CONFIGURATION GUIDE

M9421A VXT PXIe Vector Transceiver

60 MHz to 3.8 GHz or 6 GHz

This configuration guide contains information to help you configure your M9421A VXT PXIe vector transceiver to meet your requirements. Ordering optional capabilities at time of purchase provides the lowest overall cost.

KEYSIGHT TECHNOLOGIES

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:

- I/Q analyzer
- 40 MHz modulation and analysis bandwidth
- 256 MSa memory
- Getting Started Guide

Hardware

A. Select options for M9421A VXT PXIe vector transceiver

Step 1. Choose a frequency range for the VXT PXIe vector transceiver (required option; frequency range not upgradeable)			
○	M9421A-504	60 MHz to 3.8 GHz	
○	M9421A-506	60 MHz to 6 GHz	
Step 2. Choose modulation and analysis bandwidth			
●	M9421A-B40	40 MHz	Included in base configuration
○	M9421A-B85	80 MHz	
○	M9421A-B1X	160 MHz	
Step 3. Choose memory size			
●	M9421A-M02	256 MSa	Included in base configuration
○	M9421A-M05	512 MSa	
Step 4. Add high output power			
○	M9421A-1EA	High output power	
Step 5. Add half duplex port			
○	M9421A-HDX	Half duplex port	
Step 6. Add MIMO measurement capability			
○	M9421A-MMO	True MIMO measurement	
○	M9421A-MTS	Multi-tester synchronization for MIMO measurement; requires -MMO	

B. Add M9300A PXIe frequency reference

Step 1. Add an M9300A PXIe frequency reference (occupies 1 slot) **One frequency reference required per chassis to meet data sheet specifications. It can support up to four M9421A VXTs.**			
○	M9300A	Adds PXIe frequency reference	Five 100 MHz outputs
○	M9300A-S01 [1]		One 10 MHz output Internal 10 MHz OCXO timebase output

1. No export license required.

C. Select controller (either embedded controller or via PC) [1]

Step 1. If selecting an embedded controller, select either M9035A or M9038A [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	

1. For list of qualified external controllers, please see Tested Computer List Technical Note literature no. 5990-7632EN.
2. The M9010A 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.

Step 2. Upgrade from standard memory size (optional)		
For M9035A		
○	M9035A-M32	Memory upgrade to 32 GB RAM
For M9038A		
○	M9038A-M64	Memory upgrade to 64 GB RAM
Step 3. Select an operating system		
For M9035A		
○	M9035A-W16	Microsoft Windows 10 IoT Enterprise LTSB (64-bit)
For M9038A		
○	M9038A-W16	Microsoft Windows 10 IoT Enterprise LTSB (64-bit)

To use your desktop PC as a controller

	Model name	Description	
○	M9048A/48B/49A	PCIe desktop adapter [1]	
○	Y1202A	PCIe cable	
○	M9021A/22A/23A	PCIe cable interface [2]	

1. M9048A: Gen2 single port; M9048B: Gen3 single port; M9049A: Gen3 dual port.
2. M9021A: Gen2 single port (usable only with M9018B chassis); M9022A: Gen3 single port; M9023A: Gen3 dual port.

Multi-chassis configurations

Quantity of components required depends on controller selected and number of chassis supported. The M9038A embedded controller is recommended for multi-chassis configurations. The standalone PC is supported.

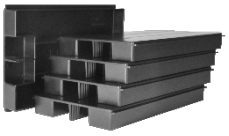
Quantity required		2-chassis configurations with		4-chassis configurations with	
		M9038A	PC	M9038A	PC
M9022A	PCIe cable interface	1	3	5	7
Y1202A	PCIe cable	1	2	3	4

PC Requirements for M9421A VXT PXIe Vector Transceiver Control [1]

	One module per chassis	Two modules per chassis	Three or four modules per chassis
Operation system	Windows 7 or Windows 10 (64-bit)	Windows 7 or Windows 10 (64-bit)	Windows 7 or Windows 10 (64-bit)
Processor speed	1.86 GHz Single Core minimum	1.86 GHz Dual Core minimum	1.86 GHz Dual Core minimum
Minimum memory	8 GB (16 GB recommended)	8 GB (16 GB recommended)	16 GB
Available disk space on Drive C	8 GB (40 GB recommended for multiple applications)	8 GB (40 GB recommended for multiple applications)	8 GB (40 GB recommended for multiple applications)

1. For list of qualified external controllers, please see Test Computer List Technical Note literature 5990-7632EN.

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

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

Using a Non-Keysight Chassis

The M9421A 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 M9421A VXT PXIe vector transceiver.
- Ensure that the chassis and controller supports 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.

