M9410A and M9411A VXT PXIe Vector Transceivers

1 MHz to 6 GHz

Overview

This configuration guide contains information to help you configure your M9410A and M9411A VXT PXIe vector transceivers 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 VXT base model at no additional charge and do not need to be ordered. They include:

- Option F06: Frequency range, 380 MHz to 6 GHz
- Option B3X: 300 MHz modulation and analysis bandwidth
- Option M02: Memory, 256 MSa
- Option EP6: Enhanced Performance (for modules with serial number greater than MY60200000)
- N9060EM0E I/Q analyzer
- Cable, MMPX male to SMB male, 260 mm
- Getting Started Guide

Hardware

A. Select options for VXT PXIe vector transceiver

Step 1. Choose your module		
M9410A-001	VXT PXIe vector transceiver, 2-slot	
M9411A-001	VXT PXIe vector transceiver, 3-slot	
Step 2. Choose modulation and analysis bandwidth		
Option B3X	300 MHz	Included in base configuration
Option B6X	600 MHz	
Option B12	1.2 GHz	
Step 3. Choose memory size		
Option M02	256 MSa	Included in base configuration
Option M05	512 MSa	
Step 4. Add frequency extension		
Option LFE	Low frequency extension, 1 MHz to 380 MHz; available on M9411A only; not compatible with Option SQC	
Step 5. Add high output power		
Option 1EA	High output power	
Step 6. Add duplex port		
Option HDX	Half duplex port	
Step 7. Add measurement capability		
Option MMO	Timing synchronization for MIMO and ccEVM	
Option SAA	Calibration for N9060EM3E spectrum analyzer application	
Option SQC	Support sequence analyzer measurement application; available on M9411A only; not compatible with Option LFE	
Option RPC	Real-time phase compensation for 5G NR signal generation; not compatible with Option LFE	

B. Add M9300A PXIe frequency reference

Step 1. Add an M9300A PXIe frequency reference (occupies 1 slot)		
One frequency reference required per system to meet data sheet specifications.		
M9300A	PXIe frequency reference	Five 100 MHz outputs
		One 10 MHz output
M9300A-S01[1]		Internal 10 MHz OCXO timebase output

C. Add M9471A PXIe frequency extender

Step 1. Add an M9471A PXIe frequency extender (occupies 3 slots)
M9471A-001 PXIe vector transceiver, 380 MHz to 26.5 GHz M9471A-CA1 semi-rigid cables to connect with M9410A or M9411A

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)

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.

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 M9410A and M9411A 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		
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
Y1816A	Cables, semi-rigid, connecting M9471A and M9410A or M9411A

1. For more information, please visit www.keysight.com/find/m9018b and www.keysight.com/find/m9019a.

Software

F. Select measurement applications or software and license type for VXT PXIe vector transceiver

Step 1. Start with M9410A and M9411A base configuration
The VXT comes standard with the following software:
Keysight IO Libraries Suite including Connection Expert 1
Drivers for use with Matlab, Visual Studio (including VB Net, C#, C/C++), Keysight VEE
Sample waveforms and programming examples
Step 2. Add X-Series measurement applications (optional)

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

Model name	Description	
N9054EM0E	VMA Vector Modulation Analysis Measurement Application	Not compatible with M9471A
N9054EM1E	Vector Modulation Analysis Custom OFDM Application	Not compatible with M9471A
N9055EM0E	Power Amplifier Measurement Application	
N9060EM3E	Spectrum Analyzer Measurement Application,	Requires Option SAA; not compatible with M9471A
N9063EM0E	Analog Demodulation Measurement Application	Not compatible with M9471A
N9065EM1E	Sequence Analyzer Device Applications	Requires Option M9411A-SQC; Not compatible with M9471A
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; works only with M9411A with Option EP6; when working with M9411A and M9471A, measurement is limited up to 5 GHz
N9071EM0E	GSM/EDGE/Evo Measurement Application	Not compatible with M9471A
Y9071EM0E	GSM/EDGE/Evo Waveform and Measurement Application	Not compatible with M9471A
N9073EM0E	W-CDMA/HSPA+ Measurement Application	Not compatible with M9471A
Y9073EM0E	W-CDMA/HSPA+ Waveform and Measurement Application	Not compatible with M9471A
N9077EM0E	WLAN 802.11a/b/g/j/p/n/af/ah Measurement Application	
Y9077EM0E	WLAN 802.11a/b/g/j/p/n/af/ah Waveform and Measurement Application	
N9077EM1E	WLAN 802.11ac/ax Measurement Application	
Y9077EM1E	WLAN 802.11ac/ax Waveform and Measurement Application	
N9077EM2E	WLAN 802.11be Measurement Application	
Y9077EM2E	WLAN 802.11be Waveform and Measurement Application	
N9080EM0E	LTE and LTE-Advanced FDD Measurement Application	
Y9080EM0E	LTE and LTE-Advanced FDD Waveform and Measurement Application	
N9080EM3E	NB-IoT and eMTC FDD Measurement Application	Not compatible with M9471A
Y9080EM3E	NB-IoT and eMTC FDD Waveform and Measurement Application	Not compatible with M9471A
N9080EM4E	LTE V2X Measurement Application	Not compatible with M9471A
Y9080EM4E	LTE V2X Waveform and Measurement Application	Not compatible with M9471A
N9081EM0E	Bluetooth (TM) Measurement Application	Not compatible with M9471A
Y9081EM0E	Bluetooth (TM) Waveform and Measurement Application	Not compatible with M9471A
N9082EM0E	LTE and LTE-Advanced TDD Measurement Application	
Y9082EM0E	LTE and LTE-Advanced TDD Waveform and Measurement Application	
N9085EM0E	5G NR Measurement Application	
Y9085EM0E	5G NR Waveform and Measurement Application	

Step 3. Add Signal Studio software [1] (optional)

Generate standard-compliant test signals validated by Keysight for receiver and component test.

