Startup Guide

Keysight M9393A PXIe Performance Vector Signal Analyzer (9 kHz to 27 GHz)

Notice: This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.

KEYSIGHT TECHNOLOGIES

Notices

Manual Part Number

M9393-90002

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Keysight Technologies, Inc.

Sales and Technical Support

To contact Keysight for sales and technical support, refer to the "support" links on the following Keysight web resources:

- www.keysight.com/find/M9393A (product-specific information and support, software and documentation updates)
- www.keysight.com/find/PXI-VSA (product-specific information and support, software and documentation updates)

Information on preventing damage to your Keysight equipment can be found at www.keysight.com/find/tips.

Regulatory Compliance

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. To review the Declaration of Conformity, go to http:/regulations.corporate.keysight.com/DoC/search.htm.

Warranty

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Safety Notices

The following safety precautions should be observed before using this product and any associated instrumentation.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product.

WARNING

If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

The types of product users are:

- **Responsible body** is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring operators are adequately trained.
- **Operators** use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

- **Maintenance personnel** perform routine procedures on the product to keep it operating properly (for example, setting the line voltage or replacing consumable materials). Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.
- **Service personnel** are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

WARNING

Operator is responsible to maintain safe operating conditions. To ensure safe operating conditions, modules should not be operated beyond the full temperature range specified in the Environmental and physical specification. Exceeding safe operating conditions can result in shorter lifespans, improper module performance and user safety issues. When the modules are in use and operation within the specified full temperature range is not maintained, module surface temperatures may exceed safe handling conditions which can cause discomfort or burns if touched. In the event of a module exceeding the full temperature range, always allow the module to cool before touching or removing modules from chassis.

Keysight products are designed for use with electrical signals that are rated Measurement Category I and Measurement Category II, as described in the International Electrotechnical Commission (IEC) Standard IEC 60664. Most measurement, control, and data I/O signals are Measurement Category I and must not be directly connected to mains voltage or to voltage sources with high transient over-voltages. Measurement Category II connections require protection for high transient over-voltages often associated with local AC mains connections. Assume all measurement, control, and data I/O connections are for connection to Category I sources unless otherwise marked or described in the user documentation.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30V RMS, 42.4V peak, or 60VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

The instrument and accessories must be used in accordance with its specifications and operating instructions, or the safety of the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories, as defined in the specifications and operating information, and as shown on the instrument or test fixture panels, or switching card.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring circuits, NOT as safety earth ground connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice,

or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits – including the power transformer, test leads, and input jacks – must be purchased from Keysight. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keysight to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Keysight office for information.

WARNING

No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers. For continued protection against fire hazard, replace fuse with same type and rating.

PRODUCT MARKINGS:

The CE mark is a registered trademark of the European Community.

Australian Communication and Media Authority mark to indicate regulatory compliance as a registered supplier.

This symbol indicates product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001). It also identifies the product is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).

South Korean Class A EMC Declaration. This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home. A급 기기 (업무용 방송통신기자재) 이 기기는 업무용 (A급) 전자파적합기기로서 판 매 자 또는 사용자는 이 점을 주 의하시기 바라 며 ,가정외의 지역에서 사용하는 것을 목적으로 합니다 .

This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).

This symbol on an instrument means caution, risk of danger. You should refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.

This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.

This symbol indicates the instrument is sensitive to electrostatic discharge (ESD). ESD can damage the highly sensitive components in your instrument. ESD damage is most likely to occur as the module is being installed or when cables are connected or disconnected. Protect the circuits from ESD damage by wearing a grounding strap that provides a high resistance path to ground. Alternatively, ground yourself to discharge any built-up static charge by touching the outer shell of any grounded instrument chassis before touching the port connectors.

CLEANING PRECAUTIONS:

WARNING

To prevent electrical shock, disconnect the Keysight Technologies instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally. To clean the connectors, use alcohol in a well-ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.

Table of Contents

M9393A Introduction

The scope of this Startup Guide is to detail the processes of receiving and installing the modules and cables that compose the Keysight M9393A PXIe Performance Vector Signal Analyzer. Additionally, installing the required software is documented. If you have any questions after reviewing this information, please contact your local Keysight Technologies Inc. representative or contact us through our website at www.key-sight.com/find/M9393A.

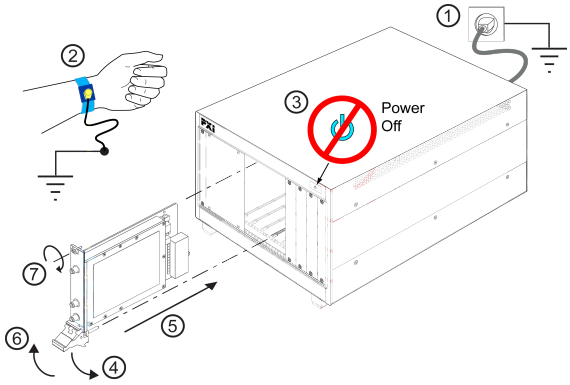
Follow the Startup Sequence

WARNING Closely follow the startup process flow in this document. Deviating from the sequence can cause unpredictable system behavior, damage your system, and may cause personal injury.

