6 to 17.1 GHz	± 2.60 dB	± 1.70 dB	± 0.70 dB
> 17.1 to 22.0 GHz	± 2.80 dB	± 1.90 dB	± 0.70 dB
> 22.0 to 26.5 GHz	± 3.00 dB	± 2.30 dB	± 0.80 dB
> 26.5 to 34.5 GHz	± 3.70 dB	± 2.60 dB	± 1.20 dB
> 34.5 to 55.0 GHz	± 5.30 dB	± 3.20 dB	± 1.60 dB

1c. Standard path, PA on frequency response (swept, preselector on, LNA off, PA on) 0 dB input attenuation, relative to reference conditions (50 MHz), preselector centering applied above 3.6 GHz			
Frequency	**Full range**	**20 to 30° C**	**Typical, unless otherwise stated**
9 kHz to 100 kHz			± 0.40 dB (nom)
> 100 kHz to 50 MHz	± 0.80 dB	± 0.68 dB	± 0.35 dB
> 50 MHz to 3.6 GHz	± 0.80 dB	± 0.60 dB	± 0.20 dB
> 3.6 to 5.2 GHz	± 3.50 dB	± 2.30 dB	± 1.20 dB
> 5.2 to 8.4 GHz	± 2.70 dB	± 2.00 dB	± 0.80 dB
> 8.4 to 13.6 GHz	± 2.50 dB	± 2.00 dB	± 0.80 dB
> 13.6 to 17.1 GHz	± 2.50 dB	± 2.00 dB	± 0.95 dB
> 17.1 to 22.0 GHz	± 2.90 dB	± 2.20 dB	± 0.95 dB
> 22.0 to 26.5 GHz	± 3.70 dB	± 2.70 dB	± 1.20 dB
> 26.5 to 34.5 GHz	± 4.50 dB	± 2.90 dB	± 1.30 dB
> 34.5 to 55.0 GHz	± 5.20 dB	± 3.40 dB	± 1.60 dB

2b. Low-noise path (LNP) frequency response (low-noise path enabled, preselector on, LNA on, PA off) 0 dB input attenuation, relative to reference conditions (50 MHz), preselector centering applied above 3.6 GHz	
Frequency	**Frequency response (nominal)**
< 3.6 GHz	If tuning to <3.6 GHz, then actually using Standard Path with LNA ON
3.6 to 8.4 GHz	± 0.80 dB
> 8.4 to 17.1 GHz	± 0.70 dB
> 17.1 to 26.5 GHz	± 1.00 dB
> 26.5 to 34.5 GHz	± 1.00 dB
> 34.5 to 55.0 GHz	± 1.40 dB

1d. Standard path, LNA on, PA on frequency response (swept, preselector on, LNA on, PA on) 0 dB input attenuation, relative to reference conditions (50 MHz), preselector centering applied above 3.6 GHz			
Frequency	**Full range**	**20 to 30 °C**	**Typical, unless otherwise stated**
< 3.6 GHz	(if tuning < 3.6 GHz, then standard path with LNA on is used)		
3.6 to 5.2 GHz	± 3.50 dB	± 2.10 dB	± 1.30 dB
> 5.2 to 8.4 GHz	± 2.80 dB	± 1.80 dB	± 0.75 dB
> 8.4 to 13.6 GHz	± 2.40 dB	± 1.80 dB	± 0.75 dB
> 13.6 to 17.1 GHz	± 2.40 dB	± 1.80 dB	± 0.75 dB
> 17.1 to 22.0 GHz	± 2.70 dB	± 2.10 dB	± 0.75 dB
> 22.0 to 26.5 GHz	± 3.20 dB	± 2.50 dB	± 0.90 dB
> 26.5 to 34.5 GHz	± 3.90 dB	± 2.80 dB	± 1.30 dB
> 34.5 to 36.5 GHz	± 5.30 dB	± 3.40 dB	± 1.70 dB
> 36.5 to 45.0 GHz	± 5.30 dB	± 3.40 dB	± 1.70 dB
> 45.0 to 50.0 GHz	± 5.80 dB	± 3.40 dB	± 1.70 dB
> 50.0 to 55.0 GHz	± 6.20 dB	± 3.40 dB	± 1.70 dB

2a. Low-noise path (LNP) frequency response (low-noise path enabled, preselector on, LNA off, PA off) 10 dB input attenuation, relative to reference conditions (50 MHz), preselector centering applied above 3.6 GHz			
Frequency	**Full range**	**20 to 3 0°C**	**Typical, unless otherwise stated**
< 3.6 GHz	If tuning to <3.6 GHz, then actually using Standard Path		
3.6 to 5.2 GHz	± 3.50 dB	± 1.80 dB	± 1.00 dB
> 5.2 to 8.4 GHz	± 2.50 dB	± 1.50 dB	± 0.75 dB
> 8.4 to 13.6 GHz	± 2.00 dB	± 1.50 dB	± 0.75 dB
> 13.6 to 17.1 GHz	± 2.00 dB	± 1.50 dB	± 0.75 dB
> 17.1 to 22.0 GHz	± 2.50 dB	± 2.00 dB	± 0.90 dB
> 22.0 to 26.5 GHz	± 3.00 dB	± 2.50 dB	± 1.05 dB
> 26.5 to 34.5 GHz	± 3.60 dB	± 2.80 dB	± 1.10 dB
> 34.5 to 36.5 GHz	± 5.30 dB	± 3.10 dB	± 1.40 dB
> 36.5 to 45.0 GHz	± 4.40 dB	± 3.10 dB	± 1.40 dB
> 45.0 to 55.0 GHz	± 5.30 dB	± 3.10 dB	± 1.40 dB

3a. Microwave preselector bypass (MPB) path frequency response (MBP enabled, LNA off, PA off) 10 dB input attenuation, relative to reference conditions (50 MHz),			
Frequency	**Full range**	**20 to 30 °C**	**Typical, unless otherwise stated**
3.6 to 8.4 GHz	± 1.40 dB	± 1.00 dB	± 0.50 dB
> 8.4 to 13.6 GHz	± 1.60 dB	± 1.10 dB	± 0.55 dB
> 13.6 to 17.1 GHz	± 1.80 dB	± 1.10 dB	± 0.55 dB
> 17.1 to 22.0 GHz	± 2.00 dB	± 1.40 dB	± 0.60 dB
> 22.0 to 26.5 GHz	± 2.20 dB	± 1.60 dB	± 0.70 dB
> 26.5 to 34.5 GHz	± 2.90 dB	± 1.80 dB	± 0.90 dB
> 34.5 to 36.5 GHz	± 5.50 dB	± 3.00 dB	± 1.50 dB
> 36.5 to 45.0 GHz	± 4.00 dB	± 3.00 dB	± 1.50 dB
> 45.0 to 55.0 GHz	± 5.50 dB	± 3.00 dB	± 1.50 dB

3b, 3c, 3d. Microwave preselector bypass (MPB) path frequency response (MBP path enabled, relative to 10 dB, excludes 0 dB setting)			
Frequency	**3b. MPB, LNA on (0 dB input attenuation) (nominal)**	**3c. Std, PA on (0 dB input attenuation) (nominal)**	**3d. Std, LNA on, PA on (0 dB input attenuation) (nominal)**
3.6 GHz to 8.4 GHz	± 0.40 dB	± 0.30 dB	± 0.40 dB
> 8.4 to 13.6 GHz	± 0.50 dB	± 0.40 dB	± 0.50dB
> 13.6 to 17.1 GHz	± 0.50 dB	± 0.40 dB	± 0.50 dB
> 17.1 to 26.5 GHz	± 0.50 dB	± 0.50 dB	± 0.60 dB
> 26.5 to 34.5 GHz	± 0.60 dB	± 0.60 dB	± 0.70 dB
> 34.5 to 55 GHz	± 1.10 dB	± 1.20 dB	± 1.10 dB

4a, 4b. Full bypass (FBP) path frequency response (full bypass path enabled)		
Frequency	**4a. FBP (10 dB input attenuation) (nominal)**	**4b. FBP, LNA on (0 dB input attenuation) (nominal)**
3.6 to 8.4 GHz	± 0.40 dB	± 0.40 dB
> 8.4 to 13.6 GHz	± 0.40 dB	± 0.50 dB
> 13.6 to 17.1 GHz	± 0.40 dB	± 0.50 dB
> 17.1 to 26.5 GHz	± 0.40 dB	± 0.50 dB
> 26.5 to 34.5 GHz	± 0.50 dB	± 0.60 dB
> 34.5 to 55 GHz	± 1.00 dB	± 1.00 dB

Electronic attenuator (option EA3) frequency response			
Maximum error relative to reference conditions (50 MHz). Mechanical attenuation set to default/calibrated setting of 10 dB.			
Frequency	**Full range**	**20 to 30 °C**	**Typical, unless stated otherwise**
2 Hz to 9 kHz	± 0.80 dB	± 0.60 dB	± 0.25 dB
9 kHz to 50 MHz	± 0.80 dB	± 0.60 dB	± 0.25 dB
50 MHz to 3.6 GHz	± 0.60 dB	± 0.40 dB	± 0.20 dB

Note: Signal frequencies above 18 GHz are prone to additional response errors due to modes in the Type-N connector used. Only analyzers with frequency Option 526 that do not also have input connector Option C35 will have these modes. With the use of Type-N to APC 3.5 mm adapter part number 1250-1744, there are nominally six such modes. The effect of these modes with this connector are included within these specifications.

Attenuator switching uncertainty (50 MHz reference frequency, relative to 10 dB reference setting, LNA off, PA off)		
1a. Standard path (swept, preselector on, LNA off, PA off)		
Attenuation	**Full range**	**Typical**
12 to 40 dB	± 0.14 dB	± 0.04 dB
2 to 8 dB, or > 40 dB	± 0.18 dB	± 0.06 dB
0 dB		± 0.05 dB (nominal)
Attenuation >2 dB at other frequencies (nominal)		
2 Hz to 3.6 GHz	± 0.3 dB	
> 3.6 to 8.4 GHz	± 0.5 dB	
> 8.4 to 26.5 GHz	± 0.7 dB	
> 26.5 to 55 GHz	± 1.0 dB	

Total absolute amplitude accuracy (at 50 MHz)				
At 50 MHz, 10 dB attenuation, RBW < = 1 MHz, input signal -10 to -50 dBm, all settings auto-coupled except Auto Swp Time = Accy, any Reference Level, any vertical Scale.				
Path	**Full range**	**20 to 30 °C**	**Typical**	**AutoAlign = Light, nominal**
1a. Std	± 0.35 dB	± 0.30 dB	± 0.10 dB	± 0.17 dB
1b. Std (LNA on, preamp off)	± 0.40 dB	± 0.35 dB	± 0.15 dB	± 0.19 dB
1c. Std (LNA off, preamp on)	± 0.40 dB	± 0.35 dB	± 0.15 dB	± 0.17 dB
With electronic attenuator				
(at 50MHz, 0 to 24 dB attenuation, RBW < = 1 MHz, input signal -7 to -25 dBm, all settings auto-coupled except Auto Swp Time = Accy, any Reference Level, any vertical Scale)				
	± 0.35 dB	± 0.30 dB	± 0.10 dB	± 0.17 dB
For absolute amplitude accuracy at any frequency, use the following formulas:				
At any frequency	± (Abs Amp at 50 MHz + Frequency Response)			
Wide range of signal levels, resolution bandwidths, reference levels, attenuation = 10 dB, 10 Hz to 3.6 GHz	± 0.20 dB, 95th percentile			

Note1: Absolute amplitude accuracy is the total of all amplitude measurement errors, and applies over the following subset of settings and conditions:

1 Hz ≤ RBW ≤ 1 MHz
Input signal −10 to −50 dBm (details below)
Input attenuation 10 dB
Span < 5 MHz (nominal additional error for span ≥ 5 MHz is is 0.02 dB)
All settings auto-coupled except Swp Time Rules = Accuracy
Combinations of low signal level and wide RBW use VBW ≤ 30 kHz to reduce noise
When using FFT sweeps, the signal must be at the center frequency.

This absolute amplitude accuracy specification includes the sum of the following individual specifications under the conditions listed above: Scale Fidelity, Reference Level Accuracy, Display Scale Switching Uncertainty, Resolution Bandwidth Switching Uncertainty, 50 MHz Amplitude Reference Accuracy, and the accuracy with which the instrument aligns its internal gains to the 50 MHz Amplitude Reference. The only difference between signals within the range above –50 dBm and those signals below that level is the scale fidelity. Our specifications and experience show no difference between signals above and below this level. The only reason our Absolute Amplitude Uncertainty specification does not go below this level is that noise detracts from our ability to verify the performance at all levels with acceptable test times and yields. So the performance is not warranted at lower levels, but we fully expect it to be the same.

Note 2: Absolute amplitude accuracy for a wide range of signal and measurement settings, covers the 95th percentile proportion with 95% confidence. Here are the details of what is covered and how the computation is made:

The wide range of conditions of RBW, signal level, VBW, reference level and display scale are described above.
There are 44 quasi-random combinations used, tested at a 50 MHz signal frequency.
We compute the 95th percentile proportion with 95% confidence for this set observed over a statistically significant number of instruments.
Also, the frequency response relative to the 50 MHz response is characterized by varying the signal across a large number of quasi-random verification frequencies that are chosen to not correspond with the frequency response adjustment frequencies.
We again compute the 95th percentile proportion with 95% confidence for this set observed over a statistically significant number of instruments.
We also compute the 95th percentile accuracy of tracing the calibration of the 50 MHz absolute amplitude accuracy to a national standards organization.
We also compute the 95th percentile accuracy of tracing the calibration of the relative frequency response to a national standards organization
We take the root-sum-square of these four independent Gaussian parameters
To that RSS we add the environmental effects of temperature variations across the 20 to 30°C range.
These computations and measurements are made with the mechanical attenuator only in circuit, set to the reference state of 10 dB.

VSWR (voltage standing wave ratio) at RF Input (95th percentile)						
Standard path, 10 dB input attenuation, 50 MHz (reference condition)				1.09:1 (nominal)		
Standard path, 0 dB input attenuation, 0.01 to 3.6 GHz				2.05:1 (nominal)		
Frequency	**Option**			**1a Std, LNA off, PA off (10 dB attenuation)**	**1b Std, LNA on, PA off 1d Std, LNA on, PA on IF Path ≤ 40 MHz (0 dB attenuation)**	**1c Std, LNA off, PA on IF Path ≤ 40 MHz (0 dB attenuation)**
	508, 513, and 526	**544 and 550**	**555**			
10 MHz to 3.6 GHz	x	x		1.20	1.30	1.70
			x	1.20	1.30	1.80
3.6 to 8.4 GHz	x	x		1.30	1.50	1.60
			x	1.40	1.60	1.70
8.4 to 13.6 GHz	x			1.50	1.60	1.60
		x	x	1.30	1.40	1.50
13.6 to 17.1 GHz	x			1.60	1.70	1.70
		x	x	1.30	1.40	1.40
17.1 to 26.5 GHz	x			1.80	1.80	1.80
		x		1.40	1.40	1.50
			x	1.60	1.60	1.70
26.5 to 34.5 GHz		x		1.50	1.60	1.60
			x	1.70	1.70	1.80
34.5 to 50 GHz		x		1.70	1.70	1.80
			x	1.80	1.80	1.90
50.0 to 55.0 GHz			x	1.70	1.70	1.70
The magnitude of the mismatch over the range of frequencies will be very similar between MPB and non-MPB operation, between LNP and non-LNP operation, and between FBP and non-FBP operation, but the details, such as the frequencies of the peaks and valleys, will shift.						
A similar process is used for computing the result when using the electronic attenuator under a wide range of settings: all even settings from 4 through 24 dB inclusive, with the mechanical attenuator set to 10 dB. The 95th percentile result was 0.20 dB.						

