DATA SHEET

M9421A VXT PXIe Vector Transceiver

60 MHz to 3.8, or 6 GHz

4TECT
ООО «4ТЕСТ»
Телефон: +7 (499) 685-4444
info@4test.ru
www.4test.ru

KEYSIGHT TECHNOLOGIES

Table of Contents

Overview

Compress time, compress test

The best solution for a specific problem is a focused tool you simply fine-tune. Keysight's M9421A PXIe vector transceiver (VXT) is purpose-built for rapid solution creation and faster throughput in manufacturing test of wireless components, power amplifiers, and RF front-end modules. With FPGA-accelerated measurements and deep software, the ready-to-run VXT lets you start closer to your finish line.

Product description

The M9421A VXT is a four-slot PXIe vector signal generator and analyzer, ranging from 60 MHz to 3.8 or 6 GHz with modulation and analysis bandwidth up to 160 MHz. Up to four VXT's can be configured in a single 18-slot PXI chassis, with only a single M9300A frequency reference required. Alternatively, a versatile single-chassis custom solution can be created from Keysight's modular portfolio, dramatically reducing test footprint.

Applications

– Power amplifier and front-end-module design validation and manufacturing
– Radio transceiver design validation and production test
– Development, design validation, and manufacturing test for radios and other IoT connected devices

Reference solutions

Application-specific reference solutions, a combination of recommended hardware, software, and measurement expertise, provide the essential components of a test system. The following reference solutions include the M9421A PXIe VXT vector transceiver as a hardware component:

– RF power amplifier/front end module characterization and test, Reference Solution for the industry's fastest power amplifier test solution including rapid waveform download, tight synchronization, automated calibration, and FPGA-accelerated power servo and fast power measurements. For more information, see www.keysight.com/find/solution-padvt

M9421A VXT PXIe vector transceiver placed inside the M9018A PXIe chassis

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 40 to 65 °C for individual module temperature, as reported by the module, and 20 to 35 °C for environment temperature unless otherwise noted
- Calibrated instrument has been stored for a minimum of 2 hours within the allowed operating range
- If 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
- Calibration cycle maintained
- An ALL Alignment has been run:
  - Within the previous 3 days
  - If the temperature has changed more than 5 °C from the previous "ALL" alignment

Typical describes 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, shown in italics, 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 45 °C.

Vector Signal Analyzer Performance

Performance		
Capture depth		
Standard	256 MSa of IQ data	
Option M9421A-M05	512 MSa of IQ data	
Frequency and Time Specifications		
Frequency range		
Option M9421A-504	60 MHz to 3.8 GHz	
Option M9421A-506	60 MHz to 6 GHz	
Frequency Reference		
Accuracy, aging rate, stability	refer to M9300A specifications	
CW Measurement Frequency Accuracy		
Accuracy	(Transmitter frequency x frequency reference accuracy) *± 50 Hz typically*	
Resolution	*1 Hz typical*	
Analysis Bandwidth		
Maximum bandwidth Standard	60 to 70 MHz 70 to 80 MHz 80 MHz to 6 GHz	10 MHz 20 MHz 40 MHz
Option M9421A-B85	60 to 70 MHz 70 to 80 MHz 80 to 230 MHz 230 MHz to 6 GHz	10 MHz 20 MHz 40 MHz 80 MHz
Option M9421A-B1X	60 to 70 MHz 70 to 80 MHz 80 to 230 MHz 230 to 400 MHz 400 MHz to 6 GHz	10 MHz 20 MHz 40 MHz 80 MHz 160 MHz
Triggering		
Trigger IQ analyzer	Free run, external 1, external 2, RF burst, video, periodic, PXI, internal	
Trigger delay range	–150 to 500 ms	
Resolution	0.1 µs	
Amplitude Accuracy and Range Specifications		
Maximum average power input		
RF input port	+27 dBm	
Option M9421A-HDX, Half duplex port	+30 dBm	

CW absolute amplitude accuracy

RF input port (in specified frequencies)

Frequency Range	Input level ≤ –8 dBm to –70 dBm	Input level > –8 dBm to +24 dBm
60 MHz to 230 MHz	< ± 0.55 dB, *< ± 0.20 dB typical*	< ± 0.65 dB, *< ± 0.30 dB typical*
230 MHz to 400 MHz		
40 MHz BW	< ± 0.55 dB, *< ± 0.20 dB typical*	< ± 0.55 dB, *< ± 0.25 dB typical*
80 MHz BW	< ± 0.65 dB, *< ± 0.35 dB typical*	< ± 0.70 dB, *< ± 0.30 dB typical*
400 MHz to 510 MHz		
40 MHz BW	< ± 0.50 dB, *< ± 0.15 dB typical*	< ± 0.55 dB, *< ± 0.25 dB typical*
80 MHz BW	< ± 0.65 dB, *< ± 0.35 dB typical*	< ± 0.70 dB, *< ± 0.30 dB typical*
160 MHz BW	< ± 0.60 dB, *< ± 0.25 dB typical*	< ± 0.70 dB, *< ± 0.35 dB typical*
510 MHz to 820 MHz		
40 MHz BW	< ± 0.45 dB, *< ± 0.20 dB typical*	< ± 0.55 dB, *< ± 0.30 dB typical*
80 MHz BW	< ± 0.55 dB, *< ± 0.20 dB typical*	< ± 0.50 dB, *< ± 0.20 dB typical*
160 MHz BW	< ± 0.50 dB, *< ± 0.20 dB typical*	< ± 0.50 dB, *< ± 0.20 dB typical*
820 MHz to 1000 MHz		
40 MHz BW	< ± 0.50 dB, *< ± 0.20 dB typical*	< ± 0.50 dB, *< ± 0.30 dB typical*
80 MHz BW	< ± 0.45 dB, *< ± 0.15 dB typical*	< ± 0.50 dB, *< ± 0.20 dB typical*
160 MHz BW	< ± 0.50 dB, *< ± 0.15 dB typical*	< ± 0.60 dB, *< ± 0.25 dB typical*
1000 MHz to 2110 MHz		
40 MHz BW	< ± 0.50 dB, *< ± 0.20 dB typical*	< ± 0.65 dB, *< ± 0.35 dB typical*
80 MHz BW	< ± 0.60 dB, *< ± 0.25 dB typical*	< ± 0.60 dB, *< ± 0.20 dB typical*
160 MHz BW	< ± 0.60 dB, *< ± 0.20 dB typical*	< ± 0.60 dB, *< ± 0.25 dB typical*
2110 MHz to 3200 MHz		
40 MHz BW	< ± 0.60 dB, *< ± 0.25 dB typical*	< ± 0.70 dB, *< ± 0.35 dB typical*
80 MHz BW	< ± 0.65 dB, *< ± 0.30 dB typical*	< ± 0.60 dB, *< ± 0.20 dB typical*
160 MHz BW	< ± 0.65 dB, *< ± 0.30 dB typical*	< ± 0.70 dB, *< ± 0.30 dB typical*
3200 MHz to 3310 MHz		
40 MHz BW	< ± 0.65 dB, *< ± 0.25 dB typical*	< ± 0.70 dB, *< ± 0.40 dB typical*
80 MHz BW	< ± 0.65 dB, *< ± 0.30 dB typical*	< ± 0.70 dB, *< ± 0.25 dB typical*
160 MHz BW	< ± 0.70 dB, *< ± 0.30 dB typical*	< ± 0.85 dB, *< ± 0.40 dB typical*
3310 MHz to 3620 MHz		
40 MHz BW	< ± 0.70 dB, *< ± 0.35 dB typical*	< ± 0.65 dB, *< ± 0.35 dB typical*
80 MHz BW	< ± 0.70 dB, *< ± 0.35 dB typical*	< ± 0.65 dB, *< ± 0.25 dB typical*
160 MHz BW	< ± 0.70 dB, *< ± 0.35 dB typical*	< ± 0.75 dB, *< ± 0.40 dB typical*
3620 MHz to 3900 MHz		
40 MHz BW	< ± 0.65 dB, *< ± 0.35 dB typical*	< ± 0.70 dB, *< ± 0.40 dB typical*
80 MHz BW	< ± 0.65 dB, *< ± 0.45 dB typical*	< ± 0.70 dB, *< ± 0.30 dB typical*
160 MHz BW	< ± 0.70 dB, *< ± 0.30 dB typical*	< ± 0.85 dB, *< ± 0.40 dB typical*
3900 MHz to 4500 MHz		
40 MHz BW	< ± 0.80 dB, *< ± 0.40 dB typical*	< ± 1.00 dB, *< ± 0.55 dB typical*
80 MHz BW	< ± 0.80 dB, *< ± 0.35 dB typical*	< ± 0.80 dB, *< ± 0.30 dB typical*
160 MHz BW	< ± 0.70 dB, *< ± 0.35 dB typical*	< ± 0.80 dB, *< ± 0.35 dB typical*
4500 MHz to 6000 MHz		
40 MHz BW	< ± 0.90 dB, *< ± 0.40 dB typical*	< ± 1.00 dB, *< ± 0.55 dB typical*
80 MHz BW	< ± 0.80 dB, *< ± 0.35 dB typical*	< ± 0.80 dB, *< ± 0.35 dB typical*
160 MHz BW	< ± 0.80 dB, *< ± 0.35 dB typical*	< ± 0.80 dB, *< ± 0.35 dB typical*

