

Keysight Technologies

M9290A CXA-m

PXIe X-Series Signal Analyzer

10 Hz to 3.0, 7.5, 13.6 or 26.5 GHz

Data Sheet



Unlocking Measurement Insights

# Table of Contents

|   |    |
|---|----|
| Technical Specifications .....                    | 3  |
| Definitions and conditions.....                   | 3  |
| Recommended best practices in use .....           | 3  |
| Frequency and Time Specifications.....            | 4  |
| Amplitude Accuracy and Range Specifications ..... | 6  |
| Dynamic Range Specifications .....                | 9  |
| PowerSuite Measurement Specifications.....        | 12 |
| Tracking Generator Specifications .....           | 13 |
| General Specifications .....                      | 14 |
| Inputs and Outputs.....                           | 14 |
| I/Q Analyzer .....                                | 15 |
| System Requirements .....                         | 15 |
| Software .....                                    | 16 |
| Related Literature.....                           | 17 |

## Deploy a smaller microwave footprint

In test system development, one of your crucial requirements is doing more in less space—but this often means tradeoffs between footprint and precision in signal analysis. That is, until now: we've expanded the Keysight X-Series with the CXA-m, a PXIe signal analyzer that offers fully specified performance up to 26.5 GHz. It lets you handle RF and microwave signals in four slots, and you can leverage your existing code. Choose the CXA-m and deploy a smaller microwave footprint.

## Technical Specifications

### Definitions and conditions

**Temperatures** referred to in this document are defined as follows:

- Full temperature range = Individual module temperature of 5 to 68 °C, as reported by the module, and environment temperature of 0 to 55 °C.
- Controlled temperature range = Individual module temperature of 25 to 40 °C, as reported by the module, and environment temperature of 20 to 30 °C.

**Specifications** describe the warranted performance of calibrated instruments. Data represented in this document are specifications under the following conditions unless otherwise noted.

- It is within its calibration cycle
- Under auto couple control, except when Auto Sweep Time Rules = Accy
- 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

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

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

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

### Recommended best practices in use

- Use slot blockers and EMC filler panels in empty module slots to ensure proper operating temperatures. Keysight chassis and slot blockers optimize module temperature performance and reliability of test.
- Set chassis fan to high at environmental temperatures above 45°C.

### Get more information

This CXA-m PXIe X-Series signal analyzer data sheet is a summary of the complete specifications and conditions available in the CXA-m PXIe Signal Analyzer Specification Guide. The CXA-m PXIe Signal Analyzer Specification Guide can be obtained on the web at:

[www.keysight.com/find/cxa-m\\_manuals](http://www.keysight.com/find/cxa-m_manuals)

For ordering information, refer to the CXA-m PXIe Signal Analyzer Configuration Guide (5992-0193EN).

## Frequency and Time Specifications

| Frequency range   | DC coupled  | AC coupled                                |
|---|---|---|
| Option F03  | 10 Hz to 3.0 GHz  | 10 MHz to 3.0 GHz                         |
| Option F07  | 10 Hz to 7.5 GHz  | 10 MHz to 7.5 GHz                         |
| Option F13  | 10 Hz to 13.6 GHz   | 10 MHz to 13.6 GHz                        |
| Option F26  | 10 Hz to 26.5 GHz   | 10 MHz to 26.5 GHz                        |
| Band  | LO multiple (N)   |   |
| 0   | 1   | 10 Hz to 3.08 GHz                         |
| 1   | 2   | 2.95 to 7.575 GHz                         |
| 2   | 2   | 7.45 to 9.55 GHz                          |
| 3   | 2   | 9.45 to 12.60 GHz                         |
| 4   | 2   | 12.50 to 13.05 GHz                        |
| 4   | 4   | 12.95 to 13.80 GHz                        |
| 5   | 4   | 13.40 to 15.55 GHz                        |
| 6   | 4   | 15.45 to 19.35 GHz                        |
| 7   | 4   | 19.25 to 21.05 GHz                        |
| 8   | 4   | 20.95 to 22.85 GHz                        |
| 9   | 4   | 22.75 to 24.25 GHz                        |
| 10  | 4   | 24.15 to 26.55 GHz                        |
| Frequency reference   |   |   |
| Accuracy  | ± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]                |   |
| Aging rate  | Option PFR<br>± 1 x 10 <sup>-7</sup> / year<br>± 1.5 x 10 <sup>-7</sup> / 2 years                           | Standard<br>± 1 x 10 <sup>-6</sup> / year |
| Temperature stability<br>20 to 30 °C  | Option PFR<br>± 1.5 x 10 <sup>-8</sup>  | Standard<br>± 2 x 10 <sup>-6</sup>        |
| Full temperature range  | ± 5 x 10 <sup>-8</sup>  | ± 2 x 10 <sup>-6</sup>                    |
| Achievable initial calibration accuracy   | Option PFR<br>± 4 x 10 <sup>-8</sup>  | Standard<br>± 1.4 x 10 <sup>-6</sup>      |
| Example frequency reference accuracy<br>(with Option PFR)<br>1 year after last adjustment   | = ± (1 x 1 x 10 <sup>-7</sup> + 5 x 10 <sup>-8</sup> + 4 x 10 <sup>-8</sup> )<br>= ± 1.9 x 10 <sup>-7</sup> |   |
| Residual FM   |   |   |
| Option PFR  | ≤ 0.25 Hz p-p in 20 ms nominal  |   |
| Standard  | ≤ 10 Hz p-p in 20 ms nominal  |   |
| Frequency readout accuracy (start, stop, center, marker)  |   |   |
| ± (marker frequency x frequency reference accuracy + 0.25 % x span + 5 % x RBW + 2 Hz + 0.5 x horizontal resolution <sup>1)</sup> ) |   |   |
| Marker frequency counter  |   |   |
| Accuracy  | ± (marker frequency x frequency reference accuracy + 0.100 Hz)  |   |
| Delta counter accuracy  | ± (delta frequency x frequency reference accuracy + 0.141 Hz)   |   |
| Counter resolution  | 0.001 Hz  |   |
| Frequency span (FFT and swept mode)   |   |   |
| Range   | 0 Hz (zero span), 10 Hz to maximum frequency of instrument  |   |
| Resolution  | 2 Hz  |   |
| Accuracy  |   |   |
| Swept   | ± (0.25 % x span + horizontal resolution)   |   |
| FFT   | ± (0.10 % x span + horizontal resolution)   |   |