VSWR plots

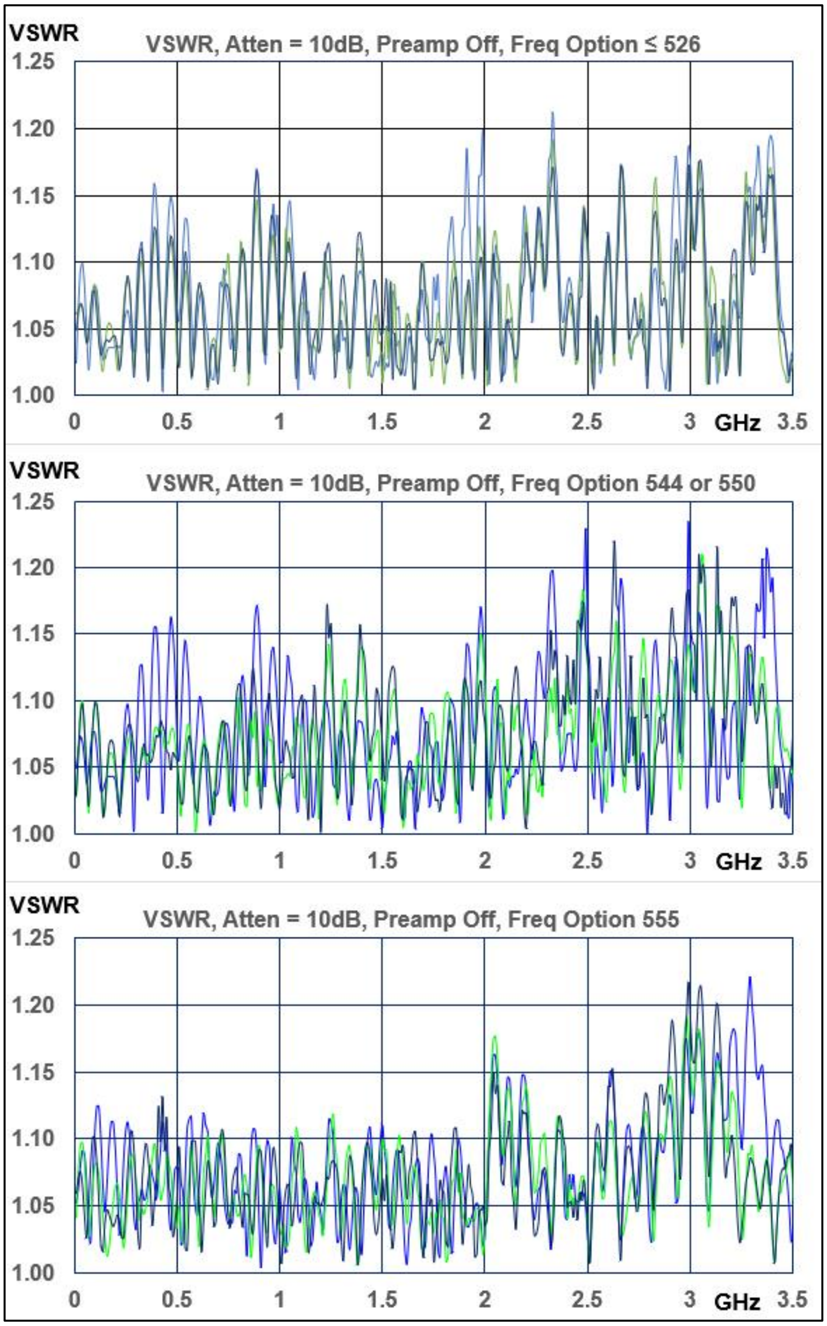


Figure 1. VSWR vs. frequency (0 to 3.5 GHz), 1a. Standard Path, 10 dB attenuation, measured on 3 units

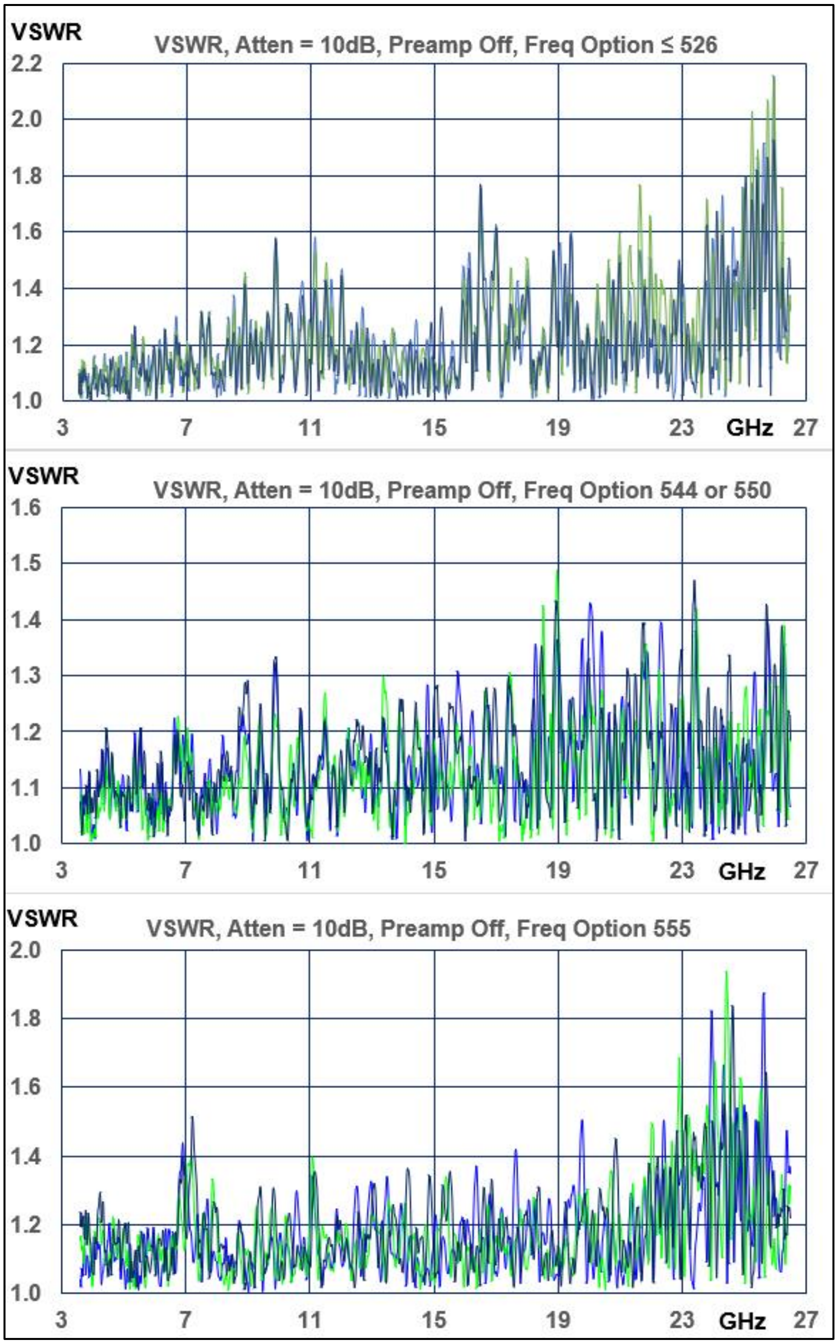


Figure 2. VSWR vs. frequency (3.5 to 26.5 GHz), 1a. Standard Path, 10 dB attenuation, measured on 3 units

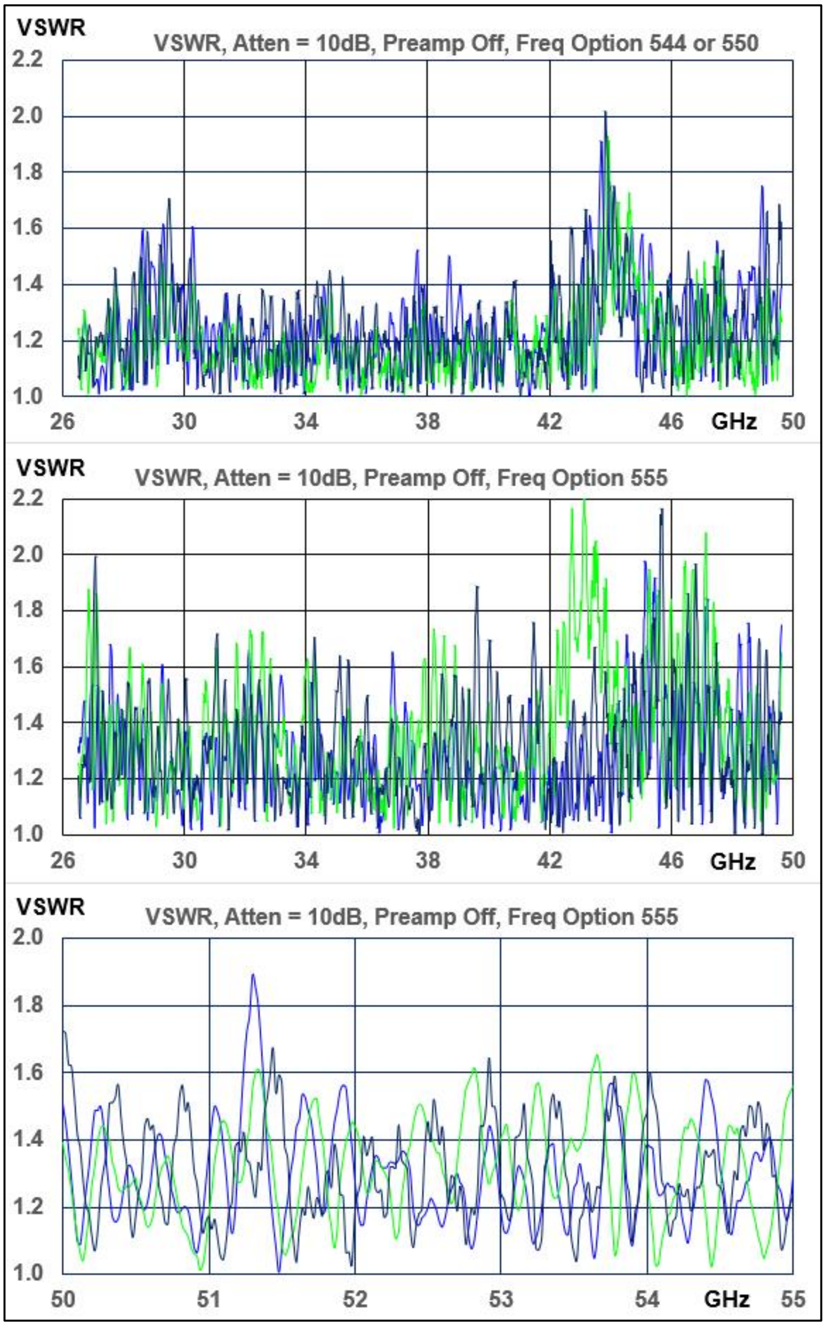


Figure 3. VSWR vs. frequency (26.5 to 50 GHz and 50 to 55 GHz), 1a. Standard Path, 10 dB attenuation, measured on 3 units

Resolution bandwidth switching uncertainty (reference to 30 kHz RWB), 20 to 30 °C		
1 Hz to 1.5 MHz RBW		< ± 0.03 dB
1.6 MHz to 2.7 MHz RBW		< ± 0.05 dB
3 MHz RBW		± 0.10 dB
4, 5, 6, 8, 10 MHz RBW		± 0.30 dB
Reference level		
Range		
Log scale		–170 to +30 dBm in 0.01 dB steps
Linear scale		707 pV to 7.07 V with 0.11% (0.01 dB) resolution
Accuracy (Only affects the display, not the measurement, so it causes no additional error in measurement results from trace data or markers.)		0 dB
Display scale switching uncertainty		
Switching between linear and log (Only affects the display, not the measurement, so it causes no additional error in measurement results from trace data or markers.)		0 dB
Log scale/div switching (Only affects the display, not the measurement, so it causes no additional error in measurement results from trace data or markers.)		0 dB
Display scale fidelity (Log-linear fidelity, relative to the reference condition -25 dBm input through 10 dB attenuation, thus -35 dBm at the input mixer)		
Input mixer level	**Full range**	**Typical**
-18 dBm ≤ ML ≤ -10 dBm	± 0.10 dB total	± 0.04 dB
ML < -18 dBm input mixer level	± 0.07 dB	± 0.02 dB
Preamplifiers (2 stages: Low-Noise Amplifier LNA, Pre-Amplifier PA)		
	Low-Noise Amplifier (LNA)	**Pre-Amplifier (PA)**
Option P08	20 MHz to 8.4 GHz	9 kHz to 8.4 GHz
Option P13	20 MHz to 13.6 GHz	9 kHz to 13.6 GHz
Option P26	20 MHz to 26.5 GHz	9 kHz to 26.5 GHz
Option P44, P4L	20 MHz to 44 GHz	9 kHz to 44 GHz
Option P50, P5L	20 MHz to 50 GHz	9 kHz to 50 GHz
Option P55, P5N	20 MHz to 55 GHz	9 kHz to 55 GHz
	For options P4L/P5L/P5N: ≥ 43.5 GHz both LNA and PA cannot be used simultaneously	
Noise figure	4 to 8 dB (nominal)	10 dB (nominal)
Gain (up to 50 GHz)	20 dB (nominal)	30 dB (nominal)
	When LNA and PA are used simultaneously, gain = 40 dB (nominal)	
Gain (50 to 55 GHz)	13 dB (nominal)	16 dB (nominal)
	When LNA and PA are used simultaneously, gain = 24 dB (nominal)	

Dynamic Range Specifications

1 dB gain compression

Notes:
- Large signals, even at frequencies not shown on the screen, can cause the analyzer to mismeasure on-screen signals because of two-tone gain compression. This specification tells how large an interfering signal must be in order to cause a 1 dB change in an on-screen signal.
- Specified at 1 kHz RBW with 100 kHz tone spacing. The compression point will nominally equal the specification for tone spacing greater than 5 times the prefilter bandwidth. At smaller spacings, ADC clipping may occur at a level lower than the 1 dB compression point.
- Reference level and off-screen performance: The reference level (RL) behavior differs from some earlier analyzers in a way that makes this analyzer more flexible. In other analyzers, the RL controlled how the measurement was performed as well as how it was displayed. Because the logarithmic amplifier in these analyzers had both range and resolution limitations, this behavior was necessary for optimum measurement accuracy. The logarithmic amplifier in this signal analyzer, however, is implemented digitally such that the range and resolution greatly exceed other instrument limitations. Because of this, the analyzer can make measurements largely independent of the setting of the RL without compromising accuracy. Because the RL becomes a display function, not a measurement function, a marker can read out results that are off-screen, either above or below, without any change in accuracy. The only exception to the independence of RL and the way in which the measurement is performed is in the input attenuation setting: When the input attenuation is set to auto, the rules for the determination of the input attenuation include dependence on the reference level. Because the input attenuation setting controls the tradeoff between large signal behaviors (third-order intermodulation, compression, and display scale fidelity) and small signal effects (noise), the measurement results can change with RL changes when the input attenuation is set to auto.
- Mixer power level (dBm) = total power at the input (dBm) − input attenuation (dB).
- Total power at the preamp (dBm) = total power at the input (dBm) − input attenuation (dB).
- The low noise path, when in use, does not substantially change the compression-to-noise dynamic range or the TOI-to-noise dynamic range because it mostly just reduces losses in the signal path in front of all significant noise, TOI and compression-affecting circuits. In other words, the compression threshold and the third-order intercept both decrease and to the same extent as that to which the DANL decreases.

Standard path: 1 dB gain compression (swept, standard, preselector on)

Large signals, even at frequencies not shown on the screen, can cause the analyzer to mismeasure on-screen signals because of two-tone gain compression. This specification tells how large an interfering signal must be in order to cause a 1 dB change in an on-screen signal. Mixer power level (dBm) = total power at the input (dBm) − input attenuation (dB).

Center frequency	Gain compression (nominal)		
	1a. PA Off	1b. LNA	1c. PA
20 to 40 MHz	+3 dBm	–16 dBm	–13 dBm
> 40 MHz to 3.6 GHz	+6 dBm	–16 dBm	–13 dBm
> 3.6 to 13.5 GHz	+5 dBm	–16 dBm	–27 dBm
> 13.5 to 26.5 GHz	+1 dBm	–20 dBm	–30 dBm
> 26.5 to 50 GHz	0 dBm	–16 dBm	–32 dBm

IF prefilter bandwidth

This table applies without *Option FS1* or *FS2*, fast sweep. With *Option FS1* or *FS2*, which is a standard option in the UXA, this table applies for sweep rates that are manually chosen to be the same as or slower than "traditional" sweep rates, instead of the much faster sweep rates, such as autocoupled sweep rates, available with *FS1* or *FS2*. Sweep rate is defined to be span divided by sweep time. If the sweep rate is ≤ 1.1 times RBW-squared, the table applies. Otherwise, compute an "effective RBW" = Span / (SweepTime × RBW). To determine the IF Prefilter Bandwidth, look up this effective RBW in the table instead of the actual RBW. For example, for RBW = 3 kHz, Span = 300 kHz, and Sweep time = 42 ms, we compute that Sweep Rate = 7.1 MHz/s, while RBW-squared is 9 MHz/s. So the Sweep Rate is < 1.1 times RBW-squared and the table applies; row 1 shows the IF Prefilter Bandwidth is nominally 8.9 kHz. If the sweep time is 1 ms, then the effective RBW computes to 100 kHz. This would result in an IF Prefilter Bandwidth from the third row, nominally 303 kHz.

Zero span or swept, RBW=	Sweep Type = FFT, FFT width =	–3 dB bandwidth (nominal)
≤ 3.9 kHz	< 4.01 kHz	8.9 kHz
4.3 to 27 kHz	< 28.81 kHz	79 kHz
30 to 160 kHz	< 167.4 kHz	303 kHz
180 to 390 kHz	< 411.9 kHz	966 kHz
430 kHz to 10 MHz	< 7.99 MHz	10.9 MHz

Displayed Average Noise Level (DANL)

Input terminated, Sample or Average detector, Averaging type set to Log, IF Gain = High, 1 Hz Resolution Bandwidth, 0 dB input attenuation.

1a. Standard path (swept, preselector on, LNA off, PA off)						
Noise Floor Extension (Option NF2) improves DANL by 8 to 12 dB, for standard path.						
Frequency	Option			Full range	20 to 30 °C	Typical, unless otherwise stated
	508, 513 and 526	544 and 550	555			
2 to 10 Hz	x			N/A		–125 dBm (nominal)
		x	x			–95 dBm (nominal)
> 10 to 100 Hz	x					–127 dBm (nominal)
		x	x			–114 dBm (nominal)
> 100 Hz to 1 kHz	x					–129 dBm (nominal)
		x	x			–128 dBm (nominal)
> 1 to 9 kHz	x					–138 dBm (nominal)
		x	x			–136 dBm (nominal)
> 9 to 100 kHz	x	x	x	–141 dBm	–141 dBm	–146 dBm
> 100 kHz to 1 MHz	x	x	x	–148 dBm	–150 dBm	–153 dBm
> 1 to 10 MHz	x	x	x	–152 dBm	–153 dBm	–156 dBm
> 10 MHz to 1.2 GHz	x	x	x	–151 dBm	–152 dBm	–155 dBm
> 1.2 to 2.1 GHz	x	x	x	–148 dBm	–150 dBm	–152 dBm
> 2.1 to 3.6 GHz	x	x	x	–147 dBm	–148 dBm	–150 dBm
> 3.6 to 6.6 GHz	x			–148 dBm	–150 dBm	–152 dBm
		x		–148 dBm	–149 dBm	–151 dBm
			x	–145 dBm	–146 dBm	–148 dBm
> 6.6 to 8.4 GHz	x	x		–148 dBm	–150 dBm	–152 dBm
			x	–147 dBm	–148 dBm	–150 dBm
> 8.4 to 13.6 GHz	x	x		–146 dBm	–147 dBm	–151 dBm
			x	–146 dBm	–147 dBm	–149 dBm
> 13.6 to 17 GHz	x	x	x	–146 dBm	–147 dBm	–151 dBm
> 17 to 22.5 GHz	x	x	x	–144 dBm	–146 dBm	–149 dBm
> 22.5 to 26.5 GHz	x	x	x	–140 dBm	–142 dBm	–146 dBm
> 26.5 to 30 GHz		x		–139 dBm	–141 dBm	–145 dBm
			x	–139 dBm	–141 dBm	–143 dBm
> 30 to 34 GHz		x	x	–135 dBm	–138 dBm	–143 dBm
> 34 to 37 GHz		x	x	–131 dBm	–133 dBm	–139 dBm
> 37 to 40 GHz		x	x	–131 dBm	–133 dBm	–138 dBm
> 40 to 45 GHz		x	x	–127 dBm	–130 dBm	–136 dBm
> 45 to 50 GHz		x	x	–122 dBm	–126 dBm	–133 dBm
> 50 to 53 GHz			x	–122 dBm	–126 dBm	–131 dBm
> 53 to 55 GHz			x	–120 dBm	–121 dBm	–127 dBm

