M9415A VXT PXIe Vector Transceiver

380 MHz to 12.3 GHz

Overview

The Keysight M9415A VXT PXIe vector transceiver is ideal for testing high frequency wideband wireless devices, chipset, front-end modules, and infrastructures equipments. M9415A VXT integrates a vector signal generator and a vector signal analyzer in a 3-slot PXIe modular form factor with up to 1.2 GHz bandwidth, and covers frequency range from 380 MHz to 12.3 GHz.

This configuration guide contains information to help you configure your M9415A VXT PXIe vector transceiver to meet your requirements. Ordering optional capabilities at time of purchase provides the lowest overall cost.

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Included in Base Product

Standard options and accessories come with the M9415A VXT base model at no additional charge and do not need to be ordered. They include:

- Option B4X: 400 MHz modulation and analysis bandwidth
- Option M02: Memory, 256 MSa
- N9060EM0E I/Q analyzer
- Cable, MMPX male to SMB male, 260 mm
- Getting Started Guide

Hardware

Refer to the following steps to configure the M9415A VXT:

A. Select options for VXT PXIe vector transceiver

Step 1. Choose your module		
M9415A-001	VXT PXIe vector transceiver, 3-slot	
Step 2. Choose maximum frequency range		
M9415A-F06	Frequency range, 380 MHz to 6 GHz	
M9415A-F08	Frequency range, 380 MHz to 8 GHz	
M9415A-F12	Frequency range, 380 MHz to 12.3 GHz	
Step 3. Choose modulation and analysis bandwidth		
M9415A-B4X	400 MHz bandwidth	Included in base configuration
M9415A-B8X	800 MHz bandwidth	
M9415A-B12	1.2 GHz bandwidth	
Step 4. Choose memory size		
M9415A-M02	256 MSa	Included in base configuration
M9415A-M05	512 MSa	
Step 5. Add high output power		
M9415A-1EA	High output power	
Step 6. Add duplex port		
M9415A-HDX	Half duplex port	
Step 7. Add measurement capability		
M9415A-SAA	Calibration for spectrum analyzer application	
M9415A-MMO	Timing synchronization for MIMO and ccEVM	

B. Select options for VXT PXIe vector transceiver

M9300A	PXIe frequency reference	Five 100 MHz outputs; One 10 MHz output; Internal 10 MHz OCXO time-based output
M9300A-S01 [1]		

C. Add M9471A PXIe frequency extender (optional)

Step 1. Add an M9471A PXIe frequency extender (occupies 3 slots)		
M9471A-001 (required option of M9471A)	PXIe vector transceiver, 380 MHz to 26.5 GHz M9471A extends the maximum frequency range of M9415A from 12.3 GHz to 26.5 GHz	
M9471A-CA2 (required option of M9471A)	Two semi-rigid cables and one reference cable for connecting M9471A to M9415A	
Step 2. Upgrade from standard frequency range (optional)		
M9471A-LFE	Low frequency extension, 1 to 380 MHz	

D. Select controller (either embedded controller or via PC)
Use embedded controller

Step 1. Select embedded controller [2]		
M9035A-M16	PXIe embedded controller, Intel i3-8100H quad-core processor, 3.0 GHz, 4-thread, 16 GB RAM	
M9038A-M32	High-performance embedded controller, Intel i7-9850HE 6-core processor, 2.7 GHz, 12-thread, 32 GB RAM, with two Thunderbolt 3.0 ports	
	Select M9038A for the best performance if you have memory intensive applications, multiple applications running in parallel, or if a lot of data is sent to the PC from the PXIe chassis. Features removable SSD drive for security and multiple connectors from front for connection to second chassis	
Step 2. Upgrade from standard memory size (optional)		
M9035A-M32		Memory upgrade to 32 GB RAM
M9038A-M64		Memory upgrade to 64 GB RAM
Step 3. Select an operating system		
M9035A-W16		Microsoft Windows 10 IoT Enterprise LTSB (64-bit)
M9038A-W16		Microsoft Windows 10 IoT Enterprise LTSB (64-bit)

1 No export license required
2 The M9010A 10-slot or M9019A 18-slot chassis includes empty space to the left of the 1st functional slot. The embedded controller occupies that empty space and the 1st functional slot.

