

Keysight Technologies

PXA X-Series Signal Analyzer, Multi-touch N9030B

3 Hz to 3.6, 8.4, 13.6, 26.5, 44, or 50 GHz

Data Sheet



Unlocking Measurement Insights

Table of Contents

| | |
|---|----|
| Definitions and Conditions | 3 |
| Frequency and Time Specifications | 4 |
| Amplitude Accuracy and Range Specifications | 6 |
| Dynamic Range Specifications..... | 9 |
| PowerSuite Measurement Specifications | 15 |
| General Specifications | 16 |
| Inputs and Outputs | 17 |
| Other Optional Outputs..... | 20 |
| I/Q Analyzer..... | 21 |
| I/Q Analyzer – Option B40 | 24 |
| I/Q Analyzer – Option B85 or B1X..... | 25 |
| Real-time spectrum analyzer (RTSA) | 27 |
| Related Literature | 27 |

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

www.keysight.com/find/pxa_specifications

Accelerate signal insight with outstanding all-around signal analysis

The PXA is the benchmark for performance that accelerates innovation in demanding applications. With measurement options that range from excellent to exceptional, the PXA puts you in the lead.

Analyze the latest signals with up to 510 MHz analysis bandwidth and better than 70 dB SFDR, and reveal previously hidden signals with Noise Floor Extension (NFE). To see your device's true behavior, get industry-leading phase noise performance by adding the Keysight-proprietary DDS-based LO.

Simplify migration from legacy Agilent/HP spectrum analyzers with backward code compatibility and compact 4U form-factor.

Definitions and Conditions

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. 2σ) of performance tolerances expected to be met in 95 percent of the cases with a 95 percent confidence, for any ambient temperature in the range of 20 to 30 °C. In addition to the statistical observations of a sample of instruments, these values include the effects of the uncertainties of external calibration references. These values are not warranted. These values are updated occasionally if a significant change in the statistically observed behavior of production instruments is observed.

Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 80 percent of the units exhibit with a 95 percent confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.

Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

The analyzer will meet its specifications when:

- The analyzer is within its calibration cycle.
- Under auto couple control, except that Auto Sweep Time Rules = Accy.
- For signal frequencies < 10 MHz, DC coupling applied.
- The analyzer has been stored at an ambient temperature within the allowed operating range for at least two hours before being turned on, if it had previously been stored at a temperature range inside the allowed storage range but outside the allowed operating range.
- The analyzer has been turned on at least 30 minutes with Auto Align set to Normal, or if Auto Align is set to Off or Partial, alignments must have been run recently enough to prevent an Alert message. If the Alert condition is changed from "Time and Temperature" to one of the disabled duration choices, the analyzer may fail to meet specifications without informing the user. If Auto Align is set to Light, performance is not warranted, and nominal performance will degrade to become a factor of 1.4 wider for any specification subject to alignment, such as amplitude tolerances.

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) - (Electronic + Mechanical) Attenuation (dBm)

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

Frequency and Time Specifications

| Frequency range | DC coupled | AC coupled |
|-----------------|------------------|--------------------|
| Option 503 | 3 Hz to 3.6 GHz | 10 MHz to 3.6 GHz |
| Option 508 | 3 Hz to 8.4 GHz | 10 MHz to 8.4 GHz |
| Option 513 | 3 Hz to 13.6 GHz | 10 MHz to 13.6 GHz |
| Option 526 | 3 Hz to 26.5 GHz | 10 MHz to 26.5 GHz |
| Option 544 | 3 Hz to 44 GHz | NA |
| Option 550 | 3 Hz to 50 GHz | NA |

| Band | LO multiple (N) | |
|------|-----------------|------------------|
| 0 | 1 | 3 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 to 26.5 GHz |
| 5 | 4 | 26.4 to 34.5 GHz |
| 6 | 8 | 34.4 to 50 GHz |

| Precision frequency reference | |
|--|---|
| Accuracy | $\pm [(time\ since\ last\ adjustment\ \times\ aging\ rate) + temperature\ stability + calibration\ accuracy]$ |
| Aging rate | $\pm 1 \times 10^{-7} / year$ $\pm 1.5 \times 10^{-7} / 2\ years$ |
| Temperature stability | |
| 20 to 30 °C | $\pm 1.5 \times 10^{-8}$ |
| Full temperature range | $\pm 5 \times 10^{-8}$ |
| Achievable initial calibration accuracy | $\pm 4 \times 10^{-8}$ |
| Example frequency reference accuracy | $= \pm (1 \times 1 \times 10^{-7} + 1.5 \times 10^{-8} + 4 \times 10^{-8})$ |
| 1 year after last adjustment 20 to 30 °C | $= \pm 1.55 \times 10^{-7}$ |
| Residual FM | |
| Center frequency = 1 GHz | $\leq (0.25\ Hz \times N)\ p-p\ in\ 20\ ms\ nominal$ |
| 10 Hz RBW, 10 Hz VBW | See band table above for N (LO multiple) |

| Frequency readout accuracy (start, stop, center, marker) | |
|--|--|
| | $\pm (\text{marker frequency} \times \text{frequency reference accuracy} + 0.10\% \times \text{span} + 5\% \times \text{RBW} + 2\ Hz + 0.5 \times \text{horizontal resolution}^1)$ |

| Marker frequency counter | |
|--------------------------|--|
| Accuracy | $\pm (\text{marker frequency} \times \text{frequency reference accuracy} + 0.100\ Hz)$ |
| Delta counter accuracy | $\pm (\text{delta frequency} \times \text{frequency reference accuracy} + 0.141\ Hz)$ |
| 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 | $\pm (0.1\% \times \text{span} + \text{horizontal resolution})$ |
| FFT | $\pm (0.1\% \times \text{span} + \text{horizontal resolution})$ |

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

Frequency and Time Specifications (continued)

| Sweep time and triggering | | |
|---|---|------------------------------|
| Range | Span = 0 Hz | 1 μ 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 |
| Sweep trigger | Free run, line, video, external 1, external 2, RF burst, periodic timer | |
| Trigger Delay | Span = 0 Hz or FFT | -150 to +500 ms |
| | Span \geq 10 Hz, swept | 0 to 500 ms |
| | Resolution | 0.1 μ s |
| Time gating | | |
| Gate methods | Gated LO; gated video; gated FFT | |
| Gate length range (except method = FFT) | 1 μ s to 5.0 s | |
| Gate delay range | 0 to 100.0 s | |
| Gate delay jitter | 33.3 ns p-p nominal | |
| Sweep (trace) point range | | |
| All spans | 1 to 40001 | |
| Resolution bandwidth (RBW) | | |
| Range (-3.01 dB bandwidth) | 1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz | |
| Bandwidth accuracy (power) | 1 Hz to 100 kHz | \pm 0.5% (\pm 0.022 dB) |
| | RBW range | |
| | 110 kHz to 1.0 MHz (< 3.6 GHz CF) | \pm 1.0% (\pm 0.044 dB) |
| | 1.1 to 2 MHz (< 3.6 GHz CF) | \pm 0.07 dB nominal |
| | 2.2 to 3 MHz (< 3.6 GHz CF) | \pm 0.10 dB nominal |
| Bandwidth accuracy (-3.01 dB) | 4 to 8 MHz (< 3.6 GHz CF) | \pm 0.20 dB nominal |
| | RBW range | 1 Hz to 1.3 MHz |
| Selectivity (-60 dB/-3 dB) | 4:1 nominal | |
| EMI bandwidth (CISPR compliant) | 200 Hz, 9 kHz, 120 kHz, 1 MHz | (Option EMC required) |
| EMI bandwidth (MIL STD 461E compliant) | 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz | (Option EMC required) |
| Analysis bandwidth ¹ | | |
| Maximum bandwidth | Option B25 (standard) | 25 MHz |
| | Option B40 | 40 MHz |
| | Option B85 | 85 MHz |
| | Option B1X | 160 MHz |
| Video bandwidth (VBW) | | |
| Range | 1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz, and wide open (labeled 50 MHz) | |
| Accuracy | \pm 6% nominal (in swept mode and zero span) | |

1. Analysis bandwidth is the instantaneous bandwidth available around a center frequency over which the input signal can be digitized for further analysis or processing in the time, frequency, or modulation domain.