1b. Standard path, LNA on (swept, preselector on, LNA on, PA off)						
Noise Floor Extension (Option NF2) improves DANL by 9 to 11 dB, for standard path, LNA on						
Frequency	Option			Full range	20 to 30 °C	Typical, unless otherwise stated
	508, 513 and 526	544 and 550	555			
< 20 MHz	x	x	x	N/A		Not permitted with LNA on
> 20 to 40 MHz	x					–164 dBm (nominal)
		x	x			–160 dBm (nominal)
> 40 to 500 MHz	x			–165 dBm	–165 dBm	–167 dBm
		x	x	–162 dBm	–163 dBm	–165 dBm
> 500 MHz to 2.5 GHz	x			–165 dBm	–165 dBm	–167 dBm
		x	x	–164 dBm	–165 dBm	–166 dBm
> 2.5 GHz to 3.6 GHz	x	x	x	–161 dBm	–163 dBm	–166 dBm
> 3.6 to 4.7 GHz	x			–163 dBm	–164 dBm	–167 dBm
		x		–162 dBm	–163 dBm	–165 dBm
			x	–161 dBm	–162 dBm	–164 dBm
> 4.7 to 8.4 GHz	x			–162 dBm	–164 dBm	–166 dBm
		x		–161 dBm	–163 dBm	–165 dBm
			x	–160 dBm	–162 dBm	–164 dBm
> 8.4 to 13.5 GHz	x	x	x	–161 dBm	–163 dBm	–165 dBm
> 13.5 to 17.1 GHz	x	x	x	–161 dBm	–163 dBm	–164 dBm
> 17.1 to 22.5 GHz	x			–159 dBm	–161 dBm	–163 dBm
		x	x	–158 dBm	–161 dBm	–162 dBm
> 22.5 to 26.5 GHz	x	x	x	–155 dBm	–156 dBm	–159 dBm
> 26.5 to 27 GHz		x	x	–153 dBm	–155 dBm	–160 dBm
> 27 to 34.5 GHz		x	x	–148 dBm	–152 dBm	–156 dBm
> 34.5 to 42.5 GHz		x	x	–142 dBm	–146 dBm	–152 dBm
> 42.5 to 47 GHz		x	x	–138 dBm	–141 dBm	–148 dBm
> 47 to 50 GHz		x	x	–134 dBm	–138 dBm	–145 dBm
> 50 to 53 GHz			x	–134 dBm	–138 dBm	–143 dBm
> 53 to 55 GHz			x	–131 dBm	–132 dBm	–138 dBm

1c. Standard path, PA on (swept, preselector on, LNA off, PA on)						
Noise Floor Extension (Option NF2) improves DANL by 5 to 12 dB, for standard path, PA on.						
Frequency	Option			Full range	20 to 30 °C	Typical, unless otherwise stated
	508, 513 and 526	544 and 550	555			
> 100 kHz to 200 kHz	x	x	x	N/A		–151 dBm (nominal)
> 200 kHz to 500 kHz	x	x	x			–162 dBm (nominal)
> 500 kHz to 1 MHz	x					–156 dBm (nominal)
		x	x			–161 dBm (nominal)
1 MHz to 2.1 GHz	x	x	x	–163 dBm	–163 dBm	–165 dBm
> 2.1 to 3.6 GHz	x	x	x	–160 dBm	–161 dBm	–163 dBm
> 3.6 to 8.4 GHz	x	x	x	–161 dBm	–162 dBm	–164 dBm
> 8.4 to 13.6 GHz	x	x	x	–161 dBm	–162 dBm	–164 dBm
> 13.6 to 17.1 GHz	x	x	x	–160 dBm	–162 dBm	–164 dBm
> 17.1 to 20.0 GHz	x	x	x	–159 dBm	–160 dBm	–163 dBm
> 20.0 to 26.5 GHz	x	x	x	–155 dBm	–156 dBm	–160 dBm
> 26.5 to 30 GHz		x	X	–155 dBm	–158 dBm	–160 dBm
> 30 to 34 GHz		x	X	–153 dBm	–157 dBm	–159 dBm
> 34 to 40 GHz		x	X	–150 dBm	–154 dBm	–156 dBm
> 40 to 45 GHz		x	X	–147 dBm	–150 dBm	–152 dBm
> 45 to 50 GHz		x	x	–144 dBm	–147 dBm	–151 dBm
> 50 to 53 GHz			X	–144 dBm	–146 dBm	–149 dBm
> 53 to 55 GHz			x	–139 dBm	–141 dBm	–146 dBm

1d. Standard path, LNA on, PA on (swept, preselector on, LNA on, PA on)

Noise Floor Extension (Option NF2) improves DANL by 5 to 11 dB, for standard path, LNA on, PA on.

Frequency	Option			Full range	20 to 30 °C	Typical, unless otherwise stated
	508, 513 and 526	544 and 550	555			
< 20 MHz	x	x	x	Not permitted with LNA on		
> 20 to 40 MHz	x			N/A		–164 dBm (nominal)
		x	x			–160 dBm (nominal)
> 40 to 500 MHz	x			–165 dBm	–165 dBm	–167 dBm
		x	x	–162 dBm	–163 dBm	–165 dBm
> 500 MHz to 2.5 GHz	x			–165 dBm	–165 dBm	–167 dBm
		x	x	–164 dBm	–165 dBm	–166 dBm
> 2.5 to 3.6 GHz	x	x	x	–161 dBm	–163 dBm	–165 dBm
> 3.6 to 8.4 GHz	x			–164 dBm	–165 dBm	–167 dBm
		x	x	–162 dBm	–164 dBm	–167 dBm
> 8.4 to 13.5 GHz	x	x	x	–163 dBm	–164 dBm	–167 dBm
> 13.5 to 17.1 GHz	x	x	x	–161 dBm	–163 dBm	–166 dBm
> 17.1 to 23 GHz	x	x	x	–161 dBm	–163 dBm	–165 dBm
> 23 to 26.5 GHz	x	x	x	–158 dBm	–160 dBm	–163 dBm
> 26.5 to 36.5 GHz		x	x	–156 dBm	–159 dBm	–161 dBm
> 36.5 to 43.5 GHz		x	x	–152 dBm	–155 dBm	–158 dBm
> 43.5 to 47 GHz (for Option P44, P50, and P55)		x	x	–151 dBm	–153 dBm	–157 dBm
> 47 to 50 GHz (for Option P50 and P55)		x	x	–150 dBm	–152 dBm	–156 dBm
> 50 to 53 GHz (for Option P55)			x	–149 dBm	–150 dBm	–154 dBm
> 53 to 55 GHz (for Option P55)			x	–144 dBm	–146 dBm	–151 dBm
> 43.5 to 47 GHz (for Option P4L, P5L and P5N)		x	x	–138 dBm	–141 dBm	–148 dBm
> 47 to 50 GHz (for Option P5L and P5N)		x	x	–134 dBm	–138 dBm	–145 dBm
> 50 to 53 GHz (for Option P5N)			x	–134 dBm	–138 dBm	–143 dBm
> 53 to 55 GHz (for Option P5N)			x	–131 dBm	–132 dBm	–138 dBm

2a. Low-Noise Path (low-noise path enabled, preselector on, LNA off, PA off)

Noise Floor Extension (Option NF2) improves DANL by 8 to 12 dB, for low-noise path.

Frequency	Option			Full range	20 to 30 °C	Typical, unless otherwise stated
	508, 513 and 526	544 and 550	555			
< 3.6 GHz	x	x	x	Not permitted with low noise path		
3.6 to 8.4 GHz	x			–151 dBm	–153 dBm	–155 dBm
		x		–150 dBm	–152 dBm	–154 dBm
			x	–149 dBm	–150 dBm	–153 dBm
8.4 to 17.1 GHz	x			–151 dBm	–153 dBm	–155 dBm
		x	x	–150 dBm	–152 dBm	–154 dBm
17.1 to 23 GHz	x	x	x	–149 dBm	–151 dBm	–153 dBm
23 to 26.5 GHz	x	x	x	–148 dBm	–150 dBm	–152 dBm
26.5 to 29 GHz		x	x	–146 dBm	–148 dBm	–151 dBm
29 to 34.5 GHz		x	x	–141 dBm	–143 dBm	–146 dBm
34.5 to 50 GHz		x	x	–137 dBm	–139 dBm	–144 dBm
50 to 53 GHz			x	–137 dBm	–139 dBm	–143 dBm
53 to 55 GHz			x	–134 dBm	–135 dBm	–140 dBm

2b. Low-noise path DANL (low-noise path enabled, preselector on, LNA on, PA off)	
Frequency	**2b. LNP path, LNA on (nominal)**
< 3.6 GHz	Not permitted with low noise path
3.6 to 17.1 GHz	–165 dBm
> 17.1 to 23 GHz	–164 dBm
> 23 to 26.5 GHz	–162 dBm
> 26.5 to 29 GHz	–162 dBm
> 29 to 34.5 GHz	–160 dBm
> 34.5 to 50 GHz	–154 dBm
> 50 to 53 GHz	–152 dBm
> 53 to 55 GHz	–151 dBm

3a, 3b. Microwave preselector bypass (MPB) path DANL (MPB path enabled)		
Frequency	**3a. MPB path (nominal)**	**3b. MPB, LNA on (nominal)**
3.6 to 8.4 GHz	-154 dBm	-163 dBm
> 8.4 to 17.1 GHz	-151 dBm	-162 dBm
> 17.1 to 22.5 GHz	-150 dBm	-161 dBm
> 22.5 to 26.5 GHz	-146 dBm	-159 dBm
> 26.5 to 30 GHz	-145 dBm	-159 dBm
> 30 to 34 GHz	-142 dBm	-158 dBm
> 34 to 40 GHz	-137 dBm	-154 dBm
> 40 to 45 GHz	-134 dBm	-153 dBm
> 45 to 50 GHz	-130 dBm	-150 dBm
> 50 to 53 GHz	-130 dBm	-150 dBm
> 53 to 55 GHz	-130 dBm	-146 dBm

If using microwave preselector path (MPB) use path 3b for digital demodulation.

4a. Full bypass (FBP) path DANL (low-noise path enabled, preselector bypass on, LNA off, PA off)			
Frequency	**Full range**	**20 to 30 °C**	**Typical, unless otherwise stated**
3.6 to 8.4 GHz	-154 dBm	-156 dBm	-158 dBm
> 8.4 to 13.6 GHz	-154 dBm	-155 dBm	-158 dBm
> 13.6 to 17.1 GHz	-154 dBm	-155 dBm	-158 dBm
> 17.1 to 22 GHz	-152 dBm	-153 dBm	-157 dBm
> 22 to 26.5 GHz	-152 dBm	-153 dBm	-156 dBm
> 26.5 to 29 GHz	-151 dBm	-152 dBm	-157 dBm
> 29 to 34.5 GHz	-150 dBm	-152 dBm	-155 dBm
> 34.5 to 45 GHz	-147 dBm	-149 dBm	-152 dBm
> 45 to 50 GHz	-145 dBm	-147 dBm	-151 dBm
> 50 to 53 GHz	-145 dBm	-147 dBm	-150 dBm
> 53 to 55 GHz	-143 dBm	-144 dBm	-148 dBm

4b. Full bypass (FBP) path DANL (low-noise path enabled, preselector bypass on, LNA on) (nominal)	
Frequency	**4b. FBP, LNA on**
3.6 to 8.4 GHz	-163 dBm
> 8.4 to 13.6 GHz	-163 dBm
> 13.6 to 17.1 GHz	-162 dBm
> 17.1 to 22 GHz	-161 dBm
> 22 to 26.5 GHz	-160 dBm
> 26.5 to 29 GHz	-160 dBm
> 29 to 34.5 GHz	-159 dBm
> 34.5 to 45 GHz	-154 dBm
> 45 to 50 GHz	-153 dBm
> 50 to 53 GHz	-153 dBm
> 53 to 55 GHz	-152 dBm

Residuals, Images, and Spurious Responses

Residual responses (input terminated, 0 dB attenuation)				
200 kHz to 8.4 GHz (swept)		–100 dBm		
Zero span or FFT or other frequencies		–100 dBm (nominal)		
Image responses (standard path, LNA off, PA off)				
Mixer level	**Tuned frequency (f)**	**Excitation frequency**	**Full range**	**Typical**
-10 dBm	10 MHz to 26.5 GHz	f+45 MHz	–80 dBc	–105 dBc
	10 MHz to 3.6 GHz	f+10,245 MHz	–80 dBc	–106 dBc
	10 MHz to 3.6 GHz	f+645 MHz	–80 dBc	–101 dBc
	> 3.6 to 13.6 GHz	f+645 MHz	–78 dBc	–87 dBc
	> 13.6 to 17.1 GHz	f+645 MHz	–74 dBc	–84 dBc
	> 17.1 to 22 GHz	f+645 MHz	–70 dBc	–82 dBc
	> 22 to 26.5 GHz	f+645 MHz	–68 dBc	–75 dBc
-30 dBm	26.5 to 55 GHz	f+45 MHz		-90 dBc (nominal)
	26.5 to 34.5 GHz	f+645 MHz	-70 dBc	-94 dBc
	34.4 to 42 GHz	f+645 MHz	-59 dBc	-76 dBc
	42 to 55 GHz	f+645 MHz		-75 dBc (nominal)

Other spurious responses (input-related, standard path, LNA off, PA off)		
N is the LO multiplication factor. Refer to earlier table for the N value versus frequency ranges. Performance is nominally the same, with PA on, and in low-noise path (LNP).		
	Mixer level	**Response**
First RF order (f ≥ 10 MHz from carrier)		
Carrier frequency ≤ 26.5 GHz	-10 dBm	-80 dBc + 20*log(N) including IF feedthrough, LO harmonic mixing responses
Carrier frequency > 26.5 GHz	-30 dBm	-90 dBc (nominal)
Higher RF order (f ≥ 10 MHz from carrier)		
Carrier frequency ≤ 26.5 GHz	-40 dBm	-80 dBc + 20*log(N) including higher order mixer responses
Carrier frequency > 26.5 GHz	-30 dBm	-90 dBc (nominal)
LO-related spurious responses		
200 Hz ≤ f < 10 MHz from carrier	-10 dBm	-68 dBc + 20*log(N) -72 dBc + 20*log(N) (typical)
45 Hz ≤ f < 200 MHz from carrier		-73 dBc + 20*log(N) (nominal)
Nominally –40 dBc under large magnetic (0.38 Gauss rms) or vibrational (0.21 g rms) environmental stimuli.		

Second-Harmonic Intercept (SHI)

1a. Standard path (swept, preselector on, LNA off, PA off)			
Frequency of the fundamental	**Mixer level**	**Distortion**	**SHI**
10 to 500 MHz	–15 dBm	–65 dBc	+50 dBm
> 500 MHz to 1.8 GHz	–15 dBm	–60 dBc	+45 dBm
> 1.8 to 3 GHz	–15 dBm	–77 dBc	+62 dBm
> 3 to 4.5 GHz	–15 dBm	–76 dBc	+61 dBm
> 4.5 to 6.5 GHz	–15 dBm	–77 dBc	+62 dBm
> 6.5 to 10 GHz	–15 dBm	–80 dBc	+65 dBm
> 10 to 13.25 GHz	–15 dBm	–80 dBc	+65 dBm
> 13.25 to 25 GHz	–15 dBm	–68 dBc	+53 dBm

1b. Standard path (swept, preselector on, LNA on, PA off) Preamp level = Input level – Input attenuation			
Frequency of the Fundamental	**Preamp level**	**Distortion (nominal)**	**SHI (nominal)**
15 to 40 MHz	–45 dBm	–65 dBc	+20 dBm
> 40 MHz to 1 GHz	–45 dBm	–63 dBc	+18 dBm
> 1 to 1.8 GHz	–45 dBm	–61 dBc	+16 dBm
> 1.8 to 13.25 GHz	–45 dBm	–63 dBc	+18 dBm

1c. Standard path (swept, preselector on, LNA off, PA on) Preamp level = Input level – Input attenuation			
Frequency of the Fundamental	**Preamp level**	**Distortion (nominal)**	**SHI (nominal)**
10 to 400 MHz	–45 dBm	–78 dBc	+33 dBm
> 400 MHz to 1.8 GHz	–45 dBm	–73 dBc	+28 dBm
> 1.8 to 4 GHz	–50 dBm	–55 dBc	+5 dBm
> 4 to 13.25 GHz	–50 dBm	–60 dBc	+10 dBm
> 13.25 to 25 GHz	–50 dBm	–50 dBc	0 dBm

1d. Standard path (swept, preselector on, LNA on, PA on) Preamp level = Input level – Input attenuation			
Frequency of the fundamental	**Preamp level**	**Distortion (nominal)**	**SHI (nominal)**
1.8 to 4 GHz	–50 dBm	–44 dBc	–6 dBm
> 4 to 13.25 GHz	–50 dBm	–47 dBc	–3 dBm

2a. Low-noise path: SHI (swept, Low-noise path enable, preselector on, LNA off, PA off)			
Frequency of the fundamental	**Mixer level**	**Distortion**	**SHI**
1.8 to 2.5 GHz	–15 dBm	–95 dBc	+80 dBm
> 2.5 to 10 GHz	–15 dBm	–101 dBc	+86 dBm
> 10 to 13.25 GHz	–15 dBm	–101 dBc	+86 dBm
> 13.25 to 25 GHz	–15 dBm	–92 dBc	+77 dBm

Third-Order Intercept (TOI)

1a. Standard path (swept, preselector on, LNA off, PA off)			
Two –16 dBm (10 MHz to 26.5 GHz) or –20 dBm (26.5 GHz to 50 GHz) tones at input mixer with tone separation ≥ 100 kHz			
Frequency	**Full range**	**20 to 30 °C**	**Typical, unless otherwise stated**
10 to 200 MHz	+9 dBm	+12 dBm	+18 dBm
> 200 to 600 MHz	+16 dBm	+17 dBm	+20 dBm
> 600 MHz to 2.0 GHz	+18.5 dBm	+19.5 dBm	+22 dBm
> 2.0 to 3.6 GHz	+18.5 dBm	+19.5 dBm	+23 dBm
> 3.6 to 7.1 GHz	+15 dBm	+16 dBm	+18 dBm
> 7.1 to 10 GHz	+14.5 dBm	+15 dBm	+18 dBm
> 10 to 13.6 GHz	+17.5 dBm	+18.5 dBm	+22 dBm
> 13.6 to 19 GHz	+7 dBm	+9.5 dBm	+12 dBm
> 19 to 23 GHz	+12 dBm	+14 dBm	+16 dBm
> 23 to 26.5 GHz	+13 dBm	+14.5 dBm	+18 dBm
> 26.5 GHz to 34.5 GHz	+11 dBm	+13 dBm	+ 17 dBm
> 34.5 to 50 GHz	+ 7 dBm	+9 dBm	+14 dBm

