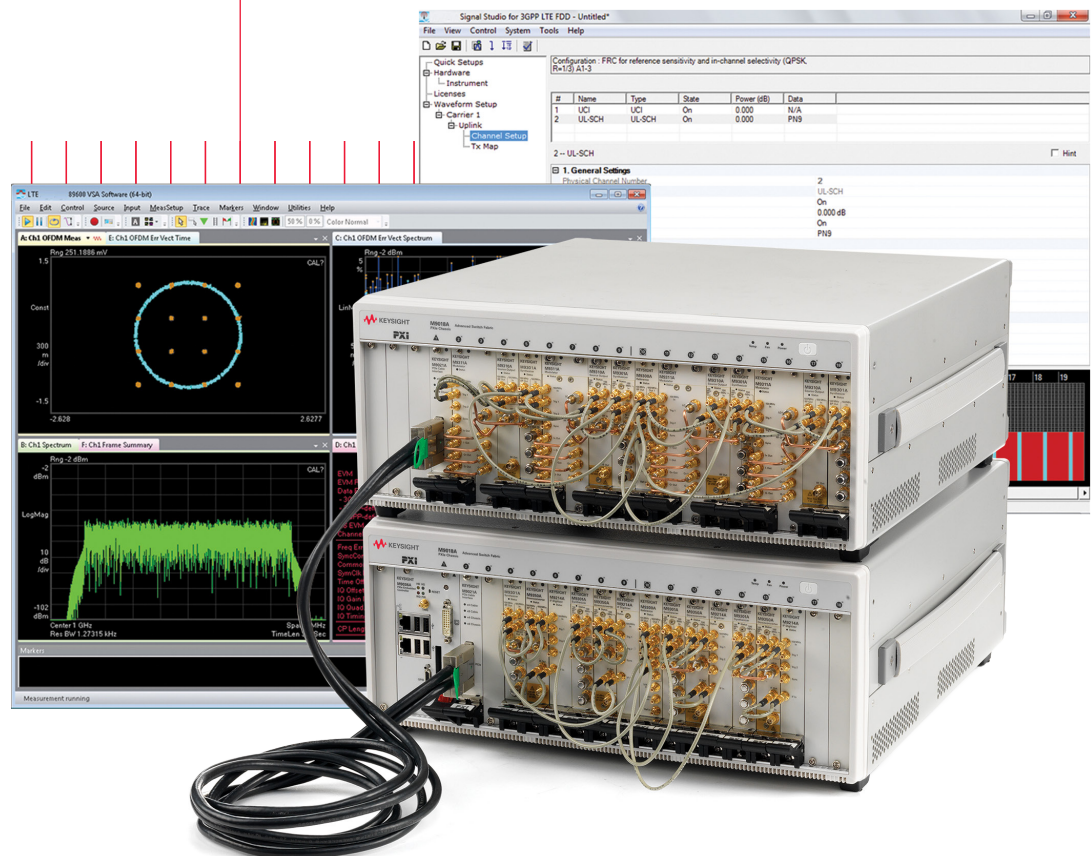


# Keysight Technologies LTE/LTE-Advanced Multi-Channel Test Solution 1 MHz to 3 GHz or 6 GHz

## Configuration Guide



# Overview

This configuration guide contains information to help you configure your LTE/LTE-Advanced Multi-Channel Test Solution and tailor the system to meet your requirements.

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## A. Select Options for M9381A PXIe VSG

Recommended options for Keysight Technologies, Inc. LTE/LTE-Advanced Multi-Channel Test Solution indicated ■ below. Select one PXI VSG per channel.

<b>Step 1. Start with M9381A PXIe VSG base configuration</b>			
Refer to the configurations section on page 12 to determine quantity of M9381As.			
■	The M9381A PXIe VSG (occupies 4 slots) includes:		
	M9301A	PXIe Synthesizer	– Frequency range 1 MHz - 3 GHz
	M9310A	PXIe Source Output	– Modulation bandwidth 40 MHz
	M9311A	PXIe Digital Vector Modulator	– Memory 32 MSa
			– One day start up assistance
			– Modular interconnect cables
			– Software, example programs and product information on CD
			– Return to Keysight warranty - 3 years
<b>Step 2. Choose a frequency range</b>			
<input type="checkbox"/>	M9381A-F03	1 MHz - 3 GHz	Included in base configuration of M9381A
■	M9381A-F06	1 MHz - 6 GHz	
<b>Step 3. Choose a modulation bandwidth</b>			
<input type="checkbox"/>	M9381A-B04	40 MHz	Included in base configuration of M9381A
■	M9381A-B10	100 MHz	
<input type="checkbox"/>	M9381A-B16	160 MHz	
<b>Step 4. Choose memory size</b>			
<input type="checkbox"/>	M9381A-M01	32 MSa	Included in base configuration of M9381A
■	M9381A-M05	512 MSa	
<input type="checkbox"/>	M9381A-M10	1024 MSa	
<b>Step 5. Add high output power (optional)</b>			
Minimizes need for external amplification to overcome power loss			
<input type="checkbox"/>	M9381A-1EA	High output power	Max output power +18 dBm across the frequency range
<b>Step 6. Add fast switching speed (optional)</b>			
Accelerates test throughput			
<input type="checkbox"/>	M9381A-UNZ	Fast switching	240 μs RF tuning and 10 μs baseband tuning in list mode
<b>Step 7. Add analog modulation (optional)</b>			
<input type="checkbox"/>	M9381A-UNT	Analog modulation	AM, FM, phase, pulse & multitone modulation

## B. Select Options for M9391A PXIe VSA

Recommended options for LTE/LTE-Advanced Multi-Channel Test Solution indicated ■ below.  
Select one PXI VSA per channel.