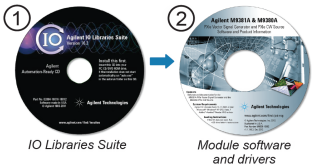
Step 1: Unpack and Inspect

Step 2: Verify Shipment

Step 3: Install Modules



Step 4: Install Drivers and Software



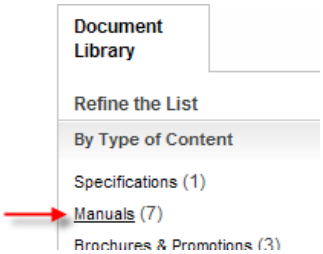
Step 5: Verify Operation with the Soft Front Panel (SFP)

Step 6: Make a Measurement

Step 7: INSTALLATION COMPLETE.

Proceed to program your product through the API.

M9393A Related Documentation



The documentation associated with this product is available at the respective product pages on keysight.com (go to **Document Library > Manuals**).

A documentation map follows with further documentation formation. See Documentation Map (page 9).

M9393A (see www.keysight.com/find/M9393A)

- M9393A Soft Front Panel help system
- M9393A Startup Guide (this document)
- M9393A VSA Programming Guide
- M9393A device driver API references (IVI-C/IVI-COM)
- M9393A Data Sheet
- M9393A Security Guide

NOTE Depending upon your particular order, you may find the following product documentation useful.

Additional Related Documentation

M9018A PXIe Chassis (see www.keysight.com/find/M9018A)

- M9018A PXIe Chassis Startup Guide

M9036A PXIe Embedded Controller (see www.keysight.com/find/M9036A)

- M9036A PXIe Embedded Controller Startup Guide (optional)

M9037A PXIe Embedded Controller (see www.keysight.com/find/M9037A)

- M9037A PXIe Embedded Controller Startup Guide (optional)

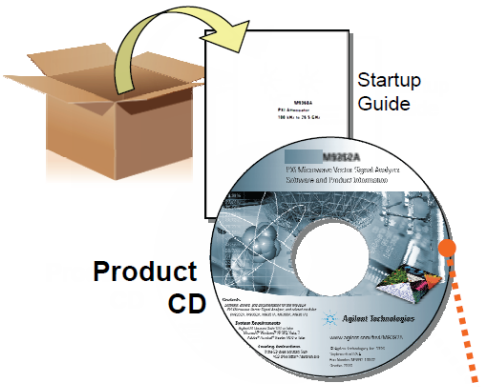
M9021A PCIe Cable Interface (see www.keysight.com/find/M9021A)

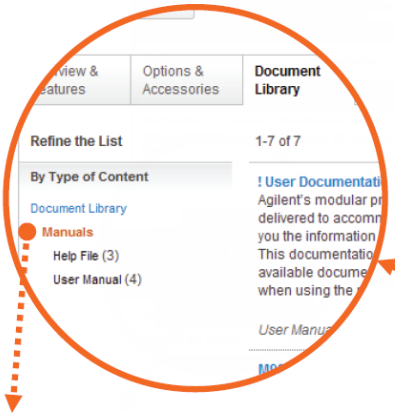
- Keysight M9021A PCIe Cable Interface Module Installation Guide (optional)

Keysight Multiple PXIe and AXIe Chassis System Configuration Tool

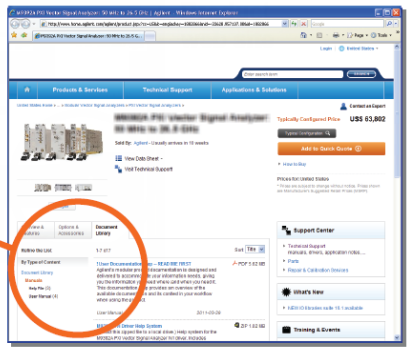
- Download and save this CHM file from www.keysight.com/find/pxie-multichassis

Documentation Map





Product web site



Access to all DOCUMENTATION noted below

Startup Guide

- Unpack product
- Verify shipment
- Install software
- Install & connect hardware
- Verify operation
- Troubleshooting

