

# SA6210A XA5 X-Series Signal Analyzer

2 Hz to 32 GHz



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# Definitions and Conditions

This data sheet provides performance information for Keysight SA6210A XA5 Signal Analyzer. The performance applies to RF 1 (one-channel or two-channel configuration) and RF 2 (two-channel configuration), unless otherwise noted.

**Specifications** describe the performance of parameters covered by the product warranty and apply to temperature ranges 0 °C to 55 °C for one-channel configuration, 0 °C to 40 °C for two-channel configuration, unless otherwise noted.

**95<sup>th</sup> percentile** values indicate the breadth of the population (approx. 2  $\sigma$ ) of performance tolerances expected to be met in 95% of the cases with a 95% confidence, for any ambient temperature in the range of 20 °C 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% of the units exhibit with a 95% confidence level over the temperature range 20 °C 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:

- Analyzer is within its calibration cycle
- Analyzer is under auto couple control, except that Auto Sweep Time Rules = Accuracy
- Analyzer is used in an 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
- If the Auto Alignment Method is set to Standard, the following conditions apply: Auto Align set to Precision and Characterize Core Hardware must have been run in the last 30 days. No alerts or warning messages are shown on the front panel.
- If the Auto Alignment Method is set to Classic, the following conditions apply: Auto Align set to Normal; or, if Auto Align is set to Off or Partial, alignments must have been run recently enough to prevent an Alert message. Note that factory default is with the Auto Align 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 Auto Align 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.

The term "mixer level" is used as a condition for many specifications in this document. This term is conceptual quantity that is defined as follows: Mixer Level (dBm) = RF Input Power Level (dBm) – Attenuation (dB).

# Certification

Keysight Technologies certifies that this product met its published specifications at the time of shipment from the factory. Keysight Technologies further certifies that its calibration measurements are traceable to the International System of Units (SI) via national metrology institutes ([www.keysight.com/find/NMI](http://www.keysight.com/find/NMI)) that are signatories to the CIPM Mutual Recognition Arrangement.

Common Abbreviations	Function
BW	Bandwidth
FFT	Fast Fourier transform
IQ	In-phase quadrature-phase (sample data)
IVL	Individual validated license (for export to restricted countries)
LO	Local oscillator
PA	Pre-amplifier
STD	Standard path, with YIG tunable filter
WPR	Wideband preselector path
MPB	Microwave preselector bypass path
RBW	Resolution bandwidth (filter)
VBW	Video bandwidth (filter)

# Frequency and Time Specifications

Frequency Option		Frequency Range
532		2 Hz to 32 GHz, RF 1
632		2 Hz to 32 GHz, RF 2
Minimal Frequency		
	"Allow Direct Path" ON	"Allow Direct Path" OFF
PA OFF		2 Hz
PA ON, Low		2 Hz
PA ON, High		1 MHz
		10 MHz
		10 MHz
Swept Spectrum Analysis (These Bands are Not Applicable to Wide-Bandwidth IQ Analysis)		
Swept Frequency Band	LO Multiple (N)	Frequency Range
Direct path	N/A	2 Hz to 30 MHz
0	1	> 30 MHz to 8.4 GHz
1	2	> 8.4 to 9.5 GHz (STD or MPB)
		> 8.4 to 12.5 GHz (WPR)
2	2	> 9.5 to 32 GHz (STD or MPB)
		> 12.5 to 32 GHz (WPR)
Frequency Reference		
Accuracy (total)		$\pm$ [(Initial accuracy) + (aging rate x time since last adjustment) + (temperature stability)]
Aging rate		$\pm 5 \times 10^{-7}$ / year
Temperature stability, full temperature range		$\pm 1 \times 10^{-7}$
Achievable initial calibration accuracy		$\pm 3.1 \times 10^{-8}$
Example frequency reference accuracy 1 year after last adjustment		$= \pm (5 \times 10^{-7} + 1 \times 10^{-7} + 3.1 \times 10^{-8})$ $= \pm 6.31 \times 10^{-7}$
Residual FM		
Center frequency = 1 GHz, 10 Hz RBW, 10 Hz VBW		$\leq (0.25 \text{ Hz} \times N)$ p-p in 20 ms nominal (N = LO multiple, see band table above)
Frequency Readout Accuracy (Start, Stop, Center, Marker)		
$\pm$ (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, Nominal		
Accuracy		$\pm$ (marker frequency x frequency reference accuracy + 0.100 Hz)
Delta counter accuracy		$\pm$ (delta frequency x frequency reference accuracy + 0.141 Hz)
Counter resolution		0.001 Hz
Frequency Span (FFT and swept mode), nominal		
Range		0 Hz (zero span), 10 Hz to maximum frequency of instrument
Resolution		2 Hz
Accuracy (Nominal)		
Stepped/Swept		$\pm (0.1\% \times \text{span} + \text{horizontal resolution})$ where horizontal resolution is span/(sweep points -1)
FFT		$\pm (0.1\% \times \text{span} + \text{horizontal resolution})$ where horizontal resolution is span/(sweep points -1)
Sweep Time and Triggering		
Range	Span = 0 Hz	1 $\mu$ s to 6000 s
	Span $\geq$ 10 Hz	1 ms to 4000 s
Accuracy	Span $\geq$ 10 Hz, swept	$\pm 0.01\%$ nominal
	Span $\geq$ 10 Hz, FFT	$\pm 40\%$ nominal
	Span = 0 Hz	$\pm 0.01\%$ nominal
Trigger delay	Span = 0 Hz or FFT	-150 to +500 ms
	Span $\geq$ 10 Hz, swept	0 to 500 ms
	Resolution	0.1 $\mu$ s

<b>Time Gating</b>	
Gate methods	Gated LO; gated video; gated FFT
Gate length range (except method = FFT)	1 $\mu$ s to 5.0 s
Gate delay range	0 to 100.0 s
Gate delay jitter	33.3 ns p-p nominal
<b>Sweep (Trace) Point Range</b>	
All spans	3 to 100,001
<b>Resolution Bandwidth (RBW) (See Also IQ Analysis Section)</b>	
Range (with -3 dB bandwidth)	1 Hz to 10 MHz (step resolution of 3 digits)
	1 Hz to 40 MHz (step resolution of 3 digits; requires N90EMWR1B)
	1 Hz to 80 MHz (step resolution of 3 digits; requires N90EMWR2B, IVL)
<b>Bandwidth Accuracy (Power)</b>	
<b>RBW Range</b>	<b>Accuracy, Nominal</b>
1 Hz to 100 kHz	$\pm 0.01$ dB
> 100 kHz to 1 MHz (< 8.4 GHz center frequency)	$\pm 0.01$ dB
> 1 to 2 MHz (< 8.4 GHz center frequency)	$\pm 0.03$ dB
> 2 to 3 MHz (< 8.4 GHz center frequency)	$\pm 0.03$ dB
4, 5, 6, 8, 10 MHz (< 8.4 GHz center frequency)	$\pm 0.20$ dB
20, 28, 30, 40 MHz (> 50 MHz to 8.4 GHz center frequency)	$\pm 0.20$ dB
50, 80 MHz (> 50 MHz to 8.4 GHz center frequency)	$\pm 0.20$ dB
<b>Bandwidth Accuracy (-3 dB)</b>	
<b>RBW Range</b>	<b>Accuracy, Nominal</b>
1 Hz to 1.3 MHz	$\pm 1$ %
> 1.3 to 3 MHz	$\pm 1$ %
4, 5, 6, 8, 10 MHz	$\pm 4$ %
20, 28, 30, 40 MHz	$\pm 3$ %
50, 80 MHz	$\pm 3$ %
Selectivity (-60 dB/-3 dB)	< 5: 1
<b>Preselector Bandwidth</b>	
The preselector can have a significant passband ripple. To avoid ambiguous results, the -4 dB bandwidth is characterized	
<b>Center Frequency</b>	<b>Mean Bandwidth (-4 dB), Nominal</b>
10 GHz	52 MHz
15 GHz	53 MHz
20 GHz	55 MHz
25 GHz	56 MHz
30 GHz	59 MHz
<b>Video Bandwidth (VBW) Filters</b>	
Range	1 Hz to 10 MHz (step resolution of 3 digits), and wide open (labeled 50 MHz)
	1 Hz to 40 MHz (step resolution of 3 digits; requires N90EMWR1B), and wide open (labeled 50 MHz)
	1 Hz to 80 MHz (step resolution of 3 digits; requires N90EMWR2B, IVL), and wide open (labeled 80 MHz)
Accuracy	$\pm 6$ %, nominal
<b>Detector Types</b>	
Normal, peak, sample, negative peak, log power average, RMS average, and voltage average	

# 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	Y	Y	
External 4	Y	Y	Y	
External 5 (Precision)			Y	Valid when the input port is set to RF 1 In and IF Path is set to 1 GHz or 2 GHz; requires option R10 or R20
External 6 (Precision)			Y	Valid when the input port is set to RF 2 In and IF Path is set to 1 GHz or 2 GHz; requires option S10 or S20, and option 002
RF burst	Y	Y	Y	Digital RF Burst trigger (filtered ADC trigger)
Video (IF Mag)	Y		Y	ADC trigger is similar
ADC			Y	Similar to Video, but operates digitally on mag[I,Q], prior to decimation, filtering, and corrections.
Periodic	Y	Y	Y	Repetitive "frame" trigger, at precise interval, following an External or RF Burst trigger

## 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 < 1000 MHz (RF burst level type = Absolute)	
Sweep type = Swept	30 MHz (nominal)
Sweep type = FFT	> 80 MHz (nominal), FFT width > 40 to 480 MHz 30 MHz (nominal), FFT width 40 MHz

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 the preselector on (in circuit). These settings impact amplitude accuracy and range.

### Front End Settings

	Microwave Path Control	Internal Preamplifier	Allow RF Gain Adjust	Description
1a	Standard path (STD)	Off	Off	Requires Option YF3/SY3; Settings provide lowest internally-generated distortion with degradation to DANL. Suitable for harmonics, IMD, spurious in presence of large signals, etc. unless noise-limited.
1b		Off	On	Requires Option YF3/SY3; Default selection following power-on, boot-up, or PRESET. Settings provide best dynamic range and lower DANL, compared to (1a).
1c		On, Low	N/A	Requires Option YF3/SY3 and P32/Q32. Settings provide lower DANL, compared to (1b), while preserving very good dynamic range. Suitable for distortion measurements (harmonics, IMD, etc.) when a lower noise floor is needed.
1d		On, High	N/A	Requires Option YF3/SY3 and P32/Q32; Settings provide lowest DANL, compared to (1c). Best for finding low-level spurs, oscillations, etc. near the noise floor. Operates down to 1 MHz.
2a	Wideband preselector path (WPR)	Off	Off	Settings provide lower internally-generated distortion with degradation to DANL, compared to (2b).
2b		Off	On	Default selection following power-on, boot-up, or PRESET when YF3/SY3 is not applicable. Settings provide very fast sweep speeds and equivalent dynamic range, with slightly reduced out-of-band rejection, compared to (1b). Suitable for wideband digitizer and FFT measurements up to 1 GHz analysis bandwidth.
2c		On, Low	N/A	Requires Option P32/Q32. Settings provide lower DANL, compared to (2b), while preserving very good dynamic range. Suitable for distortion measurements (harmonics, IMD, etc.) when a lower noise floor is needed.
2d		On, High	N/A	Requires Option P32/Q32. Settings provide lowest DANL, compared to (2c). Best for finding low-level spurs, oscillations, etc. near the noise floor. Operates down to 1 MHz.
3a	Microwave preselector bypass path (MPB)	Off	Off	Bypasses preselector. Settings provide lower internally-generated distortion with degradation to DANL, compared to (3b). Provides good EVM floor at mid-to-high input power region.
3b		Off	On	Bypasses preselector. Suitable for wideband digitizer and FFT measurements wider than 1 GHz analysis bandwidth.
3c		On, Low	N/A	Bypasses preselector. Requires Option P32/Q32. Settings provide best EVM at low input power region for wideband digitizer and FFT measurements wider than 1 GHz analysis bandwidth.
3d		On, High	N/A	Bypasses preselector. Requires Option P32/Q32. Settings provide best EVM floor at very low input power region for wideband digitizer and FFT measurements wider than 1 GHz analysis bandwidth.