<b>Step 1. Start with M9391A PXIe VSA base configuration</b>			
Refer to the configurations section on page 12 to determine quantity of M9391As.			
■	The M9391A PXIe VSA base configuration (occupies 3 slots) includes:		
	M9301A	PXIe synthesizer	– Frequency range 1 MHz - 3 GHz
	M9350A	PXIe downconverter	– Analysis bandwidth 40 MHz
	M9214A	PXIe IF digitizer	– Memory 128 MSa (512 MB)
			– One day start up assistance
			– Modular interconnect cables
			– Software, example programs and product information on CD
			– Return to Keysight warranty - 3 years
<b>Step 2. Choose a frequency range</b>			
<input type="checkbox"/>	M9391A-F03	1 MHz - 3 GHz	Included in base configuration
■	M9391A-F06	1 MHz - 6 GHz	
<b>Step 3. Choose an analysis bandwidth</b>			
<input type="checkbox"/>	M9391A-B04	40 MHz	Included in base configuration
■	M9391A-B10	100 MHz	
<input type="checkbox"/>	M9391A-B16	160 MHz	
<b>Step 4. Choose memory size</b>			
■	M9391A-M01	128 MSa	Included in base configuration
<input type="checkbox"/>	M9391A-M05	512 MSa	
<input type="checkbox"/>	M9391A-M10	1024 MSa	
<b>Step 5. Add fast switching speed (optional)</b>			
Accelerates test throughput			
■	M9391A-UNZ	Fast switching	

## C. Add M9300A PXIe Frequency Reference(s)

Required to meet data sheet specifications. Select one M9300A per chassis.

<b>Step 1. Add M9300A PXIe frequency reference(s) (occupies 1 slot)</b>			
4x4 configurations will require 2 M9300As, 1 per chassis.			
■	M9300A	Adds M9300A PXIe Frequency Reference	Five 100 MHz outputs One 10 MHz output Internal 10 MHz OCXO timebase output

## D. Select Controller (Either embedded controller or via PC) <sup>1</sup>

Recommended options for LTE/LTE-Advanced Multi-Channel Test Solution indicated ■ below.

### Step 1. If selecting an embedded controller, select either M9036A or M9037A <sup>2</sup>

- M9036A-M04 Mid-Performance Embedded Controller  
Intel i5-520E dual-core, 2.4 GHz, 4 thread, 4GB RAM

Select the M9036A for mid-performance, lower cost or, if your application requires XP operating system



- M9037A-M04 High-Performance Embedded Controller  
Intel i7-4700EQ quad-core processor, 2.4 GHz, 8 thread, 4GB RAM

Select M9037A 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 x8 connector from front for connection to second chassis



### Step 2. Upgrade from standard memory size (optional)

#### For M9036A

- M9036A-M08 Memory upgrade from 4 GB to 8 GB RAM

#### For M9037A

- M9037A-M08 Memory upgrade from 4 GB to 8 GB RAM
- M9037A-M16 Memory upgrade from 4 GB to 16 GB RAM

### Step 3. Select an operating system

#### For M9036A

- M9036A-WE3 Microsoft Windows Embedded Standard 7 (32-bit)
- M9036A-WE6 Microsoft Windows Embedded Standard 7 (64-bit)
- M9036A-WXP Downgrade to Microsoft Windows XP (32-bit)

#### For M9037A

- M9037A-WE3 Microsoft Windows Embedded Standard 7 (32-bit)
- M9037A-WE6 Microsoft Windows Embedded Standard 7 (64-bit)

1. For list of qualified external controllers, please see Tested Computer List Technical Note literature no. 5990-7632EN. The M9021A is used for both PC controllers and can only be used in the M9018A chassis.
2. The M9018A 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.

## D. Select Controller (Either embedded controller or via PC) <sup>1</sup> (Continued)

### To use your laptop PC as a controller:

- M9045B PCIe ExpressCard adapter



- Y1200B PCIe cable



- M9021A PCIe cable interface<sup>2</sup>: 1 slot



### To use your desktop PC as a controller:

- M9048A PCIe desktop adapter



- Y1202A PCIe cable



- M9021A PCIe cable interface<sup>2</sup>: 1 slot



### To configure 4x4 system with two M9018A chassis<sup>3</sup>:

- Y1202A PCIe cable (select 1)



- M9021A PCIe cable interface<sup>2</sup>: 1 slot (select 2)



1. For list of qualified external controllers, please see Tested Computer List Technical Note literature no. 5990-7632EN. See physical connections diagram on page 8.
2. The M9021A is used for either PC control option and can only be used with the Keysight M9018A 18-slot chassis.
3. For more information on multi-chassis connections, please visit [www.keysight.com/find/pxie-multichassis](http://www.keysight.com/find/pxie-multichassis).

## E. Select a Chassis and Accessories

Recommended options for LTE/LTE-Advanced Multi-Channel Test Solution indicated ■ below.