Amplitude Accuracy and Range Specifications

| Amplitude range | | | |
|---|-------------------|--|--|
| Measurement range | | | |
| Preamp Off | | Displayed average noise level (DANL) to +30 dBm | |
| Preamp On | | | |
| RF (Opt 503) | | Displayed average noise level (DANL) to +30 dBm | |
| Microwave (Opt 508, 513, 526) | | Displayed average noise level (DANL) to +24 dBm | |
| Millimeter-wave (Opt 544, 550) | | Displayed average noise level (DANL) to +20 dBm | |
| Input attenuator range (3 Hz to 50 GHz) | | 0 to 70 dB in 2 dB steps | |
| Electronic attenuator (Option EA3) | | | |
| Frequency range | | 3 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 | | | |
| Average total power (with and without preamp) | | +30 dBm (1 W) | |
| Peak pulse power | | < 10 μ s pulse width, < 1% duty cycle, input attenuation \geq 30 dB: +50 dBm (100 W) | |
| DC volts | | | |
| DC coupled | | \pm 0.2 Vdc | |
| AC coupled | | \pm 100 Vdc (For frequency Option 503, 508, 513, or 526) | |
| 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, dB μ V, dBmA, dB μ A, V, W, A | |
| Frequency response | | Specification | 95th percentile (\approx 2σ) |
| (10 dB input attenuation, 20 to 30 °C, preselector centering applied above 3.6 GHz) | | | |
| RF/MW (Option 503, 508, 513, 526) | 3 Hz to 10 MHz | \pm 0.46 dB | |
| | 10 to 20 MHz | \pm 0.35 dB | |
| | 20 MHz to 3.6 GHz | \pm 0.35 dB | \pm 0.16 dB |
| | 3.5 to 8.4 GHz | \pm 1.5 dB | \pm 0.39 dB |
| | 8.3 to 13.6 GHz | \pm 2.0 dB | \pm 0.45 dB |
| | 13.5 to 22.0 GHz | \pm 2.0 dB | \pm 0.62 dB |
| | 22.0 to 26.5 GHz | \pm 2.5 dB | \pm 0.82 dB |
| Millimeter-Wave (Option 544, 550) | 3 Hz to 20 MHz | \pm 0.46 dB | |
| | 20 to 50 MHz | \pm 0.35 dB | \pm 0.19 dB |
| | 50 MHz to 3.6 GHz | \pm 0.35 dB | \pm 0.15 dB |
| | 3.5 to 5.2 GHz | \pm 1.7 dB | \pm 0.70 dB |
| | 5.2 to 8.4 GHz | \pm 1.5 dB | \pm 0.57 dB |
| | 8.3 to 13.6 GHz | \pm 2.0 dB | \pm 0.54 dB |
| | 13.5 to 17.1 GHz | \pm 2.0 dB | \pm 0.64 dB |
| | 17.0 to 22.0 GHz | \pm 2.0 dB | \pm 0.72 dB |
| | 22.0 to 26.5 GHz | \pm 2.5 dB | \pm 0.71 dB |
| | 26.4 to 34.5 GHz | \pm 2.5 dB | \pm 0.93 dB |
| | 34.4 to 50 GHz | \pm 3.2 dB | \pm 1.24 dB |
| Preamp on (0 dB attenuation) (Option P03, P08, P13, P26, P44, P50) | | | |
| RF/MW (Option 503, 508, 513, 526) | 9 to 100 kHz | | \pm 0.36 dB |
| | 100 kHz to 50 MHz | \pm 0.68 dB | \pm 0.26 dB |
| | 50 MHz to 3.6 GHz | \pm 0.55 dB | \pm 0.28 dB |
| | 3.5 to 8.4 GHz | \pm 2.0 dB | \pm 0.64 dB |
| | 8.3 to 13.6 GHz | \pm 2.3 dB | \pm 0.76 dB |
| | 13.5 to 17.1 GHz | \pm 2.5 dB | \pm 0.95 dB |
| | 17.0 to 22.0 GHz | \pm 3.0 dB | \pm 1.41 dB |
| | 22.0 to 26.5 GHz | \pm 3.5 dB | \pm 1.61 dB |

Amplitude Accuracy and Range Specifications (continued)

| | | | |
|---|---|--|-------------------------------|
| Millimeter-Wave (Option 544, 550) | 9 to 100 kHz | | ± 0.40 dB |
| | 100 kHz to 50 MHz | ± 0.68 dB | ± 0.34 dB |
| | 50 MHz to 3.6 GHz | ± 0.60 dB | ± 0.31 dB |
| | 3.5 to 5.2 GHz | ± 2.0 dB | ± 0.81 dB |
| | 5.2 to 8.4 GHz | ± 2.0 dB | ± 0.70 dB |
| | 8.3 to 13.6 GHz | ± 2.3 dB | ± 0.79 dB |
| | 13.5 to 17.1 GHz | ± 2.5 dB | ± 0.88 dB |
| | 17.0 to 22.0 GHz | ± 3.0 dB | ± 1.07 dB |
| | 22.0 to 26.5 GHz | ± 3.5 dB | ± 1.03 dB |
| | 26.4 to 34.5 GHz | ± 3.0 dB | ± 1.35 dB |
| | 34.4 to 50 GHz | ± 4.1 dB | ± 1.69 dB |
| Input attenuation switching uncertainty | | Specifications | Additional information |
| Relative to 10 dB and preamp off | | | |
| At 50 MHz (reference frequency) | Attenuation 12 to 40 dB | ± 0.14 dB | ± 0.03 dB typical |
| | Attenuation 2 to 8 dB | ± 0.18 dB | ± 0.05 dB typical |
| | Attenuation 0 dB | | ± 0.05 dB nominal |
| Attenuation > 2 dB | | | |
| | 3 Hz to 3.6 GHz | | ± 0.3 dB nominal |
| | 3.5 to 8.4 GHz | | ± 0.5 dB nominal |
| | 8.3 to 13.6 GHz | | ± 0.7 dB nominal |
| | 13.5 to 26.5 GHz | | ± 0.7 dB nominal |
| | 26.4 to 50 GHz | | ± 1.0 dB nominal |
| Total absolute amplitude accuracy | | | |
| (10 dB attenuation, 20 to 30 °C, 1 Hz ≤ RBW ≤ 1 MHz, input signal -10 to -50 dBm, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale, σ = nominal standard deviation) | | | |
| | At 50 MHz | ± 0.24 dB | |
| | At all frequencies | ± (0.24 dB + frequency response) | |
| | 10 Hz to 3.6 GHz | ± 0.19 dB (95th Percentile approx. 2σ) | |
| Preamp on (Option P03, P08, P13, P26, P44 and P50) | At all frequencies | ± (0.36 dB + frequency response) | |
| Input voltage standing wave ratio (VSWR) | | | |
| | | Freq Opt 503, 508, 513, 526 | Freq Opt 544, 550 |
| (10 dB input attenuation) | 50 MHz | 1.07 nominal | 1.025 nominal |
| | 10 MHz to 3.6 GHz | 1.139 (95th percentile) | 1.134 (95th percentile) |
| | 3.5 to 8.4 GHz | 1.290 (95th percentile) | 1.152 (95th percentile) |
| | 8.3 to 13.6 GHz | 1.388 (95th percentile) | 1.178 (95th percentile) |
| | 13.5 to 17.1 GHz | 1.41 (95th percentile) | 1.204 (95th percentile) |
| | 17.0 to 26.5 GHz | 1.48 (95th percentile) | 1.331 (95th percentile) |
| | 26.4 to 34.5 GHz | NA | 1.321 (95th percentile) |
| | 34.4 to 50 GHz | NA | 1.378 (95th percentile) |
| | Preamp on (0 dB input attenuation) (Option P03, P08, P13, P26, P44, and P50) | 10 MHz to 3.6 GHz | 1.45 (95th percentile) |
| 3.5 to 8.4 GHz | | 1.54 (95th percentile) | 1.50 (95th percentile) |
| 8.3 to 13.6 GHz | | 1.57 (95th percentile) | 1.310 (95th percentile) |
| 13.5 to 17.1 GHz | | 1.48 (95th percentile) | 1.330 (95th percentile) |
| 17.0 to 26.5 GHz | | 1.54 (95th percentile) | 1.339 (95th percentile) |
| 26.4 to 34.5 GHz | | NA | 1.41 (95th percentile) |
| 34.4 to 50 GHz | | NA | 1.42 (95th percentile) |

Amplitude Accuracy and Range Specifications (continued)

Resolution bandwidth switching uncertainty (referenced to 30 kHz RBW)

| | |
|------------------------|-----------|
| 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 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 | 0 dB |

Display scale switching uncertainty

| | |
|----------------------------------|------|
| Switching between linear and log | 0 dB |
| Log scale/div switching | 0 dB |

Display scale fidelity

| | | |
|---|-----------------|-------------------|
| Between -10 dBm and -18 dBm input mixer level | ± 0.10 dB total | ± 0.04 dB typical |
| Below -18 dBm input mixer level | ± 0.07 dB | ± 0.02 dB typical |

Trace detectors

Normal, peak, sample, negative peak, log power average, RMS average, and voltage average

Preamplifier

| | | |
|------------------------------|------------------|-------------------|
| Frequency range ¹ | Option P03 | 9 kHz to 3.6 GHz |
| | Option P08 | 9 kHz to 8.4 GHz |
| | Option P13 | 9 kHz to 13.6 GHz |
| | Option P26 | 9 kHz to 26.5 GHz |
| | Option P44 | 9 kHz to 44 GHz |
| | Option P50 | 9 kHz to 50 GHz |
| Gain | 9 kHz to 3.6 GHz | +20 dB nominal |
| | 3.6 to 26.5 GHz | +35 dB nominal |
| | 26.5 to 50 GHz | +40 dB nominal |