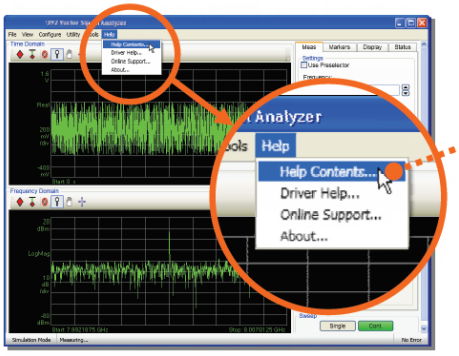
Data Sheet/Specs Guide

- Technical specifications

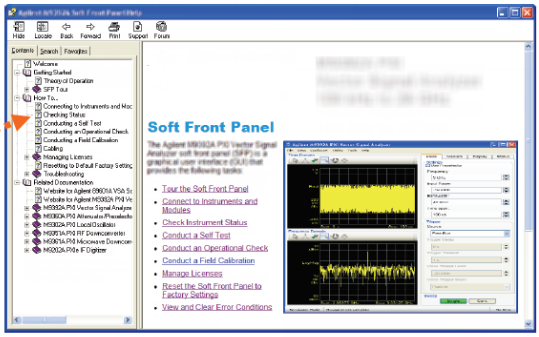
Programming Guide

- Tutorials
- Code examples
- Measurement examples
- Programming tips

Soft Front Panel (SFP) user interface

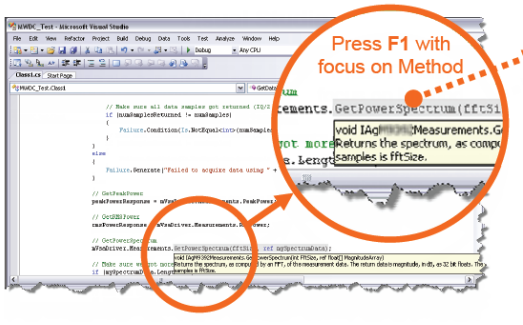


SFP help system

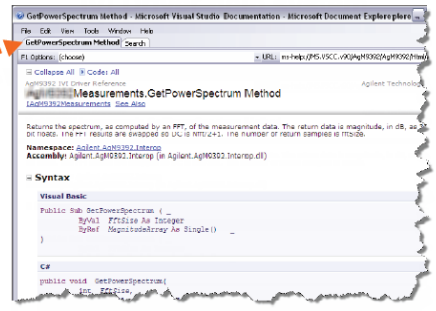


- Theory of operation
- Block diagram
- Configuration
- Self test
- Operational check
- Troubleshooting
- Measurements (limited)
- Field calibration

Visual Studio



IVI Driver help system



- IVI-COM and IVI-C driver programmer's reference
- Sample programs

Items You Will Need

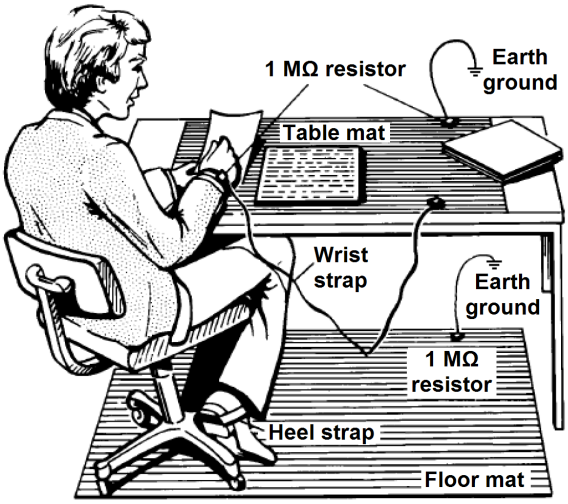
To complete the startup process and begin using the instrument, you will need the following items:

- Pozidriv P1 or slotted screwdriver to secure the modules into the chassis
- Adjustable torque wrench (at minimum, accommodate an 8 Lb-In [0.904 Nm] torque on SMA connectors).
- If your configuration contains an embedded controller, such as the M9036A or M9037A:
    - Monitor with M9036A - Use the DVI-to-VGA adaptor (an accessory to the M9036A) if necessary.
    - Monitor with M9037A - Use the Display Port to VGA adaptor (an accessory to the M9037A) if necessary.
    - USB compatible keyboard
    - USB compatible mouse
- If you are installing the software from CDs onto an embedded controller, you may wish to use a USB CD/DVD drive. As an alternative, copy the installer files to a computer, transfer the installer files to a USB flash drive, and install the software from the USB flash drive.
- A high-quality SMA (male) to SMA (male) cable at least 10 inches (25.4 cm) long. This cable is used in Step 6: Make a Measurement (page 32). If you are using a signal generator other than the Keysight M9381A PXIe Vector Signal Generator the cable end at the signal generator RF Output may be different.

Step 1: Unpack and Inspect the Modules

CAUTION The modules are shipped in materials which prevent damage from static. The module should only be removed from the packaging in an anti-static area ensuring that correct anti-static precautions are taken. Store all modules in anti-static envelopes when not in use.