Step 1. Select a chassis			
■	M9018A	PXIe 18-slot chassis	
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 Refer to configurations section on page 12 to determine quantity	
■	Y1213A	PXI EMC filler panel kit: 5 slots	
Step 3. Choose a rack mount kit (optional)			
□	Y1215A	Rack mount kit for M9018A 18-slot PXIe chassis	
Step 4. Choose an air inlet kit <sup>1</sup> (optional)			
Recommended for rack mounted systems with less than 1U space below chassis			
□	Y1214A	Air inlet kit: M9018A PXIe 18-slot chassis <sup>1</sup>  Provides additional cooling when chassis bottom is blocked or in high temperature conditions <sup>2</sup>	

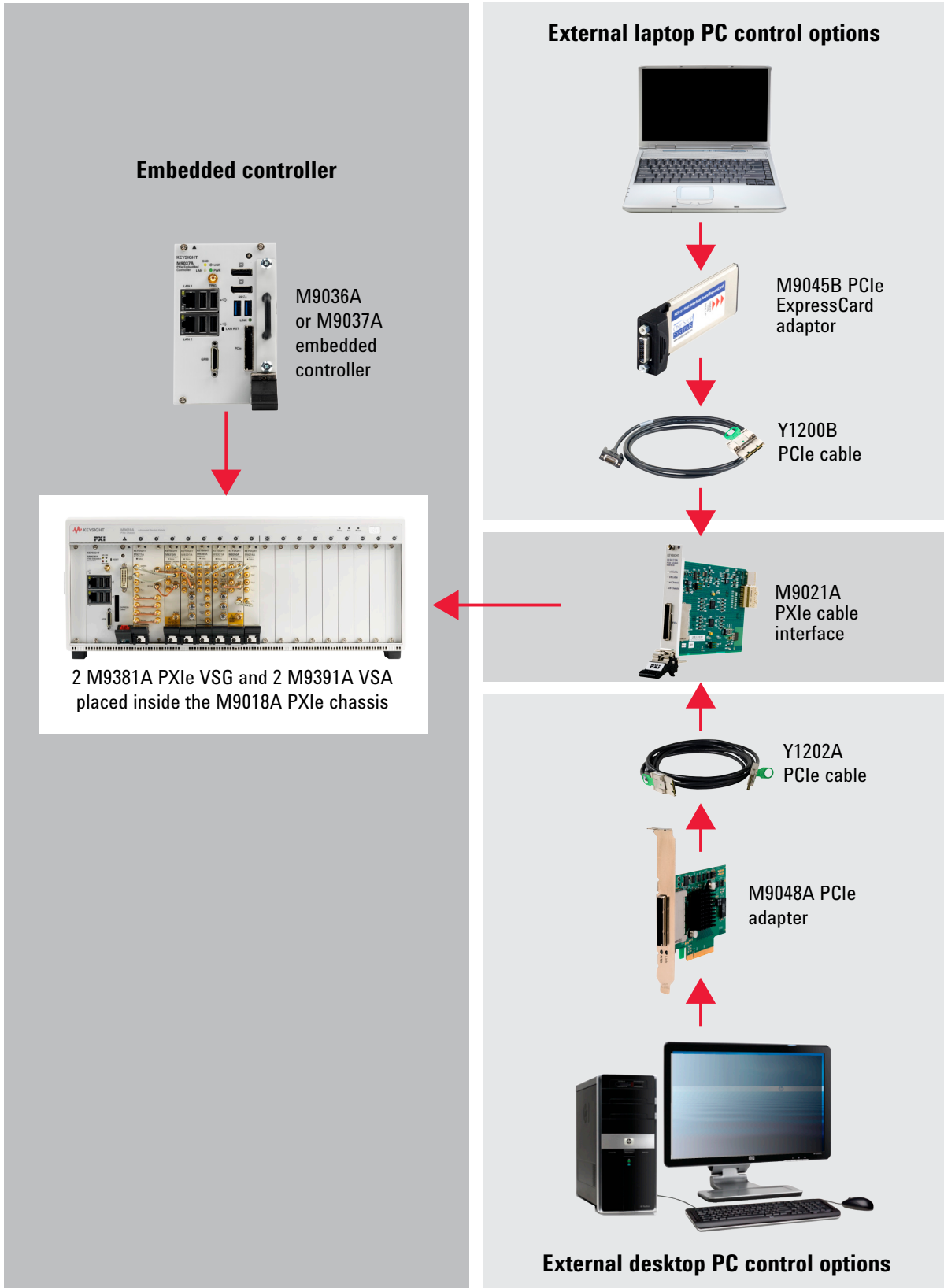
## F. Select a Test Solution Kit

Choose PXI multi-channel/MIMO test solution kit		
Provides configuration software, documentation and example programs		
■	Y1299A-001	PXI multi-channel/MIMO test solution kit <sup>3</sup>

1. Available in 1-slot, 2-slot or 3-slot options depending on the chassis configuration. For more information, please visit [www.keysight.com/find/m9018a](http://www.keysight.com/find/m9018a).
2. See the M9018A data sheet (literature number 5990-6583EN) for more information.
3. Keysight M9018A PXIe chassis and 89600 VSA software are required for multi-channel/MIMO capability and analysis. See page 10 for 89600 VSA software options.

# Physical Connections

## Physical Connection Diagram for Controllers





## G. Select Software for M9381A PXIe VSG

Recommended options for LTE/LTE-Advanced Multi-Channel Test Solution indicated ■ below.

