M9415A

VXT PXIe Vector Transceiver

380 MHz to 12.75 GHz

Introduction

The Keysight M9415A VXT PXIe vector transceiver provides engineers with a compact, scalable test platform to validate their designs of wireless components, or infrastructure equipments. M9415A operates from 380 MHz to 12.75 GHz frequency range, with up to 1.2 GHz bandwidth, and supports varieties of wireless connectivity and cellular communication technologies via industry-proven application software.

KEYSIGHT

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Technical Specifications

Definitions and conditions

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

- Specifications are valid from 45 to 75 °C for individual module temperature, as reported by the module, and 20 to 35 °C for environment temperature unless otherwise noted
- The calibrated instrument has been stored for a minimum of 2 hours within the allowed operating range
- If the instrument has previously been stored at a temperature range inside the allowed storage range, but outside the allowed operating range, instrument must have been stored for a minimum of 2 hours within the allowed operating range before turn-on
- 45-minute warm-up time with the Modular TRX application running
- Calibration cycle maintained
- When used with Keysight M9300A frequency reference and Keysight interconnect cables
- An “All Alignment” has been run within the previous 7 days
- A “Fast Alignment” has been run:
  - Within the previous 8 hours
  - If the environmental temperature has changed more than 5°C from the previous Fast Alignment

Typical values describe additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 95 percent of the units exhibit with a 95 percent confidence level. This data does not include measurement uncertainty and is valid only at room temperature (approximately 25 °C) after alignment within the stated alignment time and temperature limits.

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 35 °C.

Vector signal analyzer

Performance

Capture depth		
Standard (Option M02)	256 MSa of IQ data	
Option M05	512 MSa of IQ data	
Frequency		
Frequency range		
Option F06	380 MHz to 6 GHz	
Option F08	380 MHz to 8 GHz	
Option F12	380 MHz to 12.3 GHz. Extendable to 12.75 GHz with option EP7	
Frequency reference		
Accuracy, aging rate, stability	Refer to M9300A specifications	
Frequency readout accuracy		
CW	± (marker frequency x frequency reference accuracy + 0.10% x span + 5% x RBW + 2 Hz + 0.5 x horizontal resolution)	
Demodulation	± (center frequency × frequency reference accuracy + 1 Hz)	
Resolution	1 Hz	
Analysis bandwidth		
Standard (Option B4X)	380 to 550 MHz	100 MHz
	550 MHz to 1.31 GHz	200 MHz
	1.31 to 12.75 GHz	400 MHz
Option B8X	380 to 550 MHz	100 MHz
	550 MHz to 1.31 GHz	200 MHz
	1.31 to 2 GHz	600 MHz
	2 to 12.75 GHz	800 MHz
Option B12	380 to 550 MHz	100 MHz
	550 MHz to 1.31 GHz	200 MHz
	1.31 to 2 GHz	600 MHz
	2 to 12.75 GHz	1.2 GHz
Trigger		
IQ analyzer	Free run, External 1, External 2, RF burst, Video, Periodic, PXI, Internal	
Trigger delay range	–150 to 500 ms	
Resolution	1/sample rate	
Maximum safe input level		
	Average power input	**DC volts**
RF input port	+27 dBm	30 Vdc
Option HDX, Half duplex port	+27 dBm	30 Vdc

Absolute Amplitude Accuracy (CW mode) [1]			
RF input port			
Frequency Range	–70 dBm ≤ Input level < +10 dBm	+10 dBm ≤ Input level ≤ +20 dBm	+20 dBm < Input level ≤ +27 dBm
380 MHz to 1.31 GHz	< ± 0.50 dB, < ± 0.20 dB typical	< ± 0.60 dB, < ± 0.30 dB typical	< ± 1.00 dB, < ± 0.70 dB typical
1.31 to 4.3 GHz	< ± 0.60 dB, < ± 0.25 dB typical	< ± 0.65 dB, < ± 0.30 dB typical	< ± 1.00 dB, < ± 0.65 dB typical
4.3 to 8.4 GHz	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.75 dB, < ± 0.40 dB typical
8.4 to 11.4 GHz	< ± 0.60 dB, < ± 0.30 dB typical	< ± 0.80 dB, < ± 0.40 dB typical	< ± 0.90 dB, < ± 0.50 dB typical
11.4 to 12.3 GHz	< ± 0.70 dB, < ± 0.35 dB typical	< ± 0.85 dB, < ± 0.45 dB typical	< ± 1.25 dB, < ± 0.70 dB typical
12.3 to 13.35 GHz	< ± 0.35 dB nominal	< ± 0.60 dB nominal	< ± 0.80 dB nominal
Half duplex port, option HDX			
Frequency Range	–70 dBm ≤ Input level < +10 dBm	+10 dBm ≤ Input level ≤ +20 dBm	+20 dBm < Input level ≤ +27 dBm
380 MHz to 1.31 GHz	< ± 0.50 dB, < ± 0.25 dB typical	< ± 0.60 dB, < ± 0.30 dB typical	< ± 1.15 dB, < ± 0.85 dB typical
1.31 to 4.3 GHz	< ± 0.60 dB, < ± 0.25 dB typical	< ± 0.65 dB, < ± 0.30 dB typical	< ± 1.30 dB, < ± 0.80 dB typical
4.3 to 8.4 GHz	< ± 0.70 dB, < ± 0.30 dB typical	< ± 0.60 dB, < ± 0.30 dB typical	< ± 0.85 dB, < ± 0.50 dB typical
8.4 to 11.4 GHz	< ± 0.75 dB, < ± 0.40 dB typical	< ± 0.75 dB, < ± 0.35 dB typical	< ± 0.95 dB, < ± 0.55 dB typical
11.4 to 12.3 GHz	< ± 0.80 dB, < ± 0.40 dB typical	< ± 0.90 dB, < ± 0.45 dB typical	< ± 1.15 dB, < ± 0.65 dB typical
12.3 to 13.35 GHz	< ± 0.40 dB nominal	< ± 0.50 dB nominal	< ± 0.55 dB nominal
Input voltage standing wave radio (VSWR)			
	RF input port	Half Duplex Port (configured to input mode)	
380 MHz to 4.3 GHz	< 1.55:1, < 1.4:1 typical	< 1.55:1, < 1.4:1 typical	
4.3 to 5.8 GHz	< 1.4:1, < 1.3:1 typical	< 1.55:1, < 1.4:1 typical	
5.8 to 7.2 GHz	< 1.8:1, < 1.6:1 typical	< 1.9:1, < 1.7:1 typical	
7.2 to 10.2 GHz	< 1.6:1, < 1.4:1 typical	< 1.6:1, < 1.4:1 typical	
10.2 to 12.3 GHz	< 2.0:1, < 1.9:1 typical	< 2.0:1, < 1.9:1 typical	
Displayed average noise floor (DANL) [2]			
	RF input port, with analyzer ranged to –70 dBm	Half duplex port, Option HDX, with analyzer ranged to –70 dBm	
380 MHz to 4.3 GHz	–165 dBm, –167 dBm typical	–160 dBm, –162 dBm typical	
4.3 to 10.2 GHz	–165 dBm, –167 dBm typical	–158 dBm, –161 dBm typical	
10.2 to 12.3 GHz	–162 dBm, –165 dBm typical	–155 dBm, –157 dBm typical	
12.3 to 13.35 GHz	–165 dBm nominal	–156 dBm nominal	
Third-order intermodulation distortion (TOI, with analyzer ranged to +10 dBm)			
380 MHz to 4.3 GHz	+30 dBm, +32 dBm typical		
4.3 to 6 GHz	+28 dBm, +30 dBm typical		
6 to 12.3 GHz	+27 dBm, +29 dBm typical		

1. Signal is measured at 1.1 MHz offset from the center frequency, Otherwise, an IF flatness error must be added.
2. Input terminated, LNA on, log power average, and normalized to 1 Hz bandwidth.

Phase noise (CF = 1 GHz)	
1 kHz offset	–114 dBc/Hz, –116 dBc/Hz typical
10 kHz offset	–128 dBc/Hz, –130 dBc/Hz typical
100 kHz offset	–132 dBc/Hz, –134 dBc/Hz typical
1 MHz offset	–135 dBc/Hz, –137 dBc/Hz typical
10 MHz offset	–139 dBc/Hz, –141 dBc/Hz typical

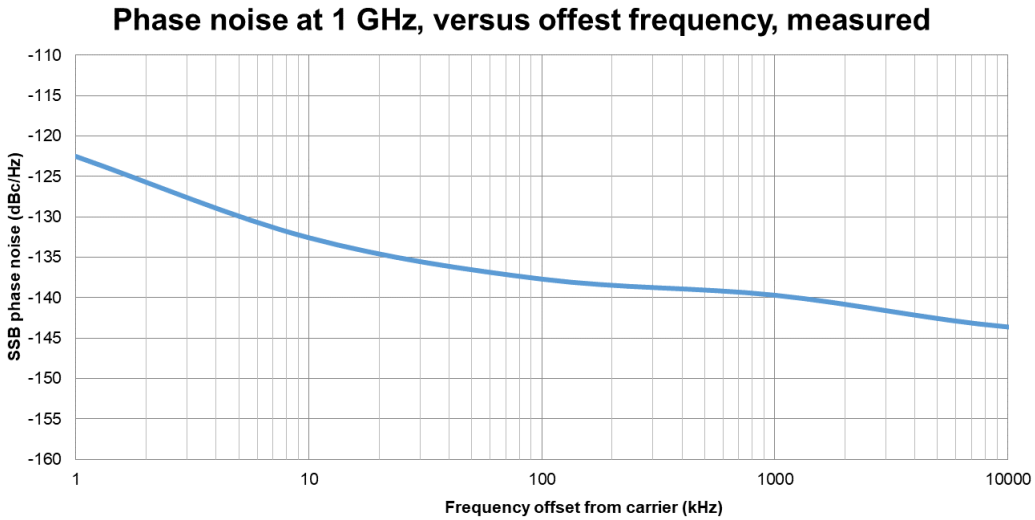

Figure 1. Phase noise at 1 GHz with offset from 1 kHz to 10 MHz

Spurious response						
Residual responses						
RF input port; Option HDX, half duplex port; with analyzer ranged to +10 dBm; offset from 10 MHz to 1/2 × analysis bandwidth						
380 MHz to 9 GHz	< –79 dBm, < –82 dBm typical					
9 to 9.6 GHz	< –76 dBm, < –80 dBm typical					
9.6 to 12.3 GHz	< –81 dBm, < –83 dBm typical					
Image responses						
Center frequency	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	–63 dBc	N/A	N/A	N/A	N/A	N/A
550 MHz to 1.31 GHz	–62 dBc	–60 dBc	N/A	N/A	N/A	N/A
s1.31 to 2 GHz	–62 dBc	–60 dBc	–60 dBc	–60 dBc	N/A	N/A
2 to 4.3 GHz	–62 dBc	–60 dBc	–60 dBc	–60 dBc	–58 dBc	–56 dBc
4.3 to 4.6 GHz	–63 dBc	–63 dBc	–60 dBc	–60 dBc	–58 dBc	–56 dBc
4.6 to 12.3 GHz	–63 dBc	–63 dBc	–60 dBc	–60 dBc	–59 dBc	–58 dBc
Sideband spurs, nominal						
1 kHz to 10 MHz offset	–85 dBc					
LO feedthrough (dBr [1])						
	RF input port, with analyzer ranged from –30 to +27 dBm			Option HDX, half duplex port, with analyzer ranged from –25 to +27 dBm		
380 MHz to 12.3 GHz	–52 dBr, –62 dBr typical			–52 dBr, –62 dBr typical		

1. dBr is LO feedthrough power relative to the range level of the receiver.