1b. Standard path (swept, preselector on, LNA on, PA off)	
Two –34 dBm tones at preamp level with tone separation ≥ 100 kHz	
Frequency	**TOI (nominal)**
30 to 200 MHz	0 dBm
> 200 to 600 MHz	+1 dBm
> 600 MHz to 3 GHz	+2.5 dBm
> 3 to 3.6 GHz	+5 dBm
> 3.6 to 4 GHz	–1 dBm
> 4 to 8 GHz	0 dBm
> 8 to 13.6 GHz	+2 dBm
> 13.6 to 19 GHz	–5 dBm
> 19 to 26.5 GHz	0 dBm

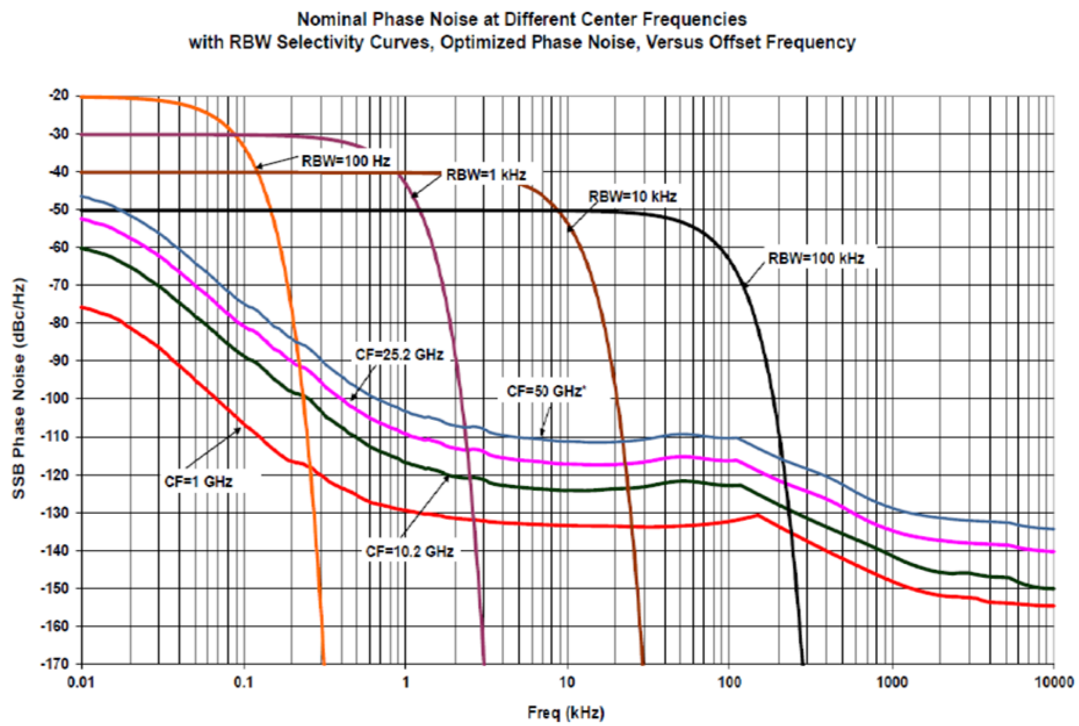
1c. Standard path (swept, preselector on, LNA off, PA on)	
Two –34 dBm (10 MHz to 3.6 GHz) or –50 dBm (3.6 GHz to 26.5 GHz) tones at LNA input with tone separation ≥ 100 kHz	
Frequency	**TOI (nominal)**
10 to 200 MHz	+2 dBm
> 200 to 400 MHz	+3 dBm
> 400 MHz to 1 GHz	+4 dBm
> 1 to 3.6 GHz	+5 dBm
> 3.6 to 4 GHz	–14 dBm
> 4 to 8 GHz	–13 dBm
> 8 to 13.6 GHz	–8 dBm
> 13.6 to 19 GHz	–17 dBm
> 19 to 26.5 GHz	–12 dBm

1d. Standard path (swept, preselector on, LNA on, PA on)	
Two –50 dBm tones at preamp level with tone separation ≥ 100 kHz	
Frequency	**TOI (nominal)**
3.6 to 4 GHz	–22 dBm
> 4 to 8 GHz	–20 dBm
> 8 to 13.6 GHz	–16 dBm
> 13.6 to 19 GHz	–24 dBm
> 19 to 26.5 GHz	–21 dBm

2a. Low-noise path (swept, Low-noise path enable, preselector on, LNA off, PA off)			
Two –16 dBm (3.6 GHz to 26.5 GHz) or –20 dBm (26.5 GHz to 50 GHz) tones at input mixer with tone separation ≥ 100 kHz			
Frequency	**Full range**	**20 °C to 30 °C**	**Typical**
3.6 to 7.6 GHz	+9 dBm	+10 dBm	+13 dBm
> 7.6 to 10 GHz	+10 dBm	+11 dBm	+14 dBm
> 10 to 13.6 GHz	+11 dBm	+12 dBm	+15 dBm
> 13.6 to 19 GHz	+2 dBm	+4 dBm	+7 dBm
> 19 to 23 GHz	+6 dBm	+7 dBm	+10 dBm
> 23 to 26.5 GHz	+6 dBm	+8 dBm	+10 dBm
> 26.5 GHz to 34.5 GHz	+3 dBm	+6 dBm	+8 dBm
> 34.5 to 50 GHz	+1.5 dBm	+4 dBm	+7 dBm

Phase Noise (SSB)

Phase noise	Offset	Full range	20 to 30 °C	Typical, unless otherwise stated
Noise sidebands (CF = 1 GHz)	10 Hz Wide Ref Loop BW		The factory test line limit is consistent with a warranted specification of –90 dBc/Hz	–93 dBc/Hz
	10 Hz Narrow Ref Loop BW			–88 dBc/Hz (nominal)
	100 Hz	–107 dBc/Hz	–107 dBc/Hz	–112 dBc/Hz
	1 kHz	–124 dBc/Hz	–125 dBc/Hz	–129 dBc/Hz
	10 kHz	–132 dBc/Hz	–134 dBc/Hz	–136 dBc/Hz
	100 kHz	–138 dBc/Hz	–139 dBc/Hz	–141 dBc/Hz
	1 MHz	–144 dBc/Hz	–145 dBc/Hz	–146 dBc/Hz
	10 MHz	–154 dBc/Hz	–154 dBc/Hz	–157 dBc/Hz



* Unlike other curves, which are measured results from the measurement of excellent sources, the CF = 50 GHz curve is the predicted, not observed, phase noise, computed from the 25.2 GHz observation. See the footnotes in the Frequency Stability section for the details of phase noise performance versus center frequency.

Figure 3. Nominal PXA phase noise at various center frequencies. RBW curves added to show impact of analyzer phase noise in resolving two closely spaced signals for various RBW filter choices.

IQ Analyzer

All specifications based on preselector by-passed (RF Path either Microwave Preselector Bypass or Full Bypass) (except <3.6 GHz), unless otherwise noted. IF Paths at 10, 25, 40, and 255 MHz are enabled by any of R10, R15, or R20. Each bandwidth option includes and enables all others with lesser bandwidth, e.g. instruments with R20 also have R15 and R10 licenses, plus B2X, B40, and B25 paths.

10 MHz Analysis Bandwidth (Standard)

Specifications on this bandwidth apply with center frequencies of 10 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector bypassed, PA off, LNA off, IF gain = Auto, IF gain offset = 0 dB.

10 MHz analysis bandwidth (standard)		
Analysis bandwidth range	10 Hz to 10 MHz	
Tuning range	2 Hz to 55 GHz	In practice, low end of tuning range limited to < (½*BW), by image folding and LO feedthrough. Over-range tuning to 55.5 GHz allowed, but without corrections, performance not specified
IF frequency	5122.5 MHz (1st IF, center frequency ≤ 3.6 GHz) 322.5 MHz (Final IF)	
ADC sample rate	100 MSa/sec	
ADC resolution	16 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
Capture memory	2 GB	
IQ Analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	536.8 MSa (2^{29} Sa) with 32-bit data packing	
	268.4 MSa (2^{28} Sa) with 64-bit data packing	
Maximum capture time (time record length)	35.8 sec at full 10 MHz BW with 32-bit data packing	Capture time increases linearly with decrease in bandwidth

IF frequency response						
Center frequency	**Span (MHz)**	**Preselector**	**Amplitude max error**	**Amplitude midwidth Error (95%)**	**Slope (dB/MHz) (95%)**	**Amplitude RMS (nominal)**
0.02 to 3.6 GHz	≤ 10	NA	± 0.20 dB	± 0.12 dB	± 0.10	0.02 dB
> 3.6 to 26.5 GHz	≤ 10	Off	± 0.25 dB	± 0.12 dB	± 0.10	0.02 dB
> 26.5 to 34.4 GHz	≤ 10	Off	± 0.30 dB	± 0.12 dB	± 0.10	0.024 dB
> 34.4 to 55 GHz	≤ 10	Off	± 0.35 dB	± 0.12 dB	± 0.10	0.024 dB

IF phase linearity			
Center frequency	**Span (MHz)**	**Preselector**	**RMS (nominal)**
≥ 0.02 GHz, ≤ 3.6 GHz	≤ 10 MHz	N/A	0.04°
> 3.6 to 50 GHz	≤ 10 MHz	Off	0.07°
> 50 to 55 GHz	≤ 10 MHz	Off	0.50°

25 MHz Analysis Bandwidth (Option B25)

Specifications on this bandwidth apply with center frequencies of 15 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector bypassed, PA off, LNA off, IFgain = Auto, IF gain offset = 0 dB.

25 MHz analysis bandwidth (Option B25)					
Analysis bandwidth range	10 Hz to 25 MHz				
Tuning range	2 Hz to 55 GHz				In practice, low end of tuning range limited to < (½*BW), by image folding and LO feedthrough. Over-range tuning to 55.5 GHz allowed, but without corrections, performance not specified
IF frequency	5122.5 MHz (1st IF, center frequency ≤ 3.6 GHz) 322.5 MHz (Final IF)				
ADC sample rate	100 MSa/sec				
ADC resolution	16 bits				
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa				
Capture memory	2 GB				
IQ Analyzer	32,000,001 sample pairs				
Length (IQ sample pairs)	536.8 MSa (2^{29} Sa) with 32-bit data packing				
	268.4 MSa (2^{28} Sa) with 64-bit data packing				
Maximum capture time (time record length)	11.9 sec at full 25 MHz BW with 32-bit data packing				Capture time increases linearly with decrease in bandwidth
IF frequency response					
Center frequency	**Span (MHz)**	**Preselector**		**Amplitude mx error**	**Amplitude RMS (nominal)**
0.02 to 3.6 GHz	10 to <= 25	NA		± 0.30 dB	0.05 dB
> 3.6 to 26.5 GHz	10 to <= 25	Off		± 0.40 dB	0.04 dB
> 26.5 to 55 GHz	10 to <= 25	Off		± 0.60 dB	0.04 dB
IF phase linearity					
Center frequency	**Span (MHz)**	**Preselector**			**RMS (nominal)**
≥ 0.02 GHz, ≤ 3.6 GHz	≤ 25 MHz	N/A			0.12°
> 3.6 to 50 GHz	≤ 25 MHz	Off			0.28°
> 50 to 55 GHz	≤ 25 MHz	Off			1.00°
Full scale (ADC clipping); preselector bypassed, LNA off, PA off (nominal)					
Full scale (ADC clipping level) is a rough estimate of the signal level at which ADC overload occurs. Actual clipping levels vary significantly; this is only a guide. Mixer level is RF input level less attenuation setting.					
Center frequency	**Option**			**Mixer level for IF gain = low**	**Mixer level for IF gain = high**
	508, 513 and 526	**544 and 550**	**555**		
2 Hz to 26.5 GHz	x	x	x	–8 dBm	–18 dBm
> 26.5 to 50 GHz		x	x	–8 dBm	–18 dBm
> 50 to 55 GHz			x	–13 dBm	–16 dBm
Effect of signal frequency ≠ CF				Up to ± 1 dB nominal	

40 MHz Analysis Bandwidth (Option B40)

Specifications on this bandwidth apply with center frequencies of 65 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector bypassed, PA off, LNA off, IF gain = Auto, IF gain offset = 0 dB.

40 MHz analysis bandwidth Option B40)		
Analysis bandwidth range	10 Hz to 40 MHz	
Tuning range	2 Hz to 55 GHz	In practice, low end of tuning range limited to < (½*BW), by image folding and LO feedthrough. Over-range tuning to 55.5 GHz allowed, but without corrections, performance not specified.
IF frequency	5050 MHz (1st IF, center frequency ≤ 3.6 GHz) 250 MHz (Final IF)	
ADC sample rate	200 MSa/sec	
ADC resolution	12 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
Capture memory	2 GB	
IQ Analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	536,870,912 (2^{29} Sa) with 32-bit data packing	
	268,435,456 (228 Sa) with 64-bit data packing	
Maximum capture time (time record length)	8.95 sec at full 40 MHz BW with 32-bit data packing	Capture time increases linearly with decrease in bandwidth
	4.47 sec at full 40 MHz BW with 64-bit data packing	

IF frequency response				
Center frequency	**Span (MHz)**	**Preselector**	**Amplitude max error**	**Amplitude RMS (nominal)**
0.02 to 3.6 GHz	≤ 40	NA	± 0.40 dB	0.07 dB
> 3.6 to 8.4 GHz	≤ 40	Off	± 0.60 dB	0.05 dB
> 8.4 to 26.5 GHz	≤ 40	Off	± 0.70 dB	0.05 dB
> 26.5 to 34.4 GHz	≤ 40	Off	± 0.80 dB	0.10 dB
> 34.4 to 55 GHz	≤ 40	Off	± 1.00 dB	0.10 dB

IF phase linearity			
Center frequency	**Span (MHz)**	**Preselector**	**RMS (nominal)**
≥ 0.02 GHz, ≤ 3.6 GHz	≤ 40 MHz	N/A	0.12°
> 3.6 to 50 GHz	≤ 40 MHz	Off	0.32°
> 50 to 55 GHz	≤ 40 MHz	Off	1.00°

IF dynamic range (IF gain = low) (nominal)		
SFDR (spurious-free dynamic range) (ADC related spurious)	-77 dBc	Signal at –12 dBFS, anywhere in full IF width

IF residual responses (relative to full scale, input terminated, IF gain = low) (nominal)	
65 MHz to 34.5 GHz	-110 dBFS
> 34.5 to 50 GHz	-105 dBFS

Full scale (ADC clipping); preselector bypassed, LNA off, PA off (nominal)

Full scale (ADC clipping level) is a rough estimate of the signal level at which ADC overload occurs. Actual clipping levels vary significantly; this is only a guide. Mixer level is RF input level less attenuation setting.

Center frequency	Option			Mixer level for IF gain = low	Mixer level for IF gain = high
	508, 513 and 526	544 and 550	555		
2 Hz to 26.5 GHz	x	x	x	–8 dBm	–18 dBm
> 26.5 to 34.5 GHz		x	x	–8 dBm	–18 dBm
> 34.5 to 50 GHz		x	x	–8 dBm	–12 dBm

> 50 to 55 GHz			x	–7 dBm	–8 dBm
Effect of signal frequency ≠ CF				Up to ±1 dB nominal	

Signal to noise ratio (ratio of clipping level to noise level, log averaged, 1 Hz RBW, IF gain = Low) (nominal)	
Center frequency	
≤ 3.6 GHz	143 dB
> 17.1 to 26.5 GHz	141 dB
> 26.5 to 50 GHz	135 dB

TOI (3rd-order intermodulation distortion in the IF, 2 tones of equal level @ -19 dBFS, 10 MHz tone separation) (nominal)	
Center frequency	
≤ 3.6 GHz	–83 dBc
> 3.6 to 13.6	–83 dBc
> 13.6 to 26.5 GHz	–83 dBc
> 26.5 to 50 GHz	–79 dBc

Noise density in IF (characterized at center of RF band and center of IF, 0 dB attenuation)

The noise level in the IF will change for frequencies away from the center of the IF. The IF part of the total noise is nominally ± 1.2 dB worse at the worst frequency within the IF bandwidth.

Center frequency	**3a. MPB**		**3b. LNA on**		**4a. FBP**	
	IF gain = low	**IF gain = high**	**IF gain = low**	**IF gain = high**	**IF gain = low**	**IF gain = high**
65 MHz to 3.6 GHz	–145 dBm/Hz	–145 dBm/Hz	–158 dBm/Hz	–158 dBm/Hz	N/A	N/A
> 3.6 to 8.4 GHz	–150 dBm/Hz	–152 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz	–152 dBm/Hz	–156 dBm/Hz
> 8.4 to 13.6 GHz	–149 dBm/Hz	–150 dBm/Hz	–158 dBm/Hz	–158 dBm/Hz	–152 dBm/Hz	–156 dBm/Hz
> 13.6 to 17.1 GHz	–149 dBm/Hz	–151 dBm/Hz	–158 dBm/Hz	–158 dBm/Hz	–152 dBm/Hz	–156 dBm/Hz
> 17.1 to 26.5 GHz	–146 dBm/Hz	–146 dBm/Hz	–155 dBm/Hz	–155 dBm/Hz	–152 dBm/Hz	–154 dBm/Hz
> 26.5 to 34.5 GHz	–142 dBm/Hz	–142 dBm/Hz	–152 dBm/Hz	–152 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz
> 34.5 to 50 GHz	–132 dBm/Hz	–132 dBm/Hz	–143 dBm/Hz	–-143 dBm/Hz	–145 dBm/Hz	–145 dBm/Hz
> 50 to 53 GHz	–132 dBm/Hz	–132 dBm/Hz	–143 dBm/Hz	–143 dBm/Hz	–143 dBm/Hz	–143 dBm/Hz
> 53 to 55 GHz	–126 dBm/Hz	–126 dBm/Hz	–136 dBm/Hz	–136 dBm/Hz	–141 dBm/Hz	–141 dBm/Hz

Spurious responses (preselector enabled for frequencies > 3.6 GHz) (nominal)

Residual responses (input terminated, 0 dB attenuation, IF gain = low)	
Center frequency	
< 3.6 GHz	–100 dBm
3.6 to 40 GHz	–105 dBm
> 40 GHz	–95 dBm

Image responses

Tuned frequency (f)	**Excitation frequency**
10 MHz to 3.6 GHz	f + 2 * 1st IF MHz
	f + 2 * Final IF MHz
> 3.6 to 50.0 GHz	f + 2 * Final IF MHz

255 MHz Analysis Bandwidth (Option B2X)

Specifications on this bandwidth apply with center frequencies of 400 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector bypassed, PA off, LNA off, IF gain = Auto, IF gain offset = 0 dB. IF frequency response and IF amplitude accuracy performance between 18 and 26.5 GHz for Type-N connectorized instruments is nominal.