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

## Frequency and Time Specifications (Continued)

| <b>Sweep time and triggering</b>          |  |                                       |
|---|--|---------------------------------------|
| 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  | $\pm$ 1 % nominal                     |
| Trigger                                   | Free run, video, external, RF burst, periodic timer                        |                                       |
| Trigger delay                             | Span = 0 Hz or FFT   | -150 to +500 ms                       |
|   | Span $\geq$ 10 Hz, swept   | 1 $\mu$ s 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)   | 100.0 ns 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                                 | 1 to 40001   |                                       |
| <b>Resolution bandwidth (RBW)</b>         |  |                                       |
| Range (-3.01 dB bandwidth)                | 1 Hz to 3 MHz (10 % steps), 4, 5, 6, 8 MHz                                 |                                       |
| Bandwidth accuracy (power)                | 1 Hz to 750 kHz  | $\pm$ 1.0 % ( $\pm$ 0.044 dB) nominal |
|   | 820 kHz to 1.2 MHz   | $\pm$ 2.0 % ( $\pm$ 0.088 dB) nominal |
|   | 1.3 to 2.0 MHz   | $\pm$ 0.13 dB nominal                 |
|   | 2.2 to 3 MHz   | $\pm$ 0.22 dB nominal                 |
|   | 4 to 8 MHz   | $\pm$ 0.32 dB nominal                 |
| Bandwidth accuracy (-3.01 dB)             | 1 Hz to 1.3 MHz  | $\pm$ 2 % nominal                     |
| <b>RBW range</b>                          |  |                                       |
| Selectivity (-60 dB/-3 dB)                | 4.1:1 nominal  |                                       |
| EMI bandwidth (CISPR compliant)           | 200 Hz, 9 kHz, 120 kHz, 1 MHz  | (Option EMC)                          |
| EMI bandwidth (MIL STD 461E compliant)    | 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz                               | (Option EMC)                          |
| <b>Analysis bandwidth <sup>1</sup></b>    |  |                                       |
| Maximum bandwidth                         | Option B25   | 25 MHz                                |
|   | Standard   | 10 MHz                                |
| <b>Video bandwidth (VBW)</b>              |  |                                       |
| Range                                     | 1 Hz to 3 MHz (10 % steps), 4, 5, 6, 8 MHz, and wide open (labeled 50 MHz) |                                       |
| Accuracy                                  | $\pm$ 6 % nominal  |                                       |
| <b>Measurement speed <sup>2</sup></b>     |  |                                       |
| Local measurement and display update rate | 11 ms (90/s) nominal   |                                       |
| Remote measurement and LAN transfer rate  | 6 ms (167/s) nominal   |                                       |
| Marker peak search                        | 5 ms nominal   |                                       |
| Center frequency tune and transfer        | 22 ms nominal  |                                       |
| Measurement/mode switching                | 75 ms nominal  |                                       |

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

2. Sweep points = 101.

## Amplitude Accuracy and Range Specifications

| <b>Amplitude range</b>  |  |  |
|---|--|--|
| <b>Measurement range</b>  |  |  |
|   | Preamp off   | Displayed average noise level (DANL) to +30 dBm                                |
|   | Preamp on  | Displayed average noise level (DANL) to +23 dBm                                |
| <b>Input attenuator range</b>   |  |  |
| Standard  | 0 to 70 dB in 10 dB steps                                |  |
| Option FSA  | 0 to 70 dB in 2 dB steps, 7.5 GHz                        |  |
|   | 0 to 70 dB in 10 dB steps, 7.5 to 26.5 GHz               |  |
| <b>Maximum safe input level</b>   |  |  |
| <b>Average total power</b>  |  |  |
|   | +30 dBm (1 W)  | Input attenuation $\geq$ 10 dB, preamp off                                     |
|   | +30 dBm (1 W)  | Input attenuation $\geq$ 20 dB, preamp on                                      |
| <b>Peak pulse power</b>   |  |  |
|   | +50 dBm (100 W)  | < 10 $\mu$ s pulse width, < 1 % duty cycle, and input attenuation $\geq$ 30 dB |
| <b>DC volts</b>   |  |  |
| AC coupled  | $\pm$ 50 Vdc   |  |
| 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 divisions) |  |
| Linear scale  | 10 divisions   |  |
| Scale units   | dBm, dBmV, dB $\mu$ V, dBmA, dB $\mu$ A, V, W, A         |  |
| <b>Frequency response</b>   | <b>Specification</b>                                     | <b>95th percentile (<math>\approx</math> 2<math>\sigma</math>)</b>             |
| <b>(10 dB input attenuation, 20 to 30 °C, <math>\sigma</math> = nominal standard deviation)</b> |  |  |
|   | 9 kHz to 10 MHz  | $\pm$ 0.50 dB  |
|   | 10 MHz to 3 GHz  | $\pm$ 0.65 dB  |
|   | 3 to 13.6 GHz  | $\pm$ 1.30 dB  |
|   | 13.6 to 19.3 GHz   | $\pm$ 1.50 dB  |
|   | 19.3 to 24.2 GHz   | $\pm$ 2.20 dB  |
|   | 24.2 to 26.5 GHz   | $\pm$ 2.50 dB  |
| <b>Preamp on (Option P03, P07, P13, P26)</b>  |  |  |
|   | 100 kHz to 10 MHz  | $\pm$ 0.5 dB   |
|   | 10 MHz to 3 GHz  | $\pm$ 1.0 dB   |
|   | 3 to 7.5 GHz   | $\pm$ 1.2 dB   |
|   | 7.5 to 13.6 GHz  | $\pm$ 1.0 dB   |
|   | 13.6 to 21 GHz   | $\pm$ 1.2 dB   |
|   | 21 to 24.2 GHz   | $\pm$ 1.8 dB   |
|   | 24.2 to 26.5 GHz   | $\pm$ 2.4 dB   |
| <b>Input attenuation switching uncertainty</b>  | <b>Specifications</b>                                    | <b>Additional information</b>  |
| Attenuation > 2 dB, preamp off  | 50 MHz (reference frequency)                             | $\pm$ 0.15 dB typical  |
| Relative to 10 dB   | 100 kHz to 3.0 GHz                                       | $\pm$ 0.30 dB nominal  |
| (reference setting)   | 3.0 to 7.5 GHz   | $\pm$ 0.50 dB nominal  |
|   | 7.5 to 26.5 GHz  | $\pm$ 0.70 dB nominal  |