IF flatness						
RF input port, –25 dBm ≤ Input level ≤ +10 dBm						
Center frequency	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	± 0.90 dB, ± 0.50 dB typical	N/A	N/A	N/A	N/A	N/A
550 MHz to 1.31 GHz	± 0.70 dB, ± 0.35 dB typical	± 0.70 dB, ± 0.40 dB typical	N/A	N/A	N/A	N/A
1.31 to 1.62 GHz	± 0.70 dB, ± 0.35 dB typical	± 0.70 dB, ± 0.40 dB typical	± 1.20 dB, ± 0.70 dB typical	± 1.50 dB, ± 0.95 dB typical	N/A	N/A
1.62 to 2 GHz	± 0.70 dB, ± 0.35 dB typical	± 0.70 dB, ± 0.40 dB typical	± 0.65 dB, ± 0.30 dB typical	± 0.65 dB, ± 0.30 dB typical	N/A	N/A
2 to 3.5 GHz	± 0.50 dB, ± 0.15 dB typical	± 0.55 dB, ± 0.25 dB typical	± 0.65 dB, ± 0.30 dB typical	± 0.65 dB, ± 0.30 dB typical	± 0.60 dB, ± 0.25 dB typical	± 0.75 dB, ± 0.35 dB typical
3.5 to 4.3 GHz	± 0.55 dB, ± 0.20 dB typical	± 0.55 dB, ± 0.25 dB typical	± 0.80 dB, ± 0.40 dB typical	± 0.80 dB, ± 0.40 dB typical	± 0.80 dB, ± 0.40 dB typical	± 0.85 dB, ± 0.45 dB typical
4.3 to 12.3 GHz	± 1.00 dB, ± 0.50 dB typical	± 1.00 dB, ± 0.50 dB typical	± 1.10 dB, ± 0.65 dB typical	± 1.15 dB, ± 0.70 dB typical	± 1.15 dB, ± 0.70 dB typical	± 1.25 dB, ± 0.80 dB typical
12.3 to 12.75 GHz	± 0.25 dB nominal	± 0.25 dB nominal	± 0.35 dB nominal	± 0.35 dB nominal	± 0.35 dB nominal	± 0.55 dB nominal
Half duplex port, option HDX, –25 dBm ≤ Input level ≤ +10 dBm						
Center frequency	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	± 0.90 dB, ± 0.55 dB typical	N/A	N/A	N/A	N/A	N/A
550 MHz to 1.31 GHz	± 0.70 dB, ± 0.35 dB typical	± 0.80 dB, ± 0.40 dB typical	N/A	N/A	N/A	N/A
1.31 to 1.62 GHz	± 0.70 dB, ± 0.35 dB typical	± 0.80 dB, ± 0.40 dB typical	± 1.15 dB, ± 0.70 dB typical	± 1.55 dB, ± 0.95 dB typical	N/A	N/A
1.62 to 2 GHz	± 0.70 dB, ± 0.35 dB typical	± 0.80 dB, ± 0.40 dB typical	± 0.60 dB, ± 0.30 dB typical	± 0.60 dB, ± 0.30 dB typical	N/A	N/A
2 to 3.5 GHz	± 0.45 dB, ± 0.15 dB typical	± 0.55 dB, ± 0.25 dB typical	± 0.60 dB, ± 0.25 dB typical	± 0.60 dB, ± 0.25 dB typical	± 0.65 dB, ± 0.30 dB typical	± 0.70 dB, ± 0.35 dB typical
3.5 to 4.3 GHz	± 0.50 dB, ± 0.20 dB typical	± 0.60 dB, ± 0.20 dB typical	± 0.75 dB, ± 0.40 dB typical	± 0.75 dB, ± 0.40 dB typical	± 1.00 dB, ± 0.55 dB typical	± 1.35 dB, ± 0.80 dB typical
4.3 to 12.3 GHz	± 0.85 dB, ± 0.40 dB typical	± 1.00 dB, ± 0.50 dB typical	± 1.10 dB, ± 0.60 dB typical	± 1.25 dB, ± 0.70 dB typical	± 1.30 dB, ± 0.75 dB typical	± 1.35 dB, ± 0.80 dB typical
12.3 to 12.75 GHz	± 0.25 dB nominal	± 0.25 dB nominal	± 0.35 dB nominal	± 0.35 dB nominal	± 0.35 dB nominal	± 0.45 dB nominal

Vector signal generator

Performance		
Arb sample memory (storage capacity)		
Standard (Option M02)	256 MSa of IQ data	
Option M05	512 MSa of IQ data	
Frequency range		
Option F06	380 MHz to 6 GHz	
Option F08	380 MHz to 8 GHz	
Option F12	380 MHz to 12.3 GHz. Extendable to 12.75 GHz with option EP7	
Frequency reference		
Accuracy, aging rate, stability	Refer to M9300A specifications	
Frequency accuracy	± (output frequency × frequency reference accuracy + 0.001 Hz)	
Frequency switching speed		
SCPI mode	≤ 14 ms nominal	
IVI mode	≤ 6 ms nominal	
Signal generation bandwidth		
	Center frequency	**Maximum bandwidth**
Option B4X (default)	380 to 550 MHz	100 MHz
	550 MHz to 1.31 GHz	200 MHz
	1.31 to 12.75 GHz	400 MHz
Option B8X	380 to 550 MHz	100 MHz
	550 MHz to 1.31 GHz	200 MHz
	1.31 to 2 GHz	600 MHz
	2 to 12.75 GHz	800 MHz
Option B12	380 to 550 MHz	100 MHz
	550 MHz to 1.31 GHz	200 MHz
	1.31 to 2 GHz	600 MHz
	2 to 12.75 GHz	1.2 GHz
Output level range (CW mode)		
380 MHz to 12.75 GHz	**RF output port**	**RF output port with option 1EA**
	–120 to +5 dBm	–120 to +20 dBm, +25 dBm settable
	Half duplex port (option HDX, set to output mode)	**Half duplex port (option HDX, set to output mode), option 1EA**
	–120 to +5 dBm	–120 to +10 dBm
Maximum reverse power		
Average power input	+27 dBm	
DC volts	30 Vdc	
Amplitude switching speed [1]		
SCPI mode	≤ 10 ms nominal	
IVI mode	≤ 5 ms nominal	

1. Switching speed depends highly upon the hardware and controller that is used. Measurements were made with the M9415A in an M9018B chassis with the M9037A embedded controller, Windows 10 Operating System.

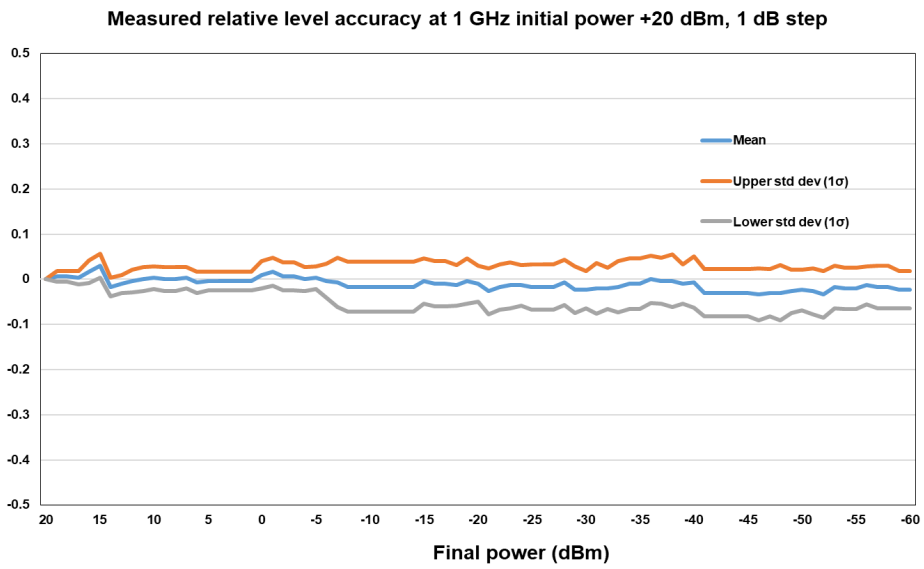

Figure 2. Measured relative level accuracy at 1 GHz

Absolute level accuracy (CW mode)

RF output port

Power level / Center Freq	+10 dBm < Level ≤ +20 dBm	0 dBm < Level ≤ +10 dBm	–60 dBm ≤ Level ≤ 0 dBm	–90 dBm ≤ Level < –60 dBm	–100 dBm ≤ Level < –90 dBm	–110 dBm ≤ Level < –100 dBm
380 to 550 MHz	< ± 0.60 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.75 dB, < ± 0.35 dB typical	< ± 0.85 dB, < ± 0.45 dB typical
550 MHz to 4.3 GHz	< ± 0.75 dB, < ± 0.35 dB typical	< ± 0.65 dB, < ± 0.30 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.75 dB, < ± 0.40 dB typical	< ± 0.90 dB, < ± 0.55 dB typical
4.3 to 6 GHz	< ± 0.90 dB, < ± 0.45 dB typical	< ± 0.80 dB, < ± 0.40 dB typical	< ± 0.60 dB, < ± 0.25 dB typical	< ± 0.65 dB, < ± 0.35 dB typical	< ± 0.70 dB, < ± 0.30 dB typical	< ± 0.90 dB, < ± 0.50 dB typical
6 to 7.8 GHz	< ± 1.00 dB, < ± 0.45 dB typical	< ± 0.85 dB, < ± 0.45 dB typical	< ± 0.60 dB, < ± 0.20 dB typical	< ± 0.95 dB, < ± 0.50 dB typical	< ± 0.95 dB, < ± 0.50 dB typical	< ± 0.95 dB, < ± 0.55 dB typical
7.8 to 10.2 GHz	< ± 0.85 dB, < ± 0.45 dB typical	< ± 0.75 dB, < ± 0.35 dB typical	< ± 0.75 dB, < ± 0.25 dB typical	< ± 0.75 dB, < ± 0.35 dB typical	< ± 0.75 dB, < ± 0.35 dB typical	< ± 0.85 dB, < ± 0.45 dB typical
10.2 to 12.3 GHz	< ± 0.85 dB, < ± 0.45 dB typical	< ± 0.65 dB, < ± 0.30 dB typical	< ± 0.70 dB, < ± 0.20 dB typical	< ± 1.00 dB, < ± 0.50 dB typical	< ± 1.10 dB, < ± 0.50 dB typical	< ± 1.10 dB, < ± 0.60 dB typical
12.3 to 13.35 GHz	< ± 0.45 dB nominal	< ± 0.40 dB nominal	< ± 0.40 dB nominal	< ± 0.65 dB nominal	< ± 0.75 dB nominal	< ± 2.14 dB nominal