<b>Amplitude Range</b>	
Measurement range	Displayed average noise level (DANL) to +30 dBm, PA off
	DANL to +24 dBm, PA on, Low
	DANL to +4 dBm, PA on, High
Input attenuator range (2 Hz to 32 GHz)	0 to 46 dB in 2 dB steps
<b>Maximum Safe Input Level (Max Applied to RF Input Connector)</b>	
Average total power, Input attenuator $\geq$ 10 dB	+30 dBm (1 W)
Average total power (with preamp), Input attenuator < 10 dB	+20 dBm (0.1 W)
Peak pulse power (< 10 $\mu$ s pulse width, < 1% duty cycle, and input attenuation $\geq$ 30 dB)	+50 dBm (100 W)
<b>DC Volts</b>	
DC coupled	$\pm$ 0.2 Vdc
<b>Display Range</b>	
Log scale	0.1 to 1 dB/division in 0.1 dB steps; 1 to 20 dB/division in 1 dB steps (10 display)
Linear scale	10 divisions
Scale units	dBm, dBmV, dB $\mu$ V, dBmA, dB $\mu$ A, V, W, A

# Frequency Response

## 1a. STD Frequency Response (Allow RF Gain Adjust OFF, Swept, Preselector ON, PA OFF)

10 dB Input Attenuation, Preselector Centering Applied for Band 2, Nominal

Frequency	RBW ≤ 10 MHz	RBW > 10 MHz
2 Hz to 30 MHz	± 0.20 dB	
> 30 MHz to 8.4 GHz	± 0.20 dB	± 0.50 dB
> 8.4 to 9.5 GHz	± 0.20 dB	± 1.20 dB
> 9.5 to 13.6 GHz	± 0.25 dB	± 0.50 dB
> 13.6 to 32 GHz	± 0.40 dB	± 0.50 dB

## 1b. STD Frequency Response (Allow RF Gain Adjust ON, Swept, Preselector ON, PA OFF)

10 dB Input Attenuation, Preselector Centering Applied for Band 2

Frequency	RBW ≤ 10 MHz, full Range	RBW ≤ 10 MHz, 20 to 30 °C	RBW ≤ 10 MHz, typical	RBW > 10 MHz, nominal
2 Hz to < 9 kHz			± 0.20 dB (nominal)	
9 kHz to 30 MHz	± 0.80 dB	± 0.70 dB	± 0.25 dB	
> 30 MHz to 3.6 GHz	± 0.85 dB	± 0.60 dB	± 0.20 dB	± 0.50 dB
> 3.6 to 8.4 GHz	± 1.50 dB	± 1.00 dB	± 0.20 dB	± 0.50 dB
> 8.4 to 9.5 GHz	± 1.70 dB	± 1.20 dB	± 0.25 dB	± 1.25 dB
> 9.5 to 13.6 GHz	± 1.80 dB	± 1.30 dB	± 0.40 dB	± 0.50 dB
> 13.6 to 26.5 GHz	± 1.90 dB	± 1.40 dB	± 0.40 dB	± 0.50 dB
> 26.5 to 32.0 GHz	± 2.30 dB	± 1.80 dB	± 0.40 dB	± 0.50 dB

## 1c. STD Frequency Response (Swept, Preselector ON, PA on Low Gain)

10 dB Input Attenuation, Preselector Centering Applied for Band 2, Nominal

Frequency	RBW ≤ 10 MHz	RBW > 10 MHz
2 Hz to 30 MHz	± 0.20 dB	
> 30 MHz to 8.4 GHz	± 0.20 dB	± 0.50 dB
> 8.4 to 9.5 GHz	± 0.25 dB	± 1.25 dB
> 9.5 to 13.6 GHz	± 0.25 dB	± 0.50 dB
> 13.6 to 26.5 GHz	± 0.40 dB	± 0.50 dB
> 26.5 to 32.0 GHz	± 0.50 dB	± 0.50 dB

## 1d. STD Frequency Response (Swept, Preselector ON, PA on High Gain)

10 dB Input Attenuation, Preselector Centering Applied for Band 2

Frequency	RBW ≤ 10 MHz, full Range	RBW ≤ 10 MHz, 20 to 30 °C	RBW ≤ 10 MHz, typical	RBW > 10 MHz, nominal
1 to 30 MHz	± 0.80 dB	± 0.68 dB	± 0.40 dB	
> 30 MHz to 3.6 GHz	± 0.80 dB	± 0.70 dB	± 0.25 dB	± 1.00 dB
> 3.6 to 8.4 GHz	± 1.50 dB	± 1.00 dB	± 0.25 dB	± 1.00 dB
> 8.4 to 9.5 GHz	± 1.70 dB	± 1.20 dB	± 0.25 dB	± 1.25 dB
> 9.5 to 13.6 GHz	± 2.10 dB	± 1.40 dB	± 0.25 dB	± 0.30 dB
> 13.6 to 26.5 GHz	± 2.50 dB	± 2.00 dB	± 0.30 dB	± 0.40 dB
> 26.5 to 32.0 GHz	± 3.60 dB	± 2.80 dB	± 0.75 dB	± 0.80 dB

## 2a. WPR Frequency Response (Allow RF Gain Adjust OFF, Swept, Wideband Preselector ON, PA OFF)

10 dB Input Attenuation, Nominal

Frequency	RBW ≤ 10 MHz	RBW > 10 MHz
2 Hz to < 30 MHz	± 0.20 dB	
> 30 MHz to 8.4 GHz	± 0.20 dB	± 0.50 dB
> 8.4 to 9.5 GHz	± 0.20 dB	± 1.20 dB
> 9.5 to 26.5 GHz	± 0.20 dB	± 0.50 dB
> 26.5 to 32.0 GHz	± 0.30 dB	± 0.50 dB

**2b. WPR Frequency Response (Allow RF Gain Adjust ON, Swept, Wideband Preselector ON, PA OFF)  
10 dB Input Attenuation**

Frequency	RBW ≤ 10 MHz, Full range	RBW ≤ 10 MHz, 20 to 30 °C	RBW ≤ 10 MHz, typical	RBW > 10 MHz, nominal
2 Hz to < 9 kHz			± 0.20 dB (nominal)	
9 kHz to 30 MHz	± 0.80 dB	± 0.70 dB	± 0.25 dB	
> 30 MHz to 3.6 GHz	± 0.85 dB	± 0.60 dB	± 0.20 dB	± 0.50 dB
> 3.6 to 8.4 GHz	± 1.50 dB	± 1.00 dB	± 0.20 dB	± 0.50 dB
> 8.4 to 12.5 GHz	± 1.60 dB	± 1.10 dB	± 0.30 dB	± 1.25 dB
> 12.5 to 13.6 GHz	± 1.60 dB	± 1.10 dB	± 0.30 dB	± 0.50 dB
> 13.6 to 26.5 GHz	± 1.80 dB	± 1.30 dB	± 0.40 dB	± 0.50 dB
> 26.5 to 32.0 GHz	± 2.00 dB	± 1.50 dB	± 0.40 dB	± 0.50 dB

**2c. WPR Frequency Response (Swept, Wideband Preselector On, PA on Low Gain)  
10 dB Input Attenuation, Nominal**

Frequency	RBW ≤ 10 MHz	RBW > 10 MHz
2 Hz to 30 MHz	± 0.20 dB	
> 30 MHz to 8.4 GHz	± 0.20 dB	± 0.50 dB
> 8.4 to 12.5 GHz	± 0.30 dB	± 1.20 dB
> 12.5 to 13.6 GHz	± 0.30 dB	± 0.50 dB
> 13.6 to 32.0 GHz	± 0.40 dB	± 0.50 dB

**2d. WPR Frequency Response (Swept, Wideband Preselector On, PA on High Gain)  
10 dB Input Attenuation, Nominal**

Frequency	RBW ≤ 10 MHz	RBW > 10 MHz
1 to 30 MHz	± 0.40 dB	
> 30 MHz to 8.4 GHz	± 0.25 dB	± 1.00 dB
> 8.4 to 12.5 GHz	± 0.30 dB	± 1.30 dB
> 12.5 to 26.5 GHz	± 0.30 dB	± 0.50 dB
> 26.5 to 32.0 GHz	± 0.40 dB	± 0.50 dB

**Attenuator Switching Uncertainty (Allow RF Gain Adjust ON, PA OFF)**

**Attenuation Alignment Reference at 10 MHz, 100 MHz, 8.4 GHz, 9.6 GHz, and 27 GHz, Relative to 10 dB Reference Setting, Nominal**

	1b. STD	2b. WPR
Attenuation > 40 dB	± 0.05 dB	± 0.07 dB
Attenuation 22 to 40 dB	± 0.05 dB	± 0.07 dB
Attenuation 12 to 20 dB	± 0.05 dB	± 0.05 dB
Attenuation 2 to 8 dB	± 0.06 dB	± 0.08 dB
Attenuation 0 dB	± 0.09 dB	± 0.09 dB

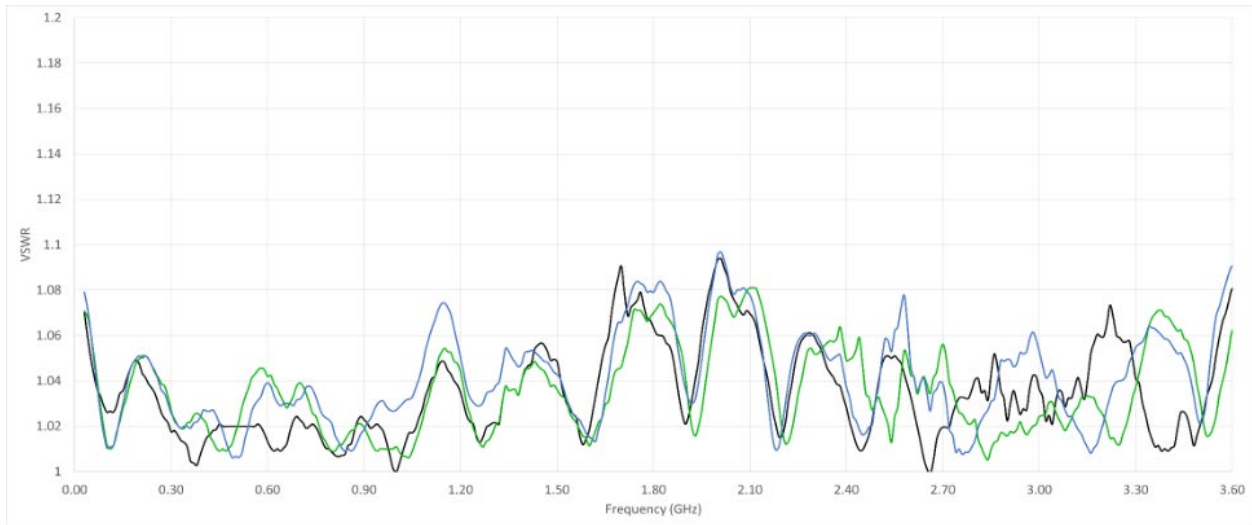
**VSWR (Voltage Standing Wave Ratio) at RF Input (95th Percentile, unless Stated Otherwise)**

Standard path, 10 dB input attenuation, < 10 MHz	1.08:1 (nominal)	
Standard path, 0 dB input attenuation, < 10 MHz	1.27:1 (nominal)	

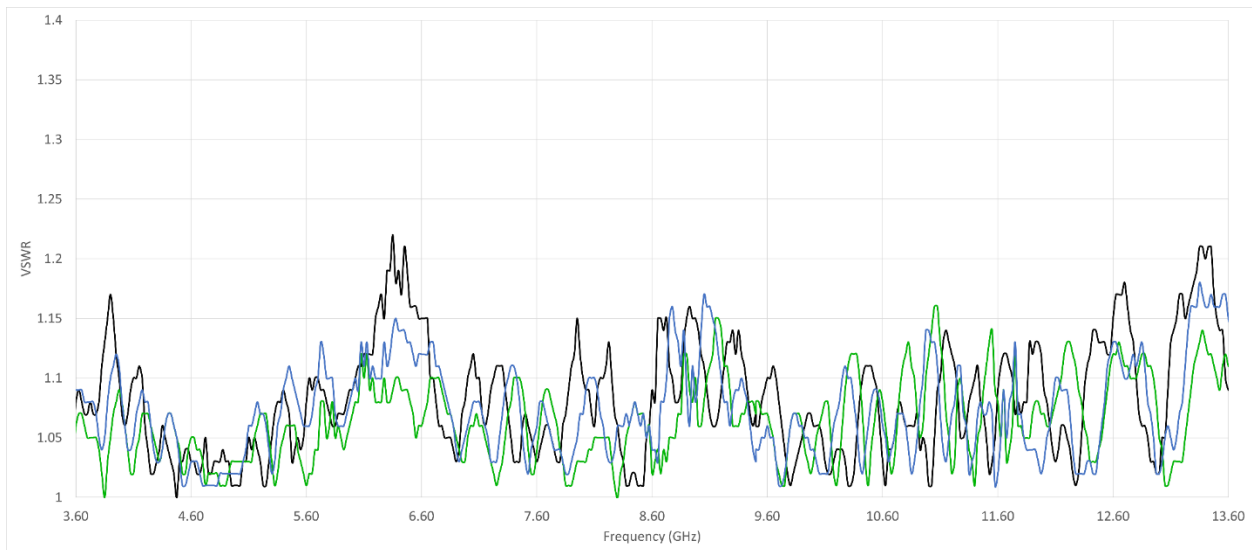
Center Frequency	1b. Std (10 dB Input Attenuation)	1d. Std (0 dB Input Attenuation)	2b. WPR (10 dB Input Attenuation), Nominal	2d. WPR (0 dB Input Attenuation), Nominal
10 to 100 MHz	1.08	1.16	1.05	1.08
100 MHz to 3.6 GHz	1.10	1.33	1.04	1.17
3.6 to 8.4 GHz	1.14	1.41	1.07	1.22
8.4 to 13.6 GHz	1.16	1.65	1.08	1.20
13.6 to 26.5 GHz	1.26	1.52	1.12	1.23
26.5 to 32 GHz	1.42	2.08	1.22	1.43

The magnitude of the mismatch over the range of frequencies will be very similar between MPB and non-MPB operation, but the details, such as the frequencies of the peaks and valleys, will shift.