Use external controller

To use your desktop PC as a controller [1, 2]		
M9048A	PCIe host adapter: Gen 2, x8	
M9048B	PCIe host adapter: Single port (x8), Gen 3	
M9049A	PCIe host adapter: Dual port (x16), Gen 3	
Y1202A	PCIe cable	
M9021A [3]	PCIe cable interface: Gen 2, x8	
M9022A	PXIe system module: Single Port (x8), Gen 3	
M9023A	PXIe system module: Dual Port (x16), Gen 3	
M9024A	PXIe system module: With connectivity expansion: Dual Port (x16) Gen 3	

PC requirements for M9415A and M9416A VXT PXIe vector transceivers control [4]

Functions	Description
Operating system	Windows 10 (64 bit)
Processor speed	1.86 GHz dual core minimum
Available memory	8 GB minimum
	16 GB is required for LTE or 5G NR measurement
Available disk space on Drive C	16 GB minimum
	40 GB recommended for multiple applications

1 For list of qualified external controllers, please see Test Computer List Technical Note literature no. 5990-7632EN.
2 For more detailed chassis configuration information including multi-chassis, see Interface Modules and Adapters for PXIe and AXIe Systems literature no. 5992-0377EN.
3 The M9021A can only be used with the Keysight M9018B
4 For list of qualified external controllers, please see Test Computer List Technical Note literature no. 5990-7632EN.

E. Select a chassis and accessories

Step 1. Select a chassis [1]

M9010A	10-slot PXIe chassis, Gen 3
M9019A	18-slot PXIe chassis, Gen 3

Step 2. Choose enough slot blocker kits and EMC filler panels to fill every open slot

Recommended to achieve data sheet specifications

Y1212A	Slot blocker kit: 5 slots

Y1213A	PXI EMC filler panel kit: 5 slots Non-EMC filler panels are included with the M9010A, M9018B, or M9019A PXIe chassis.

Step 3. Choose a rack mount kit [1] (optional)

Y1271A	Rack mount kit for M9010A and Y1217A rail kit
Y1215C	Rack mount kit for M9018B or M9019A 18-slot PXIe chassis
Y1216B	Rack mount kit for M9018B or M9019A 18-slot PXIe chassis

1 For more information on the rack mount kit, see the chassis data sheet, literature number 5992-1481EN.

Step 4. Choose an air inlet kit [1] (optional)		
Recommended for rack mounted systems with less than 1U space below chassis.		
Y1214B	Air inlet kit: M9018B or M9019A 18-slot chassis	

Step 5. Choose connecting cables		
Y1810A	Cable, MMPX male to SMB male, 260 mm	
Y1811A	Cable, MMPX male to MMPX male, 200 mm	
Y1812A	Cable, MMPX male to SMB male, 500 mm	
Y1813A	Cable, MMPX male to SMB male, 1000 mm	
Y1814A	Cable, SMA male to SMA male, 1220 mm	
Y1815A	Cable, MMPX male to BNC male, 1500 mm	
Y1818A	Cable, MMPX male right angle to SMA female, 500 mm	

1 For more information on the rack mount kit, see the chassis data sheet, literature number 5992-1481EN..

Software

The M9415A VXT comes standard with the following software:

- Keysight IO Libraries Suite including Connection Expert [1]
- Drivers for use with Visual Studio (including VB Net, C#, C/C++), Keysight VEE
- Sample waveforms and programming examples
- IQ analyzer measurement application

To transform your VXT vector transceiver into a specific measurement engine, you need add measurement applications. Measurement applications are software solutions, providing ready-to-use measurements for signal generation or signal analysis. They provide essential measurements for specific tasks in general-purpose, cellular communications, wireless connectivity applications, covering established standards or modulation types.

Measurement applications that start with the prefix “N” are measurement only applications and require waveform pack licenses for waveform playback.

Measurement applications that start with the prefix “Y” combine measurement applications with unlimited waveform playback capability.

Keysight offers 4 license types for the measurement applications. Each of the following license types are offered as perpetual or subscription. Visit www.keysight.com/find/ X-Series_apps for more information.

- **Node-locked:** Allows you to use the license on one specified instrument or computer.
- **Transportable:** Allows you to move the license from one instrument or computer to another using Keysight’s online tool.
- **USB portable:** Allows you to move the license from one instrument or computer to another with a certified USB dongle.
- **Floating:** Allows you to access the license on networked instruments or computers from a server, one at a time.