1. Below 100 kHz, only 95th percentile (approx. 2σ) value for frequency response is provided.

Dynamic Range Specifications

| 1 dB gain compression (two-tone) | | Maximum power at input mixer | | |
|---|---|------------------------------|---|---------------------|
| (At 1 kHz RBW with 100 kHz tone spacing, 20 to 30 °C) | | | | |
| | 20 to 40 MHz | -3 dBm | 0 dBm typical | |
| | 40 to 200 MHz | +1 dBm | +3 dBm typical | |
| | 200 MHz to 3.6 GHz | +3 dBm | +5 dBm typical | |
| | 3.6 to 16 GHz | +1 dBm | +4 dBm typical | |
| | 16 to 26.5 GHz | -1 dBm | +2 dBm typical | |
| | 26.5 to 50 GHz | | 0 dBm nominal | |
| Preamp on (Option P03, P08, P13, P26, P44, and P50) | 10 MHz to 3.6 GHz | | -14 dBm nominal | |
| | 3.6 to 26.5 GHz | | | |
| | Tone spacing 100 kHz to 20 MHz | | -28 dBm nominal | |
| | Tone spacing > 70 MHz | | | |
| | Freq Option ≤ 526 | | -10 dBm nominal | |
| | Freq Option > 526 | | -20 dBm nominal | |
| | 26.5 to 50 GHz | | -30 dBm nominal | |
| Displayed average noise level (DANL) | Specification | | Typical | |
| (Input terminated, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 1 Hz RBW, 20 to 30 °C) | | | | |
| RF/MW (Option 503, 508, 513, 526) | Normal ¹ /LNP enabled ² | | Normal ¹ /LNP enabled ² | |
| Preamp off | 3 Hz to 9 kHz | | -100 dBm/NA typical | |
| | 9 to 100 kHz | -146 dBm/NA | -152 dBm/NA typical | |
| | 100 kHz to 1 MHz | -150 dBm/NA | -156 dBm/NA typical | |
| | 1 to 10 MHz | -155 dBm/NA | -158 dBm/NA typical | |
| | 10 MHz to 1.2 GHz | -155 dBm/NA | -157 dBm/NA typical | |
| | 1.2 to 2.1 GHz | -153 dBm/NA | -155 dBm/NA typical | |
| | 2.1 to 3.0 GHz | -152 dBm/NA | -154 dBm/NA typical | |
| | 3.0 to 3.6 GHz | -151 dBm/NA | -153 dBm/NA typical | |
| | 3.5 to 4.2 GHz | -147 dBm/-153 dBm | -150 dBm/-156 dBm typical | |
| | 4.2 to 8.4 GHz | -150 dBm/-155 dBm | -152 dBm/-157 dBm typical | |
| | 8.3 to 13.6 GHz | -149 dBm/-155 dBm | -151 dBm/-157 dBm typical | |
| | 13.5 to 16.9 GHz | -145 dBm/-152 dBm | -147 dBm/-155 dBm typical | |
| | 16.9 to 20.0 GHz | -143 dBm/-151 dBm | -145 dBm/-153 dBm typical | |
| | 20.0 to 26.5 GHz | -137 dBm/-150 dBm | -140 dBm/-152 dBm typical | |
| | Preamp on Option P03, P08, P13, P26 ³ | 100 to 200 kHz | -157 dBm/NA | -160 dBm/NA typical |
| | | 200 to 500 kHz | -160 dBm/NA | -163 dBm/NA typical |
| 0.5 to 1 MHz | | -164 dBm/NA | -166 dBm/NA typical | |
| 1 to 10 MHz | | -164 dBm/NA | -167 dBm/NA typical | |
| 10 MHz to 2.1 GHz | | -165 dBm/NA | -166 dBm/NA typical | |
| 2.1 to 3.6 GHz | | -163 dBm/NA | -164 dBm/NA typical | |
| 3.5 to 8.4 GHz | | -164 dBm/NA | -166 dBm/NA typical | |
| 8.3 to 13.6 GHz | | -163 dBm/NA | -165 dBm/NA typical | |
| 13.5 to 16.9 GHz | | -161 dBm/NA | -162 dBm/NA typical | |
| 16.9 to 20.0 GHz | | -159 dBm/NA | -161 dBm/NA typical | |
| 20.0 to 26.5 GHz | | -155 dBm/NA | -157 dBm/NA typical | |
| DANL with Noise Floor Extension (NFE) on | Specifications | | Improvement @ 95th percentile | |
| RF/MW (Option 503, 508, 513, 526) | Preamp Off | Preamp On | LNP enabled ^{2,3} | |
| Band 0, f > 20 MHz | 9 dB | 10 dB | NA | |
| Band 1 | 10 dB | 9 dB | 10 dB | |
| Band 2 | 10 dB | 10 dB | 10 dB | |
| Band 3 | 9 dB | 10 dB | 10 dB | |
| Band 4 | 10 dB | 8 dB | 10 dB | |
| Examples of effective DANL 20 to 30 °C | Preamp Off | Preamp On | LNP enabled ^{2,3} | |
| Mid-Band 0 (1.8 GHz) | -161 dBm | -171 dBm | NA | |
| Mid-Band 1 (5.95 GHz) | -158 dBm | -172 dBm | -162 dBm | |
| Mid-Band 2 (10.95 GHz) | -159 dBm | -168 dBm | -162 dBm | |
| Mid-Band 3 (15.3 GHz) | -152 dBm | -165 dBm | -160 dBm | |
| Mid-Band 4 (21.75 GHz) | -149 dBm | -160 dBm | -160 dBm | |

1. With the NFE (Noise Floor Extension) "Off".

2. LNP (Low Noise Path) requires option LNP.

3. At higher frequency bands (beyond 3.6 GHz), Preamp "On" supersedes "LNP enabled". LNP cannot operate simultaneously with preamp.

Dynamic Range Specifications (continued)

| Millimeter-Wave (Option 544, 550) | | Normal ¹ /LNP enabled ² | Normal ¹ /LNP enabled ² |
|---|-------------------|---|---|
| Preamp off | 3 Hz to 9 kHz | | -100 dBm/NA nominal |
| | 9 to 100 kHz | -146 dBm/NA | -152 dBm/NA typical |
| | 100 kHz to 1 MHz | -150 dBm/NA | -156 dBm/NA typical |
| | 1 to 10 MHz | -155 dBm/NA | -158 dBm/NA typical |
| | 10 MHz to 1.2 GHz | -155 dBm/NA | -157 dBm/NA typical |
| | 1.2 to 2.1 GHz | -153 dBm/NA | -155 dBm/NA typical |
| | 2.1 to 3 GHz | -152 dBm/NA | -154 dBm/NA typical |
| | 3 to 3.6 GHz | -151 dBm/NA | -153 dBm/NA typical |
| | 3.5 to 4.2 GHz | -143 dBm/-150 dBm | -153 dBm/NA typical |
| | 4.2 to 6.6 GHz | -144 dBm/-152 dBm | -147 dBm/-154 dBm typical |
| | 6.6 to 8.4 GHz | -147 dBm/-154 dBm | -148 dBm/-155 dBm typical |
| | 8.3 to 13.6 GHz | -147 dBm/-153 dBm | -149 dBm/-156 dBm typical |
| | 13.5 to 14 GHz | -143 dBm/-150 dBm | -149 dBm/-152 dBm typical |
| | 14 to 17 GHz | -145 dBm/-151 dBm | -146 dBm/-153 dBm typical |
| | 17 to 22.5 GHz | -141 dBm/-149 dBm | -148 dBm/-152 dBm typical |
| | 22.5 to 26.5 GHz | -139 dBm/-146 dBm | -146 dBm/-150 dBm typical |
| | 26.4 to 34 GHz | -138 dBm/-146 dBm | -142 dBm/-149 dBm typical |
| | 33.9 to 37 GHz | -134 dBm/-141 dBm | -139 dBm/-147 dBm typical |
| | 37 to 40 GHz | -132 dBm/-140 dBm | -138 dBm/-145 dBm typical |
| | 40 to 46 GHz | -130 dBm/-140 dBm | -135 dBm/-145 dBm typical |
| 46 to 49 GHz | -130 dBm/-138 dBm | -135 dBm/-142 dBm typical | |
| 49 to 50 GHz | -128 dBm/-138 dBm | -133 dBm/-142 dBm typical | |
| Preamp on Option P03, P08, P13, P26, P44, P50 ³ | 100 to 200 kHz | -157 dBm | -160 dBm typical |
| | 200 to 500 kHz | -160 dBm | -163 dBm typical |
| | 500 kHz to 1 MHz | -162 dBm | -165 dBm typical |
| | 1 to 10 MHz | -164 dBm | -167 dBm typical |
| | 10 MHz to 2.1 GHz | -164 dBm | -166 dBm typical |
| | 2.1 to 3.6 GHz | -163 dBm | -164 dBm typical |
| | 3.5 to 8.4 GHz | -161 dBm | -163 dBm typical |
| | 8.3 to 13.6 GHz | -161 dBm | -163 dBm typical |
| | 13.5 to 17 GHz | -161 dBm | -163 dBm typical |
| | 17 to 20 GHz | -160 dBm | -163 dBm typical |
| | 20 to 26.5 GHz | -158 dBm | -161 dBm typical |
| | 26.4 to 30 GHz | -157 dBm | -159 dBm typical |
| | 30 to 34 GHz | -155 dBm | -158 dBm typical |
| | 33.9 to 37 GHz | -153 dBm | -157 dBm typical |
| | 37 to 40 GHz | -152 dBm | -156 dBm typical |
| 40 to 43 GHz | -149 dBm | -154 dBm typical | |
| 44 to 46 GHz | -149 dBm | -154 dBm typical | |
| 46 to 50 GHz | -146 dBm | -150 dBm typical | |

1. With the NFE (Noise Floor Extension) "Off".

2. LNP (Low Noise Path) requires option LNP.

3. At higher frequency bands (beyond 3.6 GHz), Preamp "On" supersedes "LNP enabled". LNP cannot operate simultaneously with preamp.