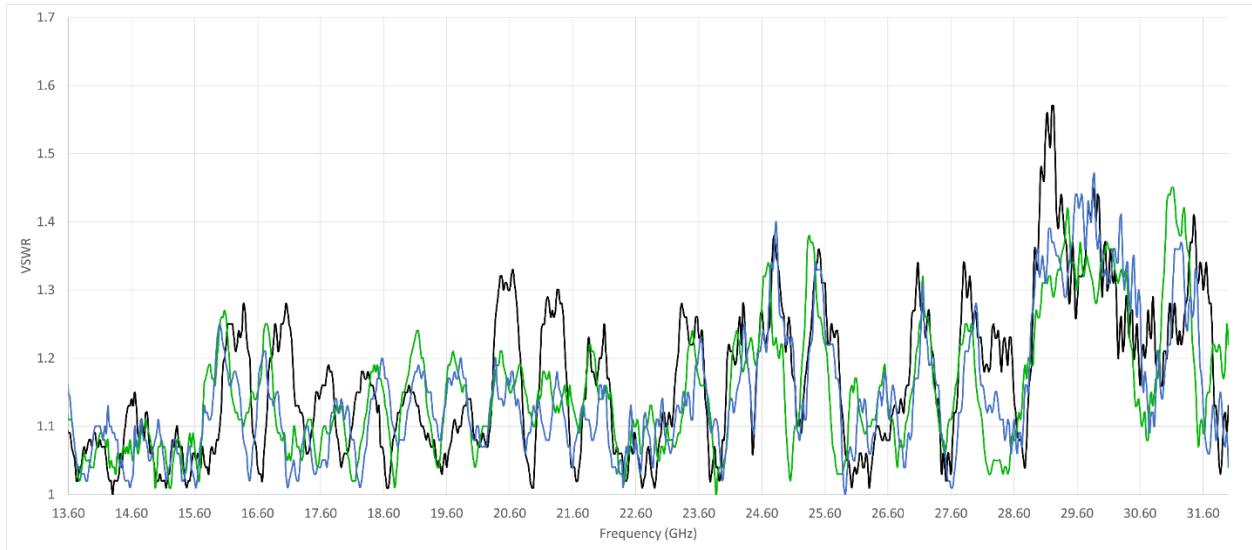
## VSWR Plots (Options 532/632)



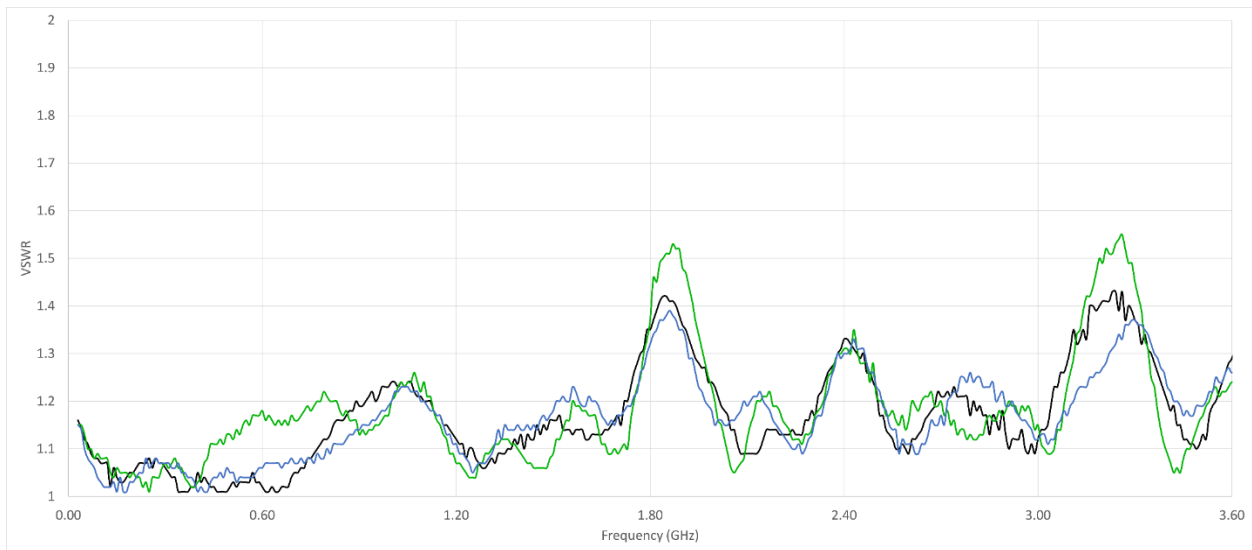
**Figure 1.** VSWR vs. frequency (0 to 3.6 GHz), 1b. standard path, 10 dB attenuation, measured on 3 units



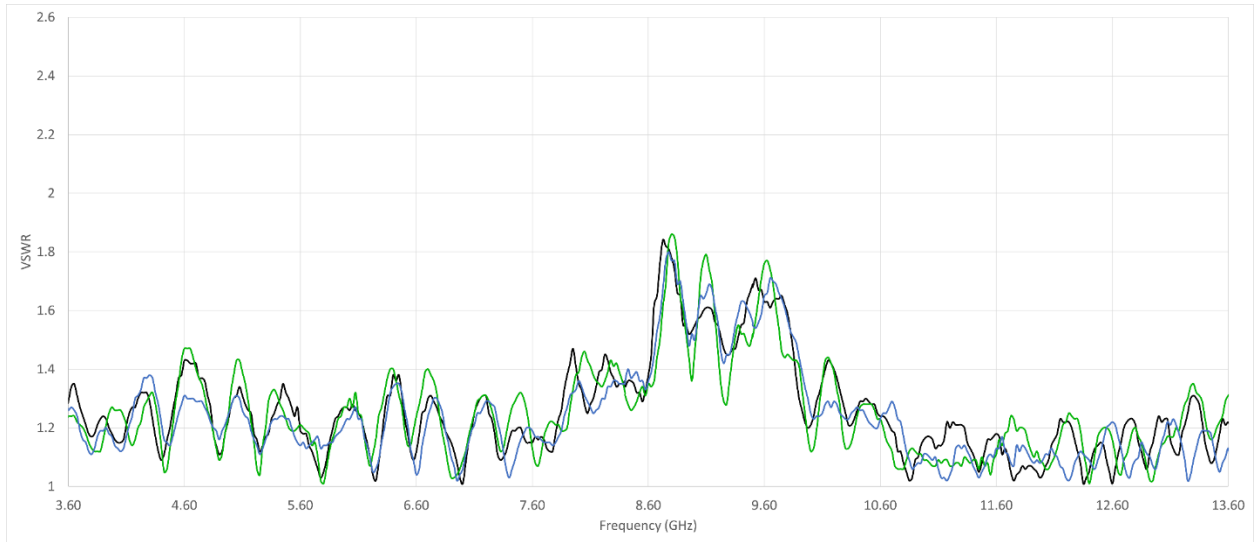
**Figure 2.** VSWR vs. frequency (3.6 to 13.6 GHz), 1b. standard path, 10 dB attenuation, measured on 3 units



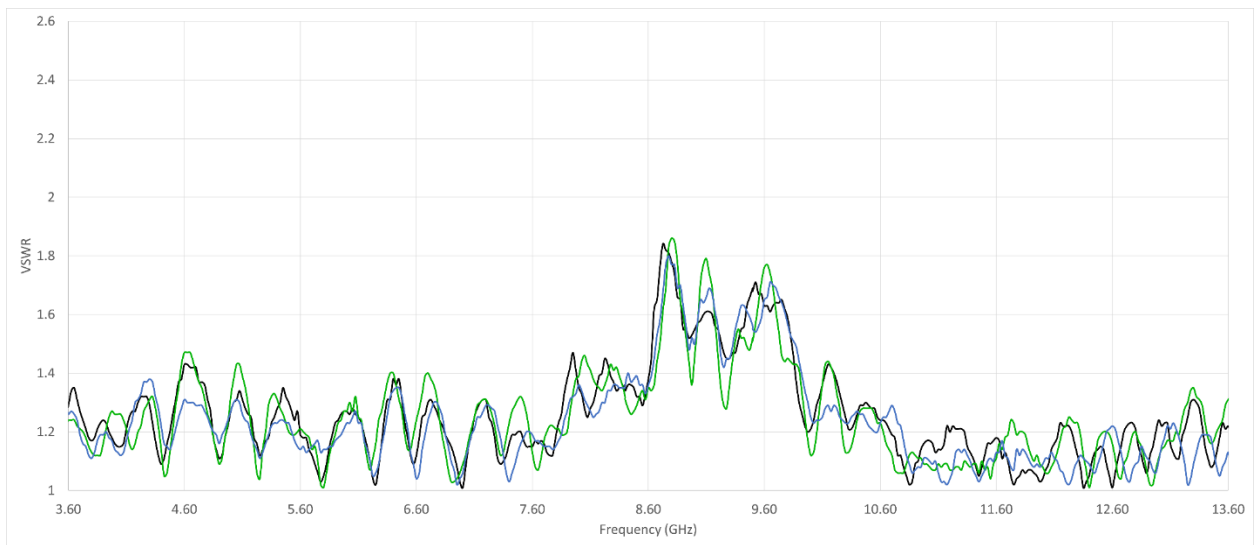
**Figure 3.** VSWR vs. frequency (13.6 to 32 GHz), 1b. standard path, 10 dB attenuation, measured on 3 units



**Figure 4.** VSWR vs. frequency (0 to 3.6 GHz), 1d. standard path, 0 dB attenuation, measured 3 units



**Figure 5.** VSWR vs. frequency (3.6 to 13.6 GHz), 1d. standard path, 0 dB attenuation, measured on 3 units



**Figure 6.** VSWR vs. frequency (13.6 to 32 GHz), 1d. standard path, 0 dB attenuation, measured on 3 units

**Resolution Bandwidth Switching Uncertainty (Relative to 30 kHz RBW)**

1 Hz to 1.5 MHz	± 0.04 dB
1.51 to 2.7 MHz	± 0.05 dB
2.7 to 3 MHz	± 0.05 dB
4, 5, 6, 8, 10 MHz	± 0.10 dB
20, 28, 30, 40 MHz	± 0.20 dB (nominal); requires Option N90EMWR1B or N90EMWR2B
50, 80 MHz	± 0.20 dB (nominal); requires Option N90EMWR2B

**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

**Preamplifier (PA)**

	<b>PA ON, Low Gain</b>	<b>PA ON, High Gain</b>
Option P32/Q32	2 Hz to 32 GHz	1 MHz to 32 GHz
Noise figure	6 to 20 dB (nominal)	4 to 8 dB (nominal)
Gain	15 dB (nominal)	20 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.
- At tone spacings smaller than 70 MHz (nominal), 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).

### 1 dB Gain Compression (Swept, Preselector ON)

Center Frequency	1b. STD, Allow RF Gain Adjust ON, PA OFF, Nominal	2b. WPR, Allow RF Gain Adjust ON, PA OFF, Nominal
Band 0	+5 dBm	+5 dBm
Band 1	+10 dBm	+10 dBm
Band 2	+10 dBm	+15 dBm

# Displayed Average Noise Level (DANL)

Input terminated, sample or average detector, averaging type set to Log, IF gain = high, normalized to 1 Hz resolution bandwidth, 0 dB input attenuation, NFE off, Sweep Type Rules = Best Drange

## 1a. STD (Swept, Preselector ON, Allow RF Gain Adjust OFF, PA OFF)

Frequency	RBW ≤ 10 MHz, Nominal	RBW > 10 MHz, Nominal
2 to 10 Hz	-80 dBm	
> 10 to 100 Hz	-110 dBm	
> 100 Hz to 1 kHz	-120 dBm	
> 1 to 9 kHz	-130 dBm	
> 9 to 100 kHz	-138 dBm	
> 100 kHz to 1 MHz	-144 dBm	
> 1 to 30 MHz	-151 dBm	
> 30 MHz to 1.2 GHz	-154 dBm	-152 dBm
> 1.2 to 2.1 GHz	-152 dBm	-154 dBm
> 2.1 to 3.6 GHz	-150 dBm	-152 dBm
> 3.6 to 6.6 GHz	-148 dBm	-149 dBm
> 6.6 to 8.4 GHz	-146 dBm	-147 dBm
> 8.4 to 9.5 GHz	-145 dBm	-145 dBm
> 9.5 to 13.6 GHz	-143 dBm	-142 dBm
> 13.6 to 18.0 GHz	-140 dBm	-139 dBm
> 18.0 to 22.55 GHz	-137 dBm	-136 dBm
> 22.55 to 26.5 GHz	-135 dBm	-134 dBm
> 26.5 to 30 GHz	-131 dBm	-130 dBm
> 30 to 32 GHz	-130 dBm	-130 dBm

## 1b. STD (Swept, Preselector ON, Allow RF Gain Adjust ON, PA OFF)

Frequency	RBW ≤ 10 MHz, Full Range	RBW ≤ 10 MHz, 20 to 30 °C	RBW ≤ 10 MHz, Typical	RBW > 10 MHz, Nominal
2 to 10 Hz			-90 dBm (nominal)	
> 10 to 100 Hz			-110 dBm (nominal)	
> 100 Hz to 1 kHz			-120 dBm (nominal)	
> 1 to 9 kHz			-130 dBm (nominal)	
> 9 to 100 kHz	-135 dBm	-135 dBm	-138 dBm	
> 100 kHz to 1 MHz	-142 dBm	-142 dBm	-145 dBm	
> 1 to 5 MHz	-148 dBm	-148 dBm	-150 dBm	
> 5 to 30 MHz	-147 dBm	-148 dBm	-151 dBm	
> 30 MHz to 1.2 GHz	-150 dBm	-151 dBm	-154 dBm	-156 dBm
> 1.2 to 2.1 GHz	-148 dBm	-149 dBm	-152 dBm	-154 dBm
> 2.1 to 3.6 GHz	-146 dBm	-147 dBm	-150 dBm	-152 dBm
> 3.6 to 6.6 GHz	-144 dBm	-145 dBm	-148 dBm	-149 dBm
> 6.6 to 8.4 GHz	-142 dBm	-143 dBm	-146 dBm	-147 dBm
> 8.4 to 9.5 GHz	-144 dBm	-146 dBm	-149 dBm	-151 dBm
> 9.5 to 13.6 GHz	-147 dBm	-149 dBm	-154 dBm	-154 dBm
> 13.6 to 18.0 GHz	-148 dBm	-150 dBm	-152 dBm	-152 dBm
> 18.0 to 22.55 GHz	-143 dBm	-146 dBm	-149 dBm	-149 dBm
> 22.55 to 26.5 GHz	-141 dBm	-144 dBm	-146 dBm	-146 dBm
> 26.5 to 30 GHz	-137 dBm	-139 dBm	-143 dBm	-143 dBm
> 30 to 32 GHz	-136 dBm	-139 dBm	-142 dBm	-142 dBm