1 Both IO library (version 18.1 or newer) and Connection Expert software need to be installed on the PC controlling the PXI instruments. To download, visit www.keysight.com/find/iosuite.

Select Measurement Applications or Software for VXT PXIe Vector Transceiver

Step 1. Add X-Series measurement applications (optional)

Model number	Description
N9054EM0E	VMA Vector Modulation Analysis measurement application
N9054EM1E	Vector Modulation Analysis Custom OFDM application
N9055EM0E	Power amplifier measurement application
N9056EM0E	Channel Quality measurement application
N9056EM1E	Channel Quality for Noise Power Ratio measurement application
N9060EM3E	Spectrum analyzer measurement application, requires Option SAA
N9069EM0E	Noise figure measurement applications; works with Keysight 346/347 series noise sources and 346CH08 USB to BNC adaptor, or U1831C USB smart noise source
N9071EM0E	GSM/EDGE/Evo measurement application
N9073EM0E	W-CDMA/HSPA+ measurement application
N9077EM0E	WLAN 802.11a/b/g/j/p/n/af/ah measurement application
N9077EM1E	WLAN 802.11ac/ax measurement application
N9077EM2E	WLAN 802.11be measurement application
N9080EM0E	LTE and LTE-Advanced FDD measurement application
N9081EM0E	*Bluetooth*® measurement application
N9082EM0E	LTE and LTE-Advanced TDD measurement application
N9084EM0E	Short range communications and IoT measurement application
N9085EM0E	5G NR measurement application
Y9071EM0E	GSM/EDGE/Evo waveform and measurement application
Y9073EM0E	W-CDMA/HSPA+ waveform and measurement application
Y9077EM0E	WLAN 802.11a/b/g/j/p/n/af/ah waveform and measurement application
Y9077EM1E	WLAN 802.11ac/ax waveform and measurement application
Y9077EM2E	WLAN 802.11be waveform and measurement application
Y9080EM0E	LTE and LTE-Advanced FDD waveform and measurement application
Y9081EM0E	*Bluetooth* waveform and measurement application
Y9082EM0E	LTE and LTE-Advanced TDD waveform and measurement application
Y9084EM0E	Short range communications waveform and measurement application
Y9085EM0E	5G NR waveform and measurement application

Step 2. Add Signal Studio[1] software (optional)

Signal studio software generates standard-compliant waveform for VXT signal generation function block to generate testing signals for receiver and component test.

Model number	Description
N7600EMBC	Signal Studio for W-CDMA/HSPA+, waveform playback
N7602EMBC	Signal Studio for GSM/EDGE/Evo, waveform playback
N7606EMBC	Signal Studio for Bluetooth, waveform playback
N7624EMBC	Signal Studio for LTE/LTE-Advanced/LTE-A Pro FDD, waveform playback
N7625EMBC	Signal Studio for LTE/LTE-Advanced TDD, waveform playback
N7617EMBC	Signal Studio for WLAN 802.11 (limited), waveform playback
N7608EMBC	Signal Studio Pro for Custom Modulation, waveform playback
N7630EMBC	Signal Studio Pro for Pre-5G, waveform playback
N7631EMBC	Signal Studio Pro for 5G NR, waveform playback
N7609EMBC	Signal Studio for Global Navigation Satellite System (GNSS), waveform playback
N7610EMBC	Signal Studio for IoT, waveform playback
N7650B [2]	5/50 pack Signal Studio Waveform Licenses

Step 3. Add 89600 VSA software (optional)

Model number	Description
89600 Vector signal analysis (VSA) software	Find detailed ordering information from www.keysight.com/find/89600_VSA 89600 VSA is an industry-leading measurement software for evaluating and troubleshooting signals in R&D; PC-based software supporting more than 30 measurement platforms, plus more than 75 signal standards and modulation types including MIMO analysis

Step 4. Add MATLAB [3] software (optional)

Model number	Description
N6171A	MATLAB software Create arbitrary waveforms, customize measurement and data analysis routines, create your own instruments applications and test systems, automate measurements, signal generation, and report generation

1 For more information, see Signal Studio brochure, literature number 5989-6448EN
2 N76EMQAMC or Y90EMQAMA license is required when using N7650B 5/50-pack waveform license to playback WLAN waveforms with 4096QAM modulation created by N7617C Signal Studio for WLAN
3 For more information on MATLAB software, visit www.keysight.com/find/n6171a