N7600EMBC	Signal Studio for W-CDMA/HSPA+, waveform playback	
N7602EMBC	Signal Studio for GSM/EDGE/Evo, 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	
N7626EMBC	Signal Studio for V2X, waveform playback	
N7606EMBC	Signal Studio for Bluetooth (TM), waveform playback	
N7617EMBC	Signal Studio for WLAN 802.11, 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	
N7650B	5/50 pack Signal Studio Waveform Licenses	

1. For more information, see Signal Studio brochure, literature number 5989-6448EN or Signal Studio configuration assistant at http://rfmw.em.keysight.com/wireless/helpfiles/all-in-one_config_asst/ssconfig.html.

Step 4. Add 89600 VSA software (optional)	
89600 vector signal analysis (VSA) software	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; www.keysight.com/find/89600_VSA

Step 5. Add MATLAB software [1] (optional)		
MATLAB software	N6171A	Create arbitrary waveforms, customize measurement and data analysis routines, create your own instruments applications and test systems, automate measurements, signal generation, and report generation

G. Calibration, start-up assistance

Model name	Description	
M9410A-UK6 M9411A-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	

1. For more information on MATLAB software, visit www.keysight.com/find/n6171a.

Wideband MIMO Configuration

The VXT PXIe vector transceiver supports multiple synchronized channels of wideband signal generation and analysis capability. This example configuration is designed for 4x4 WLAN and 5G NR MIMO test.

Model name	Description	Quantity
M9019A	18-slot PXIe chassis, Gen 3	1
M9038A Option W16 Option M64	PXIe high performance embedded controller Windows 10 IoT Enterprise LTSB (64-bit) Memory, 64 GB	1
M9300A	PXIe Frequency Reference: 10 MHz and 100 MHz	1
M9410A Option 001 Option B12 Option M05 Option 1EA Option MMO	PXIe vector transceiver VXT PXIe vector transceiver, 2-slot Bandwidth, 1.2 GHz Memory, 512 MSa High output power Timing synchronization for MIMO and ccEVM	4
Y1212A	Slot blocker kit: 5 slots	2
Y1213A	PXI EMC filler panel kit: 5 slots	2
N7617EMBC	Signal Studio for WLAN 802.11, waveform playback	1
N7631EMBC	Signal Studio Pro for 5G NR, waveform playback	1
N9077EM0E	WLAN 802.11a/b/g/j/p/n/af/ah Measurement Application	1
N9077EM1E	WLAN 802.11ac/ax Measurement Application	1
89601200C	Basic vector signal analysis and hardware connectivity	1
89601BHNC	5G NR modulation analysis	1

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:

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

Description	Upgrade number (x = 0 or 1)
Bandwidth upgrade, 300 MHz to 600 MHz	M941xAU-B6X
Bandwidth upgrade, 300 MHz to 1.2 GHz	M941xAU-B12
Bandwidth upgrade, 600 MHz to 1.2 GHz	M941xAU-BU1
Memory upgrade, 256 MSa to 512 MSa	M941xAU-M05
Add high output power	M941xAU-1EA
Add half duplex port	M941xAU-HDX
Timing synchronization for MIMO and ccEVM	M941xAU-MMO
Calibration for N9060EM3E Spectrum Analyzer application, for serial prefix equal to or greater than MY6020	M941xAU-SAA
Calibration for N9060EM3E Spectrum Analyzer application, for serial prefix prior to MY6020	M941xAU-SA1
Low frequency extension, 1 MHz to 380 MHz; not compatible with Option SQC	M9411AU-LFE
Support sequence analyzer measurement application; not compatible with Option LFE	M9411AU-SQC
Real-time phase compensation for 5G NR signal generation; not compatible with Option LFE	M941xAU-RPC

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.

Using a Non-Keysight Chassis

The M9410A and M9411A VXT 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 M9410A or M9411A.
- 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.

Related Literature

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

Publication title	Publication number
M9410A and M9411A VXT PXIe Vector Transceivers - Data Sheet	5992-3331EN
M9010A PXIe 10-slot chassis - Data Sheet	5992-1707EN
M9018B and M9019A PXIe 18-slot chassis - Data Sheet	5992-1481EN
M9035A PXIe Embedded Controller - Data Sheet	3121-1327EN
M9038A PXIe Embedded Controller - Data Sheet	3122-1717EN
X-Series Measurement Applications - Brochure	5989-8019EN
Simplify Signal Creation with Signal Studio Software - Brochure	5989-6448EN

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