## 1c. STD, PA ON (Swept, Preselector ON, PA Low)

Frequency	Nominal
500 Hz to < 100 kHz	-144 dBm
100 kHz to < 10 MHz	-160 dBm
10 to 30 MHz	-162 dBm
> 30 MHz to 1.2 GHz	-167 dBm
> 1.2 to 2.1 GHz	-168 dBm
> 2.1 to 3.6 GHz	-167 dBm
> 3.6 to 6.6 GHz	-165 dBm
> 6.6 to 8.4 GHz	-164 dBm

> 8.4 to 9.5 GHz	-163 dBm
> 9.5 to 13.6 GHz	-163 dBm
> 13.6 to 18.0 GHz	-161 dBm
> 18.0 to 22.55 GHz	-160 dBm
> 22.55 to 26.5 GHz	-158 dBm
> 26.5 to 30 GHz	-155 dBm
> 30 to 32 GHz	-154 dBm

**1d. STD, PA ON (Swept, Preselector ON, PA High)**

Frequency	RBW ≤ 10 MHz, Full Range	RBW ≤ 10 MHz, 20 to 30 °C	RBW ≤ 10 MHz, Typical	RBW > 10 MHz, Nominal
10 to 30 MHz	-161 dBm	-163 dBm	-166 dBm	
> 30 MHz to 1.2 GHz	-168 dBm	-168 dBm	-171 dBm	-171 dBm
> 1.2 to 2.1 GHz	-168 dBm	-169 dBm	-172 dBm	-171 dBm
> 2.1 to 3.6 GHz	-168 dBm	-168 dBm	-171 dBm	-170 dBm
> 3.6 to 6.6 GHz	-166 dBm	-167 dBm	-170 dBm	-169 dBm
> 6.6 to 8.4 GHz	-165 dBm	-166 dBm	-169 dBm	-169 dBm
> 8.4 to 9.5 GHz	-165 dBm	-165 dBm	-169 dBm	-167 dBm
> 9.5 to 13.6 GHz	-163 dBm	-164 dBm	-167 dBm	-167 dBm
> 13.6 to 18.0 GHz	-162 dBm	-163 dBm	-167 dBm	-167 dBm
> 18.0 to 22.55 GHz	-161 dBm	-162 dBm	-165 dBm	-165 dBm
> 22.55 to 26.5 GHz	-160 dBm	-162 dBm	-165 dBm	-164 dBm
> 26.5 to 32 GHz	-158 dBm	-159 dBm	-163 dBm	-162 dBm

**2a. WPR, PA OFF**

Frequency	RBW ≤ 10 MHz, Nominal	RBW > 10 MHz, Nominal
2 to 10 Hz	-80 dBm	
> 10 to 100 Hz	-110 dBm	
> 100 Hz to 1 kHz	-120 dBm	
> 1 to 9 kHz	-130 dBm	
> 9 to 100 kHz	-138 dBm	
> 100 kHz to 1 MHz	-144 dBm	
> 1 to 30 MHz	-150 dBm	
> 30 MHz to 1.2 GHz	-154 dBm	-152 dBm
> 1.2 to 2.1 GHz	-152 dBm	-154 dBm
> 2.1 to 3.6 GHz	-150 dBm	-151 dBm
> 3.6 to 6.6 GHz	-148 dBm	-148 dBm
> 6.6 to 8.4 GHz	-146 dBm	-147 dBm
> 8.4 to 9.5 GHz	-145 dBm	-145 dBm
> 9.5 to 12.5 GHz	-142 dBm	-146 dBm
> 12.5 to 18.0 GHz	-135 dBm	-134 dBm
> 18.0 to 22.55 GHz	-132 dBm	-131 dBm
> 22.55 to 26.5 GHz	-136 dBm	-135 dBm
> 26.5 to 30 GHz	-134 dBm	-133 dBm
> 30 to 32 GHz	-131 dBm	-131 dBm

**2b. WPR (Allow RF Gain Adjust ON, PA OFF)**

Frequency	RBW ≤ 10 MHz, Full Range	RBW ≤ 10 MHz, 20 to 30 °C	RBW ≤ 10 MHz, Typical	RBW > 10 MHz, Nominal
2 to 10 Hz			-90 dBm (nominal)	
> 10 to 100 Hz			-110 dBm (nominal)	
> 100 Hz to 1 kHz			-120 dBm (nominal)	
> 1 to 9 kHz			-130 dBm (nominal)	
> 9 to 100 kHz	-135 dBm	-135 dBm	-138 dBm	
> 100 kHz to 1 MHz	-142 dBm	-143 dBm	-145 dBm	
> 1 to 5 MHz	-148 dBm	-148 dBm	-150 dBm	
> 5 to 30 MHz	-147 dBm	-148 dBm	-150 dBm	
> 30 MHz to 1.2 GHz	-150 dBm	-151 dBm	-154 dBm	-156 dBm
> 1.2 to 2.1 GHz	-148 dBm	-149 dBm	-152 dBm	-154 dBm
> 2.1 to 3.6 GHz	-146 dBm	-147 dBm	-150 dBm	-151 dBm
> 3.6 to 6.6 GHz	-143 dBm	-144 dBm	-148 dBm	-149 dBm
> 6.6 to 8.4 GHz	-141 dBm	-143 dBm	-146 dBm	-148 dBm
> 8.4 to 9.5 GHz	-144 dBm	-146 dBm	-150 dBm	-151 dBm

> 9.5 to 12.5 GHz	-138 dBm	-139 dBm	-143 dBm	-146 dBm
> 12.5 to 13.6 GHz	-144 dBm	-146 dBm	-149 dBm	-147 dBm
> 13.6 to 18.0 GHz	-143 dBm	-145 dBm	-147 dBm	-147 dBm
> 18.0 to 22.55 GHz	-139 dBm	-141 dBm	-145 dBm	-144 dBm
> 22.55 to 26.5 GHz	-142 dBm	-144 dBm	-145 dBm	-147 dBm
> 26.5 to 30 GHz	-140 dBm	-142 dBm	-146 dBm	-145 dBm
> 30 to 32 GHz	-138 dBm	-140 dBm	-143 dBm	-143 dBm

### 2c. WPR, PA ON (PA Low)

Frequency	Nominal
500 Hz to < 100 kHz	-144 dBm
100 kHz to < 10 MHz	-160 dBm
10 to 30 MHz	-162 dBm
> 30 MHz to 1.2 GHz	-168 dBm
> 1.2 to 2.1 GHz	-168 dBm
> 2.1 to 3.6 GHz	-167 dBm
> 3.6 to 6.6 GHz	-165 dBm
> 6.6 to 8.4 GHz	-163 dBm
> 8.4 to 9.5 GHz	-163 dBm
> 9.5 to 12.5 GHz	-160 dBm
> 12.5 to 13.6 GHz	-160 dBm
> 13.6 to 18.0 GHz	-159 dBm
> 18.0 to 22.55 GHz	-156 dBm
> 22.55 to 26.5 GHz	-158 dBm
> 26.5 to 30 GHz	-155 dBm
> 30 to 32 GHz	-155 dBm

### 2d. WPR, PA ON (PA High)

Frequency	Nominal
10 to 30 MHz	-166 dBm
> 30 MHz to 1.2 GHz	-171 dBm
> 1.2 to 2.1 GHz	-171 dBm
> 2.1 to 3.6 GHz	-171 dBm
> 3.6 to 6.6 GHz	-170 dBm
> 6.6 to 8.4 GHz	-168 dBm
> 8.4 to 9.5 GHz	-168 dBm
> 9.5 to 12.5 GHz	-167 dBm
> 12.5 to 13.6 GHz	-167 dBm
> 13.6 to 18.0 GHz	-167 dBm
> 18.0 to 22.55 GHz	-166 dBm
> 22.55 to 26.5 GHz	-165 dBm
> 26.5 to 30 GHz	-165 dBm
> 30 to 32 GHz	-163 dBm

# Residuals, Images, and Spurious Responses

## Residual Responses (input Terminated, 0 dB Attenuation, 1b. STD, PA OFF, Allow RF Gain Adjust ON)

200 kHz to 30 MHz (swept)	-100 dBm
30 MHz to 7 GHz (swept)	-90 dBm
7 to 32 GHz (swept)	-100 dBm
Zero span or FFT or other frequencies	-100 dBm (nominal)

## Residual Responses (Input Terminated, 0 dB Attenuation, 2b. WPR, PA OFF, Allow RF Gain Adjust ON)

200 kHz to 32 GHz (swept)	-100 dBm (nominal)
Zero span or FFT or other frequencies	-100 dBm (nominal)

## Image Responses (1b. STD, PA OFF, Allow RF Gain Adjust ON)

Mixer Level	Tuned Frequency (f)	Excitation Frequency	Full Range	Typical
-10 dBm	10 MHz to 9.5 GHz	f±0.3 GHz	-76 dBc	-83 dBc
	> 9.5 to 26.5 GHz	f±0.3 GHz	-80 dBc	-110 dBc
	10 MHz to 8.4 GHz	f±2.7 GHz	-69 dBc	-86 dBc
	> 8.4 to 26.5 GHz	f±2.7 GHz	-80 dBc	-101 dBc
	10 MHz to 8.4 GHz	f+21.9 GHz	-76 dBc	-87 dBc
	> 8.4 to 9.5 GHz	f+31.5 GHz	-80 dBc	-100 dBc
	> 9.5 to 23 GHz	f+9.3 GHz	-74 dBc	-80 dBc
-30 dBm	> 23 to 26.5 GHz	f+9.3 GHz	-65 dBc	-74 dBc
	> 26.5 to 32 GHz	f±0.3 GHz		-80 dBc (nominal)
	> 26.5 to 32 GHz	f±2.7 GHz		-80 dBc (nominal)
	> 26.5 to 32 GHz	f-9.3 GHz		-80 dBc (nominal)

## Image Responses (2b. WPR, PA OFF, Allow RF Gain Adjust ON)

Mixer Level	Tuned Frequency (f)	Excitation Frequency	Nominal
-10 dBm	10 MHz to 26.5 GHz	f±0.3 GHz	-85 dBc
	10 MHz to 26.5 GHz	f±2.7 GHz	-85 dBc
	10 MHz to 8.4 GHz	f+21.9 GHz	-90 dBc
	8.4 to 12.5 GHz	f+31.5 GHz	-95 dBc
	12.5 to 24.0 GHz	f+9.3 GHz	-85 dBc
-30 dBm	> 24.0 to 26.5 GHz	f+9.3 GHz	-75 dBc
	> 26.5 to 32 GHz	f±0.3 GHz	-85 dBc
	> 26.5 to 32 GHz	f±2.7 GHz	-85 dBc
	> 26.5 to 32 GHz	f-9.3 GHz	-75 dBc

## Other Spurious Responses (Input-Related, 1b. STD, PA OFF, Allow RF Gain Adjust ON)

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

	Mixer Level	Response
<b>First RF Order (f ≥ 10 MHz from Carrier)</b>		
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	-100 dBc (nominal)
<b>Higher RF Order (f ≥ 10 MHz from Carrier)</b>		
Carrier frequency ≤ 26.5 GHz	-40 dBm	-90 dBc + 20*log(N) including higher order mixer responses
Carrier frequency > 26.5 GHz	-30 dBm	-110 dBc (nominal)
<b>LO-Related Spurious Responses</b>		
200 Hz ≤ f < 10 MHz from carrier	-10 dBm	-100 dBc + 20*log(N)
45 Hz ≤ f < 200 MHz from carrier	-10 dBm	-100 dBc + 20*log(N) (nominal) includes line-related

Nominally -40 dBc under large magnetic (0.38 Gauss rms) or vibrational (0.21 g rms) environmental stimuli.

## Other Spurious Responses (Input-Related, 2b. WPR, PA OFF, Allow RF Gain Adjust ON)

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.

	Mixer Level	Response
<b>First RF Order (f ≥ 10 MHz from Carrier)</b>		

Carrier frequency $\leq$ 26.5 GHz	-10 dBm	-80 dBc + 20*log(N) including IF feedthrough, LO harmonic mixing responses (nominal)
Carrier frequency > 26.5 GHz	-30 dBm	-80 dBc (nominal)
<b>Higher RF Order (f <math>\geq</math> 10 MHz from Carrier)</b>		
Carrier frequency $\leq$ 26.5 GHz	-40 dBm	-75 dBc + 20*log(N) including higher order mixer responses (nominal)
Carrier frequency > 26.5 GHz	-30 dBm	-75 dBc (nominal)
<b>LO-Related Spurious Responses</b>		
200 Hz $\leq$ f < 10 MHz from carrier	-10 dBm	-90 dBc + 20*log(N) (nominal)
45 Hz $\leq$ f < 200 MHz from carrier	-10 dBm	-90 dBc + 20*log(N) (nominal) includes line-related

## Second-Harmonic Intercept (SHI)

### 1a. STD: SHI (Swept, Preselector ON, PA OFF, Allow RF Gain Adjust OFF)

Frequency of the Fundamental	Mixer Level	Distortion	SHI
10 MHz to 1.8 GHz	-5 dBm	-44 dBc	+39 dBm
> 1.8 to 4.5 GHz	-5 dBm	-53 dBc	+48 dBm
> 4.5 to 7.5 GHz	-5 dBm	-73 dBc	+68 dBm
> 7.5 to 12.5 GHz	-5 dBm	-63 dBc	+58 dBm
> 12.5 to 16 GHz	-5 dBm	-55 dBc	+50 dBm

### 1b. STD: SHI (swept, preselector on, PA off, Allow RF Gain Adjust on)

Frequency of the Fundamental	Preamp Level	Distortion, Nominal	SHI, Nominal
10 MHz to 1.8 GHz	-20 dBm	-68 dBc	+48 dBm
> 1.8 to 4.2 GHz	-20 dBm	-82 dBc	+62 dBm
> 4.2 to 8.0 GHz	-20 dBm	-60 dBc	+40 dBm
> 8.0 to 13.25 GHz	-20 dBm	-58 dBc	+38 dBm
> 13.25 to 16 GHz	-20 dBm	-53 dBc	+33 dBm