Half duplex port, Option M9421A-HDX (in specified frequencies)		
Frequency range	Input level ≤ –8 dBm to –70 dBm	Input level > –8 dBm to +24 dBm
60 MHz to 230 MHz	< ± 0.50 dB, *< ± 0.20 dB typical*	< ± 0.55 dB, *< ± 0.25 dB typical*
230 MHz to 400 MHz	< ± 0.55 dB, *< ± 0.25 dB typical*	< ± 0.60 dB, *< ± 0.30 dB typical*
400 MHz to 510 MHz		
40 MHz BW	< ± 0.50 dB, *< ± 0.20 dB typical*	< ± 0.55 dB, *< ± 0.25 dB typical*
80 MHz BW	< ± 0.50 dB, *< ± 0.15 dB typical*	< ± 0.60 dB, *< ± 0.25 dB typical*
160 MHz BW	< ± 0.60 dB, *< ± 0.25 dB typical*	< ± 0.65 dB, *< ± 0.30 dB typical*
510 MHz to 820 MHz	< ± 0.50 dB, *< ± 0.20 dB typical*	< ± 0.55 dB, *< ± 0.25 dB typical*
820 MHz to 1000 MHz	< ± 0.55 dB, *< ± 0.25 dB typical*	< ± 0.55 dB, *< ± 0.25 dB typical*
1000 MHz to 2110MHz		
40 MHz BW	< ± 0.60 dB, *< ± 0.30 dB typical*	< ± 0.60 dB, *< ± 0.30 dB typical*
80 MHz BW	< ± 0.60 dB, *< ± 0.25 dB typical*	< ± 0.60 dB, *< ± 0.30 dB typical*
160 MHz BW	< ± 0.60 dB, *< ± 0.20 dB typical*	< ± 0.65 dB, *< ± 0.30 dB typical*
2110 MHz to 3200 MHz		
40 MHz BW	< ± 0.65 dB, *< ± 0.30 dB typical*	< ± 0.70 dB, *< ± 0.40 dB typical*
80 MHz BW	< ± 0.65 dB, *< ± 0.25 dB typical*	< ± 0.70 dB, *< ± 0.35 dB typical*
160 MHz BW	< ± 0.65 dB, *< ± 0.30 dB typical*	< ± 0.70 dB, *< ± 0.35 dB typical*
3200 MHz to 3310 MHz		
40 MHz BW	< ± 0.60 dB, *< ± 0.30 dB typical*	< ± 0.65 dB, *< ± 0.35 dB typical*
80 MHz BW	< ± 0.60 dB, *< ± 0.20 dB typical*	< ± 0.70 dB, *< ± 0.35 dB typical*
160 MHz BW	< ± 0.60 dB, *< ± 0.20 dB typical*	< ± 0.70 dB, *< ± 0.35 dB typical*
3310 MHz to 3620 MHz		
40 MHz BW	< ± 0.70 dB, *< ± 0.35 dB typical*	< ± 0.70 dB, *< ± 0.35 dB typical*
80 MHz BW	< ± 0.70 dB, *< ± 0.25 dB typical*	< ± 0.70 dB, *< ± 0.35 dB typical*
160 MHz BW	< ± 0.70 dB, *< ± 0.30 dB typical*	< ± 0.75 dB, *< ± 0.40 dB typical*
3620 MHz to 3900 MHz		
40 MHz BW	< ± 0.70 dB, *< ± 0.35 dB typical*	< ± 0.75 dB, *< ± 0.40 dB typical*
80 MHz BW	< ± 0.70 dB, *< ± 0.30 dB typical*	< ± 0.75 dB, *< ± 0.40 dB typical*
160 MHz BW	< ± 0.85 dB, *< ± 0.40 dB typical*	< ± 0.75 dB, *< ± 0.35 dB typical*
3900 MHz to 4500 MHz	< ± 0.85 dB, *< ± 0.35 dB typical*	< ± 0.90 dB, *< ± 0.50 dB typical*
4500 MHz to 6000 MHz	< ± 0.95 dB, *< ± 0.5 dB typical*	< ± 1.00 dB, *< ± 0.55 dB typical*

Input voltage standing wave ratio (VSWR)	
RF input port (in specified frequencies)	
60 to 800 MHz	< 2.0:1 nominal
800 MHz to 1.3 GHz	< 1.7:1 nominal
1.3 to 3 GHz	< 1.5:1 nominal
3 to 4.2 GHz	< 1.4:1 nominal
4.2 to 6 GHz	< 1.9:1 nominal
Option M9421A-HDX, half duplex port (configured to input mode in specified frequencies)	
60 MHz to 3 GHz	< 1.5:1 nominal
3 to 6 GHz	< 1.7:1 nominal
Spurious responses (in specified frequencies)	
Residual responses in specified frequency ranges	
RF input port with analyzer range = 0 dBm	
60 MHz to 230 MHz	*< –77 dBm typical*
230 MHz to 3.3 GHz	*< –90 dBm typical*
3.3 to 3.9 GHz	*< –80 dBm typical*
3.9 to 6 GHz	*< –87 dBm typical*
Half duplex port with analyzer ranged to < –30 dBm	
60 MHz to 6 GHz	*< –90 dBm typical*
Other spurious, for offsets from 10 MHz up to half the maximum analysis bandwidth from the signal in specified frequency bands	*< –62 dBc typical* with analyzer ranged to signal peak power level
Phase noise sidebands, (CF = 900 MHz)	
10 kHz offset	< –107 dBc/Hz, *< –111 dBc/Hz typical*
1 MHz offset	< –129 dBc/Hz, *< –132 dBc/Hz typical*