### Step 1. Start with M9381A base configuration

- The M9381A comes standard with the following software:
  - Keysight IO Libraries Suite including Connection Expert <sup>1</sup>
  - Instrument software, soft front panel, drivers for use with MATLAB, LabVIEW, Visual Studio (including VB Net, C#, C/C++), Keysight VEE <sup>2</sup>
  - Sample waveforms and programming examples

### Step 2. Download free Keysight Command Expert software <sup>4</sup>

FREE software that provides fast and easy instrument control for the PC. Command Expert combines instrument command sets, command sequences, documentation, syntax checking and command execution in one simple interface. Command Expert helps you to:

- Find instrument commands
- Access command documentation
- Verify command syntax
- Build instrument command sequences
- Integrate sequences in MATLAB, Visual Studio, Excel, LabVIEW, Keysight VEE or Keysight SystemVue PC application environment
- Generate code for command sequences in MATLAB, Visual C#, Visual Basic.NET and Visual C/C++
- Profile command execution time
- Debug command sequences using breakpoints and single stepping

### Step 3. Add Signal Studio software (one license can be used for up to 4 channels in a single chassis) <sup>3</sup>

Provides performance optimized referenced signals validated by Keysight

	N7624B	Signal Studio for LTE / LTE-Advanced FDD
■	N7624B-HFP	Basic LTE FDD R9, fixed perpetual license
■	N7624B-SFP	Advanced LTE FDD R9, fixed perpetual license
■	N7624B-JFP	Basic LTE-Advanced FDD R10, fixed perpetual license
■	N7624B-TFP	Advanced LTE-Advanced FDD R10, fixed perpetual license
□	N7624B-KFP	Envelope tracking
■	N7624B-9FP	Connect to M9381A/M9252A fixed perpetual license
	N7625B	Signal Studio for LTE / LTE-Advanced TDD
□	N7625B-EFP	Basic LTE TDD R9, fixed perpetual license
□	N7625B-GFP	Advanced LTE TDD R9, fixed perpetual license
□	N7625B-JFP	Basic LTE-Advanced TDD R10, fixed perpetual license
□	N7625B-TFP	Advanced LTE-Advanced TDD R10, fixed perpetual license
□	N7625B-KFP	Envelope tracking
□	N7625B-9FP	Connect to M9381A/M9252A fixed perpetual license
Step 4. Add SystemVue software <sup>5</sup> (optional)		
Provides baseband libraries and applications to validate design concepts in prototypes or manufactured units		
□	W1461	SystemVue Architect
Baseband Libraries and Applications		
□	W1918	LTE - Advanced
□	W1910	LTE

1. Both IO library (version 16.3 or newer) and Connection Expert software need to be installed on the PC controlling the equipment. To download, visit [www.keysight.com/find/iosuite](http://www.keysight.com/find/iosuite)
2. Find latest versions of this software at [www.keysight.com/find/m9381a](http://www.keysight.com/find/m9381a)
3. For more information, see Signal Studio brochure, literature number 5989-6448EN.
4. To download or get more information on Command Expert, visit [www.keysight.com/find/commandexpert](http://www.keysight.com/find/commandexpert)
5. For more information, see Wideband Digital Pre-Distortion with SystemVue and PXI Modular Instruments, literature number 5990-8883EN.

## H. Select Software for M9381A PXIe VSG

Recommended options for LTE/LTE-Advanced Multi-Channel Test Solution indicated ■ below.

### Step 1. Start with M9381A base configuration

- The M9381A comes standard with the following software:
  - Keysight IO Libraries Suite including Connection Expert <sup>1</sup>
  - Instrument software, soft front panel, drivers for use with MATLAB, LabVIEW, Visual Studio (including VB Net, C#, C/C++), Keysight VEE <sup>2</sup>
  - Sample waveforms and programming examples

### Step 2. Download free Keysight Command Expert software <sup>3</sup> (optional)

FREE software that provides fast and easy instrument control for the PC. Command Expert combines instrument command sets, command sequences, documentation, syntax checking and command execution in one simple interface. Command Expert helps you to:

- Find instrument commands
- Access command documentation
- Verify command syntax
- Build instrument command sequences
- Integrate sequences in MATLAB, Visual Studio, Excel, LabVIEW, Keysight VEE or Keysight SystemVue PC application environment
- Generate code for command sequences in MATLAB, Visual C#, Visual Basic.NET and Visual C/C++
- Profile command execution time
- Debug command sequences using breakpoints and single stepping

### Step 3. Add 89600 VSA Software (one license supports up to 4 channels in a single chassis) <sup>4</sup>

Provides time and spectrum measurements, powerful displays, data recording and playback, links to MATLAB and more.

■	89601B-200	Basic 89600 VSA software
■	89601B-300	Hardware connectivity to over 40 Keysight instruments, including the M9391A PXIe VSA
□	89601B-SSA	Spectrum analysis

#### Measurement options

■	89601B-BHD	LTE FDD
■	89601B-BHG	LTE-Advanced FDD
□	89601B-BHE	LTE TDD
□	89601B-BHH	<b>LTE-Advanced TDD</b>

### Step 4. Add 89600 WLA Software (one license supports up to 4 channels in a single chassis) <sup>4</sup>

Seamlessly combines with the 89600 VSA software to clarify autonomous interaction between MAC and PHY layers.

■	89620B-001	Basic 89600 Wireless Link Analysis (WLA) software, transportable license
■	89620B-002	LTE analysis, transportable license
■	89620B-003	LTE-Advanced analysis, transportable license

### Step 5. Add X-Series Measurement Applications for Modular Instruments <sup>5</sup> (optional)

Provides essential RF conformance measurements and tasks for specific communications standards.

Transportable, perpetual licenses support up to 4 modular VSAs in one chassis.