## Amplitude Accuracy and Range Specifications (Continued)

| <b>Total absolute amplitude accuracy</b>  |  |                               |
|---|--|-------------------------------|
| <b>(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, <math>\sigma</math> = nominal standard deviation)</b> |  |                               |
| At 50 MHz   | ± 0.40 dB  |                               |
| At all frequencies  | ± (0.40 dB + frequency response)                   |                               |
| 100 kHz to 3 GHz  | ± 0.60 dB (95th Percentile ≈ 2 $\sigma$ )          |                               |
| Preamp on (Option P03/P07/P13/P26)  | ± (0.36 dB + frequency response) (95th percentile) |                               |
| <b>Precision amplitude accuracy (Option PAA)</b>  |  |                               |
| <b>Preamp off (10 dB attenuation)</b>   | <b>Specification</b>                               | <b>Additional information</b> |
| 9 kHz to 10 MHz   | ± 0.70 dB  | ± 0.31 dB typical             |
| 10 MHz to 3 GHz   | ± 0.85 dB  | ± 0.40 dB typical             |
| 3 to 7.5 GHz  | ± 0.95 dB  | ± 0.44 dB typical             |
| 7.5 to 9.55 GHz   | ± 0.90 dB  | ± 0.38 dB typical             |
| 9.55 to 12.55 GHz   | ± 0.95 dB  | ± 0.44 dB typical             |
| 12.55 to 13.6 GHz   | ± 0.90 dB  | ± 0.32 dB typical             |
| 13.6 to 15.55 GHz   | ± 0.95 dB  | ± 0.35 dB typical             |
| 15.55 to 22.8 GHz   | ± 1.10 dB  | ± 0.50 dB typical             |
| 22.8 to 24.2 GHz  | ± 1.20 dB  | ± 0.50 dB typical             |
| 24.2 to 26.5 GHz  | ± 1.30 dB  | ± 0.57 dB typical             |
| <b>Preamp on (0 dB attenuation)</b>   |  |                               |
| 100 kHz to 10 MHz   |  | ± 0.30 dB typical             |
| 10 MHz to 3 GHz   |  | ± 0.65 dB typical             |
| 3 to 7.5 GHz  |  | ± 0.73 dB typical             |
| 7.5 to 9.55 GHz   |  | ± 0.49 dB typical             |
| 9.55 to 12.55 GHz   |  | ± 0.71 dB typical             |
| 12.55 to 19.3 GHz   |  | ± 0.65 dB typical             |
| 19.3 to 21 GHz  |  | ± 0.80 dB typical             |
| 21 to 22.8 GHz  |  | ± 1.20 dB typical             |
| 22.8 to 24.2 GHz  |  | ± 1.39 dB typical             |
| 24.2 to 26.5 GHz  |  | ± 1.66 dB typical             |
| <b>Input voltage standing wave ratio (VSWR) (≥ 10 dB attenuation)</b>   |  |                               |
| 10 MHz to 3 GHz   | < 1.2 nominal                                      |                               |
| 3 to 7.5 GHz  | < 1.4 nominal                                      |                               |
| 7.5 to 13.6 GHz   | < 1.6 nominal                                      |                               |
| 13.6 to 24.2 GHz  | < 1.8 nominal                                      |                               |
| 24.2 to 26.5 GHz  | < 2.2 nominal                                      |                               |
| <b>Resolution bandwidth switching uncertainty (referenced to 30 kHz RBW)</b>  |  |                               |
| 1 Hz to 3 MHz RBW   | ± 0.15 dB  |                               |
| 4, 5, 6, 8 MHz RBW  | ± 1.0 dB   |                               |
| <b>Reference level</b>  |  |                               |
| Range   |  |                               |
| Log scale   | -170 to +23 dBm in 0.01 dB steps                   |                               |
| Linear scale  | Same as log (707 pV to 3.16 V)                     |                               |
| Accuracy  | 0 dB   |                               |
| <b>Display scale switching uncertainty</b>  |  |                               |
| Switching between linear and log  | 0 dB   |                               |
| Log scale/div switching   | 0 dB   |                               |