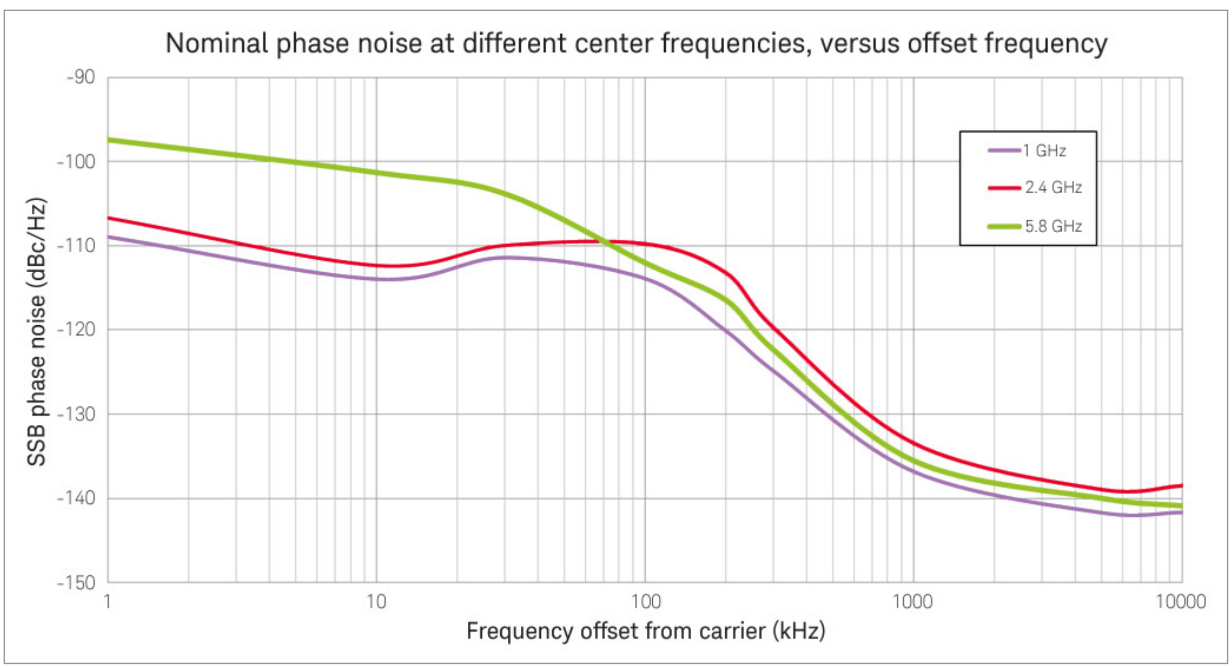


Figure 1. Nominal phase noise from 1 kHz to 10 MHz offset at 1, 2.4, and 5.8 GHz.

Displayed average noise floor (DANL)[1]		
RF input port (in specified frequencies, with analyzer ranged to -70 dBm)		
60 to 510 MHz	–160 dBm, *–164 dBm typical*	
510 to 820 MHz	–159 dBm, *–163 dBm typical*	
820 MHz to 1 GHz	–156 dBm, *–160 dBm typical*	
1 to 2.11 GHz	–154 dBm, *–159 dBm typical*	
2.11 to 3.2 GHz	–151 dBm, *–156 dBm typical*	
3.2 to 3.31 GHz	–156 dBm, *–160 dBm typical*	
3.31 to 3.62 GHz	–154 dBm, *–158 dBm typical*	
3.62 to 3.9 GHz	–153 dBm, *–157 dBm typical*	
3.9 to 4.5 GHz	–153 dBm, *–158 dBm typical*	
4.5 to 6 GHz	–150 dBm, *–154 dBm typical*	
Half duplex port, option M9421A-HDX (in specified frequencies, with analyzer ranged to –70 dBm)		
60 to 510 MHz	–156 dBm, *–161 dBm typical*	
510 to 820 MHz	–155 dBm, *–160 dBm typical*	
820 MHz to 1 GHz	–152 dBm, *–157 dBm typical*	
1 to 2.11 GHz	–150 dBm, *–155 dBm typical*	
2.11 to 3.2 GHz	–147 dBm, *–152 dBm typical*	
3.2 to 3.31 GHz	–152 dBm, –157 dBm typical	
3.31 to 3.62 GHz	–150 dBm, *–154 dBm typical*	
3.62 to 4.5 GHz	–149 dBm, *–154 dBm typical*	
4.5 to 6 GHz	–146 dBm, *–151 dBm typical*	
Third-order intermodulation distortion (TOI)		
60 MHz to 6 GHz	+25 dBm nominal with analyzer ranged to 0 dBm +33 dBm nominal with analyzer ranged to +10 dBm	
IF flatness		
Center frequency (GHz)	Span (MHz)	Max. error (nominal)
≤ 6.0	≤ 160	± 0.30 dB

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

Vector Signal Generator Performance

Performance		
Arb baseband bandwidth		
Standard M9421A-B40	60 to 70 MHz 70 to 230 MHz 230 MHz to 6 GHz	10 MHz 20 MHz 40 MHz
Option M9421A-B85	60 to 70 MHz 70 to 230 MHz 230 to 340 MHz 340 MHz to 6 GHz	10 MHz 20 MHz 40 MHz 80 MHz
Option M9421A-B1X	60 to 70 MHz 70 to 230 MHz 230 to 340 MHz 340 to 400 MHz 400 MHz to 6 GHz	10 MHz 20 MHz 40 MHz 80 MHz 160 MHz
Arb sample memory (storage capacity)		
Standard Option M9421A-M05	256 MSa of IQ data 512 MSa of IQ data	
Frequency Specifications		
Frequency range		
Option M9421A-504 Option M9421A-506	60 MHz to 3.8 GHz 60 MHz to 6 GHz	
Frequency reference		
Accuracy, aging rate, stability	Refer to M9300A specifications	
Frequency Switching Speed[1]		
Baseband frequency offset change[2]	≤ 400 µs, nominal	
Arbitrary frequency change[3]	≤ 2 ms, nominal	

1. Switching speed depends highly upon the hardware and controller that is used. Measurements were made with the M9421A in an M9018A chassis with the M9037A embedded controller.
2. Mean time from IVI command until baseband frequency changed from 0 to 1 kHz
3. Mean time from IVI command until RF frequency changed from 1.8 to 1.0 GHz

Output Level Range	
RF output port	
60 MHz to 6 GHz	–120 to +10 dBm
Option M9421A-HDX (configured to output mode)	
60 MHz to 6 GHz	–120 to +5 dBm (–120 to *+10 dBm CW typical*)
Option M9421A-1EA	
RF output port	
60 MHz to 6 GHz	–120 to +20 dBm (+25 dBm settable)
Option M9421A-HDX (configured to output mode)	
60 MHz to 6 GHz	–120 to +5 dBm (–120 to *+15 dBm CW typical*)
Amplitude Switching Speed[1]	
Baseband power level change[2]	≤ 400 µs, nominal
Arbitrary power level change[3]	≤ 2 ms, nominal

1. Switching speed depends highly upon the hardware and controller that is used. Measurements were made with the M9421A in an M9018A chassis with the M9037A embedded controller.
2. Mean time from IVI command until baseband amplitude changed by 5 dB
3. Mean time from IVI command until RF amplitude changed from 0 to -10 dBm

Absolute Level Accuracy (specified frequencies, CW)		
RF output port		
60 MHz to 380 MHz		
Level ≤ +20 dBm to –15 dBm	< ± 0.50 dB,	*< ± 0.15 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 0.55 dB,	*< ± 0.25 dB typical*
Level ≤ –80 dBm to –120 dBm	< ± 0.85 dB,	*< ± 0.50 dB typical*
380 MHz to 1325 MHz		
Level ≤ +20 dBm to –15 dBm	< ± 0.50 dB,	*< ± 0.20 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 0.50 dB,	*< ± 0.20 dB typical*
Level ≤ –80 dBm to –120 dBm	< ± 0.85 dB,	*< ± 0.50 dB typical*
1325 MHz to 2700 MHz		
Level ≤ +20 dBm to –15 dBm	< ± 0.50 dB,	*< ± 0.15 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 0.55 dB,	*< ± 0.25 dB typical*
Level ≤ –80 dBm to –120 dBm	< ± 0.90 dB,	*< ± 0.45 dB typical*
2700 MHz to 3900 MHz		
Level ≤ +20 dBm to –15 dBm	< ± 0.70 dB,	*< ± 0.25 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 0.70 dB,	*< ± 0.30 dB typical*
Level ≤ –80 dBm to –110 dBm	< ± 1.10 dB,	*< ± 0.55 dB typical*
3900 MHz to 6000 MHz		
Level ≤ +20 dBm to –15 dBm	< ± 0.65 dB,	*< ± 0.20 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 1.0 dB,*< ± 0.50 dB typical*	
Level ≤ –80 dBm to –100 dBm	< ± 1.10 dB,	*< ± 0.60 dB typical*
Option M9421A-HDX, half duplex port		
60 MHz to 380 MHz		
Level ≤ +5 dBm to –15 dBm	< ± 0.55 dB,	*< ± 0.20 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 0.50 dB,	*< ± 0.25 dB typical*
Level ≤ –80 dBm to –120 dBm	< ± 0.80 dB,	*< ± 0.40 dB typical*
380 MHz to 1325 MHz		
Level ≤ +5 dBm to –15 dBm	< ± 0.55 dB,	*< ± 0.20 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 0.50 dB,	*< ± 0.20 dB typical*
Level ≤ –80 dBm to –120 dBm	< ± 0.85 dB,	*< ± 0.45 dB typical*
1325 MHz to 2700 MHz		
Level ≤ +5 dBm to –15 dBm	< ± 0.55 dB,	*< ± 0.15 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 0.75 dB,	*< ± 0.35 dB typical*
Level ≤ –80 dBm to –120 dBm	< ± 0.95 dB,	*< ± 0.45 dB typical*
2700 MHz to 3900 MHz		
Level ≤ +5 dBm to –15 dBm	< ± 0.65 dB, *< ± 0.15 dB typical*	
Level ≤ –15 dBm to –80 dBm	< ± 0.65 dB, *< ± 0.30 dB typical*	
Level ≤ –80 dBm to –110 dBm	< ± 1.10 dB, *< ± 0.55 dB typical*	
3900 MHz to 6000 MHz		
Level ≤ +5 dBm to –15 dBm	< ± 0.70 dB,	*< ± 0.20 dB typical*
Level ≤ –15 dBm to –80 dBm	< ± 0.90 dB,	*< ± 0.45 dB typical*
Level ≤ –80 dBm to –100 dBm	< ± 1.10 dB,	*< ± 0.50 dB typical*