ESD



Electrostatic discharge (ESD) can damage or destroy electronic components. Use a static-safe work station to perform all work on electronic assemblies. The figure (left) shows a static-safe work station using two types of ESD protection: conductive table-mat and wrist-strap combination, and conductive floor-mat and heel-strap combination. Both types, when used together, provide a significant level of ESD protection. Of the two, only the table-mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 MΩ of isolation from ground.

WARNING **DO NOT use these techniques for a static-safe work station when working on circuitry with a voltage potential greater than 500 volts.**

Inspect for Damage

After unpacking an instrument, inspect it for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by the warranty (see warranty information at beginning of this document).

CAUTION To avoid damage when handling a module, do not touch exposed connector pins.

NOTE See www.keysight.com/find/tips for information on preventing damage to your keysight equipment.

Return an Instrument for Service

Should it become necessary to return an instrument for repair or service, follow the steps below:

NOTE All component modules for an M9380A, M9381A, M9391A or M9393A instrument are factory tested, aligned, calibrated and shipped as a "bundle". It is important that you maintain the bundle when installing modules or

returning an instrument for repair. See "Step 5: Verify Operation of the Keysight M9393A PXIe Vector Signal Analyzer" on page 29.

1. Review the warranty information shipped with your product.
2. Contact Keysight to obtain a Return Material Authorization (RMA) and return address. For assistance finding contact information, go to www.keysight.com/find/assist.
3. Write the following information on a tag and attach it to the malfunctioning equipment:
    - Name and address of owner. A P.O. box is not acceptable as a return address.
    - Description of failure or service required.
4. Pack the instrument in its original packaging. Include all cables. If the original packaging material is not available, use anti-static bubble wrap or packing peanuts and place the instrument in a sealed container and mark the container “FRAGILE”.
5. On the shipping label, write ATTENTION REPAIR DEPARTMENT and the RMA number.

NOTE In your correspondence, refer to the modules by serial number and the instrument by model number.

Step 2: Verify M9393A Shipment Contents and Model Options

The Keysight M9393A PXIe Performance Vector Signal Analyzer is housed in a PXIe chassis. The minimum Vector Signal Analyzer consists of the software, chassis, a Keysight M9365A PXIe Downconverter, a Keysight M9214A PXIe IF Digitizer, a Keysight M9308A PXIe Synthesizer, and a Keysight M9300A PXIe Frequency Reference. The M9300A may be used in this and other configurations. You may also configure the Keysight M9380A PXIe CW Source, the Keysight M9381A PXIe Vector Signal Generator and the Keysight M9391A PXIe Vector Signal Analyzer in the same chassis and also use the same M9300A.

Qty	Keysight Part Number	Description
1	M9393-10002	Software and Product Information CD, contains: Soft Front Panels, drivers, and all printed documentation in PDF format (also available at www.keysight.com/find/M9393A-driver
1	M9393-90002	Keysight M9393A PXIe Performance Vector Signal Analyzer Startup Guide in hard copy
1	E2094-60003	Keysight IO Libraries Suite CD
1	5023-1450	Wrench, socket,extension, 5/16 inch, SMA
1	5002-3361	Cable removal tool, SMB/SMP/MMCX
1	5972-3335	PXI Modular Product Startup Quick Reference
1	5061-7383	South Korean Class A EMC Declaration
1	9320-6698	China RoHS Addendum for Vector Signal Analyzer
1	M9300A	Keysight M9300A PXIe Frequency Reference Option M9393A-300
1	M9308A	Keysight M9308A PXIe Synthesizer
1	M9365A	Keysight M9365A PXIe Downconverter
1	M9214A	Keysight M9214A PXIe IF Digitizer
1	1250-3807	Adapter, T-type, SMB (male) - SMB (male) - SMB (female)
1	8121-2063	Cable, coaxial, BNC (male) - SMB (female) 1200 mm
1	8120-5091	Cable, coaxial, SMB (female) - SMB (female) 120 mm
1	8121-2169	Cable, coaxial, SMB (female) - SMB (female) 165 mm
1	8121-2174	Cable, coaxial SMB (female) - SMB (female) 255 mm
1	8121-2723	Cable, coaxial, SMB (female) - SMP (female) 150 mm
1	8121-2554	Cable, coaxial, SMP (female) - SMP (female) 150 mm
1	8121-2636	Cable, coaxial, SMB (female) - SMP (female) 240 mm
1	M9365-20039	Cable, semi-rigid, SMA (male) - SMA (male)
1	M9365-20040	Cable, semi-rigid, SMA (male) - SMP (male)

NOTE All of the files contained on the CDs are available for downloading at the Keysight M9202A PXIe IF Digitizerwebsite at www.keysight.com/find/M9393A.