### 2a. WPR: SHI (Swept, Preselector ON, PA OFF, Allow RF Gain Adjust OFF)

Frequency of the Fundamental	Mixer Level	Distortion, Nominal	SHI, Nominal
10 MHz to 1.8 GHz	-5 dBm	-53 dBc	+48 dBm
> 1.8 to 4.2 GHz	-5 dBm	-67 dBc	+62 dBm
> 4.2 to 6.8 GHz	-5 dBm	-45 dBc	+40 dBm
> 6.8 to 13.25 GHz	-5 dBm	-83 dBc	+78 dBm
> 13.25 to 16 GHz	-5 dBm	-80 dBc	+75 dBm

### 2b. WPR: SHI (Swept, Preselector ON, PA OFF, Allow RF Gain Adjust ON)

Frequency of the Fundamental	Preamp Level	Distortion, Nominal	SHI, Nominal
10 MHz to 1.8 GHz	-20 dBm	-68 dBc	+48 dBm
> 1.8 to 4.2 GHz	-20 dBm	-82 dBc	+62 dBm
> 4.2 to 6.8 GHz	-20 dBm	-60 dBc	+40 dBm
> 6.8 to 13.25 GHz	-20 dBm	-56 dBc	+36 dBm
> 13.25 to 16 GHz	-20 dBm	-54 dBc	+34 dBm

# Third-Order Intercept (TOI)

## 1a. STD: SHI (Swept, Preselector ON, PA OFF, Allow RF Gain Adjust OFF)

Two -16 dBm tones at input mixer with tone separation  $\geq 100$  kHz

Frequency	Nominal
10 to 350 MHz	+26 dBm
> 350 MHz to 1.8 GHz	+16 dBm
> 1.8 to 3.0 GHz	+20 dBm
> 3.0 to 7.1 GHz	+24 dBm
> 7.1 to 13.6 GHz	+16 dBm
> 13.6 to 21 GHz	+30 dBm
> 21 to 26.5 GHz	+30 dBm
> 26.5 to 32 GHz	+28 dBm

## 1b. STD (swept, preselector on, PA off, Allow RF Gain Adjust on)

Two -20 dBm tones at input mixer with tone separation  $\geq 100$  kHz

Frequency	Full Range	20 to 30 °C	Typical
10 to 350 MHz	+23 dBm	+23 dBm	+26 dBm
> 350 MHz to 1.8 GHz	+11 dBm	+13 dBm	+16 dBm
> 1.8 to 3.0 GHz	+15 dBm	+17 dBm	+20 dBm
> 3.0 to 7.1 GHz	+17 dBm	+20 dBm	+24 dBm
> 7.1 to 13.6 GHz	+13 dBm	+14 dBm	+16 dBm
> 13.6 to 21 GHz	+16 dBm	+17 dBm	+20 dBm
> 21 to 26.5 GHz	+16 dBm	+18 dBm	+21 dBm
> 26.5 to 32 GHz	+17 dBm	+19 dBm	+22 dBm

## 1c. STD (Swept, Preselector ON, PA Low)

Two -36 dBm tones at preamplifier input with tone separation  $\geq 100$  kHz

Frequency	Nominal
10 to 350 MHz	-2 dBm
> 350 MHz to 1.8 GHz	-2 dBm
> 1.8 to 2.6 GHz	+1 dBm
> 2.6 to 3.6 GHz	+5 dBm
> 3.6 to 13.6 GHz	0 dBm
> 13.6 to 21 GHz	+8 dBm
> 21 to 26.5 GHz	+8 dBm
> 26.5 to 32 GHz	+8 dBm

## 1d. STD (Swept, Preselector ON, PA High)

Two -56 dBm tones at preamplifier input with tone separation  $\geq 100$  kHz

Frequency	Nominal
10 to 350 MHz	-13 dBm
> 350 MHz to 1.8 GHz	-13 dBm
> 1.8 to 2.6 GHz	-13 dBm
> 2.6 to 3.6 GHz	-12 dBm
> 3.6 to 13.6 GHz	-12 dBm
> 13.6 to 21 GHz	-12 dBm
> 21 to 26.5 GHz	-11 dBm
> 26.5 to 32 GHz	-12 dBm

## 2a. WPR (Swept, Preselector ON, PA OFF, Allow RF Gain Adjust OFF)

Two -16 dBm tones at input mixer with tone separation  $\geq 100$  kHz

Frequency	Nominal
10 to 350 MHz	+26 dBm
> 350 MHz to 1.8 GHz	+16 dBm
> 1.8 to 3.0 GHz	+20 dBm
> 3.0 to 7.1 GHz	+24 dBm
> 7.1 to 9.5 GHz	+16 dBm
> 9.5 to 13.6 GHz	+27 dBm
> 13.6 to 21 GHz	+30 dBm
> 21 to 26.5 GHz	+29 dBm
> 26.5 to 32 GHz	+28 dBm

**2b. WPR (Swept, Preselector ON, PA OFF, Allow RF Gain Adjust ON)**Two -20 dBm tones at input mixer with tone separation  $\geq$  100 kHz

Frequency	Full range	20 to 30 °C	Typical
10 to 350 MHz	+23 dBm	+23 dBm	+26 dBm
> 350 MHz to 1.8 GHz	+11 dBm	+13 dBm	+16 dBm
> 1.8 to 3.0 GHz	+15 dBm	+17 dBm	+20 dBm
> 3.0 to 7.1 GHz	+17 dBm	+20 dBm	+24 dBm
> 7.1 to 9.0 GHz	+13 dBm	+14 dBm	+16 dBm
> 9.0 to 13.6 GHz	+16 dBm	+18 dBm	+20 dBm
> 13.6 to 21 GHz	+19 dBm	+20 dBm	+23 dBm
> 21 to 26.5 GHz	+17 dBm	+18 dBm	+21 dBm
> 26.5 to 32 GHz	+17 dBm	+19 dBm	+22 dBm

**2c. WPR (Swept, Preselector ON, PA Low)**Two -36 dBm tones at preamplifier input with tone separation  $\geq$  100 kHz

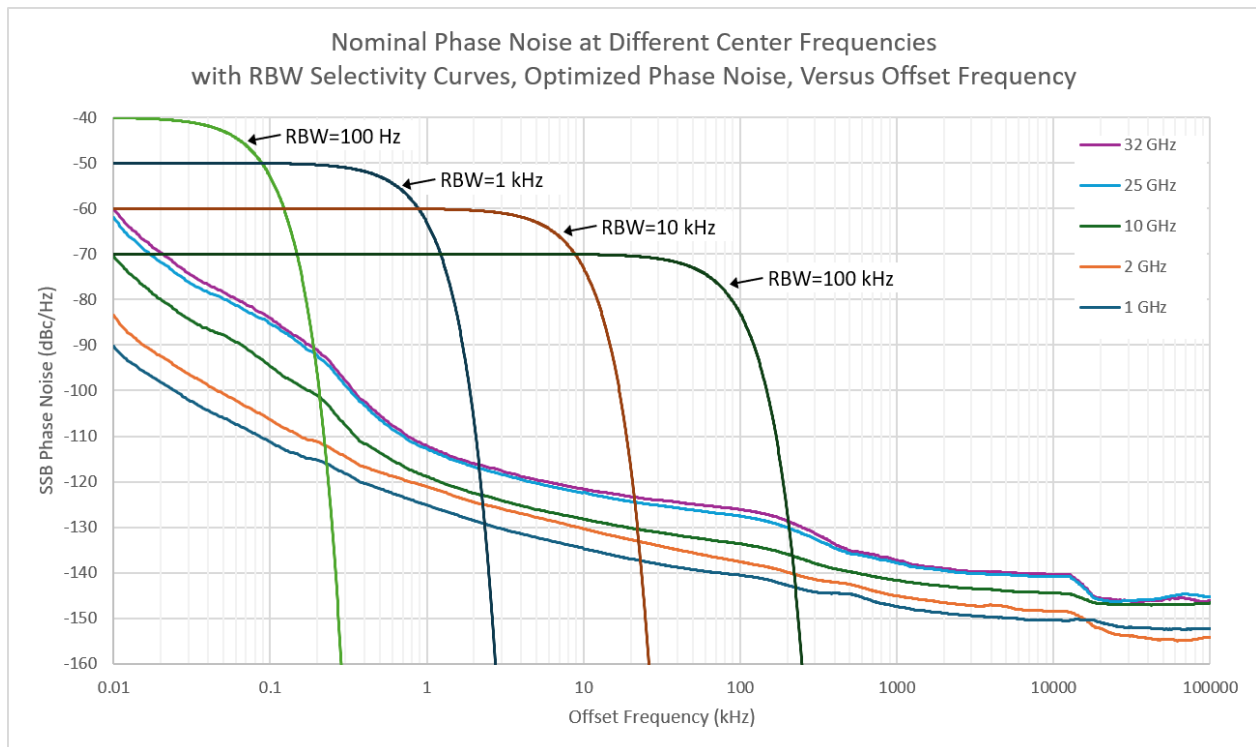
Frequency	Nominal
10 to 350 MHz	-2 dBm
> 350 MHz to 1.8 GHz	-2 dBm
> 1.8 to 2.6 GHz	+1 dBm
> 2.6 to 3.6 GHz	+5 dBm
> 3.6 to 8.4 GHz	0 dBm
> 8.4 to 13.6 GHz	+1 dBm
> 13.6 to 21 GHz	+12 dBm
> 21 to 26.5 GHz	+10 dBm
> 26.5 to 32 GHz	+9 dBm

**2d. WPR (Swept, Preselector ON, PA High)**Two -56 dBm tones at preamplifier input with tone separation  $\geq$  100 kHz

Frequency	Nominal
10 to 350 MHz	-13 dBm
> 350 MHz to 1.8 GHz	-13 dBm
> 1.8 to 2.6 GHz	-13 dBm
> 2.6 to 3.6 GHz	-12 dBm
> 3.6 to 13.6 GHz	-12 dBm
> 13.6 to 21 GHz	-10 dBm
> 21 to 26.5 GHz	-11 dBm
> 26.5 to 32 GHz	-12 dBm

# Phase Noise (SSB)

Phase Noise	Offset	Full Range	20 to 30 °C	Typical, Unless Otherwise Stated
Noise sidebands (CF = 1 GHz)	10 Hz			-85 dBc/Hz (nominal)
	100 Hz	-107 dBc/Hz	-108 dBc/Hz	-111 dBc/Hz
	1 kHz	-118 dBc/Hz	-119 dBc/Hz	-123 dBc/Hz
	10 kHz	-127 dBc/Hz	-128 dBc/Hz	-132 dBc/Hz
	100 kHz	-135 dBc/Hz	-136 dBc/Hz	-138 dBc/Hz
	1 MHz	-142 dBc/Hz	-143 dBc/Hz	-145 dBc/Hz
	10 MHz	-147 dBc/Hz	-148 dBc/Hz	-149 dBc/Hz
	100 MHz			-152 dBc/Hz (nominal)



**Figure 7.** Nominal 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.

## Multi-Channels

### Channel to Channel Isolation

1b. STD (Swept, Preselector ON, PA OFF, Allow RF Gain Adjust ON, Input Attenuator = 10 dB)

Frequency	Nominal
1 MHz to 32 GHz	100 dB

# IQ Analyzer

Each bandwidth option includes and enables all others with lesser bandwidth: e.g. instruments with R20 also have R10 licenses, plus B4X, B2X, B40 and B25 paths.

## 25 MHz Analysis Bandwidth (Standard)

Specifications on this bandwidth apply with center frequencies of 100 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector = Wideband Preselector (WPR), PA off, IF gain = Auto, IF gain offset = 0 dB.

Analysis bandwidth range	10 Hz to 25 MHz	
Tuning range	30 MHz to 32 GHz	In practice, low end of tuning range limited to $< (\frac{1}{2} * BW)$ , by image folding and LO feedthrough.
IF frequency	10.95 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 8.4 GHz)	
	15.75 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 9.5 GHz for MPB path and $\leq$ 12.5 GHz for WPR path)	
	4.65 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 32 GHz)	
	1.35 GHz (2 <sup>nd</sup> IF)	
ADC sample rate	200 MSa/sec	
ADC resolution	16 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
IQ-pair sample rate	1.25 x BW	
Capture memory	2 GB	
IQ Analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	268.4 MSa ( $2^{28}$ Sa) with 64-bit data packing	
Maximum capture time (time record length)	8.59 sec at full 25 MHz BW with 64-bit data packing	Capture time increases linearly with decrease in bandwidth

### IF Frequency Response (PA OFF, 10 dB Attenuation):

#### 2a. Wideband Preselector (WPR), Allow RF Gain Adjust OFF

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
300 MHz to 32 GHz	$\pm$ 0.20 dB	0.05 dB

### IF Frequency Response (PA OFF, 10 dB Attenuation):

#### 2b. WPR, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error, Full Range	Amplitude Max Error, 20 to 30 °C	Amplitude RMS (Nominal)
300 MHz to 8.4 GHz	$\pm$ 0.40 dB	$\pm$ 0.35 dB	0.05 dB
> 8.4 to 12.5 GHz	$\pm$ 0.50 dB	$\pm$ 0.45 dB	0.05 dB
> 12.5 to 26.5 GHz	$\pm$ 0.60 dB	$\pm$ 0.55 dB	0.05 dB
> 26.5 to 32 GHz	$\pm$ 0.70 dB	$\pm$ 0.65 dB	0.05 dB

### IF Frequency Response (PA OFF, 10 dB Attenuation):

#### 3a. MPB, Allow RF Gain Adjust OFF

#### 3b. MPB, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
300 MHz to 32 GHz	$\pm$ 0.20 dB	0.05 dB

### IF Frequency Response (PA ON, 0 dB Attenuation):

#### 2c. WPR, PA Low

#### 2d. WPR, PA High

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
300 MHz to 32 GHz	$\pm$ 0.30 dB	0.10 dB