Dynamic Range Specifications (continued)

| DANL with Noise Floor Extension (NFE) on | Specifications | | Improvement @ 95th percentile | |
|--|----------------|-----------|-------------------------------|----------------------------|
| | Preamp Off | Preamp On | Preamp Off | Preamp On |
| Millimeter-Wave (Option 544, 550) | | | Preamp Off | Preamp On |
| | | | | LNP enabled ^{1,2} |
| Band 0, f > 20 MHz | | | 10 dB | 9 dB |
| Band 1 | | | 9 dB | 9 dB |
| Band 2 | | | 9 dB | 8 dB |
| Band 3 | | | 9 dB | 8 dB |
| Band 4 | | | 10 dB | 9 dB |
| Band 5 | | | 11 dB | 9 dB |
| Band 6 | | | 11 dB | 8 dB |
| Example of effective DANL 20 to 30 °C | Preamp Off | Preamp On | LNP enabled ^{1,2} | |
| Mid-Band 0 (1.8 GHz) | -160 dBm | -172 dBm | N/A | |
| Mid-Band 1 (5.95 GHz) | -154 dBm | -164 dBm | -157 dBm | |
| Mid-Band 2 (10.95 GHz) | -155 dBm | -167 dBm | -157 dBm | |
| Mid-Band 3 (15.3 GHz) | -154 dBm | -167 dBm | -157 dBm | |
| Mid-Band 4 (21.75 GHz) | -152 dBm | -165 dBm | -157 dBm | |
| Mid-Band 5 (30.4 GHz) | -148 dBm | -160 dBm | -157 dBm | |
| Mid-Band 6 (42.7 GHz) | -143 dBm | -156 dBm | -150 dBm | |

1. LNP (Low Noise Path) requires option LNP.

2. At higher frequency bands (beyond 3.6 GHz), Preamp "On" supersedes "LNP enabled". LNP cannot operate simultaneously with preamp.

Dynamic Range Specifications (continued)

| Residuals, images, and spurious responses | | | | |
|--|---|---|-------------------------|------------------------|
| Residual responses (Input terminated and 0 dB attenuation) | 200 kHz to 8.4 GHz Zero span or FFT or other frequencies | -100 dBm -100 dBm nominal | | |
| Image responses | Tuned Freq (f) | Excitation Freq | Response | |
| (Mixer level at -10 dBm) | 10 MHz to 26.5 GHz | f+45 MHz | -80 dBc | -118 dBc typical |
| | 10 MHz to 3.6 GHz | f+10,245 MHz | -80 dBc | -112 dBc typical |
| | 10 MHz to 3.6 GHz | f+645 MHz | -80 dBc | -101 dBc typical |
| | 3.5 to 13.6 GHz | f+645 MHz | -78 dBc | -87 dBc typical |
| | 13.5 to 17.1 GHz | f+645 MHz | -74 dBc | -84 dBc typical |
| | 17.0 to 22 GHz | f+645 MHz | -70 dBc | -82 dBc typical |
| | 22 to 26.5 GHz | f+645 MHz | -68 dBc | -79 dBc typical |
| (Mixer level at -30 dBm) | 26.5 to 34.5 GHz | f+645 MHz | -68 dBc | -84 dBc typical |
| | 34.4 to 44 GHz | f+645 MHz | -57 dBc | -79 dBc typical |
| | 44 to 50 GHz | f+645 MHz | | -75 dBc nominal |
| Other spurious responses | Mixer level | Response | | |
| Carrier frequency \leq 26.5 GHz | | | | |
| First RF order (f \geq 10 MHz from carrier) | -10 dBm | -80 dBc + 20log(N ¹) Including IF feedthrough, LO harmonic mixing responses | | |
| Higher RF order (f \geq 10 MHz from carrier) | -40 dBm | -80 dBc + 20log(N ¹) Including higher order mixer responses | | |
| Carrier frequency > 26.5 GHz | | | | |
| First RF order (f \geq 10 MHz from carrier) | -30 dBm | -90 dBc nominal | | |
| Higher RF order (f \geq 10 MHz from carrier) | -30 dBm | -90 dBc nominal | | |
| LO-related spurious responses (200 Hz \leq f < 10 MHz from carrier) | -10 dBm | -68 dBc ² + 20log(N ¹) | | |
| Line-related spurious responses | | -73 dBc ² + 20log(N ¹) (nominal) | | |
| Second harmonic distortion (SHI) | | | | |
| | Source frequency | Mixer level | Distortion ³ | SHI ³ |
| RF/MW (Option 503, 508, 513, 526) | 10 to 100 MHz | -15 dBm | -57 dBc/NA | +42 dBm/NA |
| | 0.1 to 1.8 GHz | -15 dBm | -60 dBc/NA | +45 dBm/NA |
| | 1.75 to 2.5 GHz | -15 dBm | -77 dBc/-95 dBc | +62 dBm/+80 dBm |
| | 2.5 to 4 GHz | -15 dBm | -77 dBc/-101 dBc | +62 dBm/+86 dBm |
| | 4 to 6.5 GHz | -15 dBm | -77 dBc/-105 dBc | +62 dBm/+90 dBm |
| | 6.5 to 10 GHz | -15 dBm | -70 dBc/-105 dBc | +55 dBm/+90 dBm |
| | 10 to 13.25 GHz | -15 dBm | -62 dBc/-105 dBc | +47 dBm/+90 dBm |
| Millimeter-Wave (Option 544, 550) | 10 to 100MHz | -15 dBm | -57 dBc/NA | +42 dBm/NA |
| | 100 M to 1.8 GHz | -15 dBm | -60 dBc/NA | +45 dBm/NA |
| | 1.8 to 2.5 GHz | -15 dBm | -72 dBc/-95 dBc | +57 dBm/+80 dBm |
| | 2.5 to 3 GHz | -15 dBm | -72 dBc/-99 dBc | +57 dBm/+84 dBm |
| | 3 to 5 GHz | -15 dBm | -77 dBc/-99 dBc | +62 dBm/+84 dBm |
| | 5 to 6.5 GHz | -15 dBm | -77 dBc/-105 dBc | +62 dBm/+90 dBm |
| | 6.5 to 10 GHz | -15 dBm | -70 dBc/-105 dBc | +55 dBm/+90 dBm |
| | 10 to 13.25 GHz | -15 dBm | -62 dBc/-105 dBc | +47 dBm/+90 dBm |
| | 13.25 to 25 GHz | -15 dBm | -65 dBc/-105 dBc (nom.) | +50 dBm/+90 dBm (nom.) |
| | | Preamp level | Distortion | SHI |
| Preamp on (Option P03, P08, P13, P26, P44, P50) | 10 MHz to 1.8 GHz | -45 dBm | -78 dBc nominal | +33 dBm nominal |
| | 1.8 to 13.25 GHz | -50 dBm | -60 dBc nominal | +10 dBm nominal |
| | 13.25 to 25 GHz | -50 dBm | -50 dBm nominal | 0 dBm nominal |

1. N is the LO multiplication factor. Refer to page 4 for the N value versus frequency ranges.
2. Nominally -40 dBc under large magnetic (0.38 Gauss rms) or vibrational (0.21 g rms) environmental stimuli.
3. Normal path/LNP enabled (requires Option LNP).