Software

E. Select measurement applications or software for M9421A VXT PXIe vector transceiver

Step 1. Start with M9421A base configuration	
●	The M9421A comes standard with the following software: • Keysight IO Libraries Suite including Connection Expert [1] • Soft front panel, drivers for use with Matlab, LabVIEW, Visual Studio (including VB Net, C#, C/C++), Keysight VEE • Sample waveforms and programming examples

1. Both IO libraries and Connection Expert software need to be installed on theÐC controlling the PXI instruments. To download, visit www.keysight.com/find/iosuite.

Step 2. Add X-Series Measurement Applications (optional)
Measurement applications that start with the “N” prefix are measurement only applications and require waveform pack licenses for waveform playback. Applications that start with the “Y” prefix 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 time-based. 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.

Model name	Description
Cellular communications	
N9071EM0E	GSM/EDGE/Evo Measurement Application
N9072EM0E	cdma2000™ Measurement Application
N9073EM0E	W-CDMA/HSPA+ Measurement Application
N9076EM0E	1xEV-DO Measurement Application
N9079EM0E	TD-SCDMA/HSPA 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
N9080EM4E	LTE V2X Measurement Application
Y9080EM3E	NB-IoT and eMTC FDD Waveform and Measurement Application
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
Wireless connectivity	
N9075EM0D	Mobile WiMAX™ Measurement Application
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
N9081EM0E	Bluetooth® Measurement Application
Y9081EM0E	Bluetooth Waveform and Measurement Application

Model name	Description
General purpose	
N9063EM0E	Analog Demodulation Measurement Application
N9054EM0E	VMA Vector Modulation Analysis Measurement Application
N9054EM1E	Vector Modulation Analysis Custom OFDM Application
N9065EM0E	Sequence Analyzer BTS Measurement Application
N9065EM1E	Sequence Analyzer Device Measurement Application
N9069EM0E	Noise Figure Measurement Application
Step 3. Add Signal Studio software [1] (optional) **Generate standard-compliant test signals validated by Keysight for receiver and component test.**	
Cellular communications	
N7600EMBC	Signal Studio for W-CDMA/HSPA+, waveform playback
N7601EMBC	Signal Studio for cdma2000® / 1xEV-DO, waveform playback
N7602EMBC	Signal Studio for GSM/EDGE/Evo, waveform playback
N7612EMBC	Signal Studio for TD-SCDMA/HSPA, waveform playback
N7624EMBC	Signal Studio for LTE/LTE-Advanced/LTE-A Pro (NB-IoT and eMTC) FDD, waveform playback
N7625EMBC	Signal Studio for LTE/LTE-Advanced TDD, waveform playback
N7631EMBC	Signal Studio Pro for 5G NR, waveform playback
Wireless connectivity	
N7606EMBC	Signal Studio for Bluetooth®, waveform playback
N7610EMBC	Signal Studio for IoT (Internet of Things), waveform playback
N7615EMBC	Signal Studio for Mobile WiMAX™, waveform playback
N7617EMBC	Signal Studio for WLAN 802.11, waveform playback
Step 4. Add 89600 VSA Software (optional)	
89600 VSA software	Industry-leading measurement software for evaluating and troubleshooting signals in R&D; PC-based software supporting more than 40 measurement platforms, plus more than 75 signal standards and modulation types including MIMO analysis; www.keysight.com/find/89600vsa
Step 5. Add MATLAB software [2] (optional) **Create arbitrary waveforms, customize measurement and data analysis routines, create your own instruments applications and test systems, automate measurements, signal generation, and report generation.**	
○ N6171A-M01	MATLAB basic package
○ N6171A-M02	MATLAB standard package
○ N6171A-M03	MATLAB advanced package

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

Services

F. Calibration, start-up assistance

	Model name	Description	
○	M9421A-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.

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. The M9421A VXT PXIe vector transceiver is supported by the Keysight Automatic Calibration Software to perform calibrations that test all product specifications and is compliant with ISO 17025:2005, ANSI/NCSL Z540.3-2006 and Measurement Uncertainty per ISO Guide to Expression of Measurement Uncertainty 1995.

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
Upgrade from 40 MHz to 80 MHz	M9421AU-B85
Upgrade from 80 MHz to 160 MHz	M9421AU-BU5
Upgrade from 40 MHz to 160 MHz	M9421AU-B1X
Upgrade memory from 256 MSa to 512 MSa	M9421AU-M05
Add high output power	M9421AU-1EA
Add half duplex port	M9421AU-HDX
True MIMO upgrade	M9421AU-MMO
Multi-tester synchronization for MIMO measurement upgrade	M9421AU-MTS

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 analyzer has been adjusted as part of a repair or calibration during its first year, or if the analyzer 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 analyzer meets all warranted specifications.

Related Literature

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

Publication title	Publication number
M9421A VXT PXIe Vector Transceiver - Data Sheet	5992-1646EN
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
89600 VSA Software - Brochure	5990-6553EN
Signal Studio Software - Brochure	5989-6448EN

- www.keysight.com/find/modular
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