Setting resolution		
	0.01 dB	
Output voltage standing wave ratio (VSWR)		
RF output port (in specified frequencies)		
60 to 600 MHz	< 1.6:1 nominal	
600 MHz to 2.8 GHz	< 1.5:1 nominal	
2.8 to 5 GHz	< 1.5:1 nominal	
5 to 6 GHz	< 1.6:1 nominal	
Option M9421A-HDX, half duplex port (configured to output mode in specified frequencies)		
60 MHz to 2.9 GHz	< 1.4:1 nominal	
2.9 to 6 GHz	< 1.8:1 nominal	
Harmonics and spurious		
RF output port; harmonics and sub-harmonics		
+10 dBm output power	< –40 dBc nominal	
Option M9421A-HDX, half duplex port; harmonics and sub-harmonics		
+0 dBm output power	< –40 dBc nominal	
All ports; non-harmonic spurious (CW mode, specified frequency ranges)		
60 MHz to 3.8 GHz	< –62 dBc nominal	
3.8 to 6 GHz	< –58 dBc nominal	
Phase noise		
Option M9421A-HDX, half duplex port, +5 dBm; RF output port, +15 dBm, CF = 900 MHz		
10 kHz offset	≤ –106 dBc, *–112 dBc typical*	
100 kHz offset	≤ –109 dBc, *–113 dBc typical*	
1 MHz offset	≤ –128 dBc, *–134 dBc typical*	
10 MHz offset	≤ –131 dBc, *–135 dBc typical*	
Broadband noise floor		
RF output port	Output level = +18 dBm	Output level = –30 dBm
60 MHz to 3.5 GHz	*–125 dBm, typical*	*–159 dBm, typical*
3.5 to 5.5 GHz	*–120 dBm, typical*	*–161 dBm, typical*
5.5 to 6 GHz	*–114 dBm, typical*	*–156 dBm, typical*
Option M9421A-HDX, half duplex port	Output level = +5 dBm	Output level = –30 dBm
60 to 380 MHz	*–128 dBm, typical*	*–159 dBm, typical*
380 MHz to 5.5 GHz	*–130 dBm, typical*	*–160 dBm, typical*
5.5 to 6 GHz	*–124 dBm, typical*	*–158 dBm, typical*

General Specifications

Environmental Characteristics	
Operating temperature	+5 to +45 °C
Storage temperature	–40 to +70 °C
EMC	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
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.
Safety	– Complies with European Low Voltage Directive 2006/95/EC – IEC/EN 61010-1 – Canada: CSA C22.2 No. 61010-1-04 – USA: UL Std. 61010-1
Power Requirement	
Power drawn from chassis	≤ 120 W
Weight	
Net Shipping	1.6 kg (3.6 lbs) 3.8 kg (8.4 lbs)
Dimensions	
Height Width Length	130 mm (5.1 in) 82 mm (3.2 in) 209.5 mm (8.25 in)
Warranty	
The VXT PXIe vector transceiver is supplied with a one-year warranty	
Calibration Cycle	
The recommended calibration cycle is two year; calibration services are available through Keysight service centers	

Front Panel

Ref In	
Connector	SMB male, 50 Ω nominal
RF Connections	
RF Input	SMA female, 50 Ω nominal
RF Output	SMA female, 50 Ω nominal
RFHD	SMA female, 50 Ω nominal
Trigger Connections	
Trigger In 1, Trigger In 2	Connector: SMB male Impedance: 10 kΩ nominal Trigger level range: -3.5 to +3.5 V
Trigger Out 1, Trigger Out 2	Connector: SMB male Impedance: 50 Ω nominal Trigger level range: 3.3 V LVTTL

System Requirements

Operating system	Windows 7 (32 & 64 bit), Windows 10 (64 bit)
Processor speed	1.86 GHz minimum, 2.4 GHz recommended
Available memory	8 GB minimum 16 GB recommended
Available disk space	8 GB
Video	Support for DirectX 9 graphics with 128 MB graphics recommended (SuperVGA supported)
Browser	Microsoft Internet Explorer 7.0 or greater

Application Specifications

N9063EM0D analog demodulation measurement application key specifications[1]

Frequency Modulation[2]	
FM Deviation	Peak deviation[5] ≥ 200 Hz to 400 kHz
FM Deviation Accuracy	± 0.5% × (rate + deviation) (nominal)
FM Rate	20 Hz to 50 kHz
FM Rate Accuracy	± 0.1 Hz (nominal)
Residual Distortion[6]	0.3% (nominal)
Amplitude Modulation[3]	
AM Depth	1% to 99%
AM Depth Accuracy	± 0.2% + 0.002 × measured value (nominal)
AM Rate	50 Hz to 100 kHz
AM Rate Accuracy	± (0.01% × Reading) (nominal)
Residual Distortion[6]	0.25% (nominal)
Phase Modulation[4]	
PM Deviation	0.2 to 100 rad
PM Deviation Accuracy	± (1 rad × (0.005 + (rate/1 MHz))) (nominal)
PM Rate	20 Hz to 50 kHz
PM Rate Accuracy	± 0.25 Hz (nominal)
Residual Distortion[6]	0.3% (nominal)

1. For specified frequency ranges between 60 and 3000 MHz, Channel BW ≤ 1 MHz.
2. FM Rate: 400 Hz, 1 kHz, 10 kHz; FM Modulation Index: 1 to 2000
3. AM Rate: 400 Hz, 1 kHz, 10 kHz; AM Depth: 1% to 99%
4. PM Rate: 400 Hz, 1 kHz, 10 kHz; PM Deviation: 1 to 100 rad
5. Peak deviation, modulation index ("beta"), and modulation rate are related by Peak Deviation = Modulation Index × Rate.
6. SINAD [dB] can be derived by 20 x log10 (1/Distortion), SINAD bandwidth: (Channel BW)/2.

Analog modulation source key specifications[1]

Frequency Modulation[2]	
FM Deviation	200 Hz to 100 kHz
FM Deviation Accuracy	± 1% (nominal)
FM Rate	20 Hz to 40 kHz
FM Rate Accuracy	Same as RF reference source, nominal
Residual Distortion[5]	1% (nominal)
Amplitude Modulation[3]	
AM Depth	1% to 99%
AM Depth Accuracy	± 1% (nominal)
AM Rate	50 Hz to 40 kHz
AM Rate Accuracy	Same as RF reference source, nominal
Residual Distortion[5]	0.25% (nominal)
Phase Modulation[4]	
PM Deviation	0.2 to 20 rad
PM Deviation Accuracy	± 1% (nominal)
PM Rate	20 Hz to 40 kHz
PM Rate Accuracy	Same as RF reference source, nominal
Residual Distortion[5]	0.5% (nominal)

1. For specified frequency ranges between 60 and 3000 MHz.
2. FM Rate: 400 Hz, 1 kHz, 10 kHz; FM Modulation Index: 1 to 2000
3. AM Rate: 400 Hz, 1 kHz, 10 kHz; AM Depth: 5% to 95%
4. PM Rate: 400 Hz, 1 kHz, 10 kHz; PM Deviation: 1 to 20 rad
5. SINAD [dB] can be derived by 20 x log10 (1/Distortion).