## Amplitude Accuracy and Range Specifications (Continued)

### Display scale fidelity

-80 dBm ≤ input mixer level < -10 dBm      ± 0.15 dB total

### Trace detectors

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

### Preamplifier (Option P03/P07/P13/P26)

|                 |                     |                          |
|-----------------|---------------------|--------------------------|
| Frequency range | Option P03          | 100 kHz to 3.0 GHz       |
|                 | Option P07          | 100 kHz to 7.5 GHz       |
|                 | Option P13          | 100 kHz to 13.6 GHz      |
|                 | Option P26          | 100 kHz to 26.5 GHz      |
| Gain            | 100 kHz to 26.5 GHz | +20 dB nominal           |
| Noise figure    | 10 MHz to 3 GHz     | 10 dB nominal            |
|                 | 3 to 26.5 GHz       | DANL + 176.24 dB nominal |



## Dynamic Range Specifications

| 1 dB gain compression (two-tone) |                   |                            |
|----------------------------------|-------------------|----------------------------|
|                                  |                   | Total power at input mixer |
| Preamp off                       | 10 MHz to 7.5 GHz | +6 dBm nominal             |
|                                  | 7.5 to 26.5 GHz   | +4 dBm nominal             |
| Preamp on                        | 10 MHz to 7.5 GHz | -15 dBm nominal            |
|                                  | 7.5 to 26.5 GHz   | -19 dBm nominal            |

| Displayed average noise level (DANL)  |                  |                  |
|---|------------------|------------------|
| (Input terminated, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 20 to 30 °C) |                  |                  |
| Parentheses indicate typical performance  |                  |                  |
|   | Preamplifier OFF | Preamplifier ON  |
| 10 Hz   | -95 dBm nominal  |                  |
| 100 Hz  | -110 dBm nominal |                  |
| 1 kHz   | -115 dBm nominal |                  |
| 9 kHz to 1 MHz  | (-125) dBm       |                  |
| 1 to 10 MHz   | -144, (-148) dBm | -154, (-158) dBm |
| 10 MHz to 1.5 GHz   | -148, (-150) dBm | -160, (-163) dBm |
| 1.5 to 4.5 GHz  | -146, (-149) dBm | -160, (-163) dBm |
| 4.5 to 7 GHz  | -141, (-145) dBm | -157, (-161) dBm |
| 7 to 9.5 GHz  | -144, (-147) dBm | -158, (-160) dBm |
| 9.5 to 13 GHz   | -136, (-140) dBm | -156, (-160) dBm |
| 13 to 14.5 GHz  | -142, (-145) dBm | -158, (-161) dBm |
| 14.5 to 19.3 GHz  | -132, (-138) dBm | -153, (-157) dBm |
| 19.3 to 23 GHz  | -134, (-139) dBm | -152, (-157) dBm |
| 23 to 24 GHz  | -132, (-137) dBm | -150, (-155) dBm |
| 24 to 26.5 GHz  | -128, (-133) dBm | -144, (-149) dBm |

| Spurious responses                      |                                       |                  |
|---|---------------------------------------|------------------|
| Residual response                       | 200 kHz to 26.5 GHz (swept)           | -90 dBm          |
| (Input terminated and 0 dB attenuation) | Zero span or FFT or other frequencies | -100 dBm nominal |

|                                | Tuned frequency (f)  | Excitation Freq | Mixer level | Response                  |
|--------------------------------|----------------------|-----------------|-------------|---------------------------|
| Image responses (Second mixer) | 10 MHz to 7.5 GHz    | f + 1645 MHz    | -10 dBm     | -70 dBc (-80 dBc typical) |
|                                | 7.5 GHz to 19.3 GHz  | f - 1645 MHz    | -10 dBm     | -70 dBc (-80 dBc typical) |
|                                | 19.3 GHz to 21 GHz   | f + 1645 MHz    | -10 dBm     | -70 dBc (-80 dBc typical) |
|                                | 21 GHz to 22.8 GHz   | f - 1645 MHz    | -10 dBm     | -70 dBc (-80 dBc typical) |
|                                | 22.8 GHz to 24.2 GHz | f + 1645 MHz    | -10 dBm     | -70 dBc (-80 dBc typical) |
|                                | 24.2 GHz to 26.5 GHz | f - 1645 MHz    | -10 dBm     | -70 dBc (-80 dBc typical) |
| LO-related spurious            | 10 MHz to 26.5 GHz   |                 | -10 dBm     | -64 dBc typical           |

| Other spurious responses                 |             |                           |
|--|-------------|---------------------------|
|  | Mixer level | Response                  |
| IF feedthrough                           | -10 dBm     | -75 dBc (-80 dBc typical) |
| First RF order (f ≥ 10 MHz from carrier) | -10 dBm     | -70 dBc (-80 dBc nominal) |
| High RF order (f ≥ 10 MHz from carrier)  | -30 dBm     | -70 dBc (-80 dBc nominal) |

| Second harmonic distortion (SHI) |               |
|----------------------------------|---------------|
| Source frequency                 | SHI (nominal) |
| 10 MHz to 3.75 GHz               | +50 dBm       |
| 3.75 to 13.25 GHz                | +62 dBm       |

## Dynamic Range Specifications (Continued)

| Third-order intermodulation distortion (TOI) |  |                    |                    |
|--|--|--------------------|--------------------|
| Parentheses indicate typical performance     |  |                    |                    |
|  | Preamp off<br>(Two -20 dBm tones at input mixer spaced by 100 kHz, 0 dB attenuation, 20 to 30 °C)      | 10 MHz to 2 GHz    | +12 dBm, (+16) dBm |
|  |  | 2 to 3 GHz         | +12 dBm, (+17) dBm |
|  |  | 3 to 7.5 GHz       | +12 dBm, (+16) dBm |
|  |  | 7.5 to 13.6 GHz    | +11 dBm, (+15) dBm |
|  |  | 13.6 to 26.5 GHz   | +10 dBm, (+14) dBm |
| Option P03/P07/P13/P26                       | Preamp on<br>(Two -45 dBm tones at the preamp input, spaced by 100 kHz, 0 dB attenuation, 20 to 30 °C) | 10 MHz to 26.5 GHz | -8 dBm nominal     |