Services

Calibration, start-up assistance

Model number	Description	Additional information
M9415A-UK6	Commercial calibration certificate with test data	Calibration certificate with measurement results available only at time of purchase.
M9300A-UK6	Commercial calibration certificate with test data for M9300A	Calibration certificate with measurement results available only at time of purchase.
PS-S20-01	Service: 1-day start-up assistance	Training on how to operate your instrument effectively
R-50C-011-3	Calibration Assurance Plan - Return to Keysight, 3 years	
R-50C-011-5	Calibration Assurance Plan - Return to Keysight, 5 years	
R-50C-011-7	Calibration Assurance Plan - Return to Keysight, 7 years	
R-50C-011-10	Calibration Assurance Plan - Return to Keysight, 10 years	

Global warranty

Keysight provides the peace of mind that today's high-tech industry requires. Your investment is protected by Keysight's global reach in more than 100 countries (either directly or through distributors). The warranty gives you convenient standard coverage for the country in which the product is used, eliminating the need to ship equipment back to the country of purchase. Keysight's warranty service provides:

- All parts and labor necessary to return your investment to full specified performance
- Recalibration for products supplied originally with a calibration certificate
- Return shipment

One day start-up assistance

A Keysight Technologies applications engineer will get you started quickly by helping you install the modules in a chassis, configure the controller, load software and start making measurements.

Calibration services

The modular products are factory calibrated and shipped with an ISO-9002, NIST- traceable calibration certificate. A one-year calibration cycle is recommended.

Upgrading Your System

Your product can be easily upgraded after the initial purchase. Fast license-key upgrades for performance options that do not require additional hardware:

1. Contact your Keysight representative to place an order for an option upgrade
2. You will receive your hardware entitlement certificate via email
3. Redeem the certificate online by following the instructions provided to receive a license key file
4. Install the license key file using the Keysight License Manager
5. Begin using the new capability [1, 2]

Description	Upgrade number
Bandwidth upgrade, 400 MHz to 800 MHz	M9415AU-B8X
Bandwidth upgrade, 400 MHz to 1.2 GHz	M9415AU-B12
Bandwidth upgrade, 800 MHz to 1.2 GHz	M9415AU-BU2
Frequency range upgrade, 6 GHz to 8 GHz	M9415AU-F01
Frequency range upgrade, 6 GHz to 12 GHz	M9415AU-F02
Frequency range upgrade, 8 GHz to 12 GHz	M9415AU-F03
Memory upgrade, 256 MSa to 512 MSa	M9415AU-M05
Add high output power	M9415AU-1EA
Add half duplex port	M9415AU-HDX
Calibration for Spectrum Analyzer application	M9415AU-SAA
Timing synchronization for ccEVM and WLAN MIMO	M9415AU-MMO

Using a Non-Keysight Chassis

The M9415AVXT PXIe vector transceiver can be successfully installed in a non-Keysight PXI chassis. Please use the following guidelines.

- Ensure that the chassis has enough consecutive PXIe or PXI-H slots to accommodate the M9415A.
- Ensure that the chassis and controller support peer-to-peer PXI Express I/O switch topology.
- Ensure that controller selected is compatible with chassis.

Please contact your Keysight representative for more detailed information. For technical assistance with non-Keysight equipment, please refer to the equipment manufacturer's website.

1 At the time of manufacture, the hardware related to many of these options was fully adjusted and the option performance was verified to be within its warranted specifications. Within one year of the initial calibration date of the analyzer, this option is fully calibrated with no further adjustment or verification testing.

2 If this transceiver has been adjusted as part of a repair or calibration during its first year, or if the transceiver is more than one-year old, additional adjustment and performance verification tests are required to ensure that some newly installed options are functioning properly. However, the completion of these tests does not guarantee that the transceiver meets all warranted specifications.

Related literature

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

Title	Publication number
M9415A VXT PXIe Vector Transceiver - Data Sheet	3120-1518EN
M9018B and M9019A PXIe 18-slot chassis - Data Sheet	5992-1481EN
M9037A PXIe Embedded Controller - Data Sheet	5991-3661EN
X-Series Measurement Applications - Brochure	5989-8019EN
Simplify Signal Creation with Signal Studio Software - Brochure	5989-6448EN

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