Half duplex port, option HDX

Power level / Center Freq		0 dBm < Level ≤ +10 dBm	–60 dBm ≤ Level ≤ 0 dBm	–90 dBm ≤ Level < –60 dBm	–100 dBm ≤ Level < –90 dBm	–110 dBm ≤ Level < –100 dBm
380 to 550 MHz		< ± 0.50 dB, < ± 0.20 dB typical	< ± 0.50 dB, < ± 0.20 dB typical	< ± 0.50 dB, < ± 0.20 dB typical	< ± 0.65 dB, < ± 0.35 dB typical	< ± 0.80 dB, < ± 0.40 dB typical
550 MHz to 4.3 GHz		< ± 0.50 dB, < ± 0.20 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.65 dB, < ± 0.35 dB typical	< ± 0.95 dB, < ± 0.55 dB typical
4.3 to 6 GHz		< ± 0.65 dB, < ± 0.30 dB typical	< ± 0.65 dB, < ± 0.30 dB typical	< ± 0.65 dB, < ± 0.30 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.70 dB, < ± 0.40 dB typical
6 to 7.8 GHz		< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.50 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.70 dB, < ± 0.40 dB typical
7.8 to 10.2 GHz		< ± 0.60 dB, < ± 0.25 dB typical	< ± 0.70 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.55 dB, < ± 0.25 dB typical	< ± 0.65 dB, < ± 0.40 dB typical
10.2 to 12.3 GHz		< ± 0.70 dB, < ± 0.40 dB typical	< ± 0.70 dB, < ± 0.30 dB typical	< ± 0.60 dB, < ± 0.25 dB typical	< ± 0.60 dB, < ± 0.30 dB typical	< ± 0.80 dB, < ± 0.50 dB typical
12.3 to 13.35 GHz		< ± 0.65 dB nominal	< ± 0.65 dB nominal	< ± 0.55 dB nominal	< ± 0.60 dB nominal	< ± 2.15 dB nominal

Measurement amplitude repeatability	
RF output port, 0 dBm output power, 1 GHz, 25 °C	
Delta from initial value	< ± 0.10 dB nominal
Setting resolution	
0.01 dB	
Output Voltage Standing Wave Ratio (VSWR)	
RF output port	
380 MHz to 1.31 GHz	< 1.90:1, < 1.70:1 typical
1.31 to 7.8 GHz	< 1.75:1, < 1.65:1 typical
7.8 to 10.2 GHz	< 1.75:1, < 1.60:1 typical
10.2 to 12.3 GHz	< 2.00:1, < 1.70:1 typical
Half duplex port (option HDX, configured to output mode)	
380 MHz to 1.31 GHz	< 1.90:1, < 1.75:1 typical
1.31 to 6 GHz	< 1.75:1, < 1.40:1 typical
6 to 10.2 GHz	< 1.65:1, < 1.50:1 typical
10.2 to 12.3 GHz	< 1.90:1, < 1.55:1 typical
Harmonics	
RF output port, 0 dBm output power	
380 MHz to 4.3 GHz	< –41 dBc, < –45 dBc typical
4.3 to 5.8 GHz	< –36 dBc, < –42 dBc typical
5.8 to 10.2 GHz	< –34 dBc, < –39 dBc typical
10.2 to 12.3 GHz	< –41 dBc, < –46 dBc typical
RF output port, +10 dBm output power, with Option 1EA	
380 MHz to 4.3 GHz	< –31 dBc, < –35 dBc typical
4.3 to 5.8 GHz	< –27 dBc, < –33 dBc typical
5.8 to 9 GHz	< –26 dBc, < –31 dBc typical
9 to 10.2 GHz	< –24 dBc, < –29 dBc typical
10.2 to 12.3 GHz	< –29.5 dBc, < –35 dBc typical
Half duplex port (option HDX), -5 dBm output power	
380 MHz to 4.3 GHz	< –36 dBc, < –40 dBc typical
4.3 to 5.8 GHz	< –33 dBc, < –38 dBc typical
5.8 to 10.2 GHz	< –32 dBc, < –37 dBc typical
10.2 to 12.3 GHz	< –36 dBc, < –42 dBc typical
Non-harmonic spurious (CW mode)	
RF output port, Option HDX, half duplex port, 0 dBm output power	
380 MHz to 4.3 GHz	< –65 dBc, < –70 dBc typical
4.3 to 6.5 GHz	< –47 dBc, < –52 dBc typical
6.5 to 9.6 GHz	< –57 dBc, < –62 dBc typical
9.6 to 11.4 GHz	< –50 dBc, < –56 dBc typical
11.4 to 12.3 GHz	< –51 dBc, < –60 dBc typical
LO feedthrough	
RF output port, Option HDX, half duplex port, 0 dBm output power	
380 MHz to 1.31 GHz	–51 dBc, –65 dBc typical
1.31 to 1.62 GHz	–46 dBc, –59 dBc typical
1.62 to 2 GHz	–44 dBc, –58 dBc typical
2 to 4.3 GHz	–42 dBc, –54 dBc typical
4.3 to 12.3 GHz	–46 dBc, –52 dBc typical

Image response						
RF output port, 0 dBm output power						
Bandwidth / Center Freq	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	–55 dBc, –61 dBc typical	N/A	N/A	N/A	N/A	N/A
550 MHz to 1.31 GHz	–54 dBc, –60 dBc typical	–54 dBc, –59 dBc typical	N/A	N/A	N/A	N/A
1.31 to 2 GHz	–53 dBc, –59 dBc typical	–52 dBc, –58 dBc typical	–51 dBc, –57 dBc typical	–49 dBc, –54 dBc typical	N/A	N/A
2 to 12.3 GHz	–52 dBc, –58 dBc typical	–51 dBc, –57 dBc typical	–51 dBc, –54 dBc typical	–50 dBc, –54 dBc typical	–49 dBc, –53 dBc typical	–46 dBc, –50 dBc typical
Half duplex port (option HDX), 0 dBm output power						
Bandwidth / Center Freq	100 MHz BW	200 MHz BW	400 MHz BW	600 MHz BW	800 MHz BW	1.2 GHz BW
380 to 550 MHz	–55 dBc, –61 dBc typical	N/A	N/A	N/A	N/A	N/A
550 MHz to 4.3 GHz	–54 dBc, –60 dBc typical	–53 dBc, –57 dBc typical	N/A	N/A	N/A	N/A
4.3 to 6 GHz	–51 dBc, –58 dBc typical	–50 dBc, –57 dBc typical	–50 dBc, –56 dBc typical	–49 dBc, –55 dBc typical	N/A	N/A
6 to 7.8 GHz	–51 dBc, –57 dBc typical	–49 dBc, –58 dBc typical	–48 dBc, –54 dBc typical	–48 dBc, –53 dBc typical	–47 dBc, –51 dBc typical	–45 dBc, –48 dBc typical
Sideband spurious						
Offset / Center Freq	1 to 100 kHz		100 kHz to 1 MHz		1 to 10 MHz	
380 MHz to 4.3 GHz	–70 dBc	–76 dBc typical	–89 dBc	–95 dBc typical	–90 dBc,	–96 dBc typical
4.3 to 6 GHz	–66 dBc	–72 dBc typical	–86 dBc	–92 dBc typical	–88 dBc	–94 dBc typical
6 to 10.2 GHz	–62 dBc	–69 dBc typical	–84 dBc	–89 dBc typical	–87 dBc	–93 dBc typical
10.2 to 12.3 GHz	–60 dBc	–65 dBc typical	–70 dBc	–75 dBc typical	–81 dBc	–86 dBc typical
Third-order intermodulation distortion (TOI)						
RF output port, output level = 0 dBm						
380 MHz to 7.8 GHz	+24 dBm, +27 dBm typical					
7.8 to 10.2 GHz	+23 dBm, +25 dBm typical					
10.2 to 12.3 GHz	+21 dBm, +24 dBm typical					
Half duplex port (option HDX), output level = 0 dBm						
380 to 550 MHz	+25 dBm, +28 dBm typical					
550 MHz to 4.3 GHz	+23 dBm, +26 dBm typical					
4.3 to 7.8 GHz	+20 dBm, +24 dBm typical					
7.8 to 10.2 GHz	+18 dBm, +22 dBm typical					
10.2 to 12.3 GHz	+17 dBm, +20 dBm typical					

Phase noise	
RF output port, 0 dBm; Option HDX, half duplex port, 0 dBm; Option 1EA, +10 dBm; Center frequency = 1 GHz	
1 kHz offset	–105 dBc/Hz, –115 dBc/Hz typical
10 kHz offset	–126 dBc/Hz, –133 dBc/Hz typical
100 kHz offset	–134 dBc/Hz, –139 dBc/Hz typical
1 MHz offset	–141 dBc/Hz, –145 dBc/Hz typical
10 MHz offset	–142 dBc/Hz, –145 dBc/Hz typical