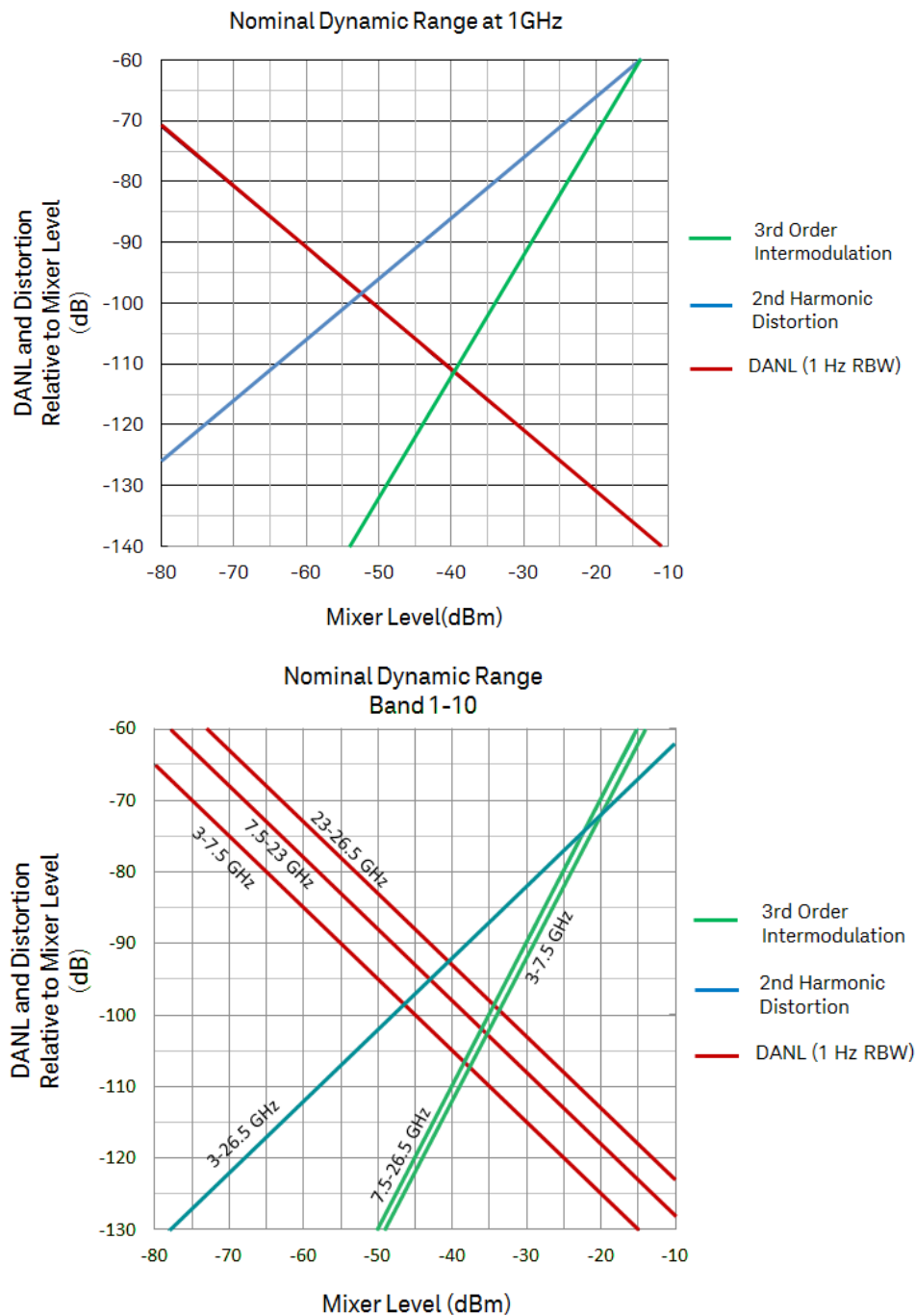


Figure 1. Nominal dynamic range for Band 0, for second and third order distortion, 10 MHz to 3 GHz

Figure 2. Nominal dynamic range, for second and third order distortion, 3 GHz to 26.5 GHz

## Dynamic Range Specifications (Continued)

| Phase noise                                      | Offset  | Specification | Typical             |
|--|---------|---------------|---------------------|
| <b>Noise sidebands (20 to 30 °C, CF = 1 GHz)</b> |         |               |                     |
|  | 100 Hz  |               | -90 dBc/Hz nominal  |
|  | 1 kHz   | -102 dBc/Hz   | -105 dBc/Hz         |
|  | 10 kHz  | -106 dBc/Hz   | -110 dBc/Hz         |
|  | 100 kHz | -108 dBc/Hz   | -110 dBc/Hz         |
|  | 1 MHz   | -130 dBc/Hz   | -132 dBc/Hz         |
|  | 10 MHz  |               | -145 dBc/Hz nominal |