N9069EM0D noise figure measurement application key specifications

The specifications apply in the frequency range documented in the table 1. For the other frequency bands, external pre-selection filter is recommended.

Noise figure (60 MHz to 6 GHz)		
Noise Source ENR	**Measurement Range**	**Instrument Uncertainty**
4 to 6.5 dB	0 to 20 dB	± 0.044 dB
12 to 17 dB	0 to 30 dB	± 0.095 dB
20 to 22 dB	0 to 35 dB	± 0.102 dB
Gain		
Instrument uncertainty (DUT gain range = –20 to +40 dB)		
60 MHz to 6 GHz	± 0.13 dB	

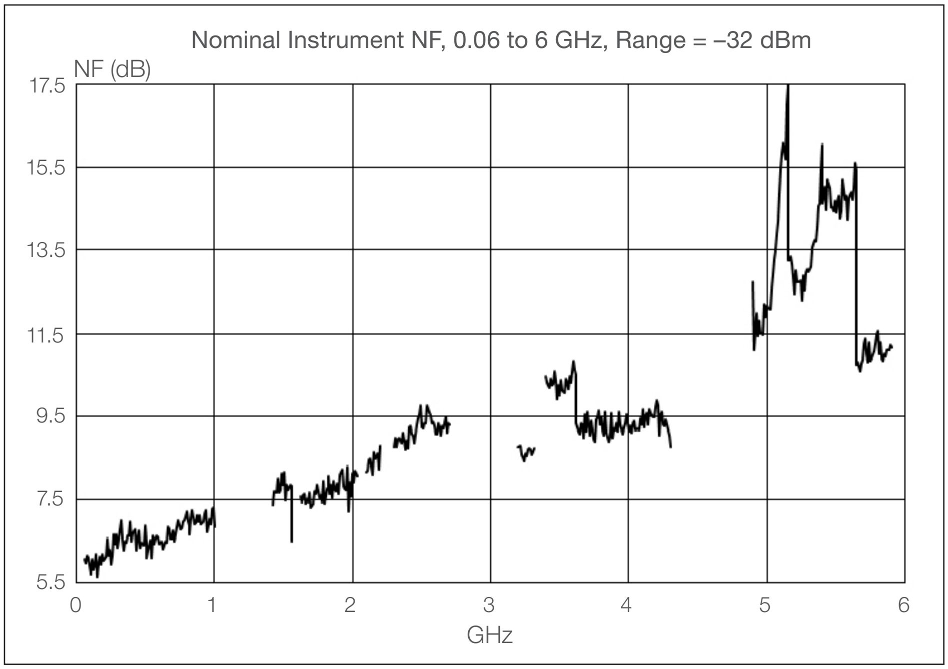


Figure 2. Nominal instrument noise figure

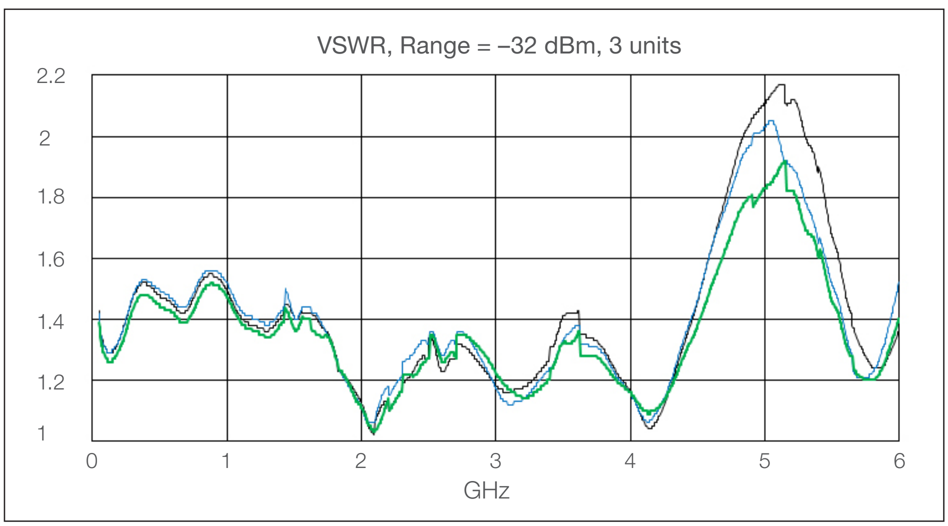


Figure 3. Nominal instrument input VSWR

Table 1. Frequency range for noise figure measurement

Frequency Band
60 MHz to 1000 MHz
1425 MHz to 1560 MHz
1620 MHz to 2030 MHz
2105 MHz to 2200 MHz
2300 MHz to 2700 MHz
3205 MHz to 3310 MHz
3400 MHz to 4300 MHz
4900 MHz to 5900 MHz

N9071EM0D GSM/EDGE/Evo measurement application key specifications[1]

Power versus time (PvT)	
Absolute power accuracy	± 0.36 dB nominal at 0 dBm input power
Phase error (GMSK modulation)	
Phase error	
Average floor	*0.30º typical* at 0 dBm input power
Peak floor	*0.85º typical* at 0 dBm input power
EDGE error vector magnitude (EVM)	
EVM	
RMS floor	*0.65% typical* at 0 dBm input power
Peak floor	*2.0% typical* at 0 dBm input power
Output RF spectrum (ORFS for GMSK and 8PSk modulation)	
Residual relative power, spectrum due to modulation	
Offset frequency	
600 kHz	*–70 dBc typical* at 0 dBm input power
1.2 MHz	*–75 dBc typical* at 0 dBm input power
1.8 MHz	*–73 dBc typical* at 0 dBm input power
Residual relative power, spectrum due to switching	
Offset frequency	
600 kHz	*–67 dBc typical* at 0 dBm input power
1.2 MHz	*–74 dBc typical* at 0 dBm input power
1.8 MHz	*–76 dBc typical* at 0 dBm input power

1. For frequencies from 450 to 490 MHz, 820 to 920 MHz, and 1710 to 1910 MHz

GSM/EDGE/Evo source key specifications[1]

Signal quality (RF output port: +15 dBm, Half duplex port: 0 dBm)	
Phase error (GMSK)	
RMS	< 0.3° nominal
Peak	< 2.0° nominal
EVM (EDGE)	
RMS	< 1% nominal
Output RF spectrum (ORFS)	
Residual relative power, spectrum due to modulation	

Offset	GSM, nominal Half duplext/RF output (0 dBm)	EDGE, nominal Half duplext/RF output (0 dBm)
200 kHz	–35 dBc	–36 dBc
400 kHz	–68 dBc	–68 dBc
600 kHz	–76 dBc	–76 dBc
1200 kHz	–81 dBc	–81 dBc
1800 kHz	–77 dBc	–76 dBc

1. For frequencies from 380 to 490 MHz, 695 to 960 MHz, and 1425 to 2180 MHz

N9073EM0D W-CDMA/HSPA+ measurement application key specifications[1]

Channel power	
Absolute power accuracy	± 0.36 dB nominal at 0 dBm input power
QPSK EVM	
Residual EVM	*0.85% typical* at –10 dBm input power
Adjacent channel leakage ratio (ACLR) and adjacent channel power ratio (ACPR)	
Residual relative power in 3.84 MHz BW	
5 MHz offsets	–65 dBc nominal at 0 dBm input power
Spectrum Emission Mask (SEM)	
Residual relative power (offset)	
Downlink	
2.515 to 2.715 MHz	*–75 dBc in a 30 kHz BW typical* at 0 dBm input power
2.715 to 3.515 MHz	*–77 dBc in a 1 MHz BW typical* at 0 dBm input power
3.515 to 4 MHz	*–77 dBc in a 1 MHz BW typical* at 0 dBm input power
4 to 8 MHz	*–67 dBc in a 1 MHz BW typical* at 0 dBm input power
8 to 12.5 MHz	*–67 dBc in a 1 MHz BW typical* at 0 dBm input power
Uplink	
2.515 to 3.485 MHz	*–80 dBc in a 30 kHz BW typica*l at 0 dBm input power
4 to 7.5 MHz	*–65 dBc in a 1 MHz BW typica*l at 0 dBm input power
7.5 MHz to 8.5 MHz	*–70 dBc in a 1 MHz BW typical* at 0 dBm input power
8.5 to 12 MHz	*–70 dBc in a 1 MHz BW typical* at 0 dBm input power