Dynamic Range Specifications (continued)

| Third-order intermodulation distortion (TOI) | | | |
|---|--------------------|------------------|-----------------|
| (two -16 dBm tones at input mixer with tone separation > 5 times IF prefilter bandwidth, 20 to 30 °C) | | | |
| For all frequency options (Option 503, 508, 513, 526, 544, and 550) | 10 to 150 MHz | +13 dBm | +16 dBm typical |
| | 150 to 600 MHz | +18 dBm | +21 dBm typical |
| | 0.6 to 1.1 GHz | +20 dBm | +22 dBm typical |
| | 1.1 to 3.6 GHz | +21 dBm | +23 dBm typical |
| For RF/MW only (Option 503, 508, 513, and 526) | 3.5 to 8.4 GHz | +17 dBm | +23 dBm typical |
| | 8.3 to 13.6 GHz | +17 dBm | +23 dBm typical |
| | 13.5 to 17.1 GHz | +15 dBm | +20 dBm typical |
| | 17.0 to 26.5 GHz | +16 dBm | +22 dBm typical |
| For Millimeter-Wave only (Option 544 and 550) | 3.5 to 8.4 GHz | +16 dBm | +23 dBm typical |
| | 8.3 to 13.6 GHz | +16 dBm | +23 dBm typical |
| | 13.5 to 17.1 GHz | +13 dBm | +17 dBm typical |
| | 17.0 to 26.5 GHz | +13 dBm | +20 dBm typical |
| Preamp on (Option P03, P08, P13, P26, P44, and P50) | | | |
| Tones at preamp input (two -45 dBm) (two -45 dBm) (two -50 dBm) | 10 to 500 MHz | +4 dBm nominal | |
| | 500 MHz to 3.6 GHz | +4.5 dBm nominal | |
| | 3.6 to 26.5 GHz | -15 dBm nominal | |

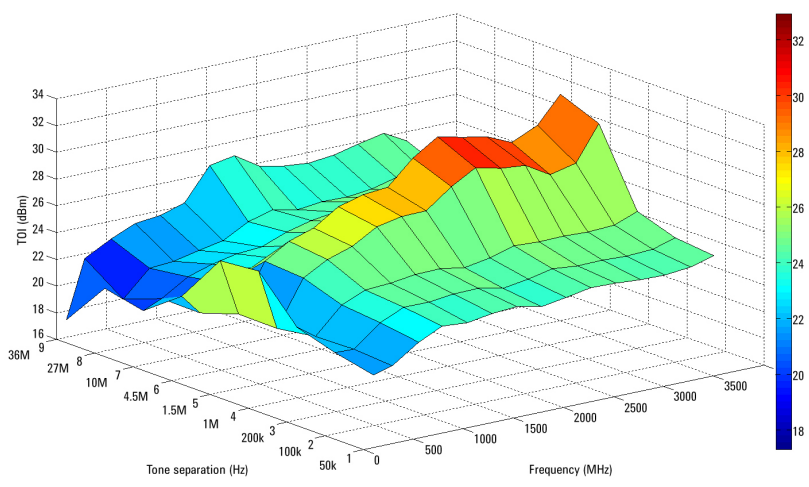


Figure 1. Nominal TOI performance versus frequency and tone separation

Dynamic Range Specifications (continued)

| Phase noise | Offset | Specification | Typical |
|--|---------|---------------|---------------------|
| Noise sidebands (20 to 30 °C, CF = 1 GHz) | 10 Hz | | -80 dBc/Hz nominal |
| | 100 Hz | -94 dBc/Hz | -100 dBc/Hz typical |
| | 1 kHz | -121 dBc/Hz | -125 dBc/Hz typical |
| | 10 kHz | -129 dBc/Hz | -132 dBc/Hz typical |
| | 30 kHz | -130 dBc/Hz | -132 dBc/Hz typical |
| | 100 kHz | -129 dBc/Hz | -131 dBc/Hz typical |
| | 1 MHz | -145 dBc/Hz | -146 dBc/Hz typical |
| | 10 MHz | -155 dBc/Hz | -158 dBc/Hz typical |

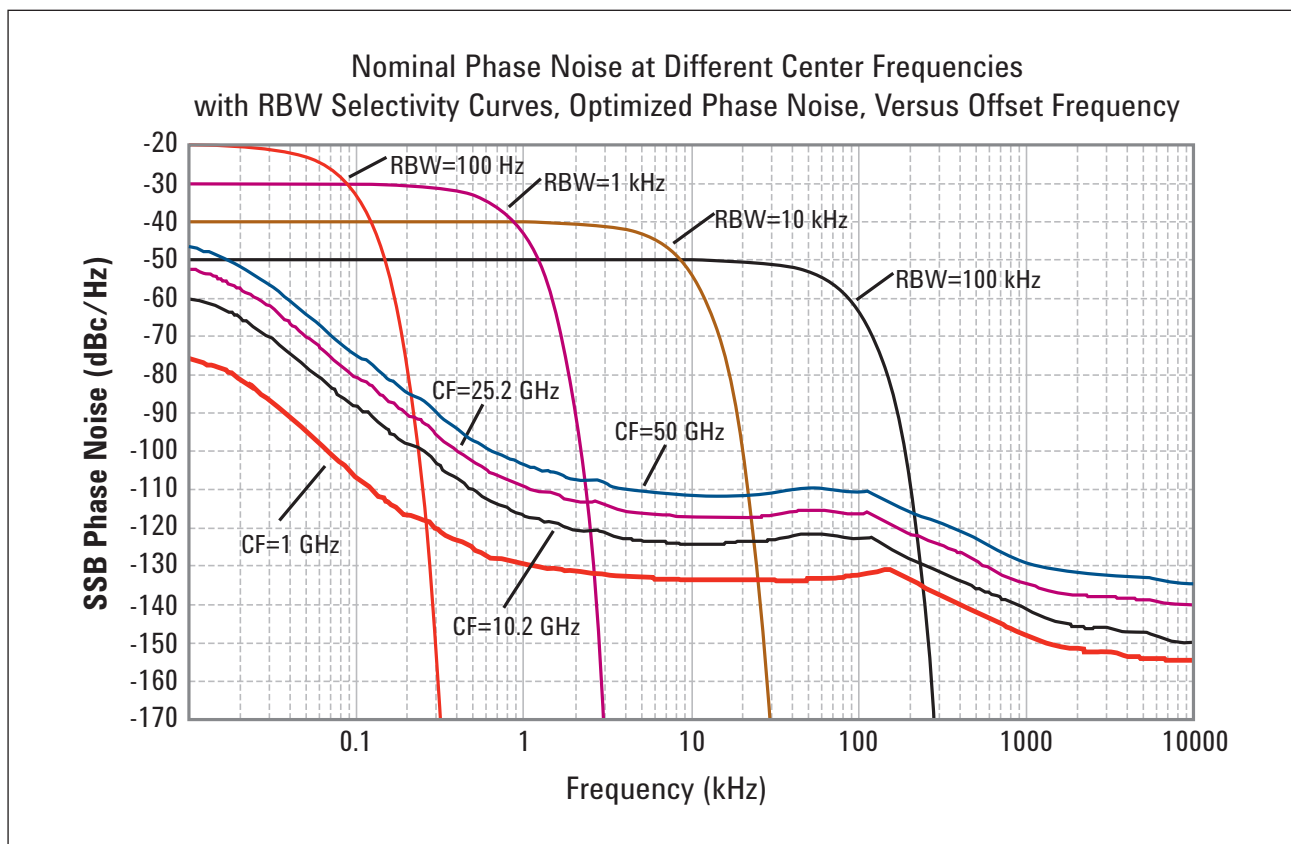


Figure 3. Nominal PXA phase noise at various center frequencies

Option MPB, microwave preselector bypass ¹

Frequency range

| | |
|------------|-----------------|
| N9030B-508 | 3.6 to 8.4 GHz |
| N9030B-513 | 3.6 to 13.6 GHz |
| N9030B-526 | 3.6 to 26.5 GHz |
| N9030B-544 | 3.6 to 44 GHz |
| N9030B-550 | 3.6 to 50 GHz |

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

PowerSuite Measurement Specifications

| | | |
|--|--|----------------------|
| Channel power | | |
| Amplitude accuracy, W-CDMA or IS95 (20 to 30 °C, attenuation = 10 dB) | ± 0.61 dB (± 0.19 dB 95th percentile) | |
| Occupied bandwidth | | |
| Frequency accuracy | ± [span/1000] nominal | |
| Adjacent channel power | | |
| Accuracy, 3GPP W-CDMA (ACLR) (at specific mixer levels and ACLR ranges) | Adjacent | Alternate |
| MS (UE) | ± 0.09 dB | ± 0.16 dB |
| BTS | ± 0.18 dB | ± 0.31 dB |
| Dynamic range (typical) | | |
| Without noise correction | -81.5 dB | -87 dB |
| With noise correction | -82.5 dB | -88 dB |
| Offset channel pairs measured | 1 to 6 | |
| Multi-carrier ACP | | |
| Accuracy, 3GPP W-CDMA (ACPR) (4 carriers, 5 MHz offset, BTS, UUT ACPR range at -42 to -48 dB, optimal mixer level at -21 dBm) | ± 0.13 dB | |
| Multiple number of carriers measured | Up to 12 | |
| Power statistics CCDF | | |
| Histogram resolution | 0.01 dB | |
| Harmonic distortion | | |
| Maximum harmonic number | 10th | |
| Result | Fundamental power (dBm), relative harmonics power (dBC), total harmonic distortion in % | |
| Intermod (TOI) | Measure the third-order products and intercepts from two tones | |
| Burst power | | |
| Methods | Power above threshold, power within burst width | |
| Results | Single burst output power, average output power, maximum power, minimum power within burst, burst width | |
| Spurious emission | | |
| 3GPP W-CDMA table-driven spurious signals; search across regions | | |
| Dynamic range (1 to 3.6 GHz) | 97.1 dB | (101.9 dB typical) |
| Absolute sensitivity (1 to 3.6 GHz) | -86.4 dBm | (-90.4 dBm typical) |
| Spectrum emission mask (SEM) | | |
| cdma2000® (750 kHz offset) | | |
| Relative dynamic range | 81.6 dB | (86.4 dB typical) |
| Absolute sensitivity | -101.7 dBm | (-105.7 dBm typical) |
| Relative accuracy | ± 0.08 dB | |
| 3GPP W-CDMA (2.515 MHz offset) | | |
| Relative dynamic range | 85.4 dB | (89.8 dB typical) |
| Absolute sensitivity | -101.7 dBm | (-105.7 dBm typical) |
| Relative accuracy | ± 0.08 dB | |

General Specifications

Temperature range

| | |
|-----------|---------------|
| Operating | 0 to 55 °C |
| Storage | -40 to +70 °C |

Altitude

4,500 meters (approx 15,000 feet)

EMC

Complies with the essential requirements of the European EMC Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- ICES/NMB-001

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme a la norme NMB-001 du Canada

South Korean Class A EMC declaration

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

A 급 기기 (업무용 방송통신기자재)이 기 기는 업무용 (A 급) 전자파적합기로서 판매자 또는 사용자는 이 점을 주의하시기 바라 며, 가 정외의 지역에서 사용하는 것을 목적으로 합니다.