Model – Option List for the Keysight M9393A PXIe Performance Vector Signal Analyzer

M9393A	Description
M9393A	PXIe Vector Signal Analyzer - comprised of: M9308A PXIe Synthesizer, M9365A PXIe Downconverter and M9214A PXIe IF Digitizer
M9393A-300	Adds M9300A PXIe Frequency Reference (required for warranted specifications)
M9393A-F08	Frequency range, 9 kHz to 8.4 GHz
M9393A-F14	Frequency range, 9 kHz to 14 GHz
M9393A-F18	Frequency range, 9 kHz to 18 GHz
M9393A-F27	Frequency range, 9 kHz to 27 GHz
M9393A-B04	Analysis bandwidth, 40 MHz
M9393A-B10	Analysis bandwidth, 100 MHz
M9393A-B16	Analysis bandwidth, 160 MHz
M9393A-M01	Memory, 128 MSa
M9393A-M05	Memory, 512 MSa
M9393A-M10	Memory, 1024 MSa
M9393A-P08	Preamplifier, 8.4 GHz
M9393A-P14	Preamplifier, 14 GHz
M9393A-P18	Preamplifier, 18 GHz
M9393A-P27	Preamplifier, 27 GHz
M9393A-UNZ	Fast tuning
M9393A-UK6	Commercial calibration certificate with test data

Step 3: Install the PXI Modules

Proceed through this section in the following order:

1. Review “Before Installing PXI Modules” to understand installation guidelines and precautions.
2. Prepare the PXI chassis for the installation process.
3. Install the controller (embedded or external).
4. Install the modules.
5. Cable the instruments.
6. Install slot blockers and filler panels in the empty PXI chassis slots.
7. Power up the chassis.

Before installing the PXI Modules

Precautions

CAUTION PXI hardware does not support "hot-swap" (changing modules while power is applied to the chassis) capabilities. Before installing or removing a module to/from the chassis, power off the chassis to prevent damage to the module.

NOTE All component modules for an M9381A, M9391A or M9393A instrument are factory tested, aligned, calibrated and shipped as a "bundle". It is important that you maintain the bundle when installing modules or returning an instrument for repair.

Recommended best practices to ensure proper and safe module operating conditions

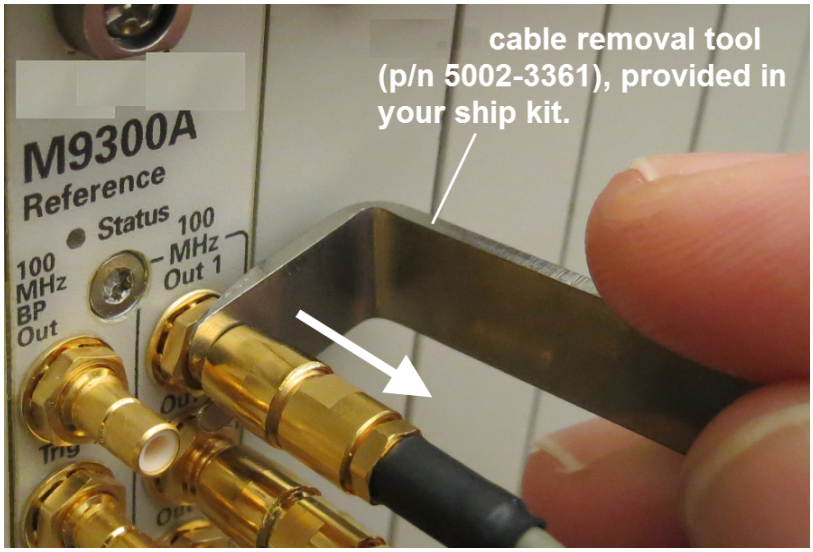
- Ensure proper chassis air flow is maintained
- Select a chassis that provides thermal protection if fans become inoperable or forced air cooling is obstructed
- Use slot blockers (Keysight model Y1212A, 5 per kit) and EMC filler panels in empty module slots to ensure proper operating temperatures. Keysight chassis Keysight M9018A chassis and slot blockers optimize module temperature performance and reliability of test.
- Set chassis fans to high or auto. Do not disable fans.
- Position chassis to allow plenty of space around chassis air intake and fan exhaust.
- At environment temperatures above 45 °C, set chassis fan speed to high.

M9018A Chassis Air Flow

The M9018A has multilple air intakes. They are located at the lower sides, lower front and bottom of the chassis.

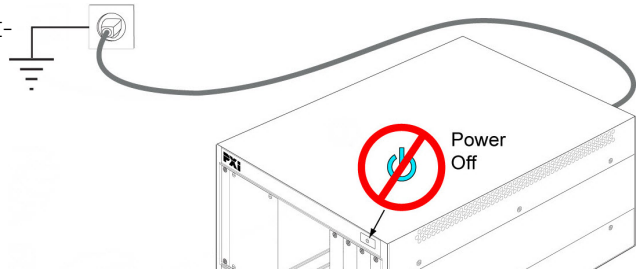
Cable and Connector Care

When you need to disconnect push-on cables from the module front panel connectors, use the Keysight Cable Removal Tool provided in your Keysight PXI instrument's ship kit.