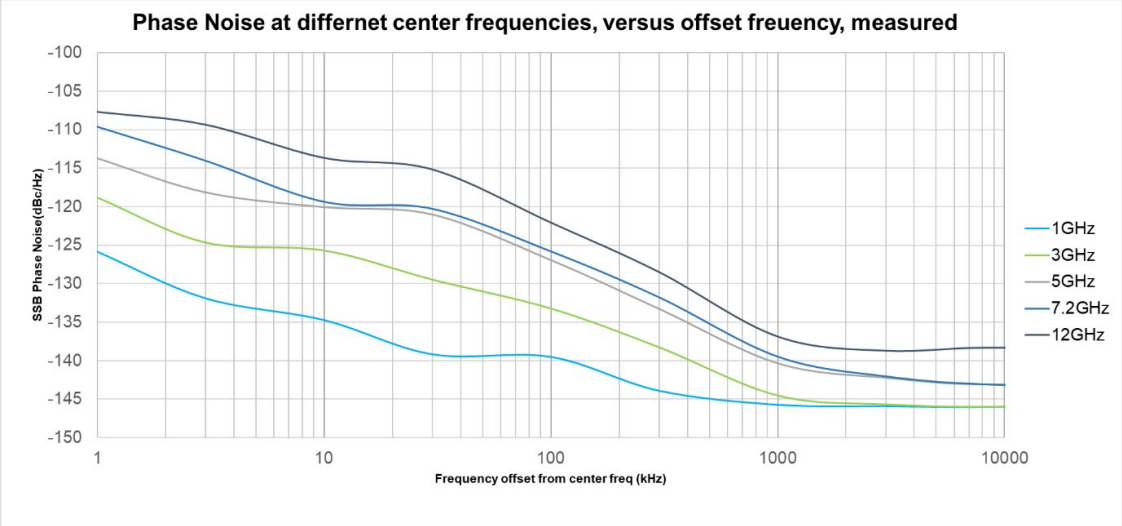

Figure 3. Measured phase noise from 1 kHz to 10 MHz offset at 1, 3, 5, 7.2 and 12 GHz

Broadband noise floor [1]	
RF output port, output level = 0 dBm	
380 to 550 MHz	–131 dBm/Hz, –135 dBm/Hz typical
550 MHz to 4.3 GHz	–133 dBm/Hz, –137 dBm/Hz typical
4.3 to 10.2 GHz	–131 dBm/Hz, –135 dBm/Hz typical
10.2 to 12.3 GHz	–133 dBm/Hz, –136 dBm/Hz typical
12.3 to 13.35 GHz	–136 dBm/Hz nominal
Half duplex port (option HDX), output level = –10 dBm	
380 to 550 MHz	–142 dBm/Hz, –147 dBm/Hz typical
550 MHz to 4.3 GHz	–143 dBm/Hz, –147 dBm/Hz typical
4.3 to 10.2 GHz	–139 dBm/Hz, –144 dBm/Hz typical
10.2 to 12.3 GHz	–141 dBm/Hz, –145 dBm/Hz typical
12.3 to 13.35 GHz	–145 dBm/Hz nominal

1. Measured at 10.1 MHz offset from the center frequency.

IF flatness

RF output port, –30 dBm ≤ Level ≤ +10 dBm, sample rate = 1.25 x bandwidth

Bandwidth / Center Freq	100 MHz	200 MHz	400 MHz	600 MHz	800 MHz	1.2 GHz
380 to 550 MHz	± 0.80 dB, ± 0.35 dB typical	N/A	N/A	N/A	N/A	N/A
550 to 680 MHz	± 0.75 dB, ± 0.25 dB typical	± 0.80 dB, ± 0.40 dB typical	N/A	N/A	N/A	N/A
680 to 730 MHz	± 0.75 dB, ± 0.25 dB typical	± 0.80 dB, ± 0.45 dB typical	N/A	N/A	N/A	N/A
730 MHz to 1.31 GHz	± 0.65 dB, ± 0.40 dB typical	± 0.75 dB, ± 0.45 dB typical	N/A	N/A	N/A	N/A
1.31 to 1.62 GHz	± 0.75 dB, ± 0.40 dB typical	± 0.80 dB, ± 0.40 dB typical	± 1.10 dB, ± 0.75 dB typical	± 1.25 dB, ± 0.90 dB typical	N/A	N/A
1.62 to 2 GHz	± 0.65 dB, ± 0.20 dB typical	± 0.65 dB, ± 0.30 dB typical	± 0.65 dB, ± 0.25 dB typical	± 0.80 dB, ± 0.45 dB typical	N/A	N/A
2 to 3.5 GHz	± 0.65 dB, ± 0.30 dB typical	± 0.75 dB, ± 0.45 dB typical	± 0.75 dB, ± 0.45 dB typical	± 0.75 dB, ± 0.45 dB typical	± 0.75 dB, ± 0.45 dB typical	± 0.85 dB, ± 0.55 dB typical
3.5 to 4.3 GHz	± 0.65 dB, ± 0.25 dB typical	± 0.65 dB, ± 0.25 dB typical	± 0.90 dB, ± 0.60 dB typical	± 1.25 dB, ± 0.85 dB typical	± 1.25 dB, ± 0.85 dB typical	± 1.30 dB, ± 0.90 dB typical
4.3 to 6 GHz	± 0.80 dB, ± 0.40 dB typical	± 0.80 dB, ± 0.45 dB typical	± 0.85 dB, ± 0.50 dB typical	± 0.80 dB, ± 0.55 dB typical	± 0.80 dB, ± 0.55 dB typical	± 1.20 dB, ± 0.85 dB typical
6 to 9 GHz	± 0.75 dB, ± 0.30 dB typical	± 0.75 dB, ± 0.30 dB typical	± 0.75 dB, ± 0.30 dB typical	± 0.70 dB, ± 0.40 dB typical	± 0.75 dB, ± 0.40 dB typical	± 0.80 dB, ± 0.50 dB typical
9 to 10.2 GHz	± 0.65 dB, ± 0.20 dB typical	± 0.70 dB, ± 0.25 dB typical	± 0.70 dB, ± 0.35 dB typical	± 0.80 dB, ± 0.40 dB typical	± 0.85 dB, ± 0.45 dB typical	± 1.30 dB, ± 0.75 dB typical
10.2 to 12.3 GHz	± 0.80 dB, ± 0.40 dB typical	± 0.80 dB, ± 0.45 dB typical	± 0.85 dB, ± 0.50 dB typical	± 0.90 dB, ± 0.60 dB typical	± 0.90 dB, ± 0.60 dB typical	± 0.90 dB, ± 0.60 dB typical
12.3 to 12.75 GHz	± 0.15 dB nominal	± 0.25 dB nominal	± 0.40 dB nominal	± 0.50 dB nominal	± 0.50 dB nominal	± 0.55 dB nominal

Half duplex port (option HDX), –20 dBm ≤ Level ≤ +5 dBm, sample rate = 1.25 x bandwidth

Power level / Center Freq	100 MHz	200 MHz	400 MHz	600 MHz	800 MHz	1.2 GHz
380 to 550 MHz	± 0.70 dB, ± 0.35 dB typical	N/A	N/A	N/A	N/A	N/A
550 to 680 MHz	± 0.60 dB, ± 0.25 dB typical	± 0.70 dB, ± 0.40 dB typical	N/A	N/A	N/A	N/A
680 to 730 MHz	± 0.60 dB, ± 0.25 dB typical	± 0.70 dB, ± 0.40 dB typical	N/A	N/A	N/A	N/A
730 MHz to 1.31 GHz	± 0.65 dB, ± 0.45 dB typical	± 0.75 dB, ± 0.50 dB typical	N/A	N/A	N/A	N/A
1.31 to 1.62 GHz	± 0.70 dB, ± 0.35 dB typical	± 0.75 dB, ± 0.40 dB typical	± 1.00 dB, ± 0.70 dB typical	± 1.15 dB, ± 0.85 dB typical	N/A	N/A
1.62 to 2 GHz	± 0.60 dB, ± 0.25 dB typical	± 0.65 dB, ± 0.25 dB typical	± 0.60 dB, ± 0.20 dB typical	± 0.50 dB, ± 0.35 dB typical	N/A	N/A
2 to 3.5 GHz	± 0.60 dB, ± 0.30 dB typical	± 0.65 dB, ± 0.40 dB typical	± 0.65 dB, ± 0.40 dB typical	± 0.65 dB, ± 0.45 dB typical	± 0.65 dB, ± 0.45 dB typical	± 0.65 dB, ± 0.45 dB typical
3.5 to 4.3 GHz	± 0.60 dB, ± 0.35 dB typical	± 0.65 dB, ± 0.35 dB typical	± 0.70 dB, ± 0.45 dB typical	± 0.75 dB, ± 0.50 dB typical	± 0.80 dB, ± 0.55 dB typical	± 0.80 dB, ± 0.55 dB typical
4.3 to 6 GHz	± 0.65 dB, ± 0.30 dB typical	± 0.70 dB, ± 0.45 dB typical	± 0.85 dB, ± 0.50 dB typical	± 0.75 dB, ± 0.55 dB typical	± 0.75 dB, ± 0.55 dB typical	± 1.10 dB, ± 0.85 dB typical
6 to 9 GHz	± 0.65 dB, ± 0.35 dB typical	± 0.65 dB, ± 0.35 dB typical	± 0.70 dB, ± 0.40 dB typical	± 0.70 dB, ± 0.40 dB typical	± 0.70 dB, ± 0.45 dB typical	± 0.75 dB, ± 0.50 dB typical
9 to 10.2 GHz	± 0.55 dB, ± 0.20 dB typical	± 0.65 dB, ± 0.30 dB typical	± 0.80 dB, ± 0.55 dB typical	± 0.80 dB, ± 0.65 dB typical	± 1.00 dB, ± 0.75 dB typical	± 1.15 dB, ± 0.75 dB typical
10.2 to 12.3 GHz	± 0.55 dB, ± 0.20 dB typical	± 0.65 dB, ± 0.30 dB typical	± 0.80 dB, ± 0.45 dB typical	± 0.75 dB, ± 0.50 dB typical	± 0.80 dB, ± 0.55 dB typical	± 0.80 dB, ± 0.50 dB typical
12.3 to 12.75 GHz	± 0.10 dB nominal	± 0.15 dB nominal	± 0.25 dB nominal	± 0.30 dB nominal	± 0.45 dB nominal	± 0.50 dB nominal

General specifications

Environmental characteristics	
Operating temperature	0 to +45 °C
Storage temperature	–40 to +65 °C
EMC	Complies with European EMC Directive 2014/30/EU • IEC/EN 61326-1 • CISPR 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
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.
Maximum power consumption	126 W nominal
Weight Net	1.5 kg (3.3 lbs)
Dimension (H*W*D)	130.2 mm x 60.5 mm x 209.6 mm
Calibration cycle	1-year, calibration services available through Keysight service center
Warranty	1-year standard

Front panel	
Reference	
Ref In, Ref Out	Frequency: 100 MHz
	Connector: MMPX female, 50 Ω nominal
	Lock range: ± 1 ppm, nominal
	Input amplitude: >+10 dBm, nominal
	Output amplitude: >+10 dBm, nominal
LO reference	
2.4 GHz In, 2.4 GHz Out	Connector: MMPX female, 50 Ω nominal
	Input amplitude: >+10 dBm, nominal
	Output amplitude: >+12 dBm, nominal
RF connections	
RF Input	Connector: 3.5 mm female, 50 Ω nominal
RF Output	Connector: 3.5 mm female, 50 Ω nominal
Half Duplex	Connector: 3.5 mm female, 50 Ω nominal
Trigger connections	
Trigger 1, Trigger 2 (input/output selectable)	Connector: MMPX female
	Input impedance: 1 kΩ or 50 Ω nominal
	Input level range: 0 to +3.3 V
	Output impedance: 50 Ω nominal
	Output level range: 3.3 V LVTTL
DIO connections	
Ctrl M, Ctrl S	Connector: Micro-HDMI female
	Level range: 3.3 V LVTTL, LVDS