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

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

≥ 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.

Power requirements

| | |
|-----------------------|--|
| Voltage and frequency | 100 to 120 V, 50/60/400 Hz 220 to 240 V, 50/60 Hz |
|-----------------------|--|

Power consumption

| | |
|---------|-----------------|
| On | 630 W (Maximum) |
| Standby | 40 W |

- The N9030B is in full compliance with CISPR 11, Class A emissions and is declared as such. In addition, the N9030B has been type tested and shown to meet CISPR 11, Class B emissions limits. Information regarding the Class B emission performance of the N9030B is provided as a convenience to the user and is not intended to be a regulatory declaration.

General Specifications (continued)

| Display | |
|--|--|
| Resolution | 1280 x 768 |
| Size | 269 mm (10.6 in.) diagonal (nominal) capacitive multi-touch screen |
| Data storage | |
| Internal | Removable solid state drive (80 GB) |
| External | Supports USB 2.0 compatible memory devices |
| Weight (without options) | |
| Net | 22 kg (48 lbs) nominal |
| Shipping | 34 kg (75 lbs) nominal |
| Dimensions | |
| Height | 177 mm (7.0 in) |
| Width | 426 mm (16.8 in) |
| Length | 556 mm (21.9 in) |
| Warranty | |
| The PXA signal analyzer is supplied with a 3-year standard warranty | |
| Calibration cycle | |
| The recommended calibration cycle is one year. Calibration services are available through Keysight service centers | |

Inputs and Outputs

| Front panel | |
|---|---|
| RF input Connector | |
| Standard (Option 503, 508, 513, 526) | Type-N female, 50 Ω nominal |
| Option C35 (with Option 526 only) | APC 3.5 mm male, 50 Ω nominal |
| Standard (Option 544, 550) | 2.4 mm male, 50 Ω nominal |
| Analog baseband IQ inputs (Option BBA) ¹ | |
| Connectors (I, Q, I-Bar, Q-Bar, and Cal Out) | BNC female |
| Cal Out | |
| Signal | AC coupled square wave |
| Frequency | Selectable between 1 kHz and 250 kHz |
| Input impedance (4 connectors: I, Q, I-, Q-) | 50 Ω , 1 M Ω (selectable, nominal) |
| Probes supported ² | |
| Active probe | 1130A, 1131A, 1132A, 1134A |
| Passive probe | 1161A |
| Input return loss | -5 dB (0 to 10 MHz, nominal) |
| 50 Ω impedance only selected | -0 dB (10 to 40 MHz, nominal) |
| Probe power | |
| Voltage/current | +15 Vdc, \pm 7% at 150 mA max nominal -12.6 Vdc, \pm 10% at 150 mA max nominal |
| USB ports | |
| Host (3 ports) | |
| Standard | Compatible with USB 2.0 |
| Connector | USB Type-A female |
| Output current | |
| Port marked with lightning bolt | 1.2 A (nominal) |
| Ports not marked with lightning bolt | 0.5 A |
| Headphone jack | Miniature stereo audio jack (3.5 mm, also known as "1/8 inch") |

1. For additional specifications, please refer to Chapter BBA in the PXA Signal Analyzer specification guide

2. For more details, please refer to the Keysight Probe Configuration Guides, literature numbers 5968-7141EN and 5989-6162EN; probe heads are necessary to attach to your device properly and probe connectivity kits such as E2668B, E2669A, or E2675A are required.

Inputs and Outputs (continued)

| External mixing, Option EXM | |
|------------------------------------|--|
| Connection port | |
| Connector | SMA, female |
| Impedance | 50 Ω nominal |
| Functions | Triplexed for mixer bias, IF input and LO output |
| Mixer bias range | ± 10 mA in 10 μ A step |
| IF input center frequency | |
| Narrowband IF path | 322.5 MHz |
| 40 MHz BW IF path | 250.0 MHz |
| 85 or 160 MHz BW IF path | 300 MHz |
| LO output frequency range | 3.75 to 14.0 GHz |
| Rear panel | |
| 10 MHz out | |
| Connector | BNC female, 50 Ω nominal |
| Output amplitude | ≥ 0 dBm nominal |
| Frequency | 10 MHz + (10 MHz x frequency reference accuracy) |
| Ext Ref In | |
| Connector | BNC female, 50 Ω nominal |
| Input amplitude range | -5 to 10 dBm nominal |
| Input frequency | 1 to 50 MHz nominal (selectable to 1 Hz resolution) |
| Frequency lock range | $\pm 2 \times 10^{-6}$ of specified external reference input frequency |
| Trigger 1 and 2 inputs | |
| Connector | BNC female |
| Impedance | > 10 k Ω nominal |
| Trigger level range | -5 to +5 V (TTL) factory preset |
| Trigger 1 and 2 outputs | |
| Connector | BNC female |
| Impedance | 50 Ω nominal |
| Level | 0 to 5 V (CMOS) nominal |
| Sync (reserved for future use) | |
| Connector | BNC female |
| Monitor output | |
| Connector | VGA compatible, 15-pin mini D-SUB |
| Format | XGA (60 Hz vertical sync rates, non-interlaced) Analog RGB |
| Resolution | 1024 x 768 |
| Noise source drive +28 V (pulsed) | |
| Connector | BNC female |
| Output voltage | On 28.0 \pm 0.1 V (60 mA maximum) Off < 1 V |
| SNS series noise source | For use with the Keysight SNS Series noise sources |
| Digital bus | |
| Connector | MDR-80 |

Inputs and Outputs (continued)

| Rear panel | |
|---|---|
| Analog out Connector | BNC female |
| USB ports | |
| Host, super speed Standard | 2 ports (stacked with each other) Compatible with USB 3.0 |
| Connector | USB Type-A female |
| Output current | 0.9 A |
| Host Standard | 1 port (stacked with LAN) USB 2.0 |
| Connector | USB Type-A female |
| Output current | 0.5 A |
| Device 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 |
| LAN TCP/IP interface | |
| Standard | 1000Base-T |
| Connector | RJ45 Ethertwist |
| IF output | |
| Connector | SMA female, shared by Opts CR3, CRP, and ALV |
| Impedance | 50 Ω nominal |
| 2nd IF output, Option CR3 | |
| Center frequency | |
| SA mode or I/Q analyzer with IF BW \leq 25 MHz | 322.5 MHz |
| with Option B40 | 250 MHz |
| with Option B85/B1X | 300 MHz |
| Conversion gain | -1 to +4 dB (nominal) plus RF frequency response |
| Bandwidth | |
| Low band | Up to 160 MHz (nominal) |
| High band, with preselector | Depends on center frequency |
| High band, with preselector bypassed ¹ | Up to 700 MHz (nominal); expandable to 900 MHz with corrections |
| Arbitrary IF output, Option CRP | |
| Center frequency | |
| Range | 10 to 75 MHz (user selectable) |
| Resolution | 0.5 MHz |
| Conversion gain | -1 to +4 dB (nominal) plus RF frequency response |
| Bandwidth | |
| Output at 70 MHz | |
| Low band or high band with preselector bypassed | 100 MHz (nominal) |
| Preselected band | Depends on RF center frequency |
| Lower output frequencies | Subject to folding |
| Residual output signals | \leq -88 dBm (nominal) |

1. The maximum bandwidth is not centered around the IF output center frequency.

Other Optional Output

Option ALV Log video out

| General port specifications | | |
|-----------------------------|---|---------------------------|
| Connector | SMA female | Shared with other options |
| Impedance | | 50 Ω nominal |
| Fast log video output | | |
| Output voltage | Open-circuit voltages shown | |
| Maximum | 1.6 V at -10 dBm nominal | |
| Slope | 25 \pm 1 mV/dB nominal | |
| Log fidelity | | |
| Range | 49 dB (nominal) with input frequency at 1 GHz | |
| Accuracy within range | \pm 1.0 dB nominal | |
| Rise time | 15 ns nominal | |
| Fall time | | |
| Bands 1-4 with Option MPB | 40 ns nominal best case | |
| Other cases | Depends on bandwidth | |