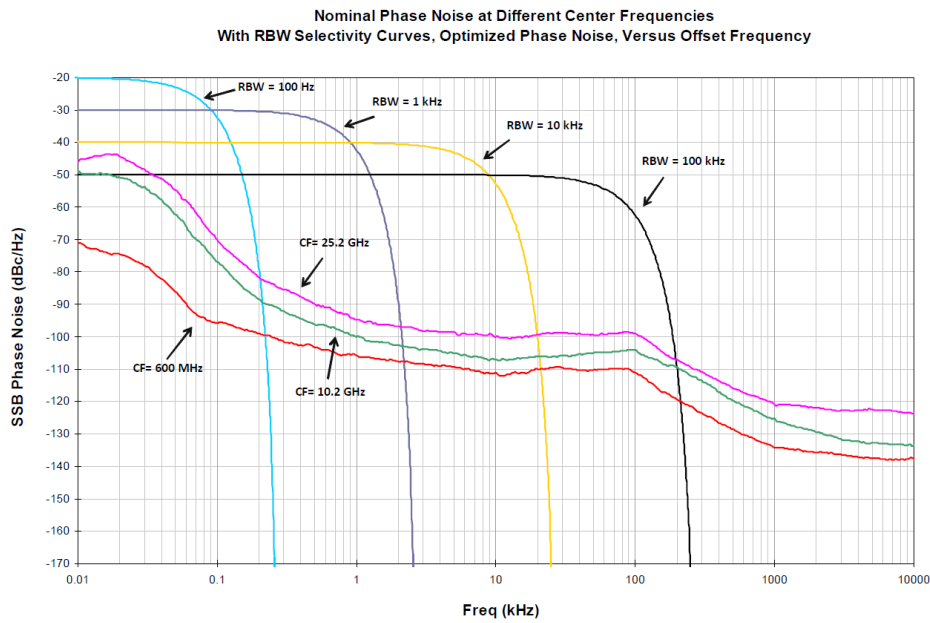


Figure 3. Nominal phase noise at different center frequencies

## PowerSuite Measurement Specifications

| <b>Channel power</b>  |   |                      |
|---|---|----------------------|
| Amplitude accuracy, W-CDMA or IS95<br>(20 to 30 °C, attenuation = 10 dB)          | ± 1.23 dB (± 0.62 dB 95th percentile)   |                      |
| <b>Occupied bandwidth</b>   |   |                      |
| Frequency accuracy  | ± [span/1000] nominal   |                      |
| <b>Adjacent channel power</b>   |   |                      |
| Accuracy, W-CDMA (ACLR)<br>(at specific mixer levels and ACLR ranges)             | Adjacent  | Alternate            |
| MS  | ± 0.21 dB   | ± 0.25 dB            |
| BTS   | ± 0.89 dB   | ± 0.67 dB            |
| <b>Dynamic range (typical)</b>  |   |                      |
|   | Without noise correction  | -68 dB               |
|   | With noise correction   | -73 dB               |
| Offset channel pairs measured   | 1 to 6  |                      |
| Multiple number of carriers measured  | Up to 12  |                      |
| <b>Power statistics CCDF</b>  |   |                      |
| Histogram resolution  | 0.01 dB   |                      |
| <b>Harmonic distortion</b>  |   |                      |
| Maximum harmonic number   | 10th  |                      |
| Results   | Fundamental power (dBm), relative harmonics power (dBc), total harmonic distortion in %                 |                      |
| <b>Intermod (TOI)</b>   |   |                      |
| Measure the third-order products and intercepts from two tones                    |   |                      |
| <b>Burst power</b>  |   |                      |
| Methods   | Power above threshold, power within burst width   |                      |
| Results   | Single burst output power, average output power, maximum power, minimum power within burst, burst width |                      |
| <b>Spurious emission</b>  |   |                      |
| <b>W-CDMA (1 to 3.0 GHz) table-driven spurious signals; search across regions</b> |   |                      |
| Dynamic range   | 75.0 dB   | (79.1 dB typical)    |
| Absolute sensitivity  | -82.5 dBm   | (-86.5 dBm typical)  |
| <b>Spectrum emission mask (SEM)</b>   |   |                      |
| <b>cdma2000® (750 kHz offset)</b>   |   |                      |
| Relative dynamic range (30 kHz RBW)   | 73.0 dB   | (78.1 dB typical)    |
| Absolute sensitivity  | -99.7 dBm   | (-102.7 dBm typical) |
| Relative accuracy   | ± 0.11 dB   |                      |
| <b>3GPP W-CDMA (2.515 MHz offset)</b>   |   |                      |
| Relative dynamic range (30 kHz RBW)   | 77.5 dB   | (82.4 dB typical)    |
| Absolute sensitivity  | -97.7 dBm   | (-101.7 dBm typical) |
| Relative accuracy   | ± 0.15 dB   |                      |

## Tracking Generator Specifications

| Output frequency                                |  |                  |
|---|--|------------------|
| Frequency range                                 |  |                  |
| Option T03                                      | 2 MHz to 3 GHz                           |                  |
| Option T07                                      | 2 MHz to 7.5 GHz                         |                  |
| Option T13                                      | 2 MHz to 13.6 GHz                        |                  |
| Option T26                                      | 2 MHz to 26.5 GHz                        |                  |
| Resolution                                      | 10 Hz                                    |                  |
| Output power level                              |  |                  |
| Range   |  |                  |
| 2 MHz to 10 GHz                                 | -35 to 0 dBm                             |                  |
| 10 to 20 GHz                                    | -35 to -5 dBm                            |                  |
| 20 to 26.5 GHz                                  | -40 to -12 dBm                           |                  |
| Resolution                                      | 0.1 dB                                   |                  |
| Absolute accuracy (at 50 MHz, -15 dBm)          | ± 1.0 dB typical                         | ± 0.3 dB nominal |
| Output flatness (Referenced to 50 MHz, -15 dBm) | 95th percentile ( $\approx 2\sigma$ )    |                  |
| 2 MHz to 7.5 GHz                                | ± 1.0 dB                                 | ± 0.3 dB         |
| 7.5 to 13.6 GHz                                 | ± 1.2 dB                                 | ± 0.3 dB         |
| 13.6 to 23 GHz                                  | ± 1.8 dB                                 | ± 0.6 dB         |
| 23 to 26 GHz                                    | ± 2.5 dB                                 | ± 1.2 dB         |
| 26 to 26.5 GHz                                  |  | ± 2.3 dB         |
| Level accuracy                                  |  | Nominal          |
| 2 MHz to 7.5 GHz                                |  | ± 0.8 dB         |
| 7.5 to 13.6 GHz                                 |  | ± 0.9 dB         |
| 13.6 to 23GHz                                   |  | ± 1.5 dB         |
| 23 to 26 GHz                                    |  | ± 1.8 dB         |
| 26 to 26.5GHz                                   |  | ± 2.9 dB         |
| Output power sweep                              |  |                  |
| Range   |  |                  |
| 2 MHz to 10 GHz                                 | -35 to 0 dBm                             |                  |
| 10 to 20 GHz                                    | -35 to -5 dBm                            |                  |
| 20 to 26.5 GHz                                  | -40 to -12 dBm                           |                  |
| Resolution                                      | 0.1 dB                                   |                  |
| Maximum safe reverse level                      |  |                  |
| Average total power                             | + 30 dBm (1 W)                           |                  |
| AC coupled                                      | ± 50 Vdc                                 |                  |
| Phase noise                                     |  |                  |
| Noise sidebands (Center Frequency = 1 GHz)      | Offset                                   | Typical          |
|   | 10 kHz                                   | -100 dBc/Hz      |
|   | 100 kHz                                  | -108 dBc/Hz      |
|   | 1 MHz                                    | -122 dBc/Hz      |
| Dynamic range                                   |  |                  |
|   | Maximum output power – displayed average | 110 dBc nominal  |
| Output VSWR                                     |  |                  |
| 2 MHz to 7 GHz                                  |  | < 1.7:1 nominal  |
| 7 to 23 GHz                                     |  | < 2.5:1 nominal  |
| 23 to 26.5 GHz                                  |  | < 3.5:1 nominal  |