To avoid damage to the cables or connectors, pull the cable straight away from the connector. **Do not use the tool as a pry bar.**

Prepare the Chassis



1. Make sure that the line cord is plugged into a grounded outlet to establish earth ground.
2. Make sure the chassis power switch is **Off**.
3. If the chassis has multiple fan speed settings, ensure that the fan switch is set to **AUTO** and the inhibit switch is set to **DEF**.

4. Position the chassis to provide ample space between the chassis fan intake and exhaust vents. Blockage by walls or obstructions affects the air flow needed for cooling.
5. Before inserting a module into the chassis, back the mounting screws out to ensure that there is no interference between the screws and the mounting rails.
6. Make sure the PXI chassis fans are operable and free of dust and other contaminants that may restrict airflow.

For additional information about setting up the M9018A chassis, refer to the M9018A documentation and the getting started video at http://www.youtube.com/watch?v=Idl02MF-nWU.

Install the Controller

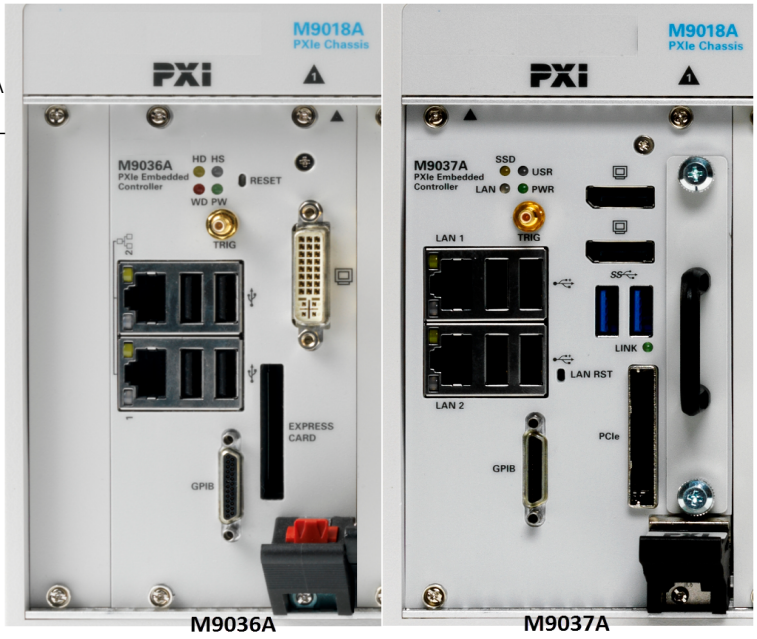
Use the appropriate instructions below for installing the **embedded controller** (Keysight models M9036A or M9037A) or **remote controller** (Keysight M9021A Cable Interface with M9045B adaptor for laptop PC or M9048A adaptor for desktop PC).

CAUTION Do not power up the controller until instructed to do so later in this document.

Embedded Controller

If your configuration contains a Keysight M9036A or M9037A Embedded Controller, follow the procedure below.

(For additional detail, refer to instructions in the M9036A Startup Guide or the M9037A Startup Guide.)

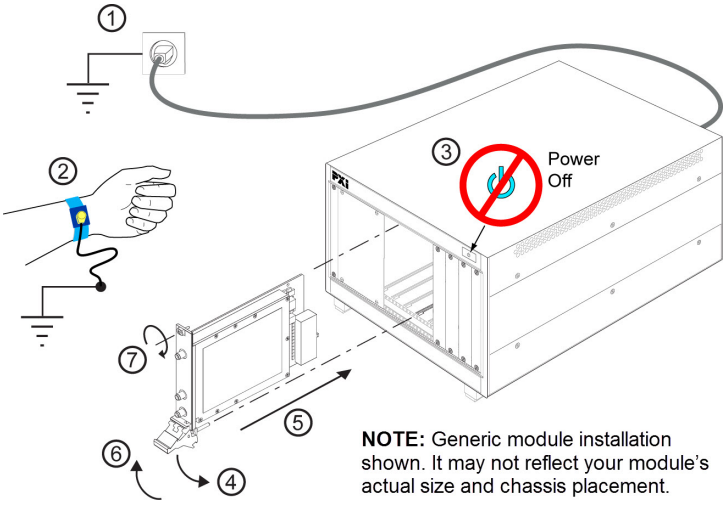


1. Remove the M9036A or M9037A module from its ESD protective bag. Observe ESD precautions (see page 11).

2. Install the embedded controller in Slot 1 (see 1 icon above the slot) in the chassis.

   a. While holding the module by the injector/ejector handle and making sure the injector/ejector handle is pushed down in the unlatched (downward) position, slide the controller module into chassis, using the slot guides (top and bottom).

   b. Sliding the module into position, when you begin to feel resistance, pull up on the injector/ejector handle to fully inject the module into the chassis backplane connectors.



   c. Tighten the module retaining screws (top and bottom) and torque them to 5 Lb-In (0.57 N-m).