255 MHz analysis bandwidth (Option B2X)		
Analysis bandwidth range	10 Hz to 255 MHz	
Tuning range	2 Hz to 55 GHz	In practice, low end of tuning range limited to < (½*BW), by image folding and LO feedthrough. Over-range tuning to 55.5 GHz allowed, but without corrections, performance not specified.
IF frequency	5490 MHz (1st IF, center frequency ≤ 3.6 GHz) 690 MHz (Final IF)	
ADC sample rate	4.8 GSa/sec	
ADC resolution	14 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
Capture memory	16 GB	
IQ Analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	2,147,483,640 samples with 32-bit data packing	
Maximum capture time (time record length)	14.3 sec at full 255 MHz BW	Capture time increases linearly with decrease in bandwidth

IF frequency response (span ≤ 255 MHz), microwave preselector bypass path (MPB)							
	3a. MPB (10 dB attenuation)			**3b. LNA on (0 dB attenuation)**		**3c. PA on (0 dB attenuation)**	
Center frequency	**Full range**	**20 to 30 °C**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**
600 MHz to 3.3 GHz	± 1.05 dB	± 0.90 dB	0.06 dB	± 0.15 dB	0.06 dB	± 0.30 dB	0.20 dB
> 3.3 to 8.4 GHz	± 1.00 dB	± 0.80 dB	0.06 dB	± 0.15 dB	0.10 dB	± 0.20 dB	0.15 dB
> 8.4 to 26.5 GHz	± 1.15 dB	± 1.05 dB	0.10 dB	± 0.40 dB	0.20 dB	± 0.35 dB	0.20 dB
> 26.5 to 34.4 GHz	± 1.70 dB	± 1.55 dB	0.20 dB	± 0.45 dB	0.20 dB	± 0.55 dB	0.30 dB
> 34.4 to 48.55 GHz	± 2.70 dB	± 2.45 dB	0.20 dB	± 0.60 dB	0.30 dB	± 0.90 dB	0.50 dB
> 48.55 to 50 GHz	± 0.65 dB (nominal)		0.30 dB	± 0.75 dB	0.30 dB	± 1.10 dB	0.50 dB
> 50 to 55 GHz	± 0.65 dB (nominal)		0.30 dB	± 0.75 dB	0.30 dB	± 1.10 dB	0.55 dB

IF frequency response (span ≤ 255 MHz) full bypass path (FBP)					
	4a. FBP (10 dB attenuation)			**4b. LNA on (0 dB attenuation)**	
Center frequency	**Full range**	**20 to 30 °C**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**
> 3.3 to 8.4 GHz	± 0.90 dB	± 0.80 dB	0.07 dB	± 0.20 dB	0.15 dB
> 8.4 to 26.5 GHz	± 1.15 dB	± 1.05 dB	0.10 dB	± 0.35 dB	0.20 dB
> 26.5 to 34.4 GHz	± 1.60 dB	± 1.50 dB	0.15 dB	± 0.35 dB	0.20 dB
> 34.4 to 48.55 GHz	± 2.80 dB	± 2.45 dB	0.20 dB	± 0.65 dB	0.30 dB
> 48.55 to 55 GHz	± 0.80 dB (nominal)		0.30 dB	± 0.95 dB	0.30 dB

IF phase linearity			
Center frequency	**Span (MHz)**	**Preselector**	**RMS (nominal)**
≥ 0.02 GHz, ≤ 3.3 GHz	≤ 255	N/A	4°
3.3 to 26.5 GHz	≤ 255	Off	0.80°
26.5 to 55 GHz	≤ 255	Off	1.50°

IF dynamic range (IF gain = high) (nominal)		
SFDR (spurious-free dynamic range) (ADC related spurious)	–78 dBc	Signal at –27 dBFS, anywhere in full IF width

IF residual responses (relative to full scale, input terminated, IF gain = low) (nominal)	
65 MHz to 50 GHz	–100 dBFS

Full scale (ADC clipping); preselector bypassed, LNA off, PA off (nominal)

Full scale (ADC clipping level) is a rough estimate of the signal level at which ADC overload occurs. Actual clipping levels vary significantly; this is only a guide. Mixer level is RF input level less attenuation setting.

Center frequency	Option			Mixer level for IF gain = low	Mixer level for IF gain = high
	508, 513 and 526	544 and 550	555		
≤ 3.3 GHz	x	x	x	–15 dBm	–15 dBm
> 3.3 to 13.3 GHz	x			–8 dBm	–17 dBm
		x	x	–10 dBm	–19 dBm
> 13.3 to 26.5 GHz	x			–10 dBm	–17 dBm
		x	x	–12 dBm	–19 dBm
> 26.5 to 50 GHz		x	x	–11 dBm	–14 dBm
> 50 to 55 GHz			x	– 5 dBm	– 6 dBm
Effect of signal frequency ≠ CF				Up to ±2.5 dB nominal	

Signal to noise ratio (ratio of clipping level to noise level, log averaged, 1 Hz RBW, IF gain = Low) (nominal)	
Center frequency	
≤ 3.6 GHz	145 dB
> 17.1 to 26.5 GHz	140 dB
> 26.5 to 50 GHz	137 dB

TOI (3rd-order intermodulation distortion in the IF, 2 tones of equal level @ -25 dBFS (≤ 26.5 GHz) or –23 dBFS (>26.5 GHz to 50 GHz), 1 MHz tonseparation) (nominal)	
Center frequency	
< 3.3 GHz	-75 dBc
> 3.3 to 20 GHz	-76 dBc
> 20 to 26.5 GHz	-76 dBc
> 26.5 GHz to 50 GHz	-76 dBc

Noise density in IF (characterized at center of RF band and center of IF, 0 dB attenuation)

The noise level in the IF will change for frequencies away from the center of the IF. The IF part of the total noise is nominally ±1.0 dB worse at the worst frequency within the IF bandwidth.

Center frequency	3a. MPB		4a. FBP		3b. LNA on	
	IF gain = low	IF gain = high	IF gain = low	IF gain = high	IF gain = low	IF gain = high
400 MHz to 3.3 GHz	–146 dBm/Hz	–145 dBm/Hz	N/A	N/A	–160 dBm/Hz	–160 dBm/Hz
> 3.3 to 8.6 GHz	–151 dBm/Hz	–153 dBm/Hz	–155 dBm/Hz	–158 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz
> 8.6 to 13.3 GHz	–151 dBm/Hz	–151 dBm/Hz	–155 dBm/Hz	–157 dBm/Hz	–159 dBm/Hz	–159 dBm/Hz
> 13.3 to 26.5 GHz	–146 dBm/Hz	–146 dBm/Hz	–152 dBm/Hz	–153 dBm/Hz	–154 dBm/Hz	–154 dBm/Hz
> 26.5 to 34 GHz	–143 dBm/Hz	–143 dBm/Hz	–152 dBm/Hz	–153 dBm/Hz	–152 dBm/Hz	–152 dBm/Hz
> 34 to 50 GHz	–133 dBm/Hz	–133 dBm/Hz	–145 dBm/Hz	–147 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz
> 50 to 53 GHz	–133 dBm/Hz	–133 dBm/Hz	–144 dBm/Hz	–144 dBm/Hz	–142 dBm/Hz	–142 dBm/Hz
> 53 to 55 GHz	–129 dBm/Hz	–129 dBm/Hz	–141 dBm/Hz	–141 dBm/Hz	–138 dBm/Hz	–138 dBm/Hz

Spurious responses (preselector enabled for frequencies > 3.6 GHz)	
Residual responses (input terminated, 0 dB attenuation)	
Center frequency	
65 MHz to 50 GHz	–100 dBm (nominal)
Image responses	
Tuned frequency (f)	**Excitation frequency**
10 MHz to 3.3 GHz	f + 2 * 1st IF MHz
	f + 2 * Final IF MHz
> 3.3 to 50.0 GHz	f + 2 * Final IF MHz

Amplitude accuracy, absolute, microwave preselector bypass path (MPB)				
	3a. MPB (10 dB attenuation)		3b. LNA on (0 dB attenuation)	3c. PA on (0 dB attenuation)
Frequency	Full range	20 to 30 °C	Nominal	Nominal
10 to 600 MHz	± 1.8 dB	± 1.5 dB	± 0.8 dB	± 0.7 dB
600 MHz to 3.3 GHz	± 1.5 dB	± 1.2 dB	± 0.5 dB	± 0.5 dB
> 3.3 to 8.6 GHz	± 1.2 dB	± 1.0 dB	± 0.3 dB	± 0.5 dB
> 8.6 to 13.3 GHz	± 2.0 dB	± 1.5 dB	± 0.4 dB	± 0.5 dB
> 13.3 to 17.1 GHz	± 2.0 dB	± 1.5 dB	± 0.5 dB	± 0.5 dB
> 17.1 to 26.5 GHz	± 2.7 dB	± 2.2 dB	± 0.6 dB	± 0.6 dB
> 26.5 to 34.5 GHz	± 3.2 dB	± 2.5 dB	± 0.9 dB	± 1.0 dB
> 34.5 to 36.5 GHz	± 5.5 dB	± 3.0 dB	± 1.3 dB	± 1.3 dB
> 36.5 to 45.0 GHz	± 4.5 dB	± 3.0 dB		
> 45 to 55 GHz	± 4.7 dB	± 3.2 dB		

Amplitude accuracy, absolute, full bypass path (FBP)			
	4a. FBP (10 dB attenuation)		4b. LNA on (0 dB attenuation)
Frequency	Full range	20 to 30 °C	Nominal
> 3.3 to 8.6 GHz	± 1.2 dB	± 1.0 dB	± 0.4 dB
> 8.6 to 13.3 GHz	± 2.0 dB	± 1.6 dB	± 0.4 dB
> 13.3 to 17.1 GHz	± 2.0 dB	± 1.6 dB	± 0.5 dB
> 17.1 to 26.5 GHz	± 2.7 dB	± 2.3 dB	± 0.6 dB
> 26.5 to 34.5 GHz	± 3.2 dB	± 2.5 dB	± 0.9 dB
> 34.5 to 36.5 GHz	± 5.5 dB	± 3.0 dB	± 1.0 dB
> 36.5 to 45.0 GHz	± 4.4 dB	± 3.0 dB	
> 45 to 55 GHz	± 4.8 dB	± 3.2 dB	

1 GHz Analysis Bandwidth (Option R10)

Specifications on this bandwidth apply with center frequencies of 700 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector bypassed, PA off, LNA off, IF gain = Auto, IF gain offset = 0 dB. IF frequency response and IF amplitude accuracy performance between 18 and 26.5 GHz for Type-N connectorized instruments is nominal.

1 GHz analysis bandwidth (Option R10)		
Analysis bandwidth range	10 Hz to 1.0 GHz	
Tuning range	2 Hz to 55 GHz	In practice, low end of tuning range limited to < (½*BW), by image folding and LO feedthrough. Over-range tuning to 55.5 GHz allowed, but without corrections, performance not specified.
IF frequency	5490 MHz (1st IF, center frequency ≤ 3.6 GHz) 690 MHz (Final IF)	
ADC sample rate	4.8 GSa/sec	
ADC resolution	14 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
Capture memory	16 GB	
IQ Analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	4,294,967,296 samples with 32-bit data packing	
Maximum capture time (time record length)	3.58 s at full 1.0 GHz BW with 32-bit data packing	Capture time increases linearly with decrease in bandwidth

IF frequency response (span ≤ 1 GHz), microwave preselector bypass path (MPB)

	3a. MPB (10 dB attenuation)			3b. LNA on (0 dB attenuation)		3c. PA on (0 dB attenuation)	
Center frequency	**Full range**	**20 to 30 °C**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**
600 MHz to 3.3 GHz	± 1.80 dB	± 1.60 dB	0.10 dB	± 0.40 dB	0.10 dB	± 0.40 dB	0.13 dB
> 3.3 to 8.4 GHz	± 1.50 dB	± 1.35 dB	0.10 dB	± 0.40 dB	0.10 dB	± 0.30 dB	0.10 dB
> 8.4 to 26.5 GHz	± 1.55 dB	± 1.40 dB	0.10 dB	± 0.60 dB	0.15 dB	± 0.40 dB	0.10 dB
> 26.5 to 34.4 GHz	± 2.50 dB	± 2.30 dB	0.30 dB	± 1.00 dB	0.30 dB	± 0.60 dB	0.20 dB
> 34.4 to 48.55 GHz	± 3.85 dB	± 3.35 dB	0.35 dB	± 1.00 dB	0.30 dB	± 0.70 dB	0.30 dB
> 48.55 to 55 GHz	± 1.00 dB (nominal)		0.60 dB	± 1.00 dB	0.50 dB	± 1.00 dB	0.50 dB

IF frequency response (span ≤ 1 GHz) full bypass path (FBP)

	4a. FBP (10 dB attenuation)			4b. LNA on (0 dB attenuation)	
Center frequency	**Full range**	**20 to 30 °C**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**
> 3.3 to 8.4 GHz	± 1.80 dB	± 1.70 dB	0.15 dB	± 0.55 dB	0.20 dB
> 8.4 to 26.5 GHz	± 1.80 dB	± 1.60 dB	0.10 dB	± 0.60 dB	0.20 dB
> 26.5 to 34.4 GHz	± 2.45 dB	± 2.30 dB	0.20 dB	± 0.70 dB	0.30 dB
> 34.4 to 48.55 GHz	± 3.20 dB	± 2.80 dB	0.40 dB	± 1.00 dB	0.40 dB
> 48.55 to 55 GHz	± 1.50 dB (nominal)		0.80 dB	± 1.50 dB	0.80 dB

IF phase linearity

Center frequency	**Span (MHz)**	**Preselector**	**RMS (nominal)**
≥ 0.02 GHz, ≤ 3.3 GHz	≤ 1000 MHz	N/A	4.00°
3.3 to 26.5 GHz	≤ 1000 MHz	Off	1.25°
26.5 to 50 GHz	≤ 1000 MHz	Off	2.50°
50 to 55 GHz	≤ 1000 MHz	Off	3.00°

IF dynamic range (nominal)		
SFDR (spurious-free dynamic range) (ADC related spurious)	–66 dBc	Signal at –27 dBFS, anywhere in full IF width

IF residual responses (relative to full scale, input terminated, IF gain = high) (nominal)	
< 20 GHz	–90 dBFS
20 to 40 GHz	–80 dBFS
> 40 GHz	–65 dBFS

Full scale (ADC clipping); preselector bypassed, LNA off, PA off (nominal)

Full scale (ADC clipping level) is a rough estimate of the signal level at which ADC overload occurs. Actual clipping levels vary significantly; this is only a guide. Mixer level is RF input level less attenuation setting.

Center frequency	Option			Mixer level for IF gain = low	Mixer level for IF gain = high
	508, 513 and 526	544 and 550	555		
≤ 3.3 GHz	x	x	x	–10 dBm	–10 dBm
> 3.3 to 13.3 GHz	x			–8 dBm	–17 dBm
		x	x	–10 dBm	–19 dBm
> 13.3 to 26.5 GHz	x			–10 dBm	–17 dBm
		x	x	–12 dBm	–19 dBm
> 26.5 to 50 GHz		x	x	–10 dBm	–15 dBm
> 50 to 55 GHz			x	– 5 dBm	– 6 dBm
Effect of signal frequency ≠ CF				Up to ±3.8 dB nominal	

Signal to noise ratio (ratio of clipping level to noise level, log averaged, 1 Hz RBW, IF gain = Low) (nominal)

Center frequency	
≤ 3.6 GHz	143 dB
> 17.1 to 26.5 GHz	140 dB
> 26.5 to 50 GHz	138 dB

TOI (3rd-order intermodulation distortion in the IF, 2 tones of equal level @ -27 dBFS (≤ 26.5 GHz) or –23 dBFS (> 26.5 GHz), 10 MHz tone separation) (nominal)

Center frequency	
< 3.3 GHz	–74 dBc
> 3.3 to 20 GHz	–74 dBc
> 20 to 26.5 GHz	–72 dBc
> 26.5 GHz to 50 GHz	–69 dBc

Noise density in IF (characterized at center of RF band and center of IF, 0 dB attenuation)

The noise level in the IF will change for frequencies away from the center of the IF. The IF part of the total noise is nominally ±4.0 dB worse at the worst frequency within the IF bandwidth.