□	M9080B-1TP	LTE FDD
□	M9080B-2TP	LTE-Advanced FDD
□	M9082B-1TP	LTE TDD
□	9082B-2TP	LTE-Advanced FDD

1. Both IO library (version 16.3 or newer) and Connection Expert software need to be installed on the PC controlling the equipment. To download, visit [www.keysight.com/find/iosuite](http://www.keysight.com/find/iosuite)
2. Find latest versions of this software at [www.keysight.com/find/m9391a](http://www.keysight.com/find/m9391a)
3. To download or get more information on Command Expert, visit [www.keysight.com/find/commandexpert](http://www.keysight.com/find/commandexpert)
4. For more information, see 89600 VSA software configuration guide literature number 5990-6553EN.
5. For more information, see X-Series Measurement Applications for LTE/LTE-Advanced, literature number 5991-3010EN.

## I. Select Services: Warranty, Calibration, Start-up Assistance

■		One day start-up assistance	Included in base configuration
■		Return to Keysight warranty - 3 years	Included in base configuration
□	R-51B-001-5Z	Return to Keysight warranty - 5 years	
□	M9381A-UK6	Commercial calibration certificate with test data for M9381A (M9301A, M9310A, M9311A)	Calibration certificate with measurement results available only at time of purchase.
□	M9391A-UK6	Commercial calibration certificate with test data for M9391A (M9301A, M9350A, M9214A)	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.
□	R-51B-001-3X	Express warranty - 5 day turnaround For 3 years	Available in the US, Japan, China and many EU countries
□	R-51B-001-5X	Express warranty - 5 day turnaround For 5 years	Available in the US, Japan, China and many EU countries
□	N7800A	Calibration and adjustment software	

### Global warranty

Keysight Technologies 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

### Express warranty

Reduce downtime with the fastest repair service in the industry. The express warranty upgrades the global warranty to provide:

- 5 day typical turnaround repair service in the US, Japan, China and many EU countries or up to a 10 day improvement in turnaround time in the rest of the world
- Priority 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 M9381A PXIe VSG and M9391A PXIe VSA are supported by the Keysight N7800A 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.

### N7800A calibration & adjustment software

The M9381A PXIe VSG and M9391A PXIe VSA are supported by Keysight's calibration and adjustment software. This is the same software used at Keysight's service centers to automate calibration. The software offers compliance tests for ISO 17025:2005, ANSI/NCSL Z540.3-2006, and measurement uncertainty per ISO Guide to Expression of Measurement Uncertainty.

Product Information: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)  
Or call: 1 800 829-4444 US

Repair and Calibration: [www.keysight.com/find/infoline](http://www.keysight.com/find/infoline)

Parts and Accessories: [www.keysight.com/find/parts](http://www.keysight.com/find/parts)

Email Updates: [www.keysight.com/find/emailupdate](http://www.keysight.com/find/emailupdate)

For all modular products: [www.keysight.com/find/modular](http://www.keysight.com/find/modular)

## Multiple M9381A PXIe VSGs in a Single PXIe Chassis

Up to four M9381As can be installed in a single M9018A 18 slot PXIe chassis. The M9018A PXIe chassis is required for multi-channel/MIMO capability. The cables below are used to connect the M9381A modules to a shared M9300A frequency reference. M9381As can also share a single embedded controller or external PC.

It is recommended that you install the M9381A modules entirely in consecutive slots when using the M9018A chassis. Additional instructions for configuring M9018A PXI backplane triggers are included in the M9381A startup guide, literature number M9381-90001.

Every M9381A comes with two cables listed below to choose from for connecting the M9301A 100 MHz In to the M9300A 100 MHz Out 1 (C1-C4). C1-C4 must be of equal length when operating in a MIMO configuration.

- 8120-5091 Used for connecting signal PXI VSG
- 8021-2175 Used when connecting more than one PXI VSG