1. For frequencies from 695 MHz to 920 MHz and specified ranges from 1425 MHz to 2700 MHz

W-CDMA/HSPA+ source key specifications[1]

Signal quality (RF output port: +15 dBm, Half duplex port: 0 dBm)	
Composite EVM	
RMS	< 1% nominal
Adjacent channel leakage ratio (ACLR)	

Offset	Port power level configuration	Frequency (MHz)	RF output/Half duplex 0 dBm nominal (dB)
Adjacent 5 MHz	1 DPCH 1 carrier	900	–70
Adjacent 10 MHz			–71
Adjacent 5 MHz		1800 to 2200	–70
Adjacent 10 MHz			–71
Adjacent 5 MHz	64 DPCH 1 carrier	900	–70
Adjacent 10 MHz			–71
Adjacent 5 MHz		1800 to 2200	–69
Adjacent 10 MHz			–71

1. For frequencies from 695 MHz to 960 MHz, and 1425 MHz to 2180 MHz

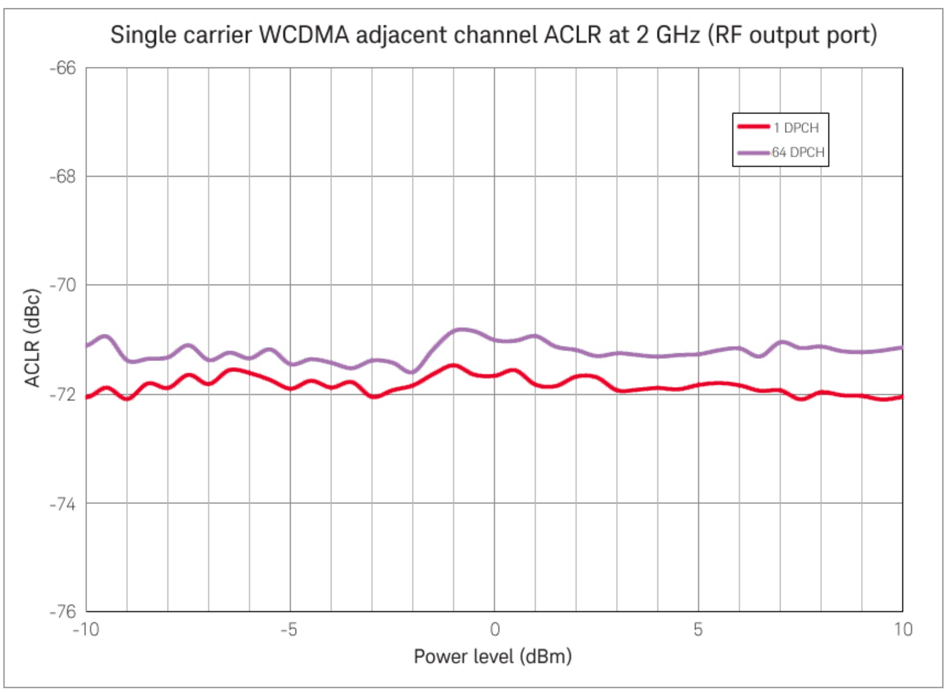


Figure 4. Single carrier W-CDMA adjacent channel ACLR versus power level at 2 GHz, RF output port

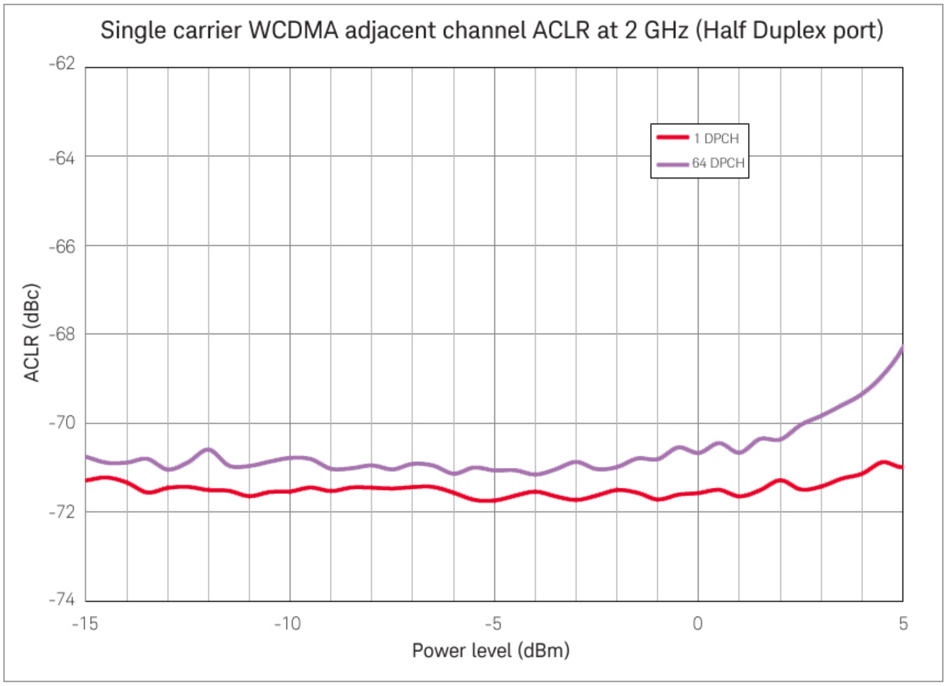


Figure 5. Single carrier W-CDMA adjacent channel ACLR versus power level at 2 GHz, half duplex port

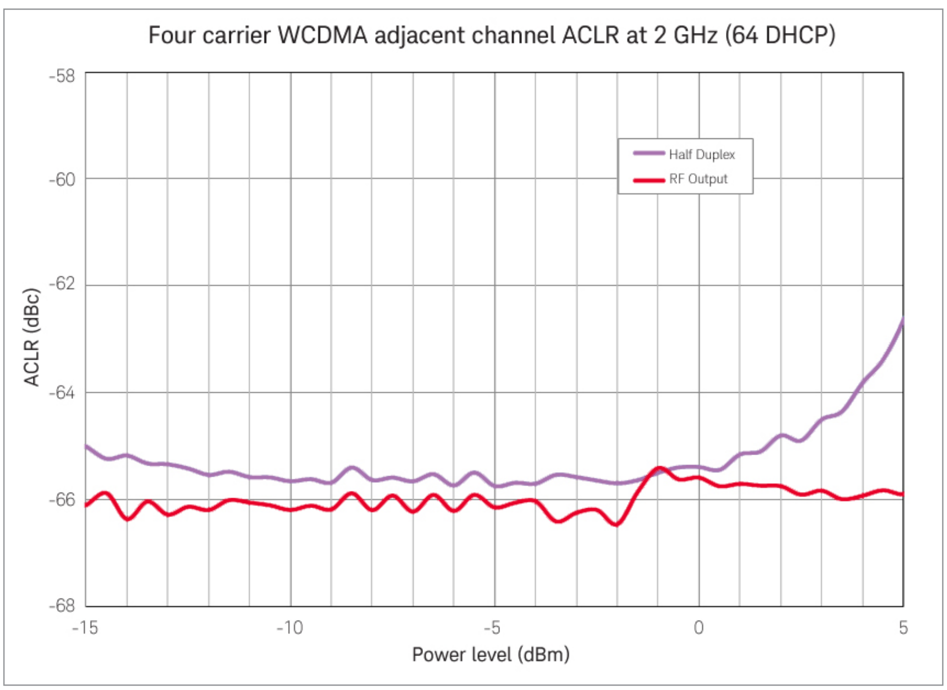


Figure 6. Four carrier W-CDMA adjacent channel ACLR versus power level at 2 GHz, RF output port and half duplex port