## General Specifications

|  |                  |
|--|------------------|
| <b>Temperature range</b>   |                  |
| Operating  | 0 to 55 °C       |
| Storage  | -40 to 70 °C     |
| <b>EMC</b>   |                  |
| Complies with European EMC Directive 2004/108/EC   |                  |
| – 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 à la norme NMB-001 du Canada   |                  |
| <b>Environmental stress</b>  |                  |
| 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. |                  |
| <b>Power requirement</b>   |                  |
| Power drawn from chassis   | ≤ 65 W           |
| <b>Weight</b>  |                  |
| Net  | 1.9 kg (4.2 lbs) |
| Shipping   | 4.2 kg (9.3 lbs) |
| <b>Dimensions</b>  |                  |
| Height   | 132 mm (5.2 in)  |
| Width  | 82 mm (3.2 in)   |
| Length   | 202 mm (8.0 in)  |
| <b>Warranty</b>  |                  |
| The CXA-m PXIe signal analyzer is supplied with a three-year warranty  |                  |
| <b>Calibration cycle</b>   |                  |
| The recommended calibration cycle is one year; calibration services are available through Keysight service centers   |                  |

## Inputs and Outputs

|  |                            |
|--|----------------------------|
| <b>RF input</b>  |                            |
| Connector  | 3.5mm female, 50 Ω nominal |
| <b>RF output</b>                                       |                            |
| Connector  | 3.5mm female, 50 Ω nominal |
| <b>10 MHz in</b>                                       |                            |
| Connector  | SMB male, 50 Ω nominal     |
| <b>10 MHz out</b>                                      |                            |
| Connector  | SMB male, 50 Ω nominal     |
| <b>Trigger in</b>                                      |                            |
| Connector  | SMB male, 10 kΩ nominal    |
| <b>Trigger out</b>                                     |                            |
| Connector  | SMB male, 50 Ω nominal     |
| <b>Analog out</b>                                      |                            |
| Connector  | SMB male, 50 Ω nominal     |
| <b>Noise source</b>                                    |                            |
| For use with Keysight 346 and SNS series noise sources |                            |


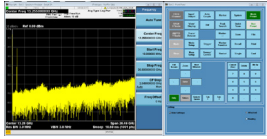




## I/Q Analyzer

| <b>Frequency</b>   |                           |               |               |
|--|---------------------------|---------------|---------------|
| <b>Frequency span</b>  |                           |               |               |
| Standard instrument  | 10 Hz to 10 MHz           |               |               |
| Option B25   | 10 Hz to 25 MHz           |               |               |
| <b>Resolution bandwidth (spectrum measurement)</b>   |                           |               |               |
| <b>Range</b>   |                           |               |               |
| Overall  | 100 MHz to 3 MHz          |               |               |
| Span = 1 MHz   | 50 Hz to 1 MHz            |               |               |
| Span = 10 kHz  | 1 Hz to 10 kHz            |               |               |
| Span = 100 Hz  | 100 MHz to 100 Hz         |               |               |
| <b>Window shapes</b>   |                           |               |               |
| Flat top, Uniform, Hanning, Gaussian, Blackman, Blackman-Harris, Kaiser Bessel (K-B 70 dB, K-B 90 dB and K-B 110 dB) |                           |               |               |
| <b>Analysis bandwidth</b>  |                           |               |               |
| Standard instrument  | 10 Hz to 10 MHz           |               |               |
| Option B25   | 10 Hz to 25 MHz           |               |               |
| <b>IF frequency response (standard 10 MHz IF path)</b>   |                           |               |               |
| <b>IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30 °C)</b>           |                           |               |               |
| Center frequency (GHz)   | Span (MHz)                | Max. error    | RMS (nominal) |
| $\leq 3.0$   | $\leq 10$                 | $\pm 0.40$ dB | 0.03 dB       |
| $3.0 < f \leq 26.5$  | $\leq 10$                 |               | 0.10 dB       |
| <b>IF phase linearity (deviation from mean phase linearity, nominal)</b>   |                           |               |               |
| Center frequency (GHz)   | Span (MHz)                | Peak-to-peak  | RMS           |
| $\leq 3.0$   | $\leq 10$                 | $0.5^\circ$   | $0.2^\circ$   |
| $3.0 < f \leq 7.5$   | $\leq 10$                 | $0.5^\circ$   | $0.4^\circ$   |
| <b>Data acquisition (standard 10 MHz IF path)</b>  |                           |               |               |
| Time record length   | 4,000,000 IQ sample pairs |               |               |
| Sample rate  | 90 MSa/s                  |               |               |
| ADC resolution   | 16 Bits                   |               |               |
| <b>Option B25 25 MHz analysis bandwidth</b>  |                           |               |               |
| <b>IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30 °C)</b>           |                           |               |               |
| Center frequency (GHz)   | Span (MHz)                | Max. error    | RMS (nominal) |
| $\leq 3.0$   | 10 to $\leq 25$           | $\pm 0.45$ dB | 0.03 dB       |
| $3.0 < f \leq 26.5$  | 10 to $\leq 25$           |               | 0.20 dB       |
| <b>IF phase linearity (deviation from mean phase linearity, nominal)</b>   |                           |               |               |
| Center frequency (GHz)   | Span (MHz)                | Peak-to-peak  | RMS           |
| $0.02 \leq f < 3.0$  | 10 to $\leq 25$           | $1^\circ$     | $0.3^\circ$   |
| $3.0 < f \leq 7.5$   | 10 to $\leq 25$           | $1^\circ$     | $0.5^\circ$   |
| <b>Data acquisition (B25 IF path)</b>  |                           |               |               |
| <b>Time record length</b>  |                           |               |               |
| IQ analyzer  | 4,000,000 IQ sample pairs |               |               |
| Sample rate  | 90 MSa/s                  |               |               |
| ADC resolution   | 16 Bits                   |               |               |