Spectrum Analyzer Measurement Application Key Specifications

Absolute Amplitude Accuracy (CW mode)			
RF input port, input level from –70 dBm to +27 dBm			
Frequency range	–70 dBm ≤ Input level < +10 dBm	+10 dBm ≤ Input level ≤ +20 dBm	+20 dBm < Input level ≤ +27 dBm
380 MHz to 1.31 GHz	< ± 0.50 dB, < ± 0.25 dB typical	< ± 0.60 dB, < ± 0.30 dB typical	< ± 1.15 dB, < ± 0.75 dB typical
1.31 to 4.3 GHz	< ± 0.60 dB, < ± 0.30 dB typical	< ± 0.65 dB, < ± 0.30 dB typical	< ± 0.85 dB, < ± 0.55 dB typical
4.3 to 8.4 GHz	< ± 0.65 dB, < ± 0.30 dB typical	< ± 0.65 dB, < ± 0.30 dB typical	< ± 0.80 dB, < ± 0.45 dB typical
8.4 to 12.3 GHz	< ± 0.75 dB, < ± 0.40 dB typical	< ± 0.80 dB, < ± 0.40 dB typical	< ± 1.10 dB, < ± 0.65 dB typical
12.3 to 13.35 GHz	< ± 0.35 dB nominal	< ± 0.50 dB nominal	< ± 0.70 dB nominal
Input voltage standing wave ratio (VSWR)			
RF input port			
380 MHz to 4.3 GHz	< 1.55:1, < 1.4:1 typical		
4.3 to 5.8 GHz	< 1.4:1, < 1.3:1 typical		
5.8 to 7.2 GHz	< 1.8:1, < 1.6:1 typical		
7.2 to 10.2 GHz	< 1.6:1, < 1.4:1 typical		
10.2 to 12.3 GHz	< 2.0:1, < 1.9:1 typical		
Phase noise (CF = 1 GHz)			
1 kHz offset	–116 dBc/Hz, –118 dBc/Hz typical		
10 kHz offset	–132 dBc/Hz, –134 dBc/Hz typical		
100 kHz offset	–136 dBc/Hz, –138 dBc/Hz typical		
1 MHz offset	–136 dBc/Hz, –139 dBc/Hz typical		
10 MHz offset	–141 dBc/Hz, –143 dBc/Hz typical		
Residual responses			
RF input port, with analyzer ranged to +10 dBm			
380 MHz to 9 GHz	< –84 dBm, < –90 dBm typical		
9 to 9.6 GHz	< –84 dBm, < –93 dBm typical		
9.6 to 12.3 GHz	< –95 dBm, < –100 dBm typical		
Displayed Average Noise Floor (DANL) [1]			
RF input port, with analyzer ranged to –70 dBm			
380 MHz to 4.3 GHz	–167 dBm/Hz, –168 dBm/Hz typical		
4.3 to 10.2 GHz	–166 dBm/Hz, –167 dBm/Hz typical		
10.2 to 12.3 GHz	–165 dBm/Hz, –166 dBm/Hz typical		
12.3 to 13.35 GHz	–165 dBm/Hz nominal		
Third-Order Intermodulation Distortion (TOI)			
RF input port, with analyzer ranged to 0 dBm			
380 MHz to 4.3 GHz	+23 dBm, +25 dBm typical		
4.3 to 6 GHz	+23 dBm, +25 dBm typical		
6 to 12.3 GHz	+21 dBm, +23 dBm typical		

1. Input terminated, log power average, SW preselection off, and normalized to 1 Hz bandwidth.

Noise Figure Measurement Application Key Specifications

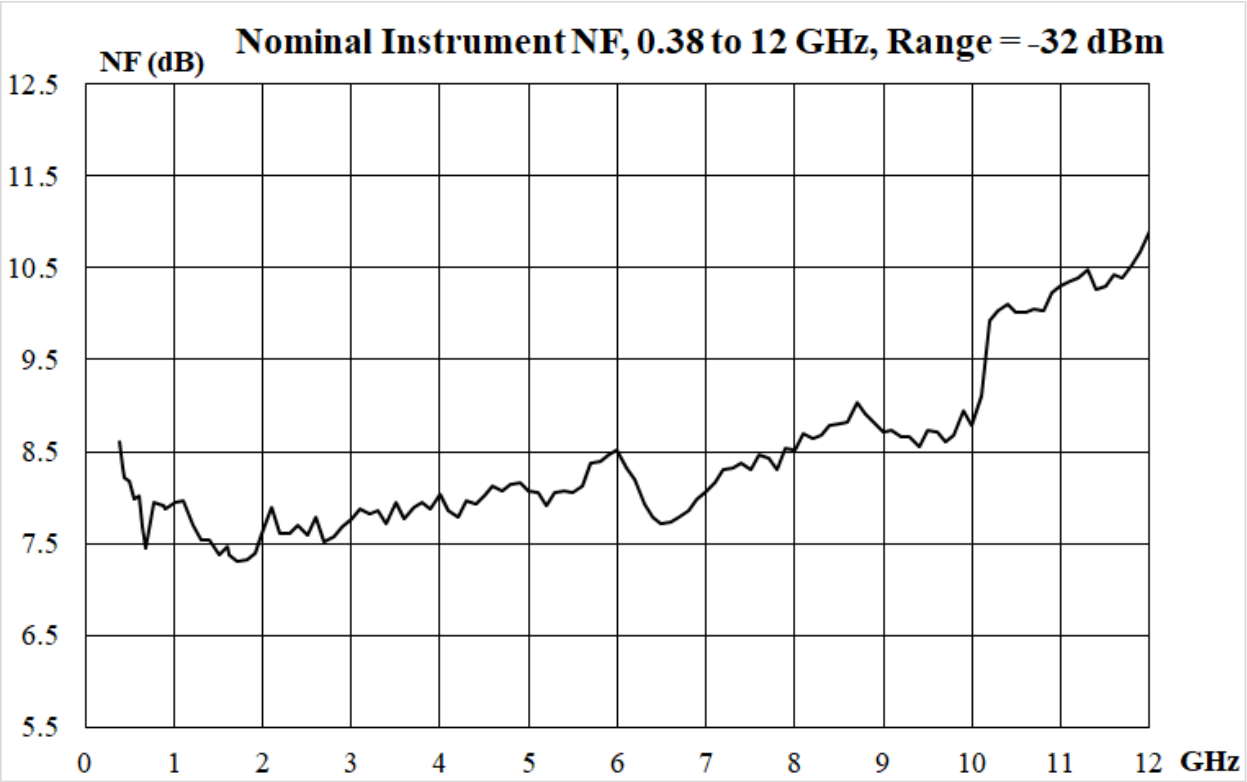

Figure 4. Nominal instrument noise figure

WLAN Measurement Application Key Specifications

Modulated power		
Absolute power accuracy	± 0.4 dB nominal at 0 dBm input power	
Error Vector Magnitude (EVM)		
EVM floor conditions Phase Tracking on, Eq Smoothing on, Eq Training Seq only, RF output loopback to RF input, at –20 dBm input power, optimized range, rms-EVM, nominal		
802.11ac 5.8 GHz 80 MHz	< –51 dB	
802.11ac 5.8 GHz 160 MHz	< –50 dB	
802.11ax 5.8 GHz 80 MHz	< –52 dB	
802.11ax 5.8 GHz 160 MHz	< –50 dB	
802.11ax 7 GHz 80 MHz	< –51 dB	
802.11ax 7 GHz 160 MHz	< –50 dB	
EVM floor conditions Phase Tracking on, Eq Smoothing on, Eq Training Seq only, RF output loopback to RF input, at –15 dBm input power, optimized range, nominal		
	rms-EVM	nc-EVM [1]
802.11be, 5 GHz, 160 MHz, 1024 QAM	< –50 dB	
802.11be, 5.8 GHz, 160 MHz, 1024 QAM	< –51 dB	
802.11be, 7 GHz, 160 MHz, 1024 QAM	< –50 dB	
802.11be, 5 GHz, 320 MHz, 4096 QAM	< –46 dB	< –51.9 dB
802.11be, 5.8 GHz, 320 MHz, 4096 QAM	< –47 dB	< –52.0 dB
802.11be, 7 GHz, 320 MHz, 4096 QAM	< –47 dB	< –51.9 dB

WLAN Source Key Specifications

Error Vector Magnitude (EVM)		
RF output port, at –5 dBm to –15 dBm output power, nominal		
802.11ac 5.8 GHz 80 MHz	< –51 dB	
802.11ac 5.8 GHz 160 MHz	< –50 dB	
802.11ax 5.8 GHz 80 MHz	< –52 dB	
802.11ax 5.8 GHz 160 MHz	< –50 dB	
802.11ax 7 GHz 80 MHz	< –51 dB	
802.11ax 7 GHz 160 MHz	< –49 dB	
EVM floor conditions Phase Tracking on, Eq Smoothing on, Eq Training Seq only, RF output loopback to RF input, at –15 dBm input power, optimized range, nominal		
	rms-EVM	nc-EVM
802.11be, 5 GHz, 160 MHz, 1024 QAM	< –50 dB	
802.11be, 5.8 GHz, 160 MHz, 1024 QAM	< –51 dB	
802.11be, 7 GHz, 160 MHz, 1024 QAM	< –50 dB	
802.11be, 5 GHz, 320 MHz, 4096 QAM	< –46 dB	< –51.9 dB
802.11be, 5.8 GHz, 320 MHz, 4096 QAM	< –47 dB	< –52.0 dB
802.11be, 7 GHz, 320 MHz, 4096 QAM	< –47 dB	< –51.9 dB

1. nc-EVM: noise corrected EVM, is a technique to improve EVM by compensating analyzer's noise in EVM domain.