Center frequency	3a. MPB		4a. FBP		3b. LNA on	
	IF gain = low	IF gain = high	IF gain = low	IF gain = high	IF gain = low	IF gain = high
700 MHz to 3.3 GHz	–145 dBm/Hz	–145 dBm/Hz	N/A	N/A	–161 dBm/Hz	–161 dBm/Hz
> 3.3 to 8.6 GHz	–146 dBm/Hz	–146 dBm/Hz	–148 dBm/Hz	–155 dBm/Hz	–158 dBm/Hz	–158 dBm/Hz
> 8.6 to 13.3 GHz	–146 dBm/Hz	–146 dBm/Hz	–147 dBm/Hz	–155 dBm/Hz	–158 dBm/Hz	–158 dBm/Hz
> 13.3 to 26.5 GHz	–144 dBm/Hz	–144 dBm/Hz	–149 dBm/Hz	–152 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
> 26.5 to 34 GHz	–143 dBm/Hz	–143 dBm/Hz	–149 dBm/Hz	–152 dBm/Hz	–152 dBm/Hz	–152 dBm/Hz
> 34 to 50 GHz	–132 dBm/Hz	–132 dBm/Hz	–145 dBm/Hz	–145 dBm/Hz	–142 dBm/Hz	–142 dBm/Hz
> 50 to 53 GHz	–132 dBm/Hz	–132 dBm/Hz	–145 dBm/Hz	–145 dBm/Hz	–142 dBm/Hz	–142 dBm/Hz
> 53 to 55 GHz	–129 dBm/Hz	–129 dBm/Hz	–141 dBm/Hz	–141 dBm/Hz	–139 dBm/Hz	–139 dBm/Hz

Spurious responses (preselector enabled for frequencies > 3.6 GHz)

Residual Responses (input terminated, 0 dB attenuation)

Center frequency	
700 MHz to 50 GHz	–100 dBm (nominal)

Image responses

Tuned frequency (f)	Excitation frequency
10 MHz to 3.3 GHz	f + 2 * 1st IF MHz
	f + 2 * Final IF MHz
> 3.3 to 50.0 GHz	f + 2 * Final IF MHz

Amplitude accuracy, absolute, microwave preselector bypass path (MPB)				
	3a. MPB (10 dB attenuation)		3b. LNA on (0 dB attenuation)	3c. PA on (0 dB attenuation)
Frequency	**Full range**	**20 to 30 °C**	**Nominal**	**Nominal**
10 to 600 MHz	± 1.7 dB	± 1.4 dB	± 0.9 dB	± 0.8 dB
600 MHz to 3.3 GHz	± 1.5 dB	± 1.2 dB	± 0.4 dB	± 0.4 dB
> 3.3 to 8.6 GHz	± 1.3 dB	± 1.1 dB	± 0.4 dB	± 0.5 dB
> 8.6 to 13.3 GHz	± 2.0 dB	± 1.6 dB	± 0.4 dB	± 0.5 dB
> 13.3 to 17.1 GHz	± 2.0 dB	± 1.6 dB	± 0.5 dB	± 0.5 dB
> 17.1 to 26.5 GHz	± 2.6 dB	± 2.2 dB	± 0.5 dB	± 0.5 dB
> 26.5 to 34.5 GHz	± 3.2 dB	± 2.5 dB	± 0.9 dB	± 0.9 dB
> 34.5 to 36.5 GHz	± 5.5 dB	± 3.0 dB	± 1.2 dB	± 1.2 dB
> 36.5 to 45.0 GHz	± 4.5 dB	± 3.0 dB		
> 45 to 55 GHz	± 4.7 dB	± 3.2 dB		

Amplitude accuracy, absolute, full bypass path (FBP)			
	4a. FBP (10 dB attenuation)		4b. LNA on (0 dB attenuation)
Frequency	**Full range**	**20 to 30 °C**	**Nominal**
> 3.3 to 8.6 GHz	± 1.2 dB	± 1.0 dB	± 0.4 dB
> 8.6 to 13.3 GHz	± 2.0 dB	± 1.7 dB	± 0.4 dB
> 13.3 to 17.1 GHz	± 2.0 dB	± 1.7 dB	± 0.5 dB
> 17.1 to 26.5 GHz	± 2.7 dB	± 2.4 dB	± 0.5 dB
> 26.5 to 34.5 GHz	± 3.2 dB	± 2.6 dB	± 0.8 dB
> 34.5 to 36.5 GHz	± 5.5 dB	± 3.0 dB	± 1.0 dB
> 36.5 to 45.0 GHz	± 4.7 dB	± 3.0 dB	
> 45 to 55 GHz	± 5.0 dB	± 3.2 dB	

1.5 GHz Analysis Bandwidth (Option R15)

Specifications on this bandwidth apply with center frequencies of 950 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector bypassed, PA off, LNA off, IF gain = Auto, IF gain offset = 0 dB. IF frequency response and IF amplitude accuracy performance between 18 and 26.5 GHz for Type-N connectorized instruments is nominal.

1.5 GHz analysis bandwidth (Option R15)		
Analysis bandwidth range	10 Hz to 1.5 GHz	
Tuning range	2 Hz to 55 GHz	In practice, low end of tuning range limited to < (½*BW), by image folding and LO feedthrough. Over-range tuning to 55.5 GHz allowed, but without corrections, performance not specified.
IF frequency	5750 MHz (1st IF) 1200 MHz (Final IF: CF > 3.5 GHz) 950 MHz (Final IF: CF ≤ 3.5 GHz	
ADC sample rate	4.8 GSa/sec	
ADC resolution	14 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
Capture memory	16 GB	
IQ Analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	3,355,443,186 samples with 32-bit data packing	
Maximum capture time (time record length)	1.79 s at full 1.5 GHz BW with 32-bit data packing	Capture time increases linearly with decrease in bandwidth

IF frequency response (span ≤ 1.5 GHz), microwave preselector bypass path (MPB)

	3a. MPB (10 dB attenuation)			3b. LNA on (0 dB attenuation)		3c. PA on (0 dB attenuation)	
Center frequency	**Full range**	**20 to 30 °C**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**
850 MHz to 3.5 GHz	± 3.10 dB	± 2.80 dB	0.15 dB	± 0.50 dB	0.15 dB	± 0.50 dB	0.17 dB
> 3.5 to 7.9 GHz	± 1.45 dB	± 1.05 dB	0.10 dB	± 0.20 dB	0.10 dB	± 0.25 dB	0.10 dB
> 7.9 to 26.5 GHz	± 1.65 dB	± 1.30 dB	0.15 dB	± 0.40 dB	0.15 dB	± 0.35 dB	0.10 dB
> 26.5 to 34.4 GHz	± 2.35 dB	± 1.90 dB	0.15 dB	± 0.60 dB	0.20 dB	± 0.50 dB	0.15 dB
> 34.4 to 48.05 GHz	± 3.20 dB	± 2.70 dB	0.30 dB	± 0.70 dB	0.30 dB	± 0.70 dB	0.30 dB
> 48.05 to 50 GHz	± 1.50 dB (nominal)		0.50 dB	± 1.00 dB	0.50 dB	± 1.00 dB	0.50 dB
> 50 to 55 GHz	± 1.50 dB (nominal)		0.50 dB	± 1.00 dB	0.50 dB	± 1.00 dB	0.60 dB

IF frequency response (span ≤ 1.5 GHz) full bypass path (FBP)

	4a. FBP (10 dB attenuation)			4b. LNA on (0 dB attenuation)	
Center frequency	**Full range**	**20 to 30 °C**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**
> 3.5 to 7.9 GHz	± 1.40 dB	± 1.05 dB	0.10 dB	± 0.25 dB	0.10 dB
> 7.9 to 26.5 GHz	± 1.65 dB	± 1.30 dB	0.15 dB	± 0.45 dB	0.15 dB
> 26.5 to 34.4 GHz	± 2.65 dB	± 2.20 dB	0.30 dB	± 0.85 dB	0.30 dB
> 34.4 to 48.05 GHz	± 3.65 dB	± 3.10 dB	0.40 dB	± 1.00 dB	0.40 dB
> 48.05 to 55 GHz	± 1.90 dB (nominal)		0.70 dB	± 1.50 dB	0.60 dB

IF phase linearity

Center frequency	Span (MHz)	Preselector	RMS (nominal)
≥ 0.02 GHz, ≤ 3.5 GHz	≤ 1500 MHz	N/A	2.00°

IF dynamic range (IF gain = high) (nominal)		
SFDR (spurious-free dynamic range) (ADC related spurious)	–60 dBc	Signal at –22 dBFS, anywhere in full IF width

IF residual responses (relative to full scale, input terminated, IF gain = high) (nominal)	
< 3.5 GHz	–100 dBFS
≥ 3.5 GHz to 34.5 GHz	–85 dBFS
34.5 GHz to 50 GHz	–65 dBFS

Full scale (ADC clipping); preselector bypassed, LNA off, PA off (nominal)

Full scale (ADC clipping level) is a rough estimate of the signal level at which ADC overload occurs. Actual clipping levels vary significantly; this is only a guide. Mixer level is RF input level less attenuation setting.

Center frequency	Option			Mixer level for IF gain = low	Mixer level for IF gain = high
	508, 513 and 526	544 and 550	555		
≤ 3.3 GHz	x	x	x	–12 dBm	–12 dBm
> 3.3 to 26.5 GHz	x			–8 dBm	–18 dBm
		x	x	–10 dBm	–20 dBm
> 26.5 to 50 GHz		x	x	–10 dBm	–16 dBm
> 50 to 55 GHz			x	– 8 dBm	– 8 dBm
Effect of signal frequency ≠ CF				Up to ±5.5 dB nominal	

Signal to noise ratio (ratio of clipping level to noise level, log averaged, 1 Hz RBW, IF gain = Low) (nominal)

Center frequency	
≤ 3.6 GHz	143 dB
> 17.1 to 26.5 GHz	141 dB
> 26.5 to 50 GHz	135 dB

TOI

(3rd-order intermodulation distortion in the IF, 2 tones of equal level @ -19 dBFS (≤ 26.5 GHz) or –15 dBFS (>26.5 GHz to 50 GHz), 10 MHz tone separation) (nominal)

Center frequency	
< 3.5 GHz	–75 dBc
> 3.5 to 20 GHz	–75 dBc
> 20 to 26.5 GHz	–70 dBc
> 26.5 GHz to 50 GHz	–69 dBc

Noise density in IF (characterized at center of RF band and center of IF, 0 dB attenuation)

The noise level in the IF will change for frequencies away from the center of the IF. The IF part of the total noise is nominally ±2.0 dB worse at the worst frequency within the IF bandwidth.

Center frequency	3a. MPB		3b. LNA on		4a. FBP	
	IF gain = low	IF gain = high	IF gain = low	IF gain = high	IF gain = low	IF gain = high
950 MHz to 3.5 GHz	–145 dBm/Hz	–145 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz	N/A	N/A
> 3.5 to 8.9 GHz	–150 dBm/Hz	–153 dBm/Hz	–160 dBm/Hz	–159 dBm/Hz	–153 dBm/Hz	–158 dBm/Hz
> 8.9 to 26.5 GHz	–147 dBm/Hz	–147 dBm/Hz	–155 dBm/Hz	–154 dBm/Hz	–152 dBm/Hz	–153 dBm/Hz
> 26.5 to 34 GHz	–143 dBm/Hz	–144 dBm/Hz	–154 dBm/Hz	–154 dBm/Hz	–152 dBm/Hz	–153 dBm/Hz
> 34 to 50 GHz	–133 dBm/Hz	–133 dBm/Hz	–145 dBm/Hz	–145 dBm/Hz	–145 dBm/Hz	–145 dBm/Hz
> 50 to 53 GHz	-133 dBm/Hz	-133 dBm/Hz	-141 dBm/Hz	-141 dBm/Hz	-145 dBm/Hz	-145 dBm/Hz
> 53 to 55 GHz	-129 dBm/Hz	-129 dBm/Hz	-139 dBm/Hz	-139 dBm/Hz	-142 dBm/Hz	-142 dBm/Hz

Spurious responses (preselector enabled for frequencies > 3.6 GHz)

Residual responses (input terminated, 0 dB attenuation)

Center frequency	
< 3.5 GHz	–100 dBm (nominal)
3.5 to 50 GHz	–90 dBm (nominal)

Image responses

Tuned frequency (f)	Excitation frequency
10 MHz to 3.3 GHz	f + 2 * 1st IF MHz
	f + 2 * Final IF MHz
> 3.3 to 50.0 GHz	f + 2 * Final IF MHz

Amplitude accuracy, absolute, microwave preselector bypass path (MPB)				
	3a. MPB (10 dB attenuation)		3b. LNA on (0 dB attenuation)	3c. PA on (0 dB attenuation)
Frequency	**Full range**	**20 to 30 °C**	**Nominal**	**Nominal**
10 to 600 MHz	± 1.8 dB	± 1.5 dB	± 0.9 dB	± 0.8 dB
600 MHz to 3.5 GHz	± 1.4 dB	± 1.1 dB	± 0.4 dB	± 0.4 dB
> 3.5 to 7.9 GHz	± 1.4 dB	± 1.1 dB	± 0.3 dB	± 0.3 dB
> 7.9 to 12.8 GHz	± 2.0 dB	± 1.5 dB	± 0.3 dB	± 0.3 dB
> 12.8 to 17.1 GHz	± 2.0 dB	± 1.5 dB	± 0.5 dB	± 0.5 dB
> 17.1 to 26.5 GHz	± 2.5 dB	± 2.2 dB	± 0.5 dB	± 0.6 dB
> 26.5 to 34.5 GHz	± 3.1 dB	± 2.4 dB	± 0.8 dB	± 0.9 dB
> 34.5 to 36.5 GHz	± 5.5 dB	± 3.1 dB	± 1.1 dB	± 1.1 dB
> 36.5 to 45.0 GHz	± 4.7 dB	± 3.1 dB		
> 45 to 55 GHz	± 4.7 dB	± 3.3 dB		

Amplitude accuracy, absolute, full bypass path (FBP)			
	4a. FBP (10 dB attenuation)		4b. LNA on (0 dB attenuation)
Frequency	**Full range**	**20 to 30 °C**	**Nominal**
> 3.5 to 7.9 GHz	± 1.2 dB	± 1.0 dB	± 0.4 dB
> 7.9 to 12.8 GHz	± 2.0 dB	± 1.7 dB	± 0.4 dB
> 12.8 to 17.1 GHz	± 2.0 dB	± 1.7 dB	± 0.6 dB
> 17.1 to 26.5 GHz	± 2.7 dB	± 2.5 dB	± 0.6 dB
> 26.5 to 34.5 GHz	± 3.2 dB	± 2.6 dB	± 1.0 dB
> 34.5 to 36.5 GHz	± 5.5 dB	± 3.1 dB	± 1.3 dB
> 36.5 to 45.0 GHz	± 4.6 dB	± 3.1 dB	
> 45 to 55 GHz	± 4.8 dB	± 3.3 dB	

2 GHz Analysis Bandwidth (Option R20)

Specifications on this bandwidth apply with center frequencies of 950 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector bypassed, PA off, LNA off, IF gain = Auto, IF gain offset = 0 dB. IF frequency response and IF amplitude accuracy performance between 18 and 26.5 GHz for Type-N connectorized instruments is nominal.

2.0 GHz analysis bandwidth (Option R20)		
Analysis bandwidth range	10 Hz to 2.0 GHz	
Tuning range	3.5 to 55 GHz	In practice, low end of tuning range limited to < (½*BW), by image folding and LO feedthrough. Over-range tuning to 55.5 GHz allowed, but without corrections, performance not specified
IF frequency	1200 MHz (center)	
ADC sample rate	4.8 GSa/sec	
ADC resolution	14 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
Capture memory	16 GB	
IQ Analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	4,294,967,280 samples with 32-bit data packing	
Capture time (time record length)	1.79 s at full 2.0 GHz BW with 32-bit data packing	Capture time increases linearly with decrease in bandwidth

IF frequency response (span ≤ 2 GHz), microwave preselector bypass path (MPB)

	3a. MPB (10 dB attenuation)			3b. LNA on (0 dB attenuation)		3c. PA on (0 dB attenuation)	
Center frequency	**Full range**	**20 to 30 °C**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**
> 3.5 to 7.9 GHz	± 1.45 dB	± 1.05 dB	0.10 dB	± 0.20 dB	0.10 dB	± 0.25 dB	0.10 dB
> 7.9 to 26.5 GHz	± 1.65 dB	± 1.30 dB	0.15 dB	± 0.40 dB	0.15 dB	± 0.35 dB	0.10 dB
> 26.5 to 34.4 GHz	± 2.35 dB	± 1.90 dB	0.15 dB	± 0.60 dB	0.20 dB	± 0.50 dB	0.15 dB
> 34.4 to 48.05 GHz	± 3.20 dB	± 2.70 dB	0.30 dB	± 0.70 dB	0.30 dB	± 0.70 dB	0.30 dB
> 48.05 to 50 GHz	± 1.50 dB (nominal)		0.50 dB	± 1.00 dB	0.50 dB	± 1.00 dB	0.50 dB
> 50 to 55 GHz	± 1.50 dB (nominal)		0.50 dB	± 1.00 dB	0.50 dB	± 1.00 dB	0.60 dB

IF frequency response (span ≤ 2 GHz) full bypass path (FBP)

	4a. FBP (10 dB attenuation)			4b. LNA on (0 dB attenuation)	
Center frequency	**Full range**	**20 to 30 °C**	**RMS (nominal)**	**Nominal**	**RMS (nominal)**
> 3.5 to 7.9 GHz	± 1.40 dB	± 1.05 dB	0.10 dB	± 0.25 dB	0.10 dB
> 7.9 to 26.5 GHz	± 1.65 dB	± 1.30 dB	0.15 dB	± 0.45 dB	0.15 dB
> 26.5 to 34.4 GHz	± 2.65 dB	± 2.20 dB	0.30 dB	± 0.85 dB	0.30 dB
> 34.4 to 48.05 GHz	± 3.65 dB	± 3.10 dB	0.40 dB	± 1.00 dB	0.40 dB
> 48.05 to 55 GHz	± 1.90 dB (nominal)		0.70 dB	± 1.50 dB	0.60 dB

IF phase linearity

Center frequency	**Span (MHz)**	**Preselector**	**RMS (nominal)**
3.5 to 26.5 GHz	≤ 2000 MHz	Off	1.00°
26.5 to 50 GHz	≤ 2000 MHz	Off	2.50°
50 to 55 GHz	≤ 2000 MHz	Off	3.00°

IF dynamic range (nominal)		
SFDR (spurious-free dynamic range) (ADC related spurious)	–65 dBc	Signal at –22 dBFS, anywhere in full IF width

IF residual responses (relative to full scale, input terminated) (nominal)	
3.5 to 34.5 GHz	–85 dBFS
34.5 to 50 GHz	-65 dBFS

Full scale (ADC clipping); preselector bypassed, LNA off, PA off (nominal)

Full scale (ADC clipping level) is a rough estimate of the signal level at which ADC overload occurs. Actual clipping levels vary significantly; this is only a guide.
Mixer level is RF input level less attenuation setting.