3. If you have an M9036A controller, install a blank Y1213A filler panel in the empty slot to the left of the controller.

4. Connect peripherals (mouse, keyboard, and monitor).

Remote Controller

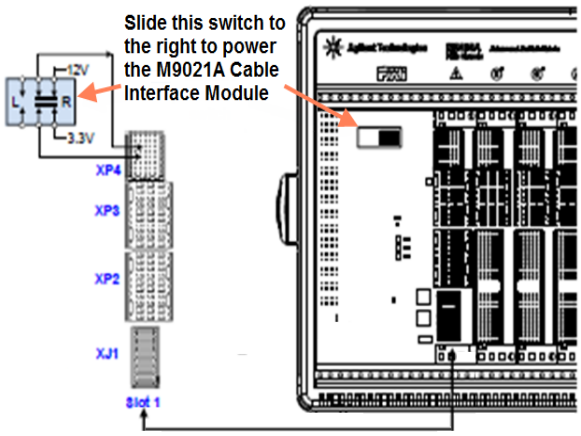
If your configuration contains a Keysight M9021A Cable Interface Module, follow the procedure below. For additional information about installing the M9021A, refer to the M9021A Installation Guide or the getting started video at http://www.youtube.com/watch?v=Idl02MF-nWU.

NOTE The following procedure addresses using the M9021A as a cabled PCIe interface between the M9018A chassis and an external host computer. However, if you intend to use an M9021A module to control a subordinate downstream chassis or RAID configuration:

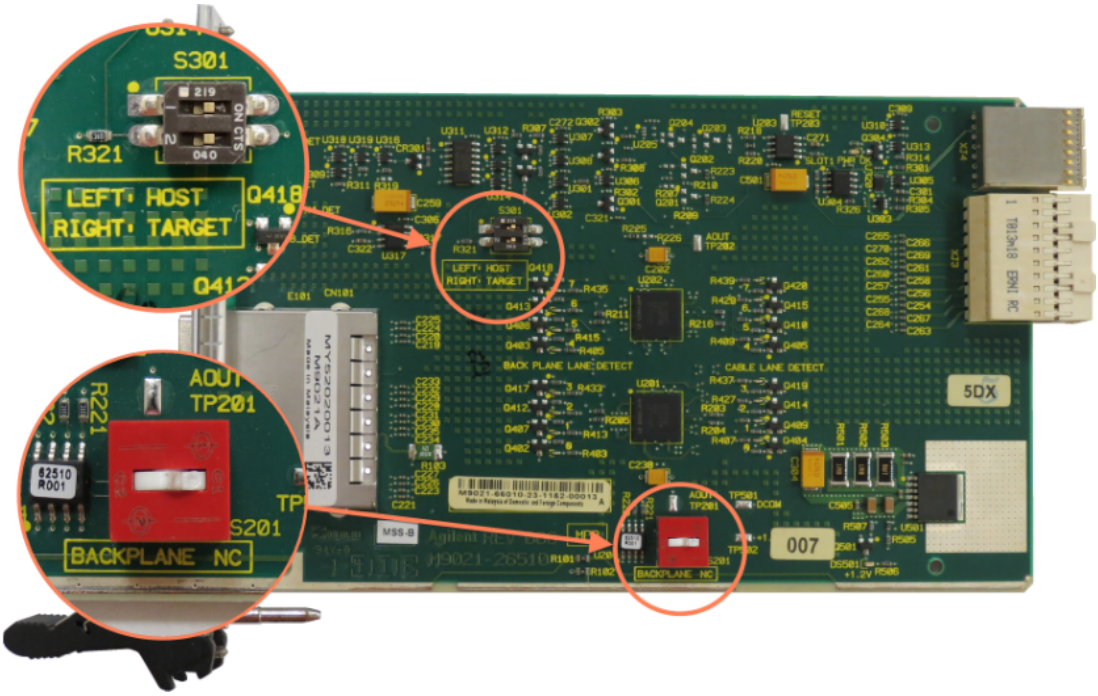
· Install the M9021A in an x8 hybrid slot in the PXIe chassis (M9018A chassis slots 2, 6, 11, or 15).

· Reverse the switch settings from those noted in this procedure: On the M9021A module, set both S301 switches to "Host" and set the S201 rocker switch to the left-hand position. On the M9018A chassis back-plane, set the controller slot power-supply switch to the left.