**IF Frequency Response (PA ON, 0 dB Attenuation):**

**3c. MPB, PA Low**  
**3d. MPB, PA High**

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
300 MHz to 32 GHz	± 0.30 dB	0.10 dB

**IF Phase Linearity (Deviation from Linear Phase)**

**2a, 2b, 2c, 2d. WPR**  
**3a, 3b, 3c, 3d. MPB**

Center Frequency	RMS (Nominal)
300 MHz to 32 GHz	0.15°

**IF Dynamic Range (2a, 2b, 2c, 2d. WPR, IF Gain = Low) (Nominal)**

SFDR (spurious-free dynamic range) (ADC related spurious)	-95 dBc, signal at -20 dBFS, anywhere in full IF width
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**IF Residual Responses (Input Terminated, IF Gain = Low) (Nominal)**

Center Frequency	2a, 2b, 2c, 2d. WPR; 3a, 3b, 3c, 3d. MPB
100 MHz to 32 GHz	-100 dBm

**TOI**

**(3rd-Order Intermodulation Distortion in the IF, 2 Tones of Equal Level at -19 dBFS, 10 MHz Tone Separation, IF Gain = High) (Nominal)**

Center Frequency	2b. WPR, PA OFF, Allow RF Gain Adjust ON	3b. MPB, PA OFF, Allow RF Gain Adjust ON
100 MHz to 8.4 GHz	-86 dBc	-86 dBc
> 8.4 to 9.5 GHz (MPB)	-80 dBc	-90 dBc
> 8.4 to 12.5 GHz (WPR)	-80 dBc	-90 dBc
> 9.5 to 32 GHz (MPB)	-92 dBc	-90 dBc
> 12.5 to 32 GHz (WPR)	-92 dBc	-90 dBc

**Noise Density in IF**

WPR: Noise density is nominally 2 dB higher than WPR DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

MPB: Noise density is nominally 2 dB higher than STD DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

**Spurious Responses**

**2b. WPR, PA OFF, Allow RF Gain Adjust ON**

Residual responses (input terminated, 0 dB attenuation, IF gain = low)

Center Frequency	Nominal
100 MHz to 32 GHz	-100 dBm

**Image Responses**

Tuned Frequency (f)	Excitation Frequency
100 MHz to 32 GHz	$f \pm 2 * 1^{st} \text{ IF MHz}$
	$f \pm 2 * 2^{nd} \text{ IF MHz}$
	$f \pm 2 * \text{Final IF MHz}$

**Amplitude Accuracy, Absolute**

**2b. WPR, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Full Range	20 to 30 °C	Nominal
100 MHz to 8.4 GHz	± 1.50 dB	± 1.10 dB	± 0.50 dB
> 8.4 to 12.5 GHz	± 1.70 dB	± 1.30 dB	± 0.60 dB
> 12.5 to 26.5 GHz	± 1.90 dB	± 1.50 dB	± 0.80 dB
> 26.5 to 32 GHz	± 2.30 dB	± 1.80 dB	± 1.00 dB

**3b. MPB, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Nominal
100 MHz to 8.4 GHz	± 0.55 dB
> 8.4 to 9.5 GHz	± 0.50 dB
> 9.5 to 26.5 GHz	± 0.50 dB
> 26.5 to 32 GHz	± 0.60 dB

# 40 MHz Analysis Bandwidth (Option B40)

Specifications on this bandwidth apply with center frequencies of 100 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector = Wideband Preselector (WPR), PA off, IF gain = Auto, IF gain offset = 0 dB.

Analysis bandwidth range	10 Hz to 40 MHz	
Tuning range	30 MHz to 32 GHz	In practice, low end of tuning range limited to $< (\frac{1}{2} * BW)$ , by image folding and LO feedthrough.
IF frequency	10.95 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 8.4 GHz)	
	15.75 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 9.5 GHz for MPB path and $\leq$ 12.5 GHz for WPR path)	
	4.65 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 32 GHz)	
	1.35 GHz (2 <sup>nd</sup> IF)	
ADC sample rate	150 MHz (Final IF)	
ADC resolution	200 MSa/sec	
Final data format	16 bits	
IQ-pair sample rate	I & Q pairs, 32 bits each, 64 bits/Sa	
Capture memory	1.25 x BW	
IQ analyzer	2 GB	
Length (IQ sample pairs)	32,000,001 sample pairs	
Maximum capture time (time record length)	268.4 MSa (2 <sup>28</sup> Sa) with 64-bit data packing	
	5.37 sec at full 40 MHz BW with 64-bit data packing	Capture time increases linearly with decrease in bandwidth

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 2a. WPR, Allow RF Gain Adjust OFF

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
300 MHz to 12.5 GHz	$\pm 0.20$ dB	0.06 dB
> 12.5 to 32 GHz	$\pm 0.30$ dB	0.10 dB

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 2b. WPR, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error, Full Range	Amplitude Max Error, 20 To 30 °C	Amplitude RMS (Nominal)
300 MHz to 8.4 GHz	$\pm 0.50$ dB	$\pm 0.45$ dB	0.08 dB
> 8.4 to 12.5 GHz	$\pm 0.60$ dB	$\pm 0.55$ dB	0.06 dB
> 12.5 to 26.5 GHz	$\pm 0.60$ dB	$\pm 0.55$ dB	0.10 dB
> 26.5 to 32 GHz	$\pm 0.80$ dB	$\pm 0.75$ dB	0.10 dB

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 3a. MPB, Allow RF Gain Adjust OFF

### 3b. MPB, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
300 MHz to 9.5 GHz	$\pm 0.20$ dB	0.06 dB
> 9.5 to 32 GHz	$\pm 0.30$ dB	0.10 dB

## IF frequency Response (PA ON, 0 dB Attenuation):

### 2c, 2d. WPR

### 3c, 3d. MPB

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
300 MHz to 32 GHz	$\pm 0.50$ dB	0.15 dB

## IF Phase Linearity (Deviation from Linear Phase)

### 2a, 2b, 2c, 2d. WPR

### 3a, 3b, 3c, 3d. MPB

Center Frequency	RMS (Nominal)
300 MHz to 32 GHz	0.15°

**IF Dynamic Range (2a, 2b, 2c, 2d. WPR, IF Gain = Low) (Nominal)**

SFDR (spurious-free dynamic range) (ADC related spurious)	-95 dBc, signal at -20 dBFS, anywhere in full IF width
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**IF Residual Responses (Input Terminated, IF Gain = Low) (Nominal)**

Center Frequency	2a, 2b, 2c, 2d. WPR; 3a, 3b, 3c, 3d. MPB
100 MHz to 32 GHz	-100 dBm

**TOI**

**(3rd-Order Intermodulation Distortion in the IF, 2 Tones of Equal Level at -19 dBFS, 10 MHz Tone Separation, IF Gain = High) (Nominal)**

Center Frequency	2b. WPR, PA OFF, Allow RF Gain Adjust ON	3b. MPB, PA OFF, Allow RF Gain Adjust ON
100 MHz to 8.4 GHz	-86 dBc	-86 dBc
> 8.4 to 9.5 GHz (MPB)	-80 dBc	-90 dBc
> 8.4 to 12.5 GHz (WPR)	-80 dBc	-90 dBc
> 9.5 to 32 GHz (MPB)	-92 dBc	-90 dBc
> 12.5 to 32 GHz (WPR)	-92 dBc	-90 dBc

**Noise Density in IF**

WPR: Noise density is nominally 2 dB higher than WPR DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

MPB: Noise density is nominally 2 dB higher than STD DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

**Spurious Responses**

**2b. WPR, PA off, Allow RF Gain Adjust ON**

Residual responses (input terminated, 0 dB attenuation, IF gain = low)

Center Frequency	Nominal
100 MHz to 32 GHz	-100 dBm

**Image Responses**

Tuned Frequency (f)	Excitation Frequency
100 MHz to 32 GHz	$f \pm 2 * 1^{st} \text{ IF MHz}$
	$f \pm 2 * 2^{nd} \text{ IF MHz}$
	$f \pm 2 * \text{ Final IF MHz}$

**Amplitude Accuracy, Absolute**

**2b. WPR, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Full Range	20 to 30 °C	Nominal
100 MHz to 8.4 GHz	± 1.50 dB	± 1.10 dB	± 0.50 dB
> 8.4 to 12.5 GHz	± 1.70 dB	± 1.30 dB	± 0.60 dB
> 12.5 to 26.5 GHz	± 1.90 dB	± 1.50 dB	± 0.80 dB
> 26.5 to 32 GHz	± 2.30 dB	± 1.80 dB	± 1.00 dB

**Amplitude accuracy, absolute**

**3b. MPB, PA off, Allow RF Gain Adjust on (10 dB attenuation)**

Center Frequency	Nominal
100 MHz to 8.4 GHz	± 0.55 dB
> 8.4 to 26.5 GHz	± 0.50 dB
> 26.5 to 32 GHz	± 0.60 dB

# 255 MHz Analysis Bandwidth (Option B2X)

Specifications on this bandwidth apply with center frequencies of 500 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector = Wideband Preselector (WPR), PA off, IF gain = Auto, IF gain offset = 0 dB.

Analysis bandwidth range	30 kHz to 255 MHz	
Tuning range	300 MHz to 32 GHz	In practice, low end of tuning range limited to <math>(\frac{1}{2} * BW)</math>, by image folding and LO feedthrough.
IF frequency	10.5 GHz (1st IF, center frequency $\leq$ 8 GHz)	
	15.3 GHz (1st IF, center frequency $\leq$ 9.5 GHz for MPB path and $\leq$ 12.5 GHz for WPR path)	
	5.1 GHz (1st IF, center frequency $\leq$ 32 GHz)	
	900 MHz (Final IF)	
ADC sample rate	1200 MSa/sec	
ADC resolution	16 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
IQ-pair sample rate	1.25 x BW	
Capture memory	2 GB	
IQ analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	268.4 MSa ( $2^{28}$ Sa) with 64-bit data packing	
Maximum capture time (time record length)	0.84 sec at full 255 MHz BW with 64-bit data packing	Capture time increases linearly with decrease in bandwidth

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 2a. WPR, Allow RF Gain Adjust OFF

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
500 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 0.40 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 0.50 dB	0.20 dB

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 2b. WPR, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error, Full Range	Amplitude Max Error, 20 to 30 °C	Amplitude RMS (Nominal)
500 MHz to 8 GHz	$\pm$ 0.90 dB	$\pm$ 0.70 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 1.00 dB	$\pm$ 0.80 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 1.30 dB	$\pm$ 1.10 dB	0.20 dB

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 3a. MPB, Allow RF Gain Adjust OFF

### 3b. MPB, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
500 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 0.40 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 0.50 dB	0.20 dB

## IF Frequency Response (PA ON, 0 dB Attenuation):

### 2c, 2d. WPR

### 3c, 3d. MPB

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
500 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 9.5 GHz (MPB)	$\pm$ 0.50 dB	0.20 dB
> 8 to 12.5 GHz (WPR)	$\pm$ 0.50 dB	0.20 dB
> 9.5 to 26.5 GHz (MPB)	$\pm$ 0.60 dB	0.20 dB
> 12.5 to 26.5 GHz (WPR)	$\pm$ 0.60 dB	0.20 dB
> 26.5 to 32 GHz	$\pm$ 1.00 dB	0.40 dB

**IF Phase Linearity (Deviation from Linear Phase)****2a, 2b, 2c, 2d. WPR****3a, 3b, 3c, 3d. MPB**

Center Frequency	RMS (Nominal)
500 MHz to 8 GHz	0.20°
> 8 to 9.5 GHz (MPB) > 8 to 12.5 GHz (WPR)	0.30°
> 9.5 to 26.5 GHz (MPB) > 12.5 to 26.5 GHz (WPR)	0.40°
> 26.5 to 32 GHz	0.90°

**IF Dynamic Range (2a, 2b, 2c, 2d. WPR, IF Gain = Low) (Nominal)**

SFDR (spurious-free dynamic range) (ADC related spurious)	-88 dBc, signal at -20 dBFS, anywhere in full IF width
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**IF Residual Responses (Input Terminated, IF Gain = Low) (Nominal)**

Center Frequency	2a, 2b, 2c, 2d. WPR; 3a, 3b, 3c, 3d. MPB
500 MHz to 32 GHz	-80 dBm

**TOI****(3rd-Order Intermodulation Distortion in the IF, 2vTones of Equal Level at -19 dBFS, 10 MHz Tone Separation, IF Gain = High) (Nominal)**

Center Frequency	2b. WPR, PA OFF, Allow RF Gain Adjust ON; 3b. MPB, PA OFF, Allow RF Gain Adjust ON
500 MHz to 8 GHz	-78 dBc
> 8 to 9.5 GHz (MPB) > 8 to 12.5 GHz (WPR)	-78 dBc
> 9.5 to 32 GHz (MPB) > 12.5 to 32 GHz (WPR)	-83 dBc

**Noise Density in IF**

WPR: Noise density is nominally 4 dB higher than WPR DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

MPB: Noise density is nominally 2 dB higher than STD DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

**Spurious Responses****2b. WPR, PA OFF, Allow RF Gain Adjust ON**

Residual responses (input terminated, 0 dB attenuation, IF gain = low)

Center frequency	Nominal
500 MHz to 32 GHz	-100 dBm

**Image Responses**

Tuned Frequency (f)	Excitation Frequency
500 MHz to 32 GHz	$f \pm 2 * 1^{st} \text{ IF MHz}$ $f \pm 2 * \text{ Final IF MHz}$

**Amplitude Accuracy, Absolute****2b. WPR, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Full Range	20 To 30 °C	Nominal
500 MHz to 8 GHz	± 1.50 dB	± 1.10 dB	± 0.50 dB
> 8 to 12.5 GHz	± 1.70 dB	± 1.30 dB	± 0.60 dB
> 12.5 to 26.5 GHz	± 1.90 dB	± 1.50 dB	± 0.80 dB
> 26.5 to 32 GHz	± 2.30 dB	± 1.80 dB	± 1.00 dB

**Amplitude Accuracy, Absolute****3b. MPB, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Nominal
500 MHz to 8 GHz	± 0.55 dB
> 8 to 26.5 GHz	± 0.50 dB
> 26.5 to 32 GHz	± 0.60 dB

# 480 MHz Analysis Bandwidth (Option B4X)

Specifications on this bandwidth apply with center frequencies of 500 MHz and higher. All specifications apply under the following settings unless otherwise specified: preselector = Wideband Preselector (WPR), PA off, IF gain = Auto, IF gain offset = 0 dB.