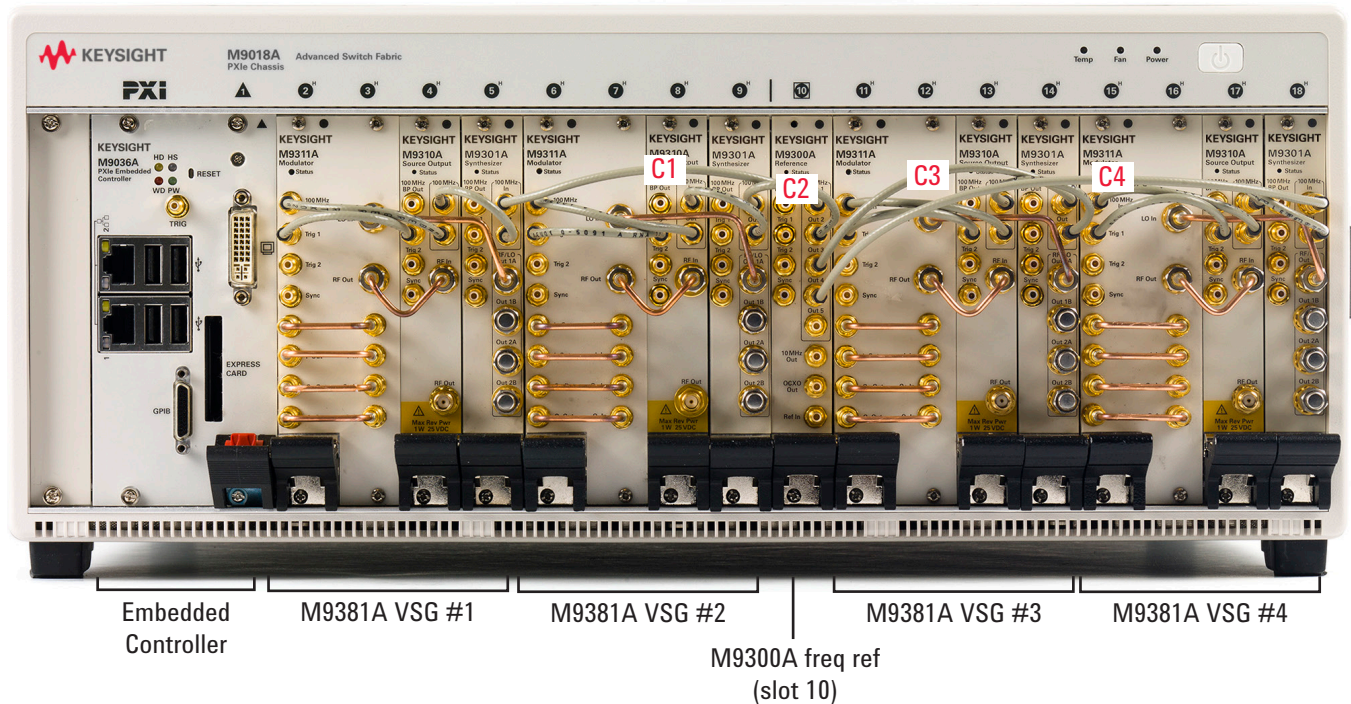


Figure 1. Cable connections for four M9381As in a M9018A PXIe 18-slot chassis.

## Multiple M9391A PXIe VSAs in a Single PXIe Chassis

Up to four M9391As can be installed in a single 18 slot PXIe chassis. The M9018A PXIe chassis is required for MIMO capability and 89600 VSA software is required for MIMO analysis. The cables below are used to connect the M9391A modules to a shared M9300A frequency reference. M9391As can also share a single embedded controller or external PC.

It is recommended that you install the M9391A modules entirely in consecutive slots beginning in slot 4 when using the M9018A chassis. Additional instructions for configuring the M9018A PXI backplane triggers are included in the M9391A and M9381A startup guide literature number M9300-90090.

Every M9391A comes with two cables listed below to choose from for connecting the M9301A 100 MHz IN to the M9300A 100 MHz Out 1 (C1-C4). C1 – C4 must be equal length when operating in a MIMO configuration.

- 8120-5091 Used for connecting single PXI VSA
- 8121-2175 Used when connecting more than one PXI VSA

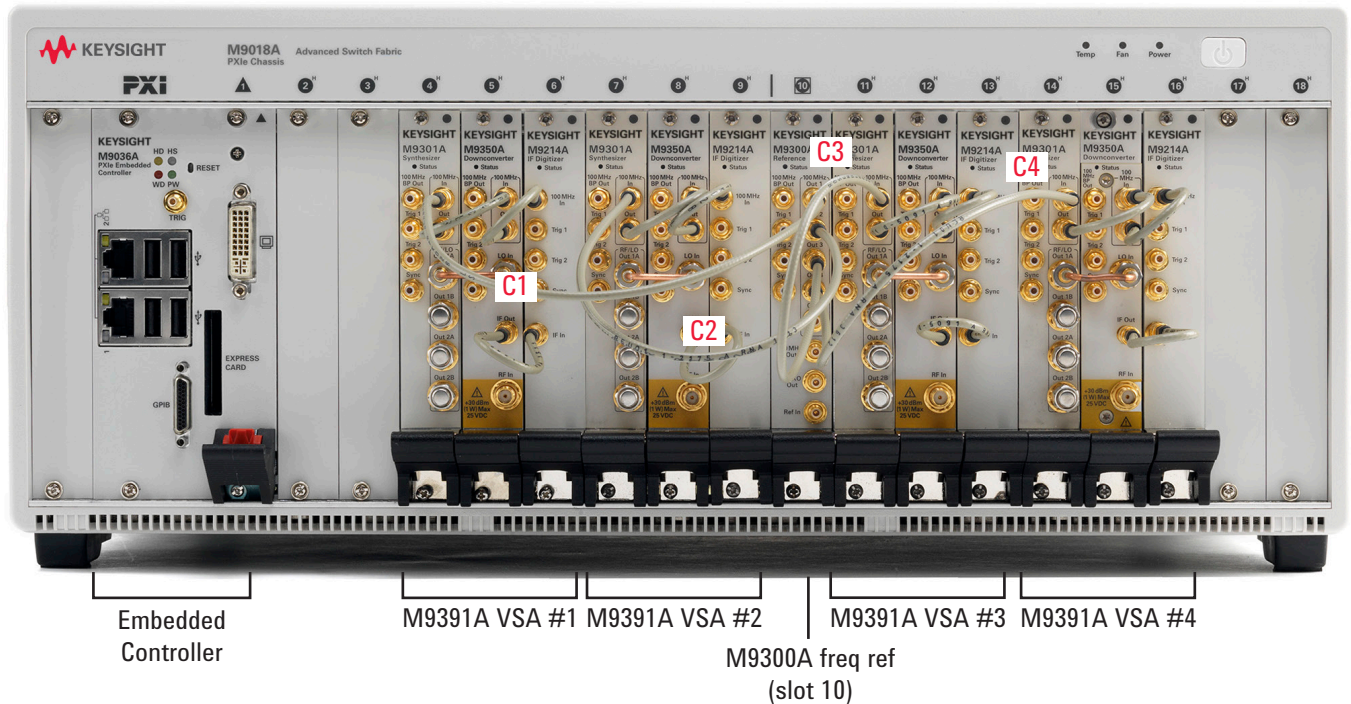


Figure 2. Cable connections for four M9391As in a M9018A PXIe 18-slot chassis.