Option YAV Y-Axis output

| General port specifications | | |
|--|--|----------------------------|
| Connector | BNC female | Shared with other options |
| Impedance | | 50 Ω nominal |
| Screen video | | |
| Operating conditions | | |
| 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 | \pm 1% of full scale nominal | |
| Gain accuracy | \pm 1% of output voltage nominal | |
| Delay between RF input to analog output | 71.7 μ s +2.56/RBW + 0.159/VBW 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 | 1 V per 192.66 dB | |
| 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 | |

I/Q Analyzer

Frequency

| | |
|-----------------------|------------------|
| Frequency span | |
| Option B25 (standard) | 10 Hz to 25 MHz |
| Option B40 | 10 Hz to 40 MHz |
| Option B85 | 10 Hz to 85 MHz |
| Option B1X | 10 Hz to 160 MHz |

Resolution bandwidth (spectrum measurement)

| | |
|---------------|---|
| Range | |
| Overall | 100 mHz to 3 MHz |
| Span = 1 MHz | 50 Hz to 3 MHz |
| Span = 10 kHz | 1 Hz to 10 kHz |
| Span = 100 Hz | 100 mHz to 100 Hz |
| Window shapes | Flat Top, Uniform, Hanning, Hamming, Gaussian, Blackman, Blackman-Harris, Kaiser Bessel (K-B 70 dB, K-B 90 dB and K-B 110 dB) |

Analysis bandwidth (waveform measurement)

| | |
|-----------------------|------------------|
| Option B25 (standard) | 10 Hz to 25 MHz |
| Option B40 | 10 Hz to 40 MHz |
| Option B85 | 10 Hz to 85 MHz |
| Option B1X | 10 Hz to 160 MHz |

IF frequency response (standard 10 MHz IF path)

IF frequency response (demodulation and FFT response relative to the center frequency)

| Freq (GHz) | Analysis BW (MHz) | Max error | Midwidth error (95th percentile) | Slope (dB/MHz) (95th percentile) | RMS (nominal) |
|-------------|-----------------------------------|-----------|----------------------------------|----------------------------------|---------------|
| ≤ 3.6 | ≤ 10 | ± 0.20 dB | ± 0.12 dB | ± 0.10 dB | 0.02 dB |
| 3.6 to 26.5 | ≤ 10 preselected | | | | 0.23 dB |
| 3.6 to 26.5 | ≤ 10 preselector off ¹ | ± 0.25 dB | ± 0.12 dB | ± 0.10 dB | 0.02 dB |
| 26.5 to 50 | ≤ 10 preselected | | | | 0.12 dB |
| 26.5 to 50 | ≤ 10 preselected off ¹ | ± 0.30 dB | ± 0.12 dB | ± 0.10 dB | 0.024 dB |

1. Option MPB is installed and enabled.

I/Q Analyzer (continued)

| IF phase linearity | | | | |
|--|--|------------------------------|------------------------|------------------------------------|
| Center freq (GHz) | Span (MHz) | Preselector | Peak-to-peak (nominal) | RMS (nominal) |
| ≥ 0.02, < 3.6 | ≤ 10 | NA | 0.06° | 0.012° |
| ≥ 3.6 to ≤ 26.5 | ≤ 10 | Off ¹ | 0.10° | 0.022° |
| ≥ 3.6 | ≤ 10 | On | 0.11° | 0.024° |
| Dynamic range (standard 10 MHz IF path) | | | | |
| Clipping-to-noise dynamic range | Excluding residuals and spurious responses | | | |
| Clipping level at mixer | Center frequency ≥ 20 MHz | | | |
| IF gain = Low | -10 dBm | | -8 dBm nominal | |
| IF gain = High | -20 dBm | | -17.5 dBm nominal | |
| Noise density at mixer at center frequency | (DANL + IF Gain effect) + 2.25 dB | | | |
| Data acquisition (standard 10 MHz IF path) | | | | |
| Time record length | | | | |
| Analysis tool | | | | |
| IQ analyzer | 4,000,000 IQ sample Pairs | | Waveform measurement | |
| Advanced tools | Data packing | | | 89600 VSA software or fast capture |
| | 32-bit | 64-bit | | |
| Length (IQ sample pairs) | 536 MSa (2 ²⁹ Sa) | 268 MSa (2 ²⁸ Sa) | 2 GB total memory | |
| Length (time units) | Samples/Sample rate (IQ pair) | | | |
| Sample rate | | | | |
| IQ pairs | Span x 1.25 | | | |
| ADC resolution | 16 bits | | | |

1. Option MPB is installed and enabled.

I/Q Analyzer (continued)

| IF frequency response (standard 25 MHz IF path) | | | | | |
|---|--|------------------------------|------------------------------------|----------------------------------|---------------|
| IF frequency response (demodulation and FFT response relative to the center frequency) | | | | | |
| Freq (GHz) | Analysis BW (MHz) | Max error | Midwidth error (95th percentile) | Slope (dB/MHz) (95th percentile) | RMS (nominal) |
| < 3.6 | 10 to \leq 25 | \pm 0.30 dB | \pm 0.12 dB | \pm 0.05 dB | 0.02 dB |
| 3.6 to 26.5 | 10 to \leq 25 preselected | | | | 0.50 dB |
| 3.6 to 26.5 | 10 to \leq 25 preselector off ¹ | \pm 0.40 dB | | | 0.03 dB |
| 26.5 to 50 | 10 to \leq 25 preselected | | | | 0.31 dB |
| 26.5 to 50 | 10 to \leq 25 preselector off ¹ | \pm 0.40 dB | | | 0.02 dB |
| IF phase linearity | | | | | |
| Center freq (GHz) | Span (MHz) | Preselector | Peak-to-peak (nominal) | RMS (nominal) | |
| \geq 0.02, < 3.6 | \leq 25 | NA | 0.48° | 0.12° | |
| \geq 3.6 | \leq 25 | Off ¹ | 0.85° | 0.20° | |
| Dynamic range (standard 25 MHz IF path) | | | | | |
| Full scale (ADC clipping) | | | | | |
| Default settings, signal at CF (IF gain = Low) | | | | | |
| Band 0 | -8 dBm mixer level nominal | | | | |
| Bands 1 through 4 | -7 dBm mixer level nominal | | | | |
| High gain setting, signal at CF (IF gain = High) | | | | | |
| Band 0 | -18 dBm mixer level nominal, subject to gain limitations | | | | |
| Bands 1 through 4 | -17 dBm mixer level nominal, subject to gain limitations | | | | |
| Effect of signal frequency \neq CF | Up to \pm 3 dB nominal | | | | |
| Data acquisition (standard 25 MHz IF path) | | | | | |
| Time record length | | | | | |
| Analysis tool | | | | | |
| IQ analyzer | 4,000,000 IQ sample Pairs | | Waveform measurement | | |
| Advanced tools | Data packing | | 89600 VSA software or fast capture | | |
| | 32-bit | 64-bit | | | |
| Length (IQ sample pairs) | 536 MSa (2 ²⁹ Sa) | 268 MSa (2 ²⁸ Sa) | 2 GB total memory | | |
| Length (time units) | Samples/Sample rate (IQ pair) | | | | |
| Sample rate | | | | | |
| IQ pairs | Span x 1.25 | | | | |
| ADC resolution | 16 bits | | | | |

1. Option MPB is installed and enabled.

I/Q Analyzer (continued)

Option B40 40 MHz analysis bandwidth (Option B40 is automatically included in Option B85 or B1X)

| IF frequency response (40 MHz IF path) | | | | | |
|--|------------|------------------|----------|--|---------------|
| IF frequency response (relative to center frequency) | | | | | |
| Center freq. (GHz) | Span (MHz) | Preselector | | Typical | RMS (nominal) |
| ≥ 0.03, < 3.6 | ≤ 40 | NA | ± 0.4 dB | ± 0.25 dB | 0.05 dB |
| ≥ 3.6, ≤ 8.4 | ≤ 40 | Off ¹ | ± 0.4 dB | ± 0.16 dB | 0.05 dB |
| > 8.4, ≤ 26.5 | ≤ 40 | Off ¹ | ± 0.7 dB | ± 0.20 dB | 0.05 dB |
| ≥ 26.5, < 34.4 | ≤ 40 | Off ¹ | ± 0.8 dB | ± 0.25 dB | 0.1 dB |
| ≥ 34.4, < 50 | ≤ 40 | Off ¹ | ± 1.0 dB | ± 0.35 dB | 0.1 dB |
| IF phase linearity (deviation from mean phase linearity) | | | | | |
| Center freq (GHz) | Span (MHz) | Preselector | | Peak-to-peak (nominal) | RMS (nominal) |
| ≥ 0.03, < 3.6 | ≤ 40 | NA | | 0.16° | 0.041° |
| ≥ 3.6 | ≤ 40 | Off ¹ | | 1.5° | 0.35° |
| EVM (EVM measurement floor for an 802.11g OFDM signal, using 89600 VSA software equalization, channel estimation and data EQ) | | | | | |
| 2.4 GHz | | | | -52.0 dB (0.25%) nominal | |
| 5.8 GHz with Option MPB | | | | -49.1 dB (0.35%) nominal | |
| Dynamic range (40 MHz IF path) | | | | | |
| SFDR (Spurious-free dynamic range) | | | | | |
| Signal frequency within ± 12 MHz of center | | | | -80 dBc nominal | |
| Signal frequency anywhere within analysis BW | | | | | |
| Spurious response within ± 18 MHz of center | | | | -79 dBc nominal | |
| Response anywhere within analysis BW | | | | -77 dBc nominal | |
| Full scale (ADC clipping) | | | | | |
| Default settings, signal at CF (IF gain = Low: IF gain offset = 0 dB) | | | | | |
| Band 0 | | | | -8 dBm mixer level nominal | |
| Bands 1 through 4 | | | | -7 dBm mixer level nominal | |
| High gain setting, signal at CF (IF gain = High) | | | | | |
| Band 0 | | | | -18 dBm mixer level nominal, subject to gain limitations | |
| Bands 1 through 4 | | | | -17 dBm mixer level nominal, subject to gain limitations | |
| Effect of signal frequency ≠ CF | | | | Up to ± 3 dB nominal | |