Analysis bandwidth range	30 kHz to 480 MHz	
Tuning range	500 MHz to 32 GHz	In practice, low end of tuning range limited to $< (\frac{1}{2} * BW)$ , by image folding and LO feedthrough.
IF frequency	10.5 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 8 GHz)	
	15.3 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 9.5 GHz for MPB path and $\leq$ 12.5 GHz for WPR path)	
	5.1 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 32 GHz)	
	900 MHz (Final IF)	
ADC sample rate	1200 MSa/sec	
ADC resolution	16 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
IQ-pair sample rate	1.25 x BW	
Capture memory	2 GB	
IQ analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	268.4 MSa (2 <sup>28</sup> Sa) with 64-bit data packing	
Maximum capture time (time record length)	0.44 sec at full 480 MHz BW with 64-bit data packing	Capture time increases linearly with decrease in bandwidth

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 2a. WPR, Allow RF Gain Adjust OFF

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
500 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 0.40 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 0.60 dB	0.30 dB

## IF frequency Response (PA off, 10 dB Attenuation):

### 2b. WPR, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error, Full Range	Amplitude Max Error, 20 To 30 °C	Amplitude RMS (Nominal)
500 MHz to 8 GHz	$\pm$ 1.00 dB	$\pm$ 0.80 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 1.20 dB	$\pm$ 1.00 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 1.60 dB	$\pm$ 1.40 dB	0.30 dB

## IF Frequency Response (PA off, 10 dB Attenuation):

### 3a. MPB, Allow RF Gain Adjust OFF

### 3b. MPB, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
500 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 0.40 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 0.60 dB	0.30 dB

## IF Frequency Response (PA ON, 0 dB Attenuation):

### 2c, 2d. WPR

### 3c, 3d. MPB

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
500 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 9.5 GHz (MPB)	$\pm$ 0.50 dB	0.20 dB
> 8 to 12.5 GHz (WPR)	$\pm$ 0.50 dB	0.20 dB
> 9.5 to 26.5 GHz (MPB)	$\pm$ 0.60 dB	0.20 dB
> 12.5 to 26.5 GHz (WPR)	$\pm$ 0.60 dB	0.20 dB
> 26.5 to 32 GHz	$\pm$ 1.00 dB	0.40 dB

**IF Phase Linearity (Deviation from Linear Phase)****2a, 2b, 2c, 2d. WPR****3a, 3b, 3c, 3d. MPB**

Center Frequency	RMS (Nominal)
500 MHz to 8 GHz	0.20°
> 8 to 9.5 GHz (MPB)	0.30°
> 8 to 12.5 GHz (WPR)	
> 9.5 to 26.5 GHz (MPB)	0.40°
> 12.5 to 26.5 GHz (WPR)	
> 26.5 to 32 GHz	0.90°

**IF Dynamic Range (2a, 2b, 2c, 2d. WPR, IF Gain = Low) (Nominal)**

SFDR (spurious-free dynamic range) (ADC related spurious)	-88 dBc, signal at -20 dBFS, anywhere in full IF width
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**IF Residual Responses (Input Terminated, IF Gain = Low) (Nominal)**

Center Frequency	2a, 2b, 2c, 2d. WPR; 3a, 3b, 3c, 3d. MPB
500 MHz to 32 GHz	-80 dBm

**TOI****(3rd-Order Intermodulation Distortion in the IF, 2 Tones of Equal Level at -19 dBFS, 10 MHz Tone Separation, IF Gain = High) (Nominal)**

Center Frequency	2b. WPR, PA OFF, Allow RF Gain Adjust ON 3b. MPB, PA OFF, Allow RF Gain Adjust ON
500 MHz to 8 GHz	-82 dBc
> 8 to 9.5 GHz (MPB)	-82 dBc
> 8 to 12.5 GHz (WPR)	
> 9.5 to 32 GHz (MPB)	-86 dBc
> 12.5 to 32 GHz (WPR)	

**Noise Density in IF**

WPR: Noise density is nominally 4 dB higher than WPR DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

MPB: Noise density is nominally 2 dB higher than STD DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

**Spurious Responses****2b. WPR, PA OFF, Allow RF Gain Adjust ON**

Residual responses (input terminated, 0 dB attenuation, IF gain = low)

Center Frequency	Nominal
500 MHz to 32 GHz	-100 dBm

**Image responses**

Tuned Frequency (f)	Excitation Frequency
500 MHz to 32 GHz	$f \pm 2 * 1^{st} \text{ IF MHz}$
	$f \pm 2 * \text{ Final IF MHz}$

**Amplitude Accuracy, Absolute****2b. WPR, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Full Range	20 to 30 °C	Nominal
500 MHz to 8 GHz	± 1.50 dB	± 1.10 dB	± 0.50 dB
> 8 to 12.5 GHz	± 1.70 dB	± 1.30 dB	± 0.60 dB
> 12.5 to 26.5 GHz	± 1.90 dB	± 1.50 dB	± 0.80 dB
> 26.5 to 32 GHz	± 2.30 dB	± 1.80 dB	± 1.00 dB

**Amplitude Accuracy, Absolute****3b. MPB, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Nominal
500 MHz to 8 GHz	± 0.55 dB
> 8 to 26.5 GHz	± 0.50 dB
> 26.5 to 32 GHz	± 0.60 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 = Wideband Preselector (WPR), PA OFF, IF gain = Auto, IF gain offset = 0 dB.

Analysis bandwidth range	1 kHz to 1 GHz	
Tuning range	700 MHz to 32 GHz	In practice, low end of tuning range limited to <math>(\frac{1}{2} * BW)</math>, by image folding and LO feedthrough.
IF frequency	10.8 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 8 GHz)	
	15.6 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 9.5 GHz for MPB path and $\leq$ 12.5 GHz for WPR path)	
	4.5 GHz (1 <sup>st</sup> IF, center frequency $\leq$ 32 GHz)	
	1.2 GHz (Final IF, center frequency $\leq$ 12.5 GHz)	
	1.5 GHz (Final IF, center frequency > 12.5 GHz)	
ADC sample rate	4800 MSa/sec	
ADC resolution	14 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
IQ-pair sample rate	1.25 x BW	
Capture memory	16 GB	
IQ analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	2,147.4 MSa ( $2^{31}$ Sa) with 64-bit data packing	
Maximum capture time (time record length)	1.78 sec at full 1 GHz BW with 64-bit data packing	Capture time increases linearly with decrease in bandwidth

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 2a. WPR, Allow RF Gain Adjust OFF

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
700 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 0.40 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 0.50 dB	0.20 dB

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 2b. WPR, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error, Full Range	Amplitude Max Error, 20 to 30 °C	Amplitude RMS (Nominal)
700 MHz to 8 GHz	$\pm$ 1.20 dB	$\pm$ 0.90 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 1.50 dB	$\pm$ 1.10 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 1.90 dB	$\pm$ 1.40 dB	0.20 dB

## IF Frequency Response (PA OFF, 10 dB Attenuation):

### 3a. MPB, Allow RF Gain Adjust OFF

### 3b. MPB, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
700 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 26.5 GHz	$\pm$ 0.40 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 0.50 dB	0.20 dB

## IF Frequency Response (PA ON, 0 dB Attenuation):

### 2c, 2d. WPR

### 3c, 3d. MPB

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
700 MHz to 8 GHz	$\pm$ 0.50 dB	0.20 dB
> 8 to 9.5 GHz (MPB)	$\pm$ 0.50 dB	0.20 dB
> 8 to 12.5 GHz (WPR)	$\pm$ 0.50 dB	0.20 dB
> 9.5 to 26.5 GHz (MPB)	$\pm$ 0.60 dB	0.20 dB
> 12.5 to 26.5 GHz (WPR)	$\pm$ 0.60 dB	0.20 dB
> 26.5 to 32 GHz	$\pm$ 1.20 dB	0.40 dB

**IF Phase Linearity (Deviation from Linear Phase)****2a, 2b, 2c, 2d. WPR****3a, 3b, 3c, 3d. MPB**

Center Frequency	RMS (Nominal)
700 MHz to 8 GHz	0.20°
> 8 to 9.5 GHz (MPB)	0.30°
> 8 to 12.5 GHz (WPR)	
> 9.5 to 26.5 GHz (MPB)	0.50°
> 12.5 to 26.5 GHz (WPR)	
> 26.5 to 32 GHz	1.40°

**IF Dynamic Range (2a, 2b, 2c, 2d. WPR, IF Gain = Low) (Nominal)**

SFDR (spurious-free dynamic range) (ADC related spurious)	-70 dBc, signal at -20 dBFS, anywhere in full IF width
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**IF Residual Responses (Input Terminated, IF Gain = Low) (Nominal)**

Center Frequency	2a, 2b, 2c, 2d. WPR; 3a, 3b, 3c, 3d. MPB
700 MHz to 32 GHz	-80 dBm

**TOI****(3rd-Order Intermodulation Distortion in the IF, 2 Tones of Equal Level at -19 dBFS, 10 MHz Tone Separation, IF Gain = High) (Nominal)**

Center Frequency	2b. WPR, PA OFF, Allow RF Gain Adjust ON; 3b. MPB, PA OFF, Allow RF Gain Adjust ON
700 MHz to 32 GHz	-75 dBc

**Noise Density in IF**

WPR: Noise density is nominally 5 dB higher than WPR DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

MPB: Noise density is nominally 5 dB higher than STD DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

**Spurious Responses****2b. WPR, PA OFF, Allow RF Gain Adjust ON**

Residual responses (input terminated, 0 dB attenuation, IF gain = low)

Center Frequency	Nominal
700 MHz to 32 GHz	-100 dBm

**Image Responses**

Tuned Frequency (f)	Excitation Frequency
30 MHz to 32 GHz	$f \pm 2 * 1^{st} \text{ IF MHz}$
	$f \pm 2 * \text{ Final IF MHz}$

**Amplitude Accuracy, Absolute****2b. WPR, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Full Range	20 to 30 °C	Nominal
700 MHz to 8 GHz	± 1.40 dB	± 1.10 dB	± 0.60 dB
> 8 to 12.5 GHz	± 1.70 dB	± 1.30 dB	± 0.80 dB
> 12.5 to 26.5 GHz	± 2.20 dB	± 1.80 dB	± 1.00 dB
> 26.5 to 32 GHz	± 3.00 dB	± 2.30 dB	± 1.20 dB

**Amplitude Accuracy, Absolute****3b. MPB, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Nominal
700 MHz to 8 GHz	± 0.55 dB
> 8 to 26.5 GHz	± 0.50 dB
> 26.5 to 32 GHz	± 0.60 dB

## 2 GHz Analysis Bandwidth (Option R20)

Specifications on this bandwidth apply with center frequencies of 2 GHz and higher. All specifications apply under the following settings unless otherwise specified: preselector = Microwave preselector bypass (MPB), PA OFF, IF gain = Auto, IF gain offset = 0 dB.

Analysis bandwidth range	1 kHz to 2 GHz	
Tuning range	2 GHz to 32 GHz	In practice, low end of tuning range limited to $< (\frac{1}{2} * BW)$ , by image folding and LO feedthrough.
IF frequency	15.6 GHz (1st IF, center frequency $\leq$ 9.5 GHz) 1.2 GHz (Final IF)	
ADC sample rate	4800 MSa/sec	
ADC resolution	14 bits	
Final data format	I & Q pairs, 32 bits each, 64 bits/Sa	
IQ-pair sample rate	1.2 x BW	
Capture memory	16 GB	
IQ analyzer	32,000,001 sample pairs	
Length (IQ sample pairs)	2,147.4 MSa ( $2^{31}$ Sa) with 64-bit data packing	
Maximum capture time (time record length)	0.89 sec at full 2 GHz BW with 64-bit data packing	Capture time increases linearly with decrease in bandwidth

### IF Frequency Response (PA OFF, 10 dB Attenuation):

#### 3a. MPB, Allow RF Gain Adjust OFF

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
2 to 26.5 GHz	$\pm$ 0.50 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 0.50 dB	0.20 dB

### IF Frequency Response (PA OFF, 10 dB Attenuation):

#### 3b. MPB, Allow RF Gain Adjust ON

Center Frequency	Amplitude Max Error, Full Range	Amplitude Max Error, 20 to 30 °C	Amplitude RMS (Nominal)
2 to 9.5 GHz	$\pm$ 1.30 dB	$\pm$ 1.00 dB	0.10 dB
> 9.5 to 12.5 GHz	$\pm$ 1.60 dB	$\pm$ 1.20 dB	0.10 dB
> 12.5 to 26.5 GHz	$\pm$ 1.60 dB	$\pm$ 1.20 dB	0.10 dB
> 26.5 to 32 GHz	$\pm$ 2.00 dB	$\pm$ 1.50 dB	0.20 dB

### IF Frequency Response (PA ON, 0 dB Attenuation):

#### 3c. MPB, PA Low

#### 3d. MPB, PA High

Center Frequency	Amplitude Max Error (Nominal)	Amplitude RMS (Nominal)
2 to 12.5 GHz	$\pm$ 0.50 dB	0.20 dB
> 12.5 to 26.5 GHz	$\pm$ 1.00 dB	0.20 dB
> 26.5 to 32 GHz	$\pm$ 1.20 dB	0.40 dB

### IF Phase Linearity (Deviation from Linear Phase)

#### 3a, 3b, 3c, 3d. MPB

Center Frequency	RMS (Nominal)
2 to 9.5 GHz	0.20°
> 9.5 to 12.5 GHz	0.30°
> 12.5 to 26.5 GHz	0.50°
> 26.5 to 32 GHz	1.40°

### IF Dynamic Range (3a, 3b, 3c, 3d. MPB, IF Gain = Low) (Nominal)

SFDR (spurious-free dynamic range) (ADC related spurious)	-70 dBc, signal at -20 dBFS, anywhere in full IF width
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### IF Residual Responses (Input Terminated, IF Gain = Low) (Nominal)

Center Frequency	3a, 3b, 3c, 3d. MPB
2 to 32 GHz	-80 dBm

**TOI****(3rd-Order Intermodulation Distortion in the IF, 2 Tones of Equal Level at -19 dBFS, 10 MHz Tone Separation, IF Gain = High) (Nominal)**

Center Frequency	3b. MPB, PA Off, Allow RF Gain Adjust ON
2 to 32 GHz	-75 dBc

**Noise Density In IF**

MPB: Noise density is nominally 5 dB higher than STD DANL at default IF Gain settings. The noise level in the IF will change for frequencies away from the center of the IF.