## System Requirements

|                      |  |
|----------------------|--|
| Operating system     | Windows 7 (32 & 64 bit)  |
| Processor speed      | 1.86 GHz minimum<br>2.4 GHz recommended  |
| Available memory     | 4 GB minimum<br>8 GB recommended   |
| Available disk space | 4 GB   |
| Video                | Support for DirectX 9 graphics with 128 MB graphics recommended (SuperVGA supported) |
| Browser              | Microsoft Internet Explorer 7.0 or greater   |

## Software

| Instrument connection software  |                                       |  |   |
|---|---------------------------------------|--|---|
|    | Keysight IO library                   | The IO library suite offers a single entry point for connection to the most common instruments including AXIe, PXI, GPIB, USB, Ethernet/LAN, RS-232, and VXI test instruments from Keysight and other vendors. It automatically discovers interfaces, chassis, and instruments. The graphical user interface allows you to search for, verify, and update IVI instrument and soft front panel drivers for modular and traditional instruments. The IO suite safely installs in side-by-side mode with NI I/O software. | Free software download at <a href="http://www.keysight.com/find/iosuite">www.keysight.com/find/iosuite</a>                                  |
| Module setup and usage  |                                       |  |   |
|    | Keysight soft front panel             | The CXA-m includes a soft front panel (SFP), a software-based graphical user interface (GUI) which enables the instrument's capabilities from your PC.   | Included on CD-ROM shipped with module or online  |
| Module management   |                                       |  |   |
|   | Keysight connection expert            | Connection expert is the graphical user interface included in the IO libraries suite that allows you to search for, verify and update IVI instrument and soft front panel drivers for modular and traditional instruments  | Free software download at <a href="http://www.keysight.com/find/iosuite">www.keysight.com/find/iosuite</a>                                  |
| Programming   |                                       |  |   |
|   | <b>Driver</b>                         | <b>Development environments</b>  |   |
|   | IVI-COM<br>IVI-C<br>LabVIEW<br>MATLAB | Visual Studio (VB .NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB   | Included on CD-ROM shipped with module.   |
| Programming assistance  |                                       |  |   |
|  | Command expert                        | Assists in finding the right instrument commands and setting correct parameters. A simple interface includes documentation, examples, syntax checking, command execution, and debug tools to build sequences for integration in Excel, MATLAB, Visual Studio, and VEE.   | Free software download at <a href="http://www.keysight.com/find/commandexpert">www.keysight.com/find/commandexpert</a>                      |
| Signal analysis software  |                                       |  |   |
|  | X-Series measurement applications     | Provides measurements for analog demodulation, noise figure, phase noise, vector signal analysis, and others.  | Licensed software. For more information, visit <a href="http://www.keysight.com/find/x-series_apps">www.keysight.com/find/x-series_apps</a> |
|  | 89600 VSA                             | 89600 VSA software sees through the complexity of emerging and existing industry standards, serving as your window into complex signal interactions.   | Licensed software. For more information, visit <a href="http://www.keysight.com/find/vsa">www.keysight.com/find/vsa</a>                     |
|  | SystemVue                             | SystemVue is a system-level EDA platform for designing communications and defense systems. Used with the M9290A, SystemVue enables you to create model-based design validation tests to ensure consistency from design to manufacturing.   | Licensed software. For more information, visit <a href="http://www.keysight.com/find/systemvue">www.keysight.com/find/systemvue</a>         |



## Related Literature

| Literature  | Pub number  |
|---|-------------|
| M9290A CXA-m PXIe Signal Analyzer - Product Fact Sheet        | 5992-0044EN |
| M9290A CXA-m PXIe Signal Analyzer - Configuration Guide       | 5992-0193EN |
| M9018A PXIe 18 slot Chassis - Data Sheet                      | 5990-6583EN |
| M9037A PXIe High Performance Embedded Controller - Data Sheet | 5991-3661EN |
| M9036A PXIe Embedded Controller - Data Sheet                  | 5990-8465EN |

## Web

For more information or literature resources please visit the web:

Product page: [www.keysight.com/find/M9290A](http://www.keysight.com/find/M9290A)

X-Series measurement applications: [www.keysight.com/find/X-Series\\_Apps](http://www.keysight.com/find/X-Series_Apps)

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