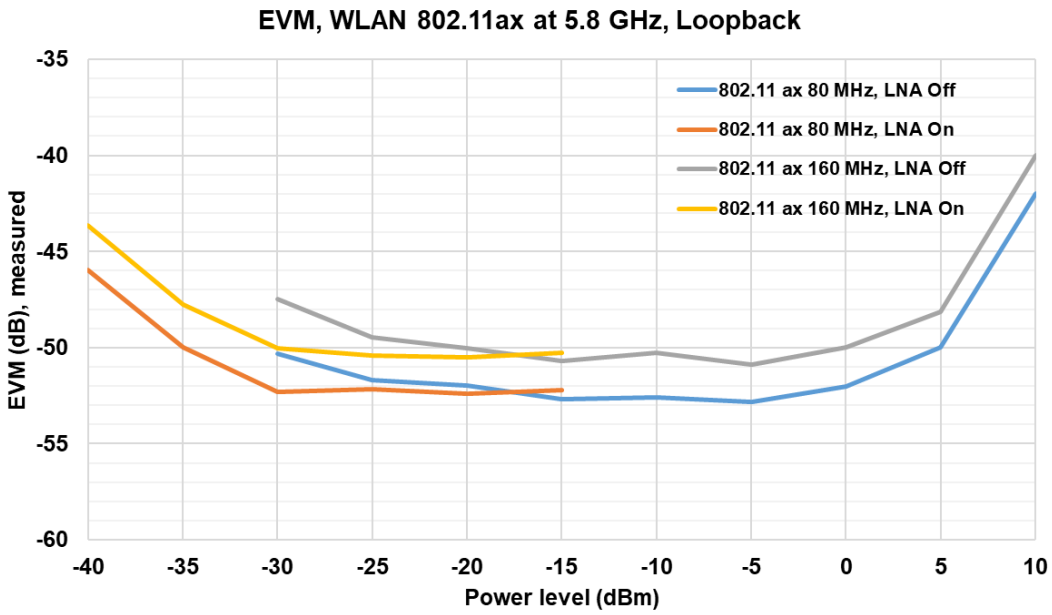

Figure 5. WLAN 802.11ax EVM vs. output power level at 5.8 GHz, loopback

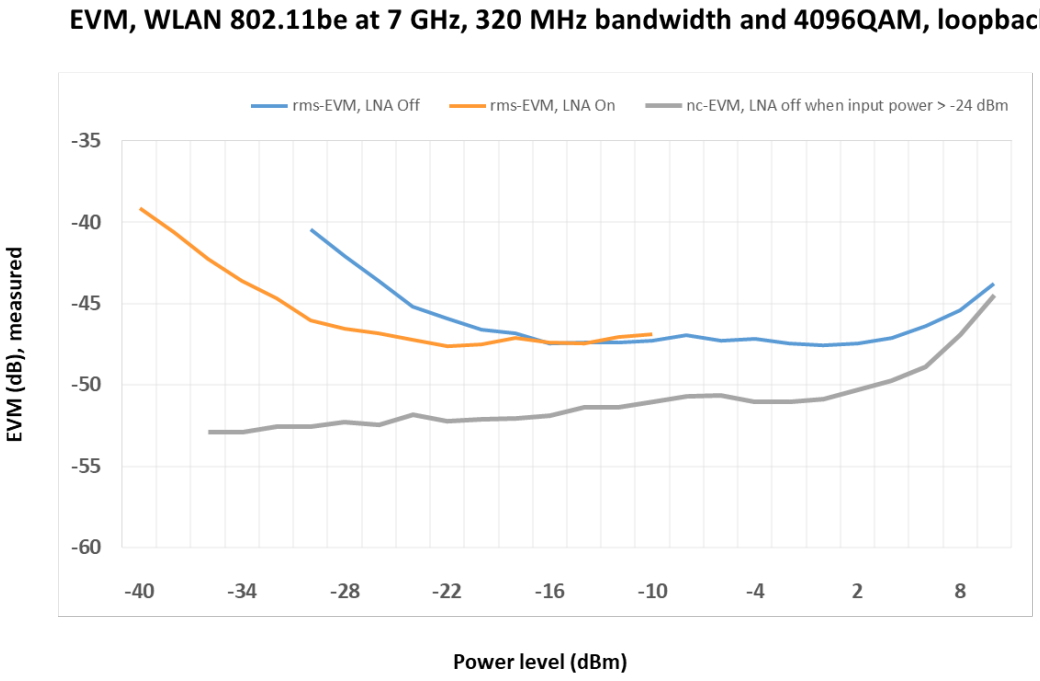

Figure 6. WLAN 802.11be EVM vs. output power level at 7 GHz, loopback

5G NR Measurement Application Specifications

Transmit power	
Absolute power accuracy	± 0.35 dB nominal at 0 dBm input power
Error Vector Magnitude (EVM)	
Residual EVM, at –10 dBm or 0 dBm input power	
30 kHz SCS, 4 GHz, 100 MHz (256QAM)	0.33%
30 kHz SCS, 5 GHz, 100 MHz (256QAM)	0.38%
30 kHz SCS, 7 GHz, 100 MHz (256QAM)	0.46%
30 kHz SCS, 12 GHz, 100 MHz (256QAM)	0.42%
Residual EVM, RF output loopback to RF input, at –5 dBm input power	
120 kHz SCS, 4 GHz, 200 MHz (256QAM)	0.28% nominal
120 kHz SCS, 5 GHz, 200 MHz (256QAM)	0.36% nominal
120 kHz SCS, 7 GHz, 200 MHz (256QAM)	0.35% nominal
120 kHz SCS, 12.3 GHz, 200 MHz (256QAM)	0.41% nominal
Residual EVM, RF output loopback to RF input, at –10 dBm input power	
120 kHz SCS, 4 GHz, 400 MHz (256QAM)	0.42% nominal
120 kHz SCS, 5 GHz, 400 MHz (256QAM)	0.50% nominal
120 kHz SCS, 7 GHz, 400 MHz (256QAM)	0.43% nominal
120 kHz SCS, 11 GHz, 400 MHz (256QAM)	0.50% nominal
120 kHz SCS, 7 GHz, 100 MHz 8CC (256QAM)	0.65% nominal
120 kHz SCS, 12.3 GHz, 100 MHz 8CC (256QAM)	0.74% nominal
Adjacent channel power	
RF input port, at –10 dBm or 0 dBm input power, LNA off, noise correction on	
30 kHz SCS, 4 GHz, 100 MHz (256QAM)	–66 dBc typical
30 kHz SCS, 5 GHz, 100 MHz (256QAM)	–66 dBc typical

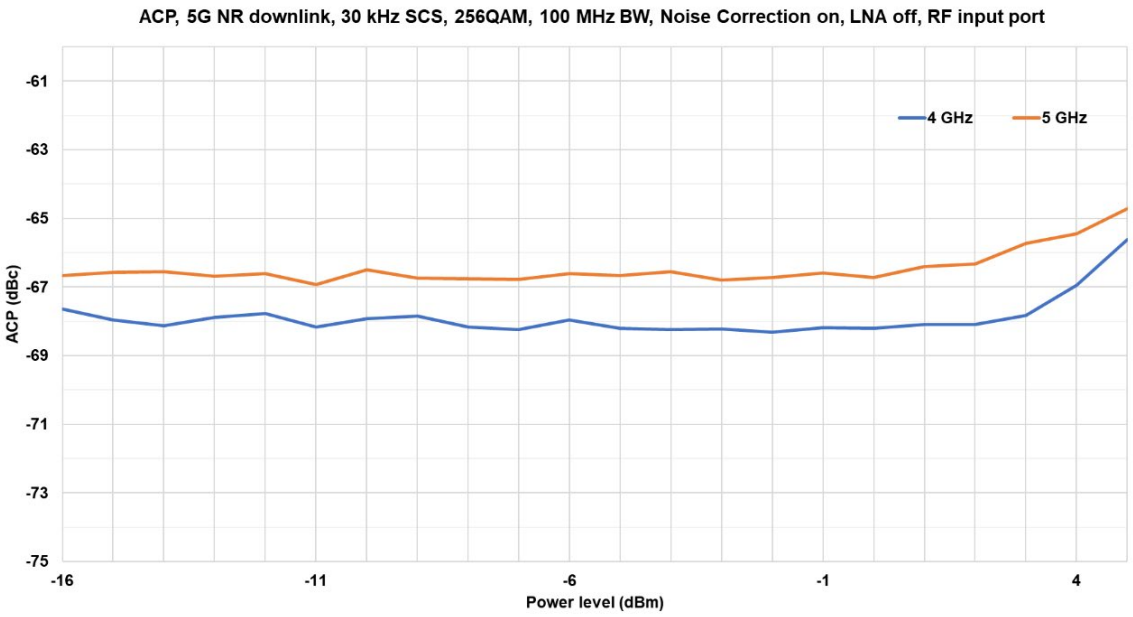

Figure 7. 5G NR downlink ACP vs. input power level, noise correction on, LNA off, 100 MHz bandwidth, 30 kHz SCS, 256QAM.

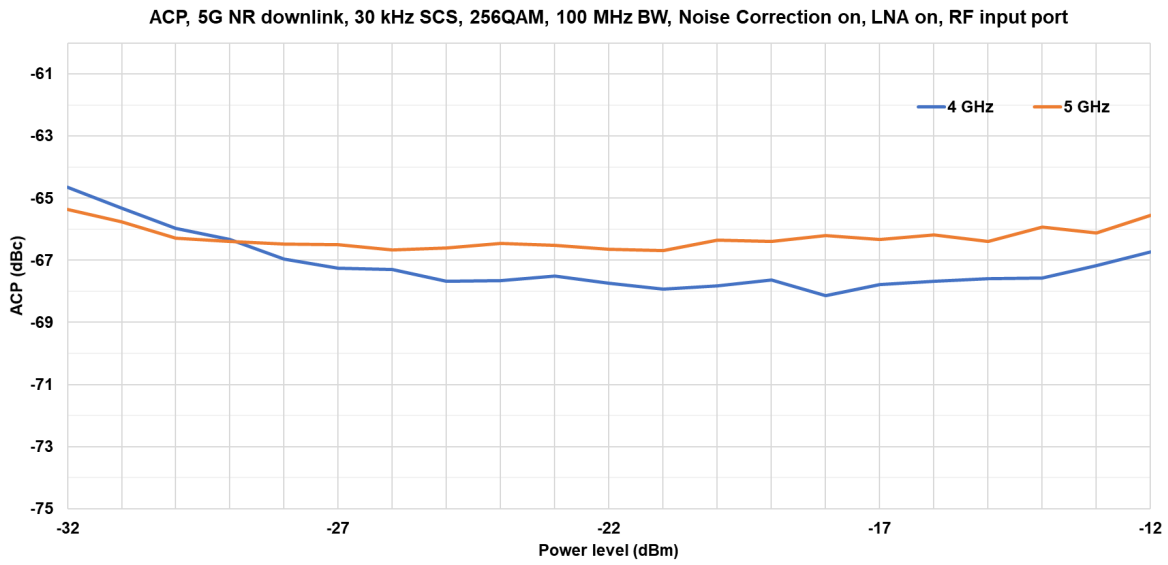

Figure 8. 5G NR downlink ACP vs. input power level, noise correction on, LNA on, 100 MHz bandwidth, 30 kHz SCS, 256QAM.