1. Option MPB is installed and enabled.

I/Q Analyzer (continued)

Option B40 40 MHz analysis bandwidth

| Data acquisition (40 MHz IF path) | | | |
|-----------------------------------|-------------------------------|------------------------------|------------------------------------|
| Time record length | | | |
| Analysis tool | | | |
| IQ analyzer | 4,000,000 IQ sample pairs | Waveform measurement | |
| Advanced tools | Data packing | | 89600 VSA software or fast capture |
| | 32-bit | 64-bit | |
| Length (IQ sample pairs) | 536 MSa (2 ²⁹ Sa) | 268 MSa (2 ²⁸ Sa) | 2 GB total memory |
| Length (time units) | Samples/Sample rate (IQ pair) | | |
| Sample rate | | | |
| IQ pairs | Span x 1.25 | | |
| ADC resolution | 12 bits | | |

Option B85 85 MHz or B1X 160 MHz analysis bandwidth

| IF frequency response (85 or 160 MHz IF path) | | | | | |
|---|------------|-----------------------------|-----------|---------------------------|---------------|
| IF frequency response (relative to center frequency) | | | | | |
| Center freq. (GHz) | Span (MHz) | Preselector | | Typical | RMS (nominal) |
| ≥ 0.1, < 3.6 | ≤ 85 | NA | ± 0.6 dB | ± 0.17 dB | 0.05 dB |
| | ≤ 140 | NA | ± 0.6 dB | ± 0.25 dB | 0.05 dB |
| | ≤ 160 | NA | | ± 0.2 dB (nom) | 0.07 dB |
| ≥ 3.6, ≤ 8.4 | ≤ 85 | Off ¹ | ± 0.73 dB | ± 0.2 dB | 0.05 dB |
| | ≤ 140 | Off ¹ | ± 0.8 dB | ± 0.35 dB | 0.05 dB |
| | ≤ 160 | Off ¹ | | ± 0.3 dB (nom) | 0.07 dB |
| > 8.4, ≤ 26.5 | ≤ 85 | Off ¹ | ± 1.10 dB | ± 0.50 dB | 0.1 dB |
| | ≤ 140 | Off ¹ | ± 1.30 dB | ± 0.75 dB | 0.1 dB |
| | ≤ 160 | Off ¹ | | ± 0.5 dB (nom) | 0.12 dB |
| ≥ 26.5, ≤ 50 | ≤ 85 | Off ¹ | ± 1.20 dB | ± 0.45 dB | 0.12 dB |
| | ≤ 140 | Off ¹ | ± 1.40 dB | ± 0.65 dB | 0.12 dB |
| IF phase linearity (deviation from mean phase linearity) | | | | | |
| Center freq (GHz) | Span (MHz) | Preselector | | Peak-to-peak (nominal) | RMS (nominal) |
| ≥ 0.03, < 3.6 | ≤ 140 | NA | | 0.9° | 0.20° |
| | ≥ 3.6, | ≤ 160 | NA | 1.7° | 0.42° |
| ≥ 3.6, | ≤ 140 | Off ¹ | | 1.6° | 0.39° |
| | ≤ 160 | Off ¹ | | 2.8° | 0.64° |
| EVM (EVM measurement floor) Customized settings required, preselector bypassed (Option MPB) above Band 0 | | | | | |
| Case 1: 62.5 Msymbol/s, 16QAM signal, RRC filter alpha of 0.2, non-equalized, with approximately 75 MHz occupied bandwidth | | | | | |
| Band 0, 1.8 GHz | | 0.8% nominal | | | |
| Band 1, 5.95 GHz | | 1.1% nominal | | | |
| Case 2: 104.167 Msymbol/s, 16QAM signal, RRC filter alpha of 0.35, non-equalized, with approximately 140 MHz occupied bandwidth | | | | | |
| Band 1, 5.95 GHz | | 3.0% nominal, (unequalized) | | 0.5% nominal, (equalized) | |
| Band 2, 15.3 GHz | | 2.5% nominal, (unequalized) | | 0.6% nominal, (equalized) | |
| Band 4, 26 GHz | | 3.5% nominal, (unequalized) | | 1.6% nominal, (equalized) | |

1. Option MPB is installed and enabled.

I/Q Analyzer (continued)

Option B85 85 MHz or B1X 160 MHz analysis bandwidth

Dynamic range (85 or 160 MHz IF path)

SFDR (Spurious-free dynamic range)

Signal frequency within ± 12 MHz of center -75 dBc nominal

Signal frequency anywhere within analysis BW

Spurious response within ± 63 MHz of center -74 dBc nominal

Response anywhere within analysis BW -72 dBc nominal

Full scale (ADC clipping)

Default settings, signal at CF

(IF gain = Low: IF gain offset = 0 dB)

Band 0 -8 dBm mixer level nominal

Band 1 through 4 -7 dBm mixer level nominal

High gain setting, signal at CF

(IF gain = High)

Band 0 -18 dBm mixer level nominal, subject to gain limitations

Band 1 through 4 -17 dBm mixer level nominal, subject to gain limitations

Effect of signal frequency \neq CF Up to ± 3 dB nominal

Data acquisition (85 or 160 MHz IF path)

Time record length

Analysis tool

| | | |
|--------------------------|-------------------------------|------------------------|
| IQ analyzer | 4,000,000 IQ sample pairs | Waveform measurement |
| Advanced tools | Data packing | |
| | 32-bit | 64-bit |
| Length (IQ sample pairs) | 536 MSa (2^{29} Sa) | 268 MSa (2^{28} Sa) |
| Length (time units) | Samples/Sample rate (IQ pair) | |
| Sample rate | | |
| IQ pairs | Span x 1.25 | |
| ADC resolution | 14 bits | |

Real-time spectrum analyzer (RTSA) ¹

Option RT1 or RT2

| Real-time analysis | | |
|---|---------------|---|
| Real-time analysis bandwidth | | |
| Option RT1 | Up to 160 MHz | Analysis BW option determines the max real-time bandwidth |
| Option RT2 | Up to 160 MHz | Analysis BW option determines the max real-time bandwidth |
| Minimum detectable signal duration with > 60 dB StM ² ratio | | |
| Option RT1 | 11.42 ns | |
| Option RT2 | 5.0 ns | |
| Minimum signal duration with 100% probability of intercept (POI) at full amplitude accuracy | | For Frequency Mask Triggering (FMT) |
| Option RT1 | 17.3 μs | Signal is at mask level |
| Option RT2 | 3.57 μs | Signal is at mask level |
| Minimum acquisition time | 100 μs | |
| FFT rate | 292,969/s | |

Option RTS

| Real-time I/Q data streaming ³ | | |
|--|--|----------------|
| Output stream resolution | 16-bit I + jQ | |
| IQ streaming bandwidth | 160 MHz | |
| Electrical interface | LVDS | |
| Sample rate | Varies continuously based on RTSA span setting | |
| Max IQ streaming bandwidth and sample rate | | |
| B1X | 160 MHz | 200 Msamples/s |
| Supported data recorder | X-COM Systems IQC5160B | |
| Capture time | < 3 hours at 160 MHz bandwidth | |
| Data tagging | Event markers, IRIG-B GPS | |

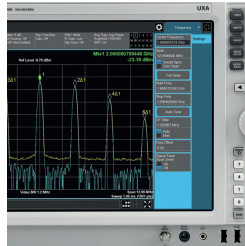
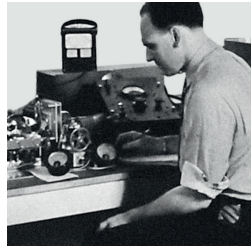
1. For additional RTSA specifications, please refer to Option RT1/RT2 Chapter in the PXA Signal Analyzer specifications guide
2. StM = "Signal-to-Mask"
3. Use with X-COM Systems IQC5160B data recorder to capture rare events and play back at RF using integrated control software on the PXA.

Related Literature

| Keysight PXA signal analyzers | |
|-------------------------------|-------------|
| Brochure | 5992-1316EN |
| Configuration guide | 5992-1318EN |

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