**Spurious Responses****3b. MPB, PA OFF, Allow RF Gain Adjust ON**

Residual responses (input terminated, 0 dB attenuation, IF gain = high)

Center Frequency	Nominal
2 to 32 GHz	-100 dBm

**Image Responses**

Tuned Frequency (f)	Excitation Frequency
2 to 32 GHz	$f \pm 2 * 1^{st} \text{ IF MHz}$
	$f \pm 2 * \text{ Final IF MHz}$

**Amplitude Accuracy, Absolute****3b. MPB, PA OFF, Allow RF Gain Adjust ON (10 dB Attenuation)**

Center Frequency	Full Range	20 to 30 °C	Nominal
2 to 9.5 GHz	± 1.40 dB	± 1.10 dB	± 0.60 dB
> 9.5 to 12.5 GHz	± 1.70 dB	± 1.30 dB	± 0.80 dB
> 12.5 to 26.5 GHz	± 2.20 dB	± 1.80 dB	± 1.00 dB
> 26.5 to 32 GHz	± 3.00 dB	± 2.30 dB	± 1.20 dB

# General Specifications

<b>Temperature Range</b>		
Operating	0 to 55 °C (for 1-port, Option 001) 0 to 40 °C (for 2-port, Option 001, 002)	
Storage	-40 to +70 °C	
Altitude	Operating: Up to 3,000 meters (9,842 feet) Non-operating: up to 4,600 m (approx. 15,091 feet)	
Maximum relative humidity	95% up to 40 °C, non-condensing	
<b>Environment</b>		
Indoor use		
<b>Power Requirements</b>		
Voltage and frequency (nominal)	100 to 240 V AC, 50/60 Hz	
Rated input power	900 W with C20 input connector (maximum)	The instruments can operate with mains supply voltage fluctuations up to ± 10% of the nominal voltage
	600 W with C14 input connector (maximum)	
Power consumption, on	300 W (1-port, Option 001 and B40, typical)	
	550 W (2-port, Option 001, 002, and R20, typical)	
Power consumption, standby	10 W	
<b>Display</b>		
Resolution	1920 x 1080	
Size	400 mm (15.6 in.) diagonal (nominal) capacitive multi-touch screen	
<b>Data Storage</b>		
Internal	Removable solid-state drive (≥ 480 GB)	
External	Supports USB 3.0/2.0 compatible memory devices	
CPU	Intel i7, 8-core, 4.4 GHz clock, 64 GB DDR4 DRAM	
Operating system	Windows-11, Enterprise	
<b>Weight</b>		
Net	26.3 kg (58.0 lbs) (1-port, Option 001, nominal)	
	37.6 kg (82.9 lbs) (2-port, Option 001 and 002, nominal)	
Shipping	33.1 kg (73.0 lbs) (1-port, Option 001, nominal)	
	44.4 kg (97.9 lbs) (2-port, Option 001 and 002, nominal)	
<b>Dimensions</b>		
Height	278 mm (10.9 in)	
Width	476 mm (18.7 in)	
Length	523 mm (20.6 in)	
<b>Calibration Cycle</b>		
The recommended calibration cycle is one year; calibration services are available through Keysight Service Centers.		

# Inputs and Outputs

## Front Panel

RF Input			
Option 532/632	2.4 mm male 50 $\Omega$ (nominal) (standard)		
	Adapter 2.4 mm female to 2.92 mm female included with Option 532/632		
USB Ports			
Type	Description	Connector	Output Current
USB 3.0 (2)	Compatible with USB 3.0	USB Type-A female (blue)	5 V, 0.9 A
USB 2.0 (2)	Compatible with USB 2.0	USB Type-A female (black)	5 V, 0.5 A
USB C (2)	Compatible with USB Type-C	USB Type-C female	5 V, 0.9 A

## Rear Panel

<b>Ref Out</b>	
Connector	BNC female, 50 $\Omega$ (nominal)
Output amplitude	$\geq 0$ dBm (nominal)
Frequency	10 MHz $\times$ (1+ frequency reference accuracy), Other frequency $\times$ (1+ frequency reference accuracy)
<b>Ref In</b>	
Connector	BNC female, 50 $\Omega$ (nominal)
Input amplitude range	0 to 10 dBm (nominal)
Input frequency	1 to 110 MHz (nominal)
Frequency lock range	$\pm 2 \times 10^{-6}$ of specified external reference input frequency
<b>2.4 GHz Out</b>	
Amplitude	+8 dBm (nominal) sine wave
Connector	SMA female
Impedance	50 $\Omega$ (nominal)
Frequency	2.4 GHz (nominal)
<b>2.4 GHz In</b>	
Amplitude	-1 to +10 dBm (nominal)
Connector	SMA female
Impedance	50 $\Omega$ (nominal)
Frequency	2.4 GHz (nominal)
<b>Trigger Inputs</b>	
Connector	BNC female, 10 k $\Omega$ (nominal)
Trigger level range	-5 to 5 V
<b>Precision Trigger Input (For Wide-Bandwidth Measurements Only, Requires Option R10/S10 or R20/S20)</b>	
Connector	SMA, female, 50 $\Omega$ (nominal)
Trigger level range	-5 to 5 V
<b>Trigger Outputs</b>	
Connector	BNC female, 50 $\Omega$ (nominal)
Trigger level range	0 to 5 V (CMOS) (nominal)
<b>Noise Source Drive +28 V (Pulsed)</b>	
Connector	BNC female
Output voltage on	28.0 $\pm$ 0.1 V (nominal)
Output voltage off	< 1.0 V
<b>USB Ports</b>	
<b>USB 3.0 (4 Ports)</b>	
Standard	Compatible with USB 3.0
Connector	USB Type-A female
Output current	0.9 A (nominal)
<b>Device Side USB</b>	
Standard	Compatible with USB 3.0
Connector	USB Type-B female
<b>DisplayPort (DP)</b>	
Connector	DisplayPort
Resolution	1920 x 1080
<b>Micro GPIB Interface (Option GPB)</b>	
Connector	Micro-D 25-pin
GPIB codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3, C28, DT1, L4, C0
GPIB mode	Controller or device
<b>LAN TCP/IP Interface</b>	
Standard	1GBase-T x2
Connector	RJ45 Ethernet connector
Option GBE (10 Gbit Ethernet)	10GBase-T x2
Connector	RJ45 Ethernet connector








# Regulatory Information

This product is designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2 and MEASUREMENT CATEGORY NONE.

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

	<p>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.</p>
<p><a href="mailto:ccr.keysight@keysight.com">ccr.keysight@keysight.com</a></p>	<p>The Keysight email address is required by EU directives applicable to our product.</p>
<p>CAN ICES/NMB-001(A)</p>	<p>Canada EMC label. Interference-Causing Equipment Standard for industrial, scientific and medical (ISM) equipment. Matériel industriel, scientifique et médical (ISM)</p>
<p>ISM 1-A (GRP.1 CLASS A)</p>	<p>This is a symbol of an Industrial Scientific and Medical Group 1 Class A product. (CISPR 11, Clause 4)</p>
	<p>The CSA mark is a registered trademark of the CSA International.</p>
	<p>The RCM mark is a registered trademark of the Australian Communications and Media Authority.</p>
	<p>UK conformity mark is a UK government owned mark. Products showing this mark comply with all applicable UK regulations.</p>
	<p>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).</p> <p>The crossed out wheeled bin symbol indicates that separate collection for waste electric and electronic equipment (WEEE) is required, as obligated by the EU DIRECTIVE and other National legislation.</p> <p>Please refer to <a href="https://www.keysight.com/go/takeback">keysight.com/go/takeback</a> to understand your Trade in options with Keysight in addition to product takeback instructions.</p>
	<p>China Restricted Substance Product Label. The EPUP (environmental protection use period) number in the center indicates the time period during which no hazardous or toxic substances or elements are expected to leak or deteriorate during normal use and generally reflects the expected useful life of the product.</p>
	<p>Universal recycling symbol. This symbol indicates compliance with the China standard GB 18455-2001 as required by the China RoHS regulations for paper/fiberboard packaging.</p>
	<p>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.</p>
	<p>South Korean Certification (KC) mark; includes the marking's identifier code.</p>



This symbol indicates the presence of a class 1 Laser device

### Regulatory, Environmental and Certifications

EMC	<p>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 Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments. AS/NZS CISPR 11 ICES/NMB-001 This ISM device complies with Canadian ICES-001 Cet appareil ISM est conforme a la norme NMB-001 du Canada</p> <p>NOTE: This is a sensitive measurement apparatus by design and may have some performance loss (up to 25 dBm above the Spurious Responses, Residual specification of -100 dBm) when exposed to 3V/m ambient continuous electromagnetic phenomenon in the range of 80 MHz to 6 GHz (similar to those used in testing per IEC 61000-4-3).</p>
South Korean Class A EMC declaration	<p>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.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>사용자 안내문</b></p> <p>이 기기는 업무용 환경에서 사용할 목적으로 적합성 평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.</p> <p>※ 사용자 안내문은 "업무용 방송통신기자재"에만 적용한다. <a href="http://www.rra.go.kr/selform/Kst-12251043">http://www.rra.go.kr/selform/Kst-12251043</a></p> </div>
Safety	<p>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</p> <p><b>WARNING</b> "WARNING: EMBEDDED CLASS 1 INVISIBLE LASER RADIATION. DO NOT EXPOSE USERS OR VIEW DIRECTLY WITH TELESCOPES"</p>
Acoustic statement (European Machinery Directive)	<p>Acoustic noise emission LpA &lt; 70 dB Operator position Normal operation mode per ISO 7779</p> <p>Acoustic noise - more information (Values given are per ISO 7779 standard in the "Operator Sitting" position)</p>
Environmental stress	<p>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.</p>

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

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

## Additional Resources

The SA6210A XA5 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 SA6210A XA5 partners with the:

- [PathWave X-Series measurement applications](#) and [PathWave Vector Signal Analysis \(VSA\)](#)
- [M9484C VXG signal generator](#) for wideband stimulus and response testing


SA6210A XA5 Signal Analyzer Configuration Guide ([3126-1375.EN](#))  
<https://www.keysight.com/find/SA6210A>

## Keysight Support Services

Accelerate your learning curve, enhance your test uptime, and confidently guarantee your instrument accuracy with Keysight Support Services. Keysight Services are here to support your test needs with expert technical support, instrument repair and calibration, training, alternative acquisition program options, and more.

A KeysightCare agreement provides dedicated, proactive support through a single point of contact for an extensive group of instruments, software, and solutions to ensure optimal uptime, with fast response times and resolution. Explore the services that are right for you.

## Keysight Services

Offering	Benefits
<a href="#">KeysightCare</a> 	KeysightCare provides elevated support for Keysight instruments and software, with access to technical support experts who 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 <a href="#">KeysightCare data sheet</a> for details.
KeysightCare Assured	KeysightCare Assured provides a commitment to respond to your engineer's technical needs quickly. When unexpected repairs are necessary, you can count on a committed repair service turnaround time to get you back up and running.
KeysightCare Enhanced	KeysightCare Enhanced includes all the benefits of KeysightCare Assured plus Keysight's accurate and reliable <a href="#">Calibration Services</a> , accelerated and committed TAT, and technical response.
<a href="#">Keysight Support Portal &amp; Knowledge Center</a>	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.
<a href="#">Education Services</a>	Build confidence and gain new skills to make accurate measurements, with flexible Education Services developed by Keysight experts. Including Start-up Assistance.
<b>Alternative Acquisition Options</b>	
<a href="#">KeysightAccess</a>	Reduce budget challenges with a lease-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 instrument uptime and confidently make accurate measurements by securing technical support, repair, and calibration services with committed response and turnaround times. High-performance instruments include 1 year of KeysightCare Assured or KeysightCare Warranty Plus. 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
<b>KeysightCare Enhanced*</b>	<b>Includes Tech Support, Warranty and Calibration</b>
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)
<b>KeysightCare Assured*</b>	<b>Includes Tech Support and Warranty</b>
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
<b>Start-Up Assistance</b>	
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

\* Limited availability might apply. Please review the [service definition tool](#) for model number availability and the [datasheet](#) for country availability. Coverage might be limited to KeysightCare Warranty Plus (R-55F-001). If KeysightCare Enhanced is available, R-55B-001-2/3/5 must be ordered with R-55B-001-1.

As a mission-critical design enablement partner, Keysight connects design, emulation, and test so customers can solve the world's most complex engineering challenges. Accelerate innovation at [www.keysight.com](http://www.keysight.com).



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