N9072EM0D cdma2000 Measurement Application and N9076EM0D 1xEV-DO Measurement Application Key Specifications[1]

Channel power	
Absolute power accuracy	± 0.36 dB nominal at 0 dBm input power
Error vector magnitude (EVM)	
Residual EVM	*0.85% typical* at –10 dBm input power
Adjacent channel power (ACP)	
Residual relative power in 30 kHz BW (offset)	
750 kHz (DL), 885 kHz (UL)	*–71 dBc typical* at 0 dBm input power
1.98 MHz	*–83 dBc typical* at 0 dBm input power
4.0 MHz	*–82 dBc typical* at 0 dBm input power

1. For frequencies from 410 MHz to 484 MHz, 776 MHz to 920 MHz, and 1710 to 1980 MHz

cdma2000 and 1xEV-DO Source Key Specifications[1]

Signal quality (RF output port: +15 dBm, half duplex port: 0 dBm)	
Composite EVM	
RMS	< 1.1% nominal
Adjacent channel power (ACP)	
Residual relative power in 30 kHz BW (offset)	
750 kHz (DL), 885 kHz (UL)	–71 dBc nominal at 0 dBm input power
1.98 MHz	–83 dBc nominal at 0 dBm input power
4.0 MHz	–82 dBc nominal at 0 dBm input power

1. For frequencies from 380 MHz to 490 MHz, 695 MHz to 960 MHz, and 1425 MHz to 2180 MHz

N9080EM0E LTE/LTE-Advanced FDD & N9082EM0E LTE/LTE-Advanced TDD Measurement Application Key Specifications[1]

Transmit power		
Absolute power accuracy	± 0.36 dB nominal at 0 dBm input power	
Error vector magnitude (EVM)		
Residual EVM		
5 MHz, 10 MHz, 15 MHz, 20 MHz BW	0.8% typical at –10 dBm input power	
Adjacent channel power		
Minimum carrier power at RF input		
RF input port	–20 dBm	
Half duplex port	–20 dBm	
Dynamic range	Uplink, nominal	Downlink, nominal
E-UTRA	–58 dBc	–56 dBc
UTRA	–60 dBc	–58 dBc

1. For specified frequency ranges between 695 and 3800 MHz

LTE Source Key Specifications[1]

Signal quality (RF output port: +15 dBm, half duplex port: 0 dBm)	
Composite EVM	
RMS	< 1.1% nominal
Adjacent channel power (ACP)	

	Adjacent, nominal RF output/half duplex (0 dBm)	Alternate, nominal RF output/half duplex (0 dBm)
900 MHz	–64	–64
2 GHz	–65	–65

1. For specified frequency ranges between 695 and 3800 MHz

N9081EM0D *Bluetooth* Measurement Application Key Specifications[1]

Transmit power	
Absolute power accuracy	± 0.26 dB nominal at 0 dBm input power
Modulation characteristics	
Deviation range	± 250 kHz nominal
EDR modulation accuracy	
Range (rms DEVM)	0 to 12% nominal
Floor	*0.6% typical* at –20 dBm input power

1. Specifications apply for frequencies between 2400 and 2486 MHz.

Bluetooth Source Key Specifications[1]

***Bluetooth* signal using Signal Studio waveform**	
Basic Data Rate (ACL)	
FSK error at –10 dBm at half duplex port or RF output port	0.65% nominal, DH1 packet, GFSK, standard packet, 2402 MHz
Enhanced Data Rate	
ACP for –10 dBm signal at half duplex port or RF output port	3-DH1 packet, GFSK +D8PSK, standard packet, 2402 MHz –69 dBm nominal, k=2; –72 dBm nominal, k= 3, 4, 5, …78
EDR rms DEVM error	< 1% nominal

1. For specified frequency ranges between 1620 and 2700 MHz

N9079EM0D TD-SCDMA Measurement Application Key Specifications[1]

Channel power	
Absolute power accuracy	± 0.36 dB nominal at 0 dBm input power
Error vector magnitude (EVM)	
Residual EVM, 1.6 MHz channel BW	*0.75% typical* at 0 dBm input power
Adjacent channel leakage ratio (ACLR) and adjacent channel power ratio (ACPR)	
Residual relative power in 1.28 MHz BW	
1.6 MHz offset	*–55 dBc typical* at 0 dBm input power
3.2 MHz offset	*–70 dBc typical* at 0 dBm input power
Spectrum emission mask (SEM)	
Residual relative power (offset)	
Downlink	
815 kHz to 1.015 MHz	–60 dBc in a 30 kHz BW nominal at 0 dBm input power
1.015 to 1.815 MHz	–68 dBc in a 1 MHz BW nominal at 0 dBm input power
1.815 to 2.3 MHz	–71 dBc in a 1 MHz BW nominal at 0 dBm input power
2.3 to 4 MHz	–58 dBc in a 1 MHz BW nominal at 0 dBm input power
Uplink	
815 kHz to 1.8 MHz	*–54 dBc in a 30 kHz BW typical* at 0 dBm input power
1.8 to 2.385 MHz	*–68 dBc in a 1 MHz BW typical* at 0 dBm input power
2.9 to 3.5 MHz	*–71 dBc in a 1 MHz BW typical* at 0 dBm input power

1. For specified frequency ranges between 1620 and 2700 MHz

TD-SCDMA Source Key Specifications[1]

Signal quality (RF output port: +15 dBm, half duplex port: 0 dBm, full duplex port: –20 dBm)	
Composite EVM	
RMS	< 0.5% nominal
Adjacent channel power (ACP)	
Residual relative power in 30 kHz BW	
1.6 MHz offset	–65 dBc nominal at 0 dBm input power
3.2 MHz offset	–68 dBc nominal at 0 dBm input power

1. For specified frequency ranges between 1620 and 2700 MHz

N9077EM0E and N9077EM1E WLAN Measurement Application Key Specifications[1]

Modulated Power	
Absolute power accuracy	
2400 MHz to 2483.5 MHz	± 0.27 dB nominal at 0 dBm input power
5150 MHz to 5185 MHz	± 0.49 dB nominal at 0 dBm input power
Error Vector Magnitude (EVM)	
EVM floor conditions Phase Tracking on, pre-amble only, Half duplex port	
802.11b 2.4 GHz	< *–40.9 dB typical* at –20 dBm input power
802.11g 2.4 GHz	< *–47 dB typical* at –20 dBm input power
802.11a 5.8 GHz	< *–48 dB typical* at –20 dBm input power
802.11n 5.8 GHz 20 MHz 802.11n 5.8 GHz 40 MHz	< *–48 dB typical* at –20 dBm input power < *–44 dB typical* at –20 dBm input power
802.11ac 5.8 GHz 80 MHz 802.11ac 5.8 GHz 80 MHz 802.11ac 5.8 GHz 160 MHz	< *–45 dB typical* at –20 dBm input power < –48 dB nominal at –5 dBm input power < *–43 dB typical* at –20 dBm input power
802.11ax 5.8 GHz 80 MHz	< –49 dB nominal at -10 dBm input power
SEM	
802.11a/g at 2. 4GHz with 20 MHz BW	See Figure 5
802.11a/g at 5.8 GHz with 20 MHz BW	See Figure 6
802.11n at 5.8 GHz with 40 MHz BW	See Figure 7
802.11ac at 5.8 GHz with 80 MHz BW	See Figure 8