## 2x2 Channel PXIe VSA/G (M9391A + M9381A) Configuration in a Single PXIe Chassis

You may order a 2-channel PXIe VSA/G pre-assembled in a PXI chassis at no additional charge. Please contact your Keysight Sales Representative to order the M9018AC PXI Modular Solutions Configuration.

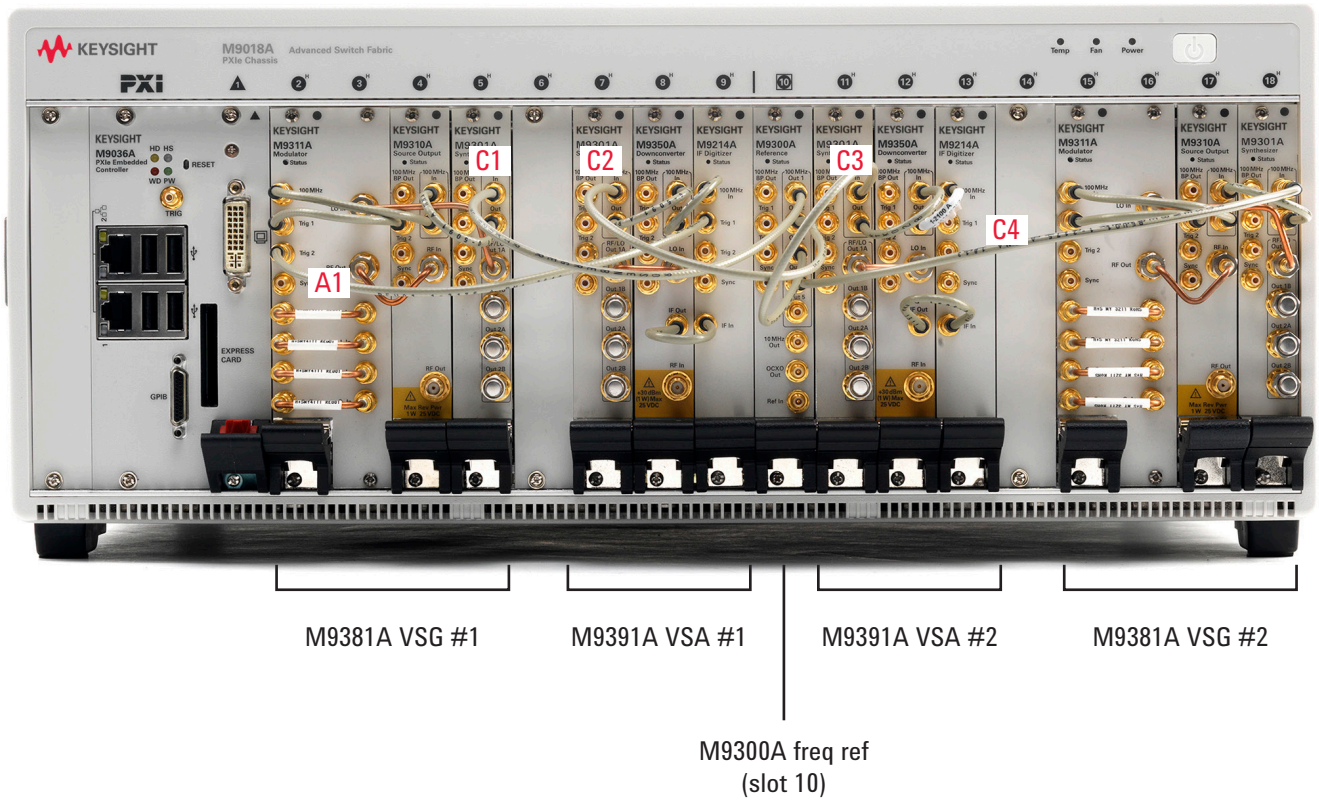
All intermodule cables are shipped with each M9381A and M9391A.

In addition, every M9381A and M9391A comes with two cables listed below to choose from for connecting the M9301A 100 MHz IN to the M9300A 100 MHz Out 1 (C1-C4). C1 – C4 must be equal length when operating in a MIMO configuration.

- 8120-5091 Used for connecting single PXI VSG and/or PXI VSA
- 8121-2175 Used for MIMO cable connections

Note that cable A1 going from the M9311A Trig 2 to M9214A Trig 1 in the left-most PXI VSA/G set is optional. It is used to trigger the PXI VSA from the PXI VSG. Other triggering mechanisms may be employed. Not required for MIMO configuration. For more information, see the *M9391A and M9381A Startup Guide*, literature number M9300-90090.