Center frequency	Option			Mixer level for IF gain = low	Mixer level for IF gain = high
	508, 513 and 526	544 and 550	555		
> 3.3 to 26.5 GHz	x			–8 dBm	–18 dBm
		x	x	–10 dBm	–20 dBm
> 26.5 to 50 GHz		x	x	–10 dBm	–16 dBm
> 50 to 55 GHz			x	– 8 dBm	–8 dBm
Effect of signal frequency ≠ CF				Up to ±5.5 dB nominal	

Signal to noise ratio (ratio of clipping level to noise level, log averaged, 1 Hz RBW, IF gain low) (nominal)

Center frequency	
≤ 3.6 GHz	143 dB
> 17.1 to 26.5 GHz	141 dB
> 26.5 to 50 GHz	135 dB

TOI (3rd-order intermodulation distortion in the IF, 2 tones of equal level @ -19 dBFS (≤ 26.5 GHz) or –15 dBFS (>26.5 GHz to 50 GHz), 10 MHz tone separation)

Center frequency	
3.5 to 20 GHz	–75 dBc
20 to 26.5 GHz	–70 dBc
26.5 to 50 GHz	–69 dBc

Noise density in IF (characterized at center of RF band and center of IF, 0 dB attenuation)

The noise level in the IF will change for frequencies away from the center of the IF. The IF part of the total noise is nominally ±2.0 dB worse at the worst frequency within the IF bandwidth.

Center frequency	3a. MPB		3b. LNA on		4a. FBP	
	IF gain = low	IF gain = high	IF gain = low	IF gain = high	IF gain = low	IF gain = high
> 3.5 to 8.9 GHz	-150 dBm/Hz	-153 dBm/Hz	-160 dBm/Hz	-159 dBm/Hz	-153 dBm/Hz	-158 dBm/Hz
> 8.9 to 26.5 GHz	-147 dBm/Hz	-147 dBm/Hz	-155 dBm/Hz	-154 dBm/Hz	-152 dBm/Hz	-153 dBm/Hz
> 26.5 to 34 GHz	-143 dBm/Hz	-144 dBm/Hz	-154 dBm/Hz	-154 dBm/Hz	-152 dBm/Hz	-153 dBm/Hz
> 34 to 50 GHz	-133 dBm/Hz	-133 dBm/Hz	-145 dBm/Hz	-145 dBm/Hz	-145 dBm/Hz	-145 dBm/Hz
> 50 to 53 GHz	-133 dBm/Hz	-133 dBm/Hz	-141 dBm/Hz	-141 dBm/Hz	-145 dBm/Hz	-145 dBm/Hz
> 53 to 55 GHz	-129 dBm/Hz	-129 dBm/Hz	-139 dBm/Hz	-139 dBm/Hz	-142 dBm/Hz	-142 dBm/Hz

Spurious responses (preselector enabled for frequencies > 3.6 GHz)

Residual Responses (input terminated, 0 dB attenuation)

Center frequency	
3.5 to-50 GHz	-90 dBm (nominal)

Image responses

Tuned frequency (f)	Excitation frequency
10 MHz to 3.3 GHz	f + 2 * 1st IF MHz
	f + 2 * Final IF MHz
> 3.3 to 50.0 GHz	f + 2 * Final IF MHz

Amplitude accuracy, absolute, microwave preselector bypass path (MPB)				
	3a. MPB (10 dB attenuation)		3b. LNA on (0 dB attenuation)	3c. PA on (0 dB attenuation)
Frequency	**Full range**	**20 to 30 °C**	**Nominal**	**Nominal**
> 3.5 to 7.9 GHz	± 1.4 dB	± 1.1 dB	± 0.4 dB	± 0.4 dB
> 7.9 to 12.8 GHz	± 2.0 dB	± 1.5 dB	± 0.4 dB	± 0.4 dB
> 12.8 to 17.1 GHz	± 2.0 dB	± 1.5 dB	± 0.5 dB	± 0.5 dB
> 17.1 to 26.5 GHz	± 2.6 dB	± 2.2 dB	± 0.6 dB	± 0.6 dB
> 26.5 to 34.5 GHz	± 3.1 dB	± 2.4 dB	± 0.9 dB	± 0.9 dB
> 34.5 to 36.5 GHz	± 5.5 dB	± 3.1 dB	± 1.3 dB	± 1.3 dB
> 36.5 to 45.0 GHz	± 4.7 dB	± 3.1 dB		
> 45 to 55 GHz	± 4.7 dB	± 3.3 dB		

Amplitude accuracy, absolute, full bypass path (FBP)			
	4a. FBP (10 dB attenuation)		4b. LNA on (0 dB attenuation)
Frequency	**Full range**	**20 to 30 °C**	**Nominal**
> 3.5 to 7.9 GHz	± 1.2 dB	± 1.0 dB	± 0.4 dB
> 7.9 to 12.8 GHz	± 2.0 dB	± 1.7 dB	± 0.4 dB
> 12.8 to 17.1 GHz	± 2.0 dB	± 1.7 dB	± 0.5 dB
> 17.1 to 26.5 GHz	± 2.7 dB	± 2.5 dB	± 0.5 dB
> 26.5 to 34.5 GHz	± 3.2 dB	± 2.6 dB	± 1.0 dB
> 34.5 to 36.5 GHz	± 5.5 dB	± 3.1 dB	± 1.5 dB
> 36.5 to 45.0 GHz	± 4.7 dB	± 3.1 dB	
> 45 to 55 GHz	± 5.0 dB	± 3.3 dB	

Real-time Spectrum Analyzer (RTSA)

General Frequency Domain Characteristics				
A/D Converter Sample Rate	4.8 Gsa/s (2.4 GHz complex)			
Supported detectors	Peak, Negative Peak, Sample, Average Voltage, Average Power (RMS)			
Number of display traces	Up to 6			
Available types of traces	Clear Write, Max Hold, Min Hold			
Window types	Hanning, Blackman-Harris, Rectangular, Flattop, Kaiser, Gaussian			
Resolutions bandwidths (RBW) (Default window type = Kaiser)	6 RBWs available for each window type for spans Approximate Span: RBW ratio for windows (Note: not applicable for spans from 240 to 255 MHz, 960 MHz to 1 GHz and from 1.9 to 2 GHz) Flattop = 7 to 212, Gaussian, Blackman-Harris = 13 to 417, Kaiser = 13 to 418, Hanning = 17 to 551			
Span	Min RBW		Max RBW	
1 kHz	1.86 Hz		59.4 Hz	
255 MHz	447 kHz		14.3 MHz	
1 GHz	1.78 MHz		57.1 MHz	
2 GHz	3.57 MHz		114 MHz	
	N9032RTAB	**N9032RTBB**	**N9032RTEB**	**N9032RTFB**
Maximum real-time analysis bandwidth	Up to 1 GHz	Up to 1 GHz	Up to 2 GHz	Up to 2 GHz
Minimum signal duration for 100% probability of intercept (POI) with full amplitude accuracy (with at least 50% overlap)	15.4 μs	227 ns	15.4 μs	227 ns

Histogram	Max 1 GHz BW (span)		Max 2 GHz BW (span)	
Maximum sample rate (Hz)	1.247259439e9	1.247259439e9	2.4e9	2.4e9
(Gap free) FFT processing rate	4,687,500 FFT/sec			
FFT Length	1024			
Supported triggers	Free Run, Line, External 1, External 2, External 3, RF Burst, Periodic, FMT, ADC			
Number of markers	12			
Supported markers	Normal, Delta, Noise, Band Power			
Filter Type	Gaussian, Flattop, Blackman-Harris, Rectangular, Hanning, Kaiser			
Amplitude resolution	.01 dB			
Frequency points	821		855	
RMS average	Yes			
Minimum acquisition time	8.55 μs @ 170 MHz 236.45 μs @ 1 GHz	8.55 μs	8.55 μs @ 170 MHz 239.4 μs @ 2 GHz	8.55 μs
Maximum acquisition time at widest bandwidth				
Spectrogram and Normal	3.58 sec			
Density view	3.58 sec			
Density and spectrogram	3.58 sec			

Density View				
	N9032RTAB	**N9032RTBB**	**N9032RTEB**	**N9032RTFB**
Probability range	0 to 100%			
Minimum span	1 kHz	1 kHz	1 kHz	1 kHz
Maximum span	1 GHz	1 GHz	2 GHz	2 GHz
Persistence duration	Infinite, Finite			
Color palettes	Cool, Warm, Grayscale, Radar, Fire, Frost			

Spectrogram View				
	N9032RTAB	**N9032RTBB**	**N9032RTEB**	**N9032RTFB**
Maximum number of acquisitions stored	250,000			
Dynamic range covered by colors	200 dB			
Minimum slice time	8.55 μs @ 170 MHz 232.45 μs @ 1 GHz	8.55 μs	8.55 μs @ 170MHz 239.4 μs @ 2 GHz	8.55 μs

Power vs. Time				
	N9032RTAB	N9032RTBB	N9032RTEB	N9032RTFB
Supported detectors	Peak, Negative Peak, Sample, Average Voltage, Average Power (RMS)			
Supported triggers	Free Run, Line, External 1, External 2, External 3, RF Burst, Periodic, FMT, Level (PvT) ≤ 255 MHz, ADC			
Number of markers	12			
Maximum time viewable	13.77 s @ 1 GHz		7.27 s @ 2 GHz	
Minimum time viewable	13.96 µs @ 1 GHz		8.55 µs @ 2 GHz	
Maximum IF bandwidth	1 GHz		2 GHz	
Minimum detectable signal duration	Note: Signal must have >60 dB signal to mask (StM) to maintain 100% POI. Does not include analog front-end effects.			
With option B2X	3.33 ns			
With option R10	802 ps			
With option R15	n/a		535 ps	
With option R20	n/a		418 ps	

Frequency Mask Trigger (FMT)				
	N9032RTAB	N9032RTBB	N9032RTEB	N9032RTFB
Trigger views	Density, Spectrogram, Normal			
Trigger setting resolution	0.001dB			
Trigger conditions	Enter, Leave, Inside, Outside, Enter->Leave, Leave->Enter, TQT			
Minimum time qualified trigger (TQT) duration	14.77 µs @ 1 GHz	231 ns @ 1 GHz	14.96 µs @ 2 GHz	214 ns @ 2 GHz
Minimum detectable signal duration with >60 dB signal to mask (StM)	Note: Calculated with the length 1024 Blackman-Harris window			
At 170 MHz	9.43 ns	9.43 ns	9.43 ns	9.43 ns
With option B2X (255 MHz)	9.32 µs	6.67 ns	10.98 µs	6.67 ns
With option R10 (1 GHz)	14.13 µs	1.60 ns	14.13 µs	1.60 ns
With option R15 (1.5 GHz)	n/a		14.34 µs	1.06 ns
With option R20 (2 GHz)	n/a		14.62 µs	1.25 ns

Minimum signal duration (in µs) for 100% probability of FMT triggering with various RBW

	Span									
N9032RTAB/ N9032RTEB	2 GHz	1.5 GHz	1 GHz	255 MHz	170 MHz	160 MHz	120 MHz	80 MHz	40 MHz	20 MHz
RBW1	0.64	0.76	1.04	3.62	5.13	5.45	7.26	10.89	21.79	43.58
RBW2	0.43	0.49	0.63	1.92	2.71	2.88	3.84	5.76	11.53	23.05
RBW3	0.32	0.35	0.42	1.06	1.50	1.599	2.13	3.197	6.39	12.79
RBW4	0.27	0.28	0.32	0.64	0.90	0.96	1.28	1.91	3.83	7.66
RBW5	0.24	0.25	0.27	0.424	0.599	0.64	0.85	1.27	2.55	5.09
RBW6	0.23	0.23	0.24	0.32	0.45	0.48	0.64	0.95	1.90	3.81
N9032RTBB/ N9032RTFB	2 GHz	1.5 GHz	1 GHz	255 MHz	170 MHz	160 MHz	120 MHz	80 MHz	40 MHz	20 MHz
RBW1	16.24	16.42	17.24	23.91	5.13	5.45	7.26	10.89	21.79	43.58
RBW2	15.82	15.87	16.42	20.49	2.71	2.88	3.84	5.76	11.53	23.05
RBW3	15.50	15.74	16.21	19.64	1.50	1.599	2.13	3.197	6.39	12.79
RBW4	15.44	15.67	15.70	19.21	0.90	0.96	1.28	1.91	3.83	7.66
RBW5	15.42	15.36	15.65	17.29	0.599	0.64	0.85	1.27	2.55	5.09
RBW6	15.40	15.34	15.62	17.18	0.45	0.48	0.64	0.95	1.90	3.81

Minimum signal duration (in μs) for 100% probability of FMT triggering with various signal to mask (StM)
Note: Calculated with the length 1024 Blackman-Harris window

	Span									
N9032RTAB/ N9032RTEB	**2 GHz**	**1.5 GHz**	**1 GHz**	**255 MHz**	**170 MHz**	**160 MHz**	**120 MHz**	**80 MHz**	**40 MHz**	**20 MHz**
0 dB offset	16.25	16.42	17.24	23.91	5.13	5.452	7.27	10.90	21.81	43.62
6 dB offset	15.82	15.87	16.42	20.51	0.96	1.017	1.36	2.03	4.07	8.14
12 dB offset	15.74	15.77	16.27	19.85	0.46	0.49	0.65	0.97	1.94	3.89
20 dB offset	15.66	15.68	16.13	19.27	0.18	0.195	0.26	0.39	0.78	1.56
40 dB offset	15.55	15.53	15.91	18.37	0.02	0.03	0.03	0.05	0.10	0.20
60 dB offset	15.48	15.44	15.78	17.81	0.01	0.01	0.01	0.02	0.04	0.08
N9032RTBB/ N9032RTFB	**2 GHz**	**1.5 GHz**	**1 GHz**	**255 MHz**	**170 MHz**	**160 MHz**	**120 MHz**	**80 MHz**	**40 MHz**	**20 MHz**
0 dB offset	0.64	0.76	1.04	3.63	5.13	5.45	7.27	10.90	21.81	43.62
6 dB offset	0.22	0.22	0.23	0.68	0.96	1.02	1.36	2.03	4.07	8.14
12 dB offset	0.13	0.12	0.11	0.32	0.46	0.49	0.65	0.97	1.94	3.89
20 dB offset	0.07	0.05	0.05	0.13	0.18	0.195	0.26	0.39	0.78	1.56
40 dB offset	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.05	0.10	0.20
60 dB offset	0.001	0.001	0.002	0.007	0.009	0.01	0.01	0.02	0.04	0.08

General Specifications

Temperature range		
Operating Altitude ≤ 2,300 m Altitude = 4,600 m Derating	 0 to 55 °C 0 to 47 °C The maximum operating temperature derates linearly from altitude of 4,600 m to 2,300 m	
Storage	–40 to +70 °C	
Altitude	4,600 m (approx. 15,000 feet)	
Maximum relative humidity	95% up to 40°C, non-condensing. From 40 °C to 55 °C, the maximum % Relative Humidity follows the line of constant dew point.	
Environment		
Indoor use		
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
Rated input power	630 W (maximum)	
Power consumption, on	560W (typical)	
Power Consumption, Standby	45 W	
Display		
Resolution	1280 x 768	
Size	269 mm (10.6 in.) diagonal (nominal) capacitive multi-touch screen	
Data storage		
Internal	Removable solid-state drive (≥ 256 GB)	
External	Supports USB 3.0/2.0 compatible memory devices	
CPU	Option PC8: Modular, upgradeable; Intel i7, 6-core, 1.9 GHz clock, 32 GB DDR4 DRAM; includes secure memory for instrument calibration data	
	Option PCA: Modular; Intel i7, 6-core, 2.7 GHz clock, 32 GB DDR4 DRAM; includes secure memory for instrument calibration data.	
SSD (solid-state drive)	≥256 GB, removeable	
Operating system	Windows-10, Enterprise	
Weight		
Net	27 kg (59 lbs) (nominal)	
Shipping	39 kg (86 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			
Standard (Option 508, 513, 526)	Type-N female, 50 Ω nominal		
Standard (Option 544, 550)	2.4 mm male, 50 Ω nominal		
Standard (Option 555)	1.85mm male, 50 Ω nominal		
Option C35 (with Option 526 only)	3.5 mm male, 50 Ω nominal		
External mixing (Option EXM)			
Connector	SMA, female, 50 Ω, nominal		
Functions	Diplexer, LO output, IF input		
IF Input			
Maximum safe level	+7 dBm		
Center frequency	IF BW ≤ 25 MHz		322.5 MHz
	40 MHz IF path		250 MHz
	255 MHz IF path		690 MHz
	1 GHz IF path		690 MHz
Bandwidth	Supports all optional IFs up to and including R10		
ADC clipping level	25, 255, or 1 GHz IF paths		–15 dBm (nominal)
	40 MHz IF path		–20 dBm (nominal)
1 dB gain compression	–2 dB (nominal)		
Gain accuracy (The amplitude accuracy of a measurement includes this term and the accuracy with which the settings of corrections model the loss of the external mixer.)	**IF BW**	**Full range**	**20 to 30 °C**
	IF BW ≤ 25 MHz (swept and narrowband)	±2.5 dB	±1.2 dB
	Wider IF BW	±1.2 dB (nominal)	
IF frequency response	**Center frequency**	**Width**	**RMS (nominal)**
	322.5 MHz	±5 MHz	0.05 dB
	322.5 MHz	±12.5 MHz	0.07 dB
	250 MHz	±20 MHz	0.10 dB
	690 MHz	±127.5 MHz	0.12 dB
	690 MHz	±127.5 MHz	0.18 dB
Noise figure (322.5 MHz, swept operation high IF gain)	11 dB (nominal)		
VSWR	See Figure 4		
LO output			
Frequency range	3.75 to 14.1 GHz		
Output power	The LO output port power is compatible with Keysight M1970 and 11970 Series mixers except for the 11970K. The power is specified at the connector. Cable loss will affect the power available at the mixer. With non-Keysight/Agilent mixer units, supplied loss calibration data may be valid only at a specified LO power that may differ from the power available at the mixer. In such cases, additional uncertainties apply.		
	Center frequency	Full range	20 to 30 °C
	3.75 to 8.72 GHz (LO Doubler = Off settings)	14 to 18.8 dBm	+15 to 18 dBm
	7.8 to 14.1 GHz (LO Doubler = On setting. Fundamental frequency = 3.9 to 7.05 GHz)	N/A	+14 to 18.5 dBm
Second Harmonic	-20 dB (nominal) (LO Doubler = Off settings)		
Fundamental feedthrough and undesired harmonics	-30 dB (nominal) (LO Doubler = On setting. Fundamental frequency = 3.9 to 7.05 GHz)		
VSWR (The reflection coefficient has a Rayleigh probability distribution from 3.75 GHz to 14.1 GHz with a median VSWR of 1.22:1.)	1.8:1 (nominal)		