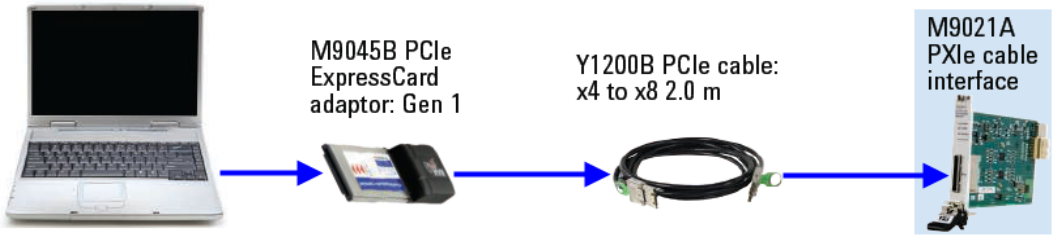
1. Locate slot 1 in the chassis. It has the icon (1) above it.
2. Set the M9018A chassis controller slot power supply switch to the right-hand position. This provides power to slot 1 for the benefit of the M9021A card.
3. Remove the M9021A module from its protect bag. Observe ESD precautions (see page 11).



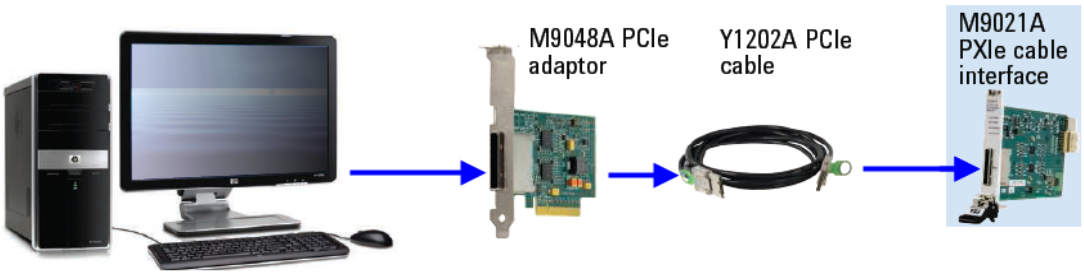
4. On the M9021A module, set both S301 switches to the “Host” (right-hand) position and set the S201 rocker switch to the left-hand position. Refer to the following figure for M9021A switch locations and positions.



5. Install the M9021A Cable Interface Module into the chassis:
   a. While holding the module by the injector/ejector handle and making sure the injector/ejector handle is pushed down in the unlatched (downward) position, slide the M9021A module into chassis, using the slot guides (top and bottom).
   b. Sliding the module into position, when you begin to feel resistance, pull up on the injector/ejector handle to fully inject the module into the chassis backplane connectors.
   c. Tighten the module retaining screws (top and bottom) and torque them to 5 Lb-In (0.57 N-m).
6. Connect the M9021A to your laptop or desktop PC.
   a. If you are using a **laptop** as a controller, connect to your M9021A using the following components:



b. If you are using a **desktop** PC as a controller, connect to the M9021A using the following components:

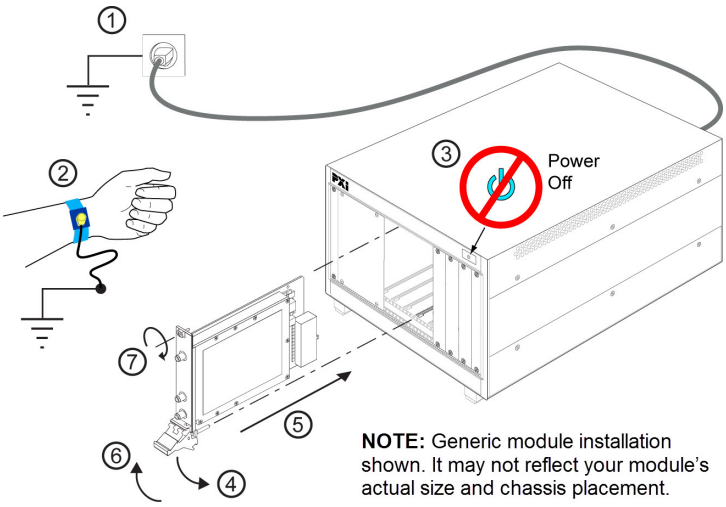


Install the M9393A Instrument Modules

Plan your module positions. Install the left-most module first and then continue installing modules from left to right according to the following photo.

When installing each module:

1. While holding the module by the injector/ejector handle and making sure the injector/ejector handle is pushed down in the unlatched (downward) position, slide the module into chassis, using the slot guides (top and bottom).
2. Sliding the module into position, when you begin to feel resistance, pull up on the injector/ejector handle to fully inject the module into the chassis backplane connectors.



3. Tighten the module retaining screws (top and bottom) and torque them to 5 Lb-In (0.57 