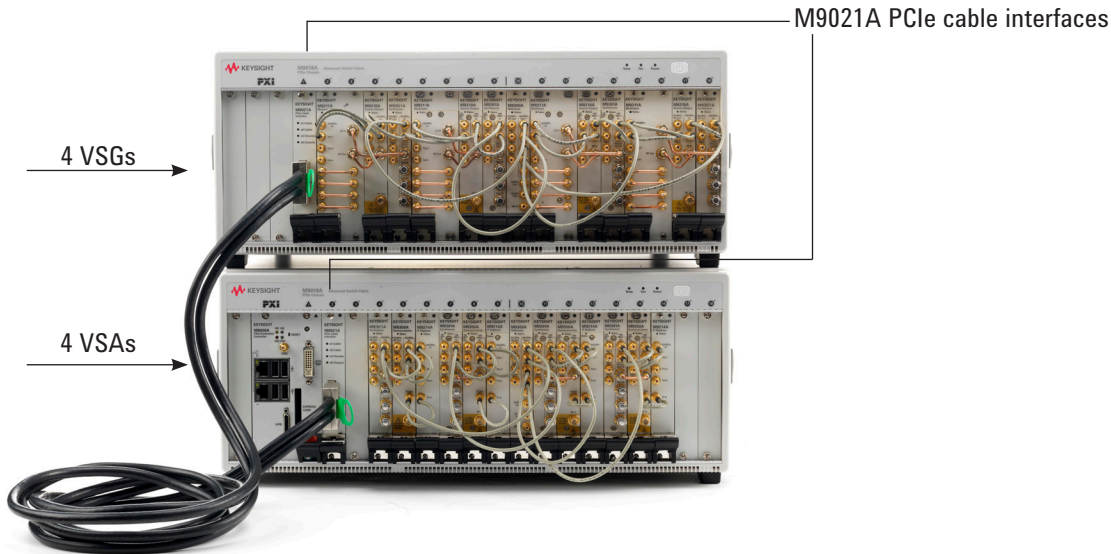
Keysight M9018A PXIe chassis is required for MIMO capability and 89600 VSA software is required for MIMO analysis.



## 4x4 Channel VSA/G (M9391A + M9381A) Configuration in 2 PXIe Chassis

All intermodule cables are shipped with each M9381A and M9391A. The black cable connecting the 2 chassis (model number Y1202A), must be purchased separately. For notes on intermodule cabling of the M9381A and M9391A, please refer to pages 13 to 15. For more information on multi-chassis connections, please visit [www.keysight.com/find/pxie-multichassis](http://www.keysight.com/find/pxie-multichassis).

Keysight M9018A PXIe chassis and 89600 VSA software are required for multi-channel/MIMO capability and analysis.



### Upgrading Your System

Your product can be easily upgraded after the initial purchase. All PXIe VSA and PXIe VSG options are controlled by a licensing key and can be quickly upgraded.

#### How to upgrade your M9391A PXIe VSA or M9381A PXIe VSG:

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.

### Using a Non-Keysight Chassis

The M9381A and M9391A (with M9300A frequency reference) can be successfully installed in a non-Keysight PXI chassis. Please use the following guidelines.

- Ensure that the chassis has 5 consecutive PXIe or PXI-H slots which can be used by the M9381A or M9391A and M9300A.
- Ensure that the chassis and controller supports peer-to-peer PXI Express I/O switch topology.
- Ensure that controller selected is compatible with chassis.

Keysight M9018A PXIe chassis is required for MIMO capability and 89600 VSA software is required for MIMO analysis.

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

# PC Requirements for M9381A PXIe VSG and M9391A PXIe VSA Control <sup>1</sup>

	Windows 7 and Vista	Windows XP
Operating system	Windows 7 (32 & 64 bit) Windows Vista, SP 1 & 2 (32 & 64 bit)	Windows XP, SP 3
Processor speed	1.5 GHz dual core (x86 or x64) minimum, 2.4 GHz recommended No support for Itanium64	1.5 GHz dual core minimum, 2.4 GHz recommended
Available memory	4 GB minimum 8 GB recommended	3 GB minimum
Available disk space <sup>1</sup>	1.5 GB available hard disk space includes: 1 GB for Microsoft.NET framework 3.5 SPI <sup>2</sup> 100 MB for Keysight IO libraries suite available hard disk space includes: 1 GB for Microsoft.NET framework 3.5 SPI <sup>2</sup> 100 MB for Keysight IO libraries suite	
Video	Support for DirectX 9 graphics with 128 MB graphics recommended (SuperVGA supported)	SuperVGA (800 x 600) 256 colors or more
Browser	Microsoft Internet Explorer 7.0 or greater	Microsoft Internet Explorer 6.0 or greater

1. For a list of computers compatible with Keysight Technologies PXIe M9018A chassis, refer to Tested Computer Technical Note (literature no. 5990-7632EN).
2. NET framework runtime components are installed by default with Windows Vista and Windows 7.  
Therefore, you may not need this amount of available disk space.

## Related Literature

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

- *Quickly Gain Insight Into LTE/LTE-A Multi-Channel Designs*, Application Brief (literature no. 5991-4684EN)
- *Y1299A-001 PXI Multi-channel/MIMO Test Solution Kit*, Startup Guide (literature no. Y1299-90001)
- *M9381A PXIe VSG*, Data Sheet (literature no. 5991-0279EN)
- *M9391A PXIe VSA*, Data Sheet (literature no. 5991-2603EN)
- *M9391A PXIe VSA and M9381A PXIe VSG*, Startup Guide (literature no. M9300-90090).
- *M9018A PXIe 18 slot Chassis*, Data Sheet (literature no. 5990-6583EN)
- *M9037A PXIe High Performance Embedded Controller*, Data Sheet (literature no. 5991-3661EN)
- *M9036A PXIe Embedded Controller*, Data Sheet (literature no. 5990-8465EN)
- *X-Series Measurement Applications for Modular Instruments*, Brochure (literature no. 5991-2604EN)



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