1. SEM Transmitter test signal generated by Agilent N5182B MXG signal generator

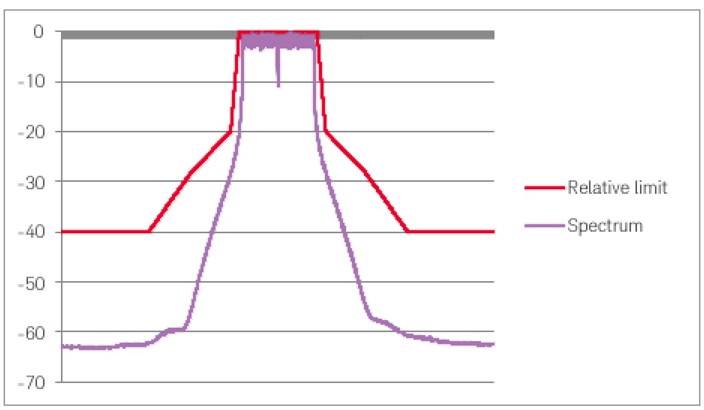


Figure 7. 802.11 a/g SEM nominal performance at 2.4 GHz with 20 MHz BW

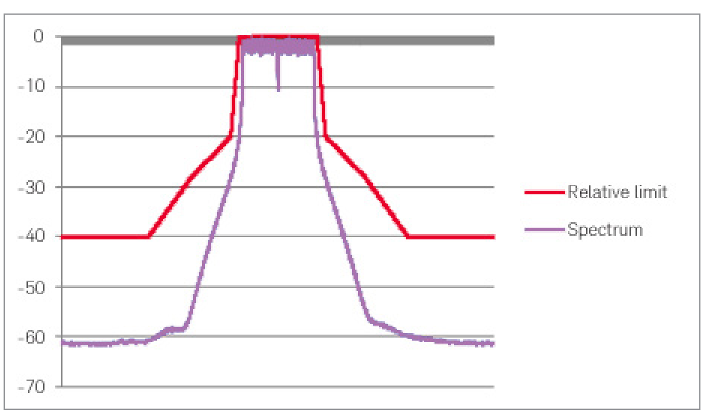


Figure 8. 802.11 a/g SEM nominal performance at 5.8 GHz with 20 MHz BW

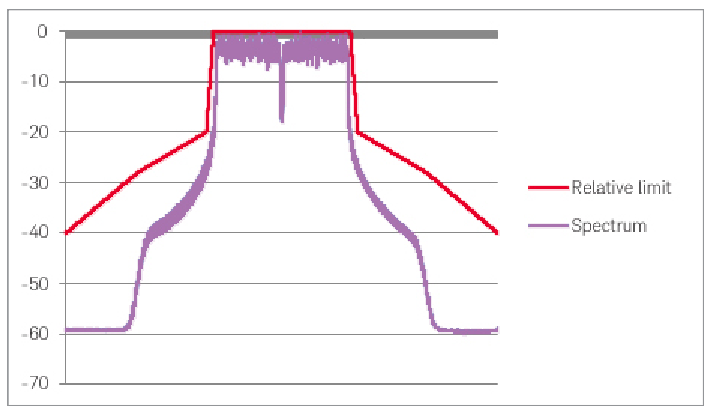


Figure 9. 802.11 n SEM nominal performance at 5.8 GHz with 40 MHz BW

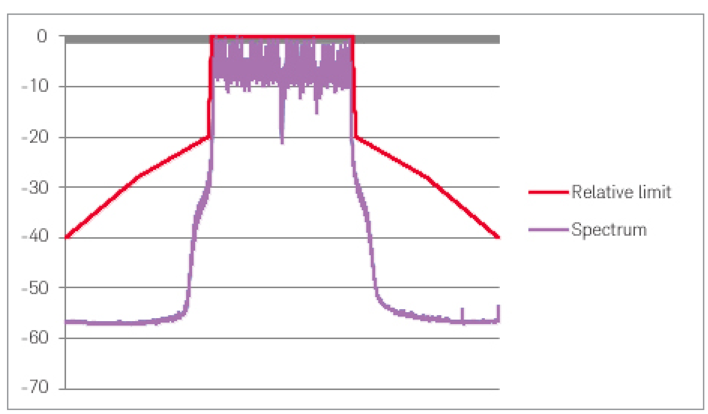


Figure 10. 802.11 ac SEM nominal performance at 5.8 GHz with 80 MHz BW

WLAN Source Key Specifications

Error Vector Magnitude (EVM)	
Wireless LAN error vector magnitude (EVM Performance (using Signal Studio signal noted)) half duplex port, RF output port	
802.11b 2.4GHz	< *–28 dB typical* (0 dBm to –30 dBm)
802.11a 5.8 GHz	< *–44 dB typical* (–5 dBm to –15 dBm)
802.11n 5.8 GHz 20MHz 802.11n 5.8 GHz 40MHz	< *–43 dB typical* (–5 dBm to –15 dBm) < *–44 dB typical* (–5 dBm to –15 dBm)
802.11ac 5.57GHz 80MHz 802.11ac 5.8 GHz 80 MHz 802.11ac 5.57GHz 160MHz	< *–47 dB typical* (–5 dBm to –15 dBm) < –49 dB nominal (–5 dBm) < *–45 dB typical* (–5 dBm to –15 dBm)
802.11ax 5.8 GHz 80 MHz	< –50 dB nominal (–10 dBm)

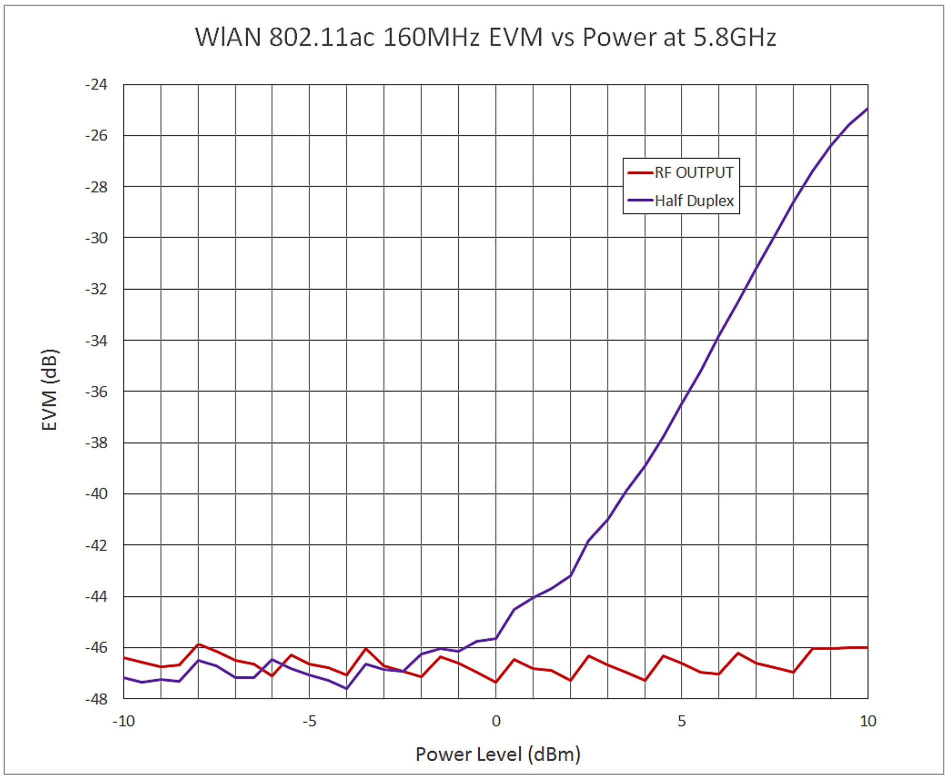
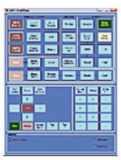


Figure 11. 802.11 ac EVM nominal performance versus power level at 5.8 GHz for 160 MHz signal bandwidth with equalization on the preamble

Software

Instrument connection software		
Keysight I/O library	The I/O 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 www.keysight.com/find/iosuite
Module setup and usage		
Keysight soft front panel 	The VXT 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 I/O 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 www.keysight.com/find/iosuite
Programming		
Driver IVI-COM IVI-C MATLAB	Development environments Visual Studio (VB .NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB	Included on CD-ROM shipped with module or online
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 www.keysight.com/find/commandexpert
Signal analysis software		
X-Series measurement applications	Provides measurements for analog demodulation, noise figure, phase noise and others.	Licensed software. For more information, visit www.keysight.com/find/x-series_apps

Related Literature

Literature	Pub number
M9421A VXT PXIe Vector Transceiver - Configuration Guide	5992-1641EN
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