Internal calibrator output			
Cal out (Option 508, 513, 526)	SMA female, 10 MHz to 26.5 GHz internal calibrator output		
Cal out (Option 544, 550)	2.4 mm female, 10 MHz to 50 GHz internal calibrator output		
Cal out (Option 555)	1.85 mm female, 10 MHz to 55 GHz internal calibrator output		
Probe power			
Voltage/Current	+15 Vdc, ± 7% at 150 mA max (nominal)		
	−12.6 Vdc, ± 10% at 150 mA max (nominal)		
	GND		
USB ports			
Type	**Description**	**Connector**	**Output current**
Standard (3)	Compatible with USB 2.0	USB Type-A female	0.5 A (nom) for ports not marked with lightning bolt 1.2 A (nom) for port marked with lightning bolt
Headphone jack			
Connector	Miniature stereo audio jack		
	3.5 mm		

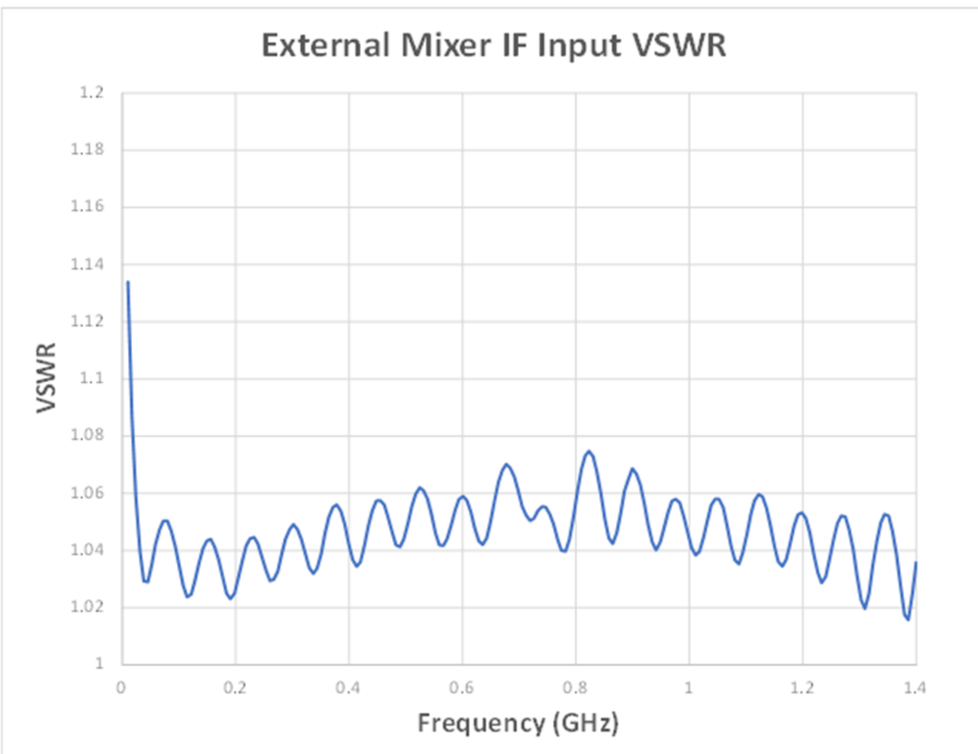


Figure 4. External mixer IF input VSWR

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	Sine wave: –5 to 10 dBm (nominal) Square wave: 0.2 to 1.5 V peak-to-peak (nominal)
Input frequency	1 to 50 MHz (nominal) (selectable to 1 Hz resolution)
Frequency lock range	±2 x 10^{-6} of specified external reference input frequency
Trigger 1 and 2 inputs	
Connector	BNC female,10 kΩ (nominal)
Trigger level range	–5 to +5 V
Trigger 3 input (precision, for wide-bandwidth measurements only)	
Connector	SMA, female, 50 Ω (nominal)
Trigger level range	–4.5 to 4.5 V
Trigger 1 and 2 outputs	
Connector	BNC female, 50 Ω (nominal)
Trigger level range	0 to 5 V (CMOS) (nominal)
VGA (monitor output 1)	
Connector	VGA compatible, 15-pin mini D-SUB
Format	XGA (60 Hz vertical sync rates, non-interlaced) analog RGB
Resolution	1280 x 768 (Default)
DisplayPort (monitor output 2)	
Connector	Option PC8: Mini display port Option PCA: DisplayPort 1.2
Resolution	1280 x 768 (Default)
Noise source drive +28 V (pulsed)	
Connector	BNC female
Output Voltage On	28.0 ± 0.1 V
Output Voltage Off	< 1.0 V
SNS Series Noise Source	**For use with Keysight Technologies SNS series noise sources**
Connector	12 pin circular
Analog out	
Connector	BNC female, 50 Ω (nominal)
USB ports	
USB 3.0 (Option PC8 CPU, host, superspeed; 2 ports)	
Standard	Compatible with USB 3.0
Connector	USB Type-A female
Output current	0.9 A (nominal)
USB 2.0 (Option PC8 CPU, 1 port)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	0.5 A (nominal)
USB 3.1 (Option PCA CPU, 4 ports)	
Standard	Compatible with USB 3.0
Connector	USB Type-A female
Output current	0.9 A (nominal)
USB 3.0 (Option PC8 and PCA CPUs; device; 1 port)	
Standard	Compatible with USB 3.0
Connector	USB Type-B female
GPIB interface	

Connector	IEEE-488 bus connector
GPIB codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3, C28, DT1, L4, C0
GPIB mode	Controller or device
Thunderbolt (Option PCA CPU)	
Connector	USB Type C, female (2 ports)
Output power	5 V, 1.0 A (max.)
PCIe X4 interface	
Connector	PCIe X4, female
Digital bus interface	
Connector	MDR-80 This port is intended for use with the Agilent/Keysight N5105 and N5106 products only. It is not available for general purpose use.
LAN TCP/IP interface	
Standard	Option PC8, PCA: 1000Base-T
	Option PCA: 10GBase-T
Connector	RJ45 Ethertwist
Optical Data Interface (ODI)	
ODI physical interface characteristics	
Specification	ODI-1: Physical Layer Specification, Revision 3.0
Number of ODI ports	1
Connector	MPO style, 2 rows of 12 fiber positions
Lane rate	12.5 Gbit/s
Interlaken burst max	2048 byte
Flow control	In-band
Port directionality	Producer only
Port aggregation	Not applicable
Interlaken channels	1 channel (Ch 0)
Streaming data rate	Up to 9.6 GByte/s
ODI data format capability	
Specification	ODI-2: Transport Layer, Revision 3.0, ODI-2.1: High Speed Data Formats, Revision 3.0
Packet types supported	Data packets Context packets
Context packets	Signal context packets supported: Data includes bandwidth, IF frequency, RF frequency, reference level, sample rate, overrange count
Control packets	Not used
Timestamp support	Supported, time of day Typical accuracy: System clock ± 20us
Trailer bit support	Overrange Spectral inversion Incomplete packet
Data format class IDs supported	See table below
Signal data packet size	Data size 65,536 bytes 16,384 16-bit IQ samples per packet 8,192 32-bit IQ samples per packet

Supported data format and class ID table

Item packing field width	Data item (signed)	Real or IQ	Data type identifier	Notes
32-bit	16-bit	IQ	0x18	16-bit I&Q for bandwidths > 255.176 MHz
64-bit	32-bit	IQ	0x20	32-bit I&Q for bandwidths ≤ 255.176MHz

Wide IF out (enabled by option CRW)	
Connector	SMA, female, 50 Ω nominal
AUX IF output	
Connector	SMA female, shared by CR3, CRP and ALV
Impedance	50 Ω nominal
AUX IF output, second IF output (option CR3)	
SA mode	322.5 MHz center frequency
IQ analyzer with IF bandwidth ≤ 25 MHz	322.5 MHz center frequency
IQ analyzer with IF path 40 MHz	250 MHz center frequency
IQ analyzer with IF path 255 MHz or 1 GHz	690 MHz center frequency
IQ analyzer with IF path 1.5 GHz	950 MHz (band 0), 1200 MHz (band 1 to 4)

IQ analyzer with IF path 2 GHz	1200 MHz center frequency	
Conversion gain (SA mode and up to 40 MHz bandwidth)	−1 to +4 dB (nominal) plus RF frequency response	
Bandwidth (-6 dB)		
< 3.6 GHz	Up to 1 GHz (nominal)	
> 3.6 GHz, with preselector	Depends on RF center frequency	
> 3.6 GHz, with preselector bypass	100-800 MHz ±3 dB (nominal)	
AUX IF output, programmable (Option CRP) (only available in swept spectrum analysis or IF path ≤ 40 MHz)		
Bandwidth		
Highpass corner frequency	5 MHz (nominal) at −3 dB	
Lowpass corner frequency	120 MHz (nominal) at −3 dB	
Output at 70 MHz		
< 3.6 GHz or > 3.6 GHz with preselector bypassed	100 MHz nominal	
Preselected band	Depends on RF center frequency	
IF output center frequency		
Range	10 to 75 MHz (user selectable)	
Resolution	0.5 MHz	
Conversion gain	–1 to +4 dB (nominal) plus RF frequency response	
Lower output frequencies	Subject to folding	
Residual output signals	≤ −88 dBm (nominal)	
AUX IF output, Fast Log Video (Option ALV)		
General Port Specifications		
Connector	SMA female	Shared with other options
Impedance	50 Ω nominal	
Fast Log Video Output		
Output voltage	**Open-circuit voltages**	
Maximum	1.6 V at –10 dBm nominal	
Slope	25 ± 1 mV/dB nominal	
Rise Time	15 ns nominal	
Fall Time	40 ns nominal	
Y-axis video output (Option YAV)		
General port specifications		
Connector	BNC female	Shared with other options
Impedance	50 Ω nominal	
Screen video		
Display scale types	Log or Lin	"Lin" is linear in voltage
Log scales	All (0.1 to 20 dB/div)	
Modes	Spectrum analyzer only	
Gating	Gating must be off	
Output scaling	0 to 1.0 V open circuit, representing bottom to top of screen	
Offset	± 1% of full scale (nominal)	
Gain accuracy	± 1% of output voltage (nominal)	
Log Video (log envelope) Output		
Amplitude Range (terminated with 50 Ω)		
Maximum	1.0 V (nominal) for –10 dBm at the mixer	
Scale factor	Output changes 1 V per 192.66 dB change in the signal envelope	
Bandwidth	Set by RBW	
Operating conditions	Select Sweep Type = Swept	
Linear Video (AM demod) Output		
Amplitude Range (terminated with 50 Ω)		
Maximum	1.0 V (nominal) for signal envelope at the reference level	
Minimum	0 V	
Scale factor	If carrier level is set to half the reference level in volts, the scale factor is 200% of carrier level per volt. Regardless of the carrier level, the scale factor is 100% of reference level per volt.	
Bandwidth	Set by RBW	
Operating conditions	Select Sweep Type = Swept	

Regulatory Information

This product is designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2 and MEASUREMENT CATEGORY NONE per IEC 61010-1, and 664 respectively.

This product has been designed and tested in accordance with accepted industry standards and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

This product is intended for indoor use.

Safety and Regulatory Markings Which May Be on the Product

	The CE mark is a registered trademark of the European Community (if accompanied by a year, it is the year when the design was proven). This product complies with all relevant directives.
ccr.keysight@keysight.com	The Keysight email address is required by EU directives applicable to our product.
CAN ICES/NMB-001(A)	"This ISM device complies with Canadian ICES-001." "Cet appareil ISM est conforme a la norme NMB du Canada."
ISM 1-A (GRP.1 CLASS A)	This is a symbol of an Industrial Scientific and Medical Group 1 Class A product. (CISPR 11, Clause 4)
	The CSA mark is a registered trademark of the CSA International.
	The RCM mark is a registered trademark of the Australian Communications and Media Authority.
	UK conformity mark is a UK government owned mark. When affixed to the product is declaring all applicable Directives and Regulations have been met in full.
	This symbol indicates separate collection for electrical and electronic equipment mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive 2002/96/EC).
	China RoHS regulations include requirements related to packaging and require compliance to China standard GB18455-2001.
	This symbol indicates compliance with the China RoHS regulations for paper/fiberboard packaging.
	More than one person is required to safely lift or carry this instrument. Alternately a mechanical lift can be used to eliminate the risk of personal injury.
	South Korean Certification (KC) mark; includes the marking's identifier code: R-R-Kst-xxxxxxx
	This symbol indicates the presence of a class 1 Laser device.

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 CISPR 11 Group 1, Class A AS/NZS CISPR 11 ICES/NMB-001 UKCA This ISM device complies with Canadian ICES-001 Cet appareil ISM est conforme a la norme NMB-001 du Canada NOTE: This is a sensitive measurement apparatus by design and may have some performance loss (up to 40 dB in the range 80 MHz to 6 GHz; above the Spurious Responses, Residual Responses specification of –100 dBm) when in the presence of ambient electromagnetic field of 3V/m.
South Korean Class A EMC declaration	This equipment has been conformity assessed for use in business environments. In a residential environment this equipment may cause radio interference. This EMC statement applies to the equipment only for use in business environment. 사 용 자 안 내 문 이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다. ※ 사용자 안내문은 "업무용 방송통신기자재"에만 적용한다.
Safety	Complies with the essential requirements of the European Low Voltage Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity): IEC/EN 61010-1 Canada: CSA C22.2 No. 61010-1 USA: UL std no. 61010-1 **WARNING** "WARNING: EMBEDDED CLASS 1 INVISIBLE LASER RADIATION. DO NOT EXPOSE USERS OR VIEW DIRECTLY WITH TELESCOPES"
Acoustic statement (European Machinery Directive)	Acoustic noise emission LpA < 70 dB Operator position Normal operation mode per ISO 7779 Acoustic noise - more information (Values given are per ISO 7779 standard in the "Operator Sitting" position) Ambient temperature (< 40 °C) Nominally under 55 dBA Sound Pressure. 55 dBA is generally considered suitable for use in quiet office environment Ambient temperature (≥ 40 °C) Nominally under 65 dBA Sound Pressure. 65 dBA is generally considered suitable for use in noisy office environment
Environmental stress	Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation, and end-use; those stresses include, but are not limited to, temperature, humidity, shock, vibration, altitude, and power line conditions; test methods are aligned with IEC 60068-2 and levels are similar to MILPRF-28800F Class 3.

To find a current **Declaration of Conformity** for a specific Keysight product, go to:

http://www.keysight.com/go/conformity

Additional Resources

The N9032B PXA X-Series signal analyzer isn't the only thing that will bring you to RF breakthroughs. Powerful software drives your measurements while finely tuned hardware takes them to new heights. In order to move the measurement plane to your device under test, reach even higher levels of measurement accuracy, and achieve 2 GHz of signal analysis and generation, the N9032B PXA partners with the:

- PathWave X-Series measurement applications and PathWave Vector Signal Analysis (VSA)
- U9361 RCal receiver calibrator for improved receiver test system accuracy by 10X
- M9484C VXG signal generator for wideband stimulus and response testing

N9032B PXA Signal Analyzer Configuration Guide (3121-1216.EN)

www.keysight.com/find/N9032B

Confidently Covered by Keysight Services

Prevent delays caused by technical questions and reduce system downtime due to instrument maintenance and repairs with Keysight Services. Keysight Services are here to support your test needs with expert technical support, instrument repair and calibration, software support, training, alternative acquisition program options, and more.

A KeysightCare agreement provides dedicated, proactive support through a single point of contact for instruments, software, and solutions. KeysightCare covers an extensive group of instruments, application software, and solutions and ensures optimal uptime, faster response, faster access to experts, and faster resolution.

Keysight Services

Offering	Benefits
KeysightCare KEYSIGHTCARE	KeysightCare provides elevated support for Keysight instruments and software, with access to technical support experts that respond within a specified time and ensure committed repair and calibration turnaround times (TAT). KeysightCare offers multiple service agreement tiers, including KeysightCare Assured, Enhanced, and Application Software Support. See the KeysightCare data sheet for details.
KeysightCare Assured	KeysightCare Assured goes beyond basic warranty with repair services that include committed TAT and unlimited access to technical experts.
KeysightCare Enhanced	KeysightCare Enhanced includes all the benefits of KeysightCare Assured plus Keysight's accurate and reliable Calibration Services, accelerated, and committed TAT, and technical response.
Keysight Support Portal & Knowledge Center	All KeysightCare tiers include access to the Keysight Support Portal where you can manage support and service resources related to your assets such as service requests, and status, or browse the Knowledge Center.
Education Services	Build confidence and gain new skills to make accurate measurements, with flexible Education Services developed by Keysight experts. Including Start-up Assistance.
Alternative acquisition options	
KeysightAccess	Reduce budget challenges with a leased-based subscription service, that offers low monthly payments, enabling you to get the instruments, software, and technical support you want for your test needs.

Recommended services

Maximize your test system up-time by securing technical support, repair, and calibration services with committed response and turnaround times. 1-year KeysightCare Assured is included in every new instrument purchase. Obtain multi-year KeysightCare upfront to eliminate the need for lengthy and tedious paperwork and yearly requests for maintenance budget. Plus, you benefit from secured service for 2, 3, or 5 years.

Service	Function
KeysightCare Enhanced*	**Includes tech support, warranty and calibration**
R-55B-001-1	KeysightCare Enhanced – Upgrade 1 year
R-55B-001-2	KeysightCare Enhanced – Extend to 2 years
R-55B-001-3	KeysightCare Enhanced – Extend to 3 years (Recommended)
R-55B-001-5	KeysightCare Enhanced – Extend to 5 years (Recommended)
KeysightCare Assured	**Includes tech support and warranty**
R-55A-001-2	KeysightCare Assured – Extend to 2 years
R-55A-001-3	KeysightCare Assured – Extend to 3 years
R-55A-001-5	KeysightCare Assured – Extend to 5 years
Start-Up Assistance	
PS-S40-01	Included – instrument fundamentals and operations starter
PS-S40-04	Recommended – instrument fundamentals and operations starter
PS-S40-02	Optional, technology & measurement science standard learning

* Available in select countries. For details, please view the datasheet. R-55B-001-2/3/5 must be ordered with R-55B-001-1.

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com

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