5G NR Source Key Specifications

Modulated signal level accuracy	
600 MHz to 12.3 GHz	±0.45 dB
Error Vector Magnitude (EVM)	
Composite EVM, RF output port, half duplex port, at –10 dBm output power	
30 kHz SCS, 4 GHz, 100 MHz (256QAM)	0.28%, 0.24% typical
30 kHz SCS, 5 GHz, 100 MHz (256QAM)	0.28%, 0.26% typical
30 kHz SCS, 7 GHz, 100 MHz (256QAM)	0.30%, 0.27% typical
30 kHz SCS, 12 GHz, 100 MHz (256QAM)	0.40%, 0.35% typical
Composite EVM, RF output port, at 0 dBm output power	
30 kHz SCS, 4 GHz, 100 MHz (256QAM)	0.33%, 0.28% typical
30 kHz SCS, 5 GHz, 100 MHz (256QAM)	0.33%, 0.29% typical
30 kHz SCS, 7 GHz, 100 MHz (256QAM)	0.33%, 0.29% typical
30 kHz SCS, 12 GHz, 100 MHz (256QAM)	0.67%, 0.56% typical
Composite EVM, RF output loopback to RF input, at –5 dBm output power	
120 kHz SCS, 4 GHz, 200 MHz (256QAM)	0.28% nominal
120 kHz SCS, 5 GHz, 200 MHz (256QAM)	0.36% nominal
120 kHz SCS, 7 GHz, 200 MHz (256QAM)	0.35% nominal
120 kHz SCS, 12.3 GHz, 200 MHz (256QAM)	0.41% nominal
Composite EVM, RF output loopback to RF input, at –10 dBm output power	
120 kHz SCS, 4 GHz, 400 MHz (256QAM)	0.42% nominal
120 kHz SCS, 5 GHz, 400 MHz (256QAM)	0.50% nominal
120 kHz SCS, 7 GHz, 400 MHz (256QAM)	0.43% nominal
120 kHz SCS, 11 GHz, 400 MHz (256QAM)	0.50% nominal
120 kHz SCS, 7 GHz, 100 MHz 8CC (256QAM)	0.65% nominal
120 kHz SCS, 12.3 GHz, 100 MHz 8CC (256QAM)	0.74% nominal

Adjacent channel power	
RF output port, at –10 dBm output power	
30 kHz SCS, 4 GHz, 100 MHz (256QAM)	–59.5 dBc, –60.5 dBc typical
30 kHz SCS, 5 GHz, 100 MHz (256QAM)	–55.0 dBc, –56.0 dBc typical
30 kHz SCS, 7 GHz, 100 MHz (256QAM)	–57.0 dBc, –58.0 dBc typical
30 kHz SCS, 12 GHz, 100 MHz (256QAM)	–53.0 dBc, –55.5 dBc typical
RF output port, at 0 dBm output power	
30 kHz SCS, 4 GHz, 100 MHz (256QAM)	–57.0 dBc, –58.5 dBc typical
30 kHz SCS, 5 GHz, 100 MHz (256QAM)	–55.0 dBc, –56.0 dBc typical
30 kHz SCS, 7 GHz, 100 MHz (256QAM)	–55.5 dBc, –56.5 dBc typical
30 kHz SCS, 12 GHz, 100 MHz (256QAM)	–49.0 dBc, –50.5 dBc typical
RF output port, at –10 dBm output power	
120 kHz SCS, 4 GHz, 200 MHz (256QAM)	–58.0 dBc nominal
120 kHz SCS, 5 GHz, 200 MHz (256QAM)	–54.0 dBc nominal
120 kHz SCS, 7 GHz, 200 MHz (256QAM)	–56.5 dBc nominal
120 kHz SCS, 11 GHz, 200 MHz (256QAM)	–54.5 dBc nominal
120 kHz SCS, 4 GHz, 400 MHz (256QAM)	–54.0 dBc nominal
120 kHz SCS, 5 GHz, 400 MHz (256QAM)	–51.0 dBc nominal
120 kHz SCS, 7 GHz, 400 MHz (256QAM)	–52.0 dBc nominal
120 kHz SCS, 11 GHz, 400 MHz (256QAM)	–52.0 dBc nominal
120 kHz SCS, 7 GHz, 100 MHz 8CC (256QAM)	–50.5 dBc nominal
120 kHz SCS, 11 GHz, 100 MHz 8CC (256QAM)	–49.0 dBc nominal

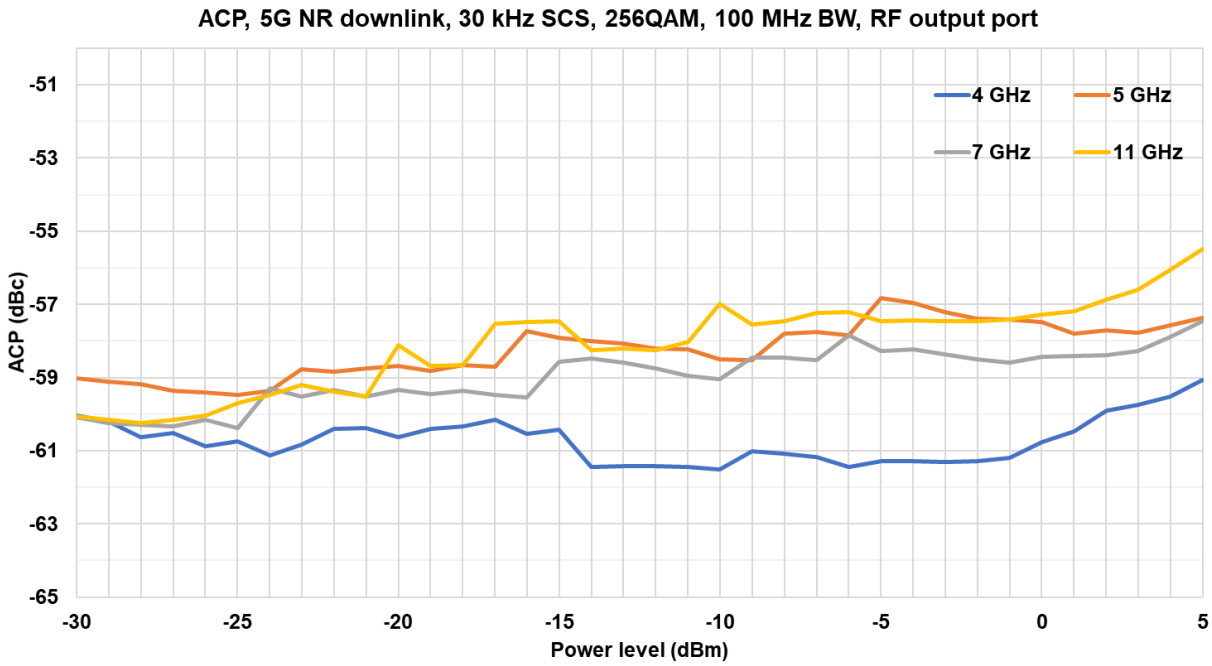

Figure 9. 5G NR downlink ACP vs. output power level, 100 MHz bandwidth, 30 kHz SCS, 256QAM.

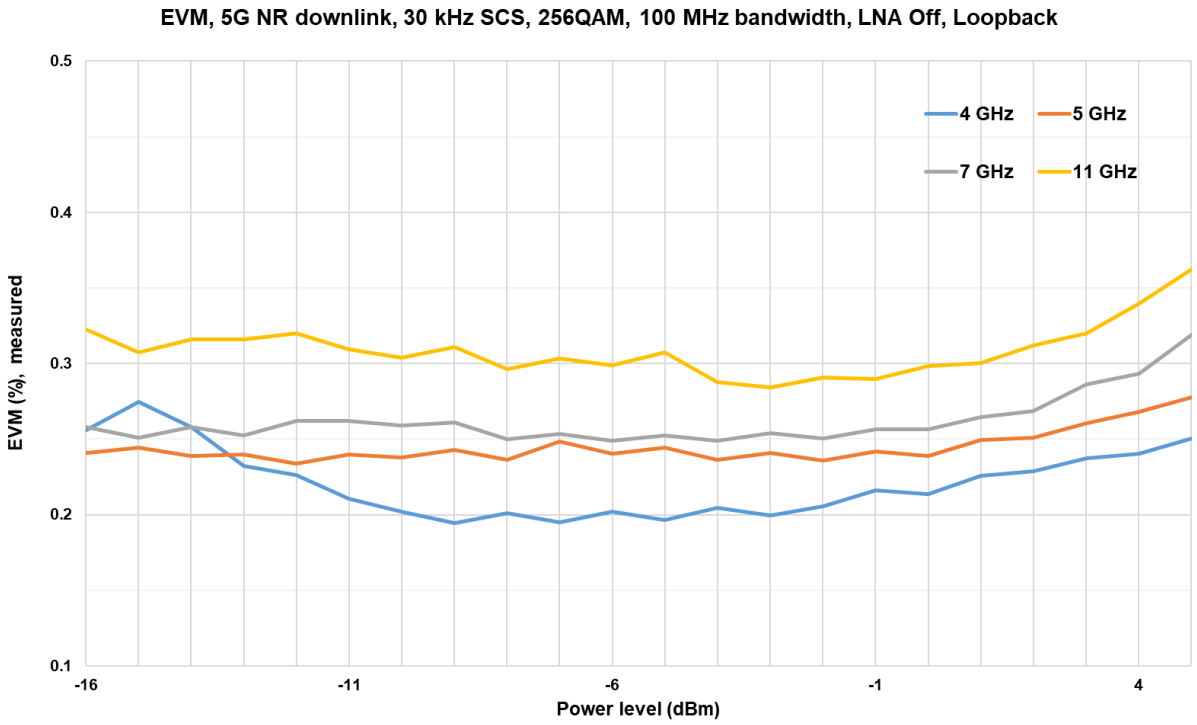

Figure 10. 5G NR downlink EVM vs. output power level, LNA off, loopback, with 100 MHz bandwidth, 30 kHz SCS, 256QAM.

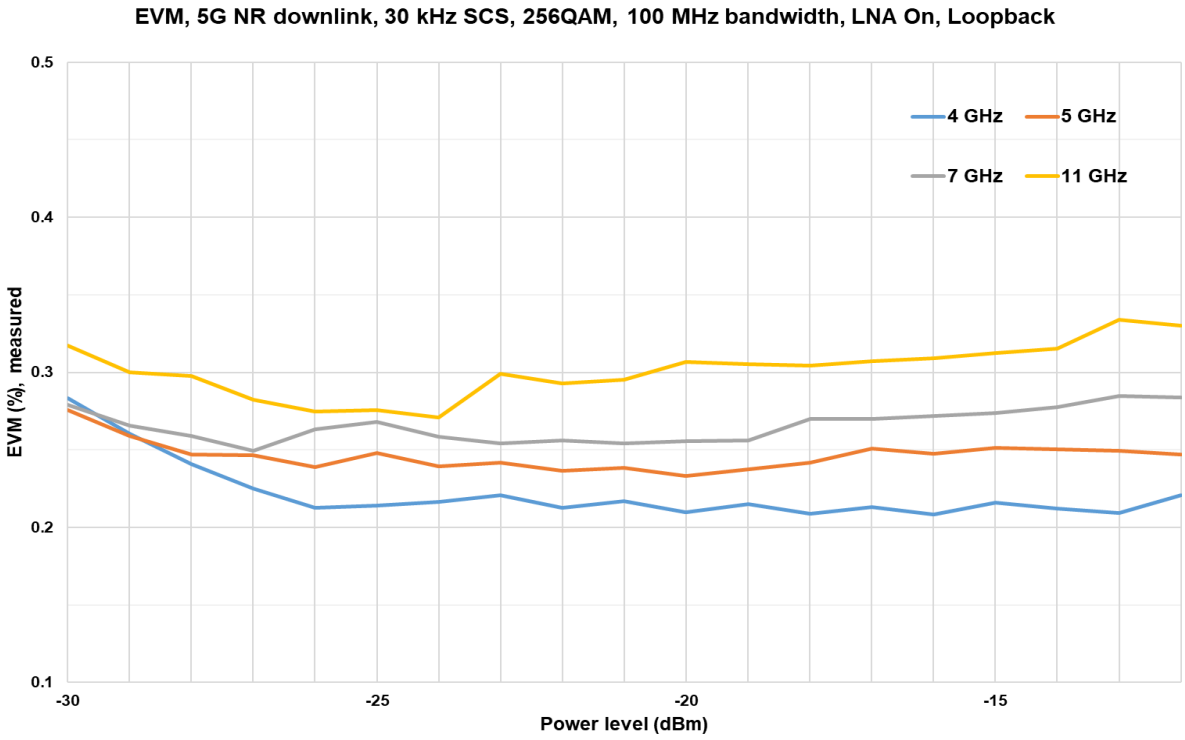

Figure 11. 5G NR downlink EVM vs. output power level, LNA on, loopback, with 100 MHz bandwidth, 30 kHz SCS, 256QAM.

LTE/LTE-Advanced FDD & LTE/LTE-Advanced TDD Measurement Application Specifications [1]

Error Vector Magnitude (EVM)				
Residual EVM, at –10 dBm or 0 dBm input power				
900 MHz	5 MHz bandwidth	0.21% downlink, 0.19% uplink		
	20 MHz bandwidth	0.24% downlink, 0.26% uplink		
2000 MHz	5 MHz bandwidth	0.21% downlink, 0.22% uplink		
	20 MHz bandwidth	0.29% downlink, 0.26% uplink		
Adjacent channel power				
RF input port; Option HDX, half duplex port; at –10 dBm or 0 dBm input power				
FDD	E-UTRA (Uplink and downlink)	900 MHz, 2000 MHz	5 MHz bandwidth, 20 MHz bandwidth	–63 dBc typical
FDD	UTRA (Uplink and downlink)	900 MHz, 2000 MHz	5 MHz bandwidth, 20 MHz bandwidth	–69 dBc typical
TDD	E-UTRA (Uplink and downlink)	900 MHz, 2000 MHz	5 MHz bandwidth, 20 MHz bandwidth	–62 dBc typical
TDD	UTRA (Uplink and downlink)	900 MHz, 2000 MHz	5 MHz bandwidth, 20 MHz bandwidth	–68 dBc typical

1. For frequencies from 695 to 3800 MHz.

LTE Source Key Specifications

Modulated signal level accuracy				
410 MHz to 3.3 GHz			±0.51 dB	
3.3 to 5.8 GHz			±0.66 dB	
Error Vector Magnitude (EVM)				
Composite EVM, RF output port, half duplex port, at –10 dBm or 0 dBm output power				
FDD	900 MHz	5 MHz bandwidth	< 0.24%	
		20 MHz bandwidth	< 0.35%	
	2000 MHz	5 MHz bandwidth	< 0.28%	
		20 MHz bandwidth	< 0.39%	
TDD	900 MHz	5 MHz bandwidth	< 0.32%	
		20 MHz bandwidth	< 0.29%	
	2000 MHz	5 MHz bandwidth	< 0.35%	
		20 MHz bandwidth	< 0.34%	
Adjacent channel power				
RF output port, half duplex port, at –10 dBm output power			**Adjacent**	**Alternate**
FDD	900 MHz	5 MHz bandwidth	–67 dBc	–69 dBc
		20 MHz bandwidth	–62 dBc	–63 dBc
	2000 MHz	5 MHz bandwidth	–66 dBc	–70 dBc
		20 MHz bandwidth	–65 dBc	–66 dBc
TDD	900 MHz	5 MHz bandwidth	–66 dBc	–68 dBc
		20 MHz bandwidth	–62 dBc	–63 dBc
	2000 MHz	5 MHz bandwidth	–65 dBc	–69 dBc
		20 MHz bandwidth	–64 dBc	–66 dBc
RF output port, half duplex port, at 0 dBm output power			**Adjacent**	**Alternate**
FDD	900 MHz	5 MHz bandwidth	–64 dBc	–68 dBc
		20 MHz bandwidth	–62 dBc	–62 dBc
	2000 MHz	5 MHz bandwidth	–63 dBc	–70 dBc
		20 MHz bandwidth	–62 dBc	–66 dBc
TDD	900 MHz	5 MHz bandwidth	–63 dBc	–68 dBc
		20 MHz bandwidth	–62 dBc	–63 dBc
	2000 MHz	5 MHz bandwidth	–62 dBc	–70 dBc
		20 MHz bandwidth	–62 dBc	–66 dBc

W-CDMA/HSPA+ Measurement Application Key Specifications [1]

Channel power	
Absolute power accuracy	±0.1 dB nominal at 0 dBm input power
QPSK EVM	
Residual EVM	0.7% nominal at –10 dBm input power
Adjacent Channel Power Ratio (ACPR)	
Residual relative power in 3.84 MHz BW	
5 MHz offset	–66 dBc nominal at 0 dBm input power
Spectrum Emission Mask (SEM)	
Residual relative power (offset), at 0 dBm input power	
Downlink	
2.515 to 2.715 MHz	–83 dBc nominal in a 30 kHz BW
2.715 to 3.515 MHz	–85 dBc nominal in a 1 MHz BW
3.515 to 4 MHz	–85 dBc nominal in a 1 MHz BW
4 to 8 MHz	–71 dBc nominal in a 1 MHz BW
8 to 12.5 MHz	–72 dBc nominal in a 1 MHz BW
Uplink	
2.515 to 3.485 MHz	–84 dBc nominal in a 30 kHz BW
4 to 7.5 MHz	–72 dBc nominal in a 1 MHz BW
7.5 to 8.5 MHz	–73 dBc nominal in a 1 MHz BW
8.5 to 12 MHz	–73 dBc nominal in a 1 MHz BW

W-CDMA/HSPA+ Source Key Specifications

Error Vector Magnitude (EVM) [1]			
Composite EVM, RF output port, half duplex port, at 0 dBm output power			
RMS	< 0.6% nominal		
Adjacent Channel Leakage Ratio (ACLR), RF output port, half duplex port, at 0 dBm output power			
Offset	**Configuration**	**Frequency (MHz)**	**ACLR**
Adjacent 5 MHz	1 DPCH 1 carrier	900	–66 dB nominal
Adjacent 10 MHz			–69 dB nominal
Adjacent 5 MHz		1800 to 2000	–65 dB nominal
Adjacent 10 MHz			–71 dB nominal
Adjacent 5 MHz	64 DPCH 1 carrier	900	–67 dB nominal
Adjacent 10 MHz			–69 dB nominal
Adjacent 5 MHz		1800 to 2000	–66 dB nominal
Adjacent 10 MHz			–72 dB nominal

1. For frequencies from 730 MHz to 2650 MHz.

GSM/EDGE/Evo Measurement Application Key Specifications [1]

Power versus time (PvT)	
Absolute power accuracy	± 0.28 dB nominal at 0 dBm input power
Phase error (GMSK modulation)	
Average floor	0.4° nominal at 0 dBm input power
EDGE error vector magnitude (EVM)	
RMS floor	0.30% nominal at 0 dBm input power
Peak floor	0.37% nominal at 0 dBm input power
Output RF spectrum (ORFS for GMSK and 8PSk modulation)	
Residual relative power, spectrum due to modulation, at 0 dBm input power	
Offset frequency	
600 kHz	–80 dBc nominal
1.2 MHz	–83 dBc nominal
1.8 MHz	–79 dBc nominal
Residual relative power, spectrum due to switching, at 0 dBm input power	
Offset frequency	
600 kHz	–73 dBc nominal
1.2 MHz	–75 dBc nominal
1.8 MHz	–76 dBc nominal

GSM/EDGE/Evo Source Key Specifications [2]

Signal quality	
Phase error (GMSK), RF output port, Half duplex port	
RMS	< 0.2° nominal at 0 dBm output power
Peak	< 0.3° nominal at 0 dBm output power
EVM (EDGE)	
RMS	< 0.1% nominal at 0 dBm output power
Output RF spectrum (ORFS for GMSK and 8PSK modulation)	
Residual relative power, spectrum due to modulation, RF output port, Half duplex port, at 0 dBm output power	
Offset	GSM
200 kHz	–34 dBc nominal
400 kHz	–68 dBc nominal
600 kHz	–77 dBc nominal
1200 kHz	–75 dBc nominal
1800 kHz	–71 dBc nominal

1. For frequencies from 450 to 490 MHz, 820 to 920 MHz, and 1710 to 1790 MHz.
2. For frequencies from 380 to 490 MHz, 695 to 960 MHz, and 1425 to 2180 MHz.

Related Literature

For more detailed product and specification information refer to the following literature and web pages:

- M9415A VXT PXIe Vector Transceiver Configuration Guide (literature no. 3120-1477EN)
- M9019B PXIe 18 slot Chassis Data Sheet (literature no. 5992-1481EN)
- M9038A PXIe High Performance Embedded Controller Data Sheet (literature no. 3122-1717EN)
- M9300A PXIe Frequency Reference Data Sheet (literature no. 5991-0898EN)
- X-Series Measurement Applications Brochure (literature no. 5989-8019EN)
- Signal Studio Software Brochure (literature no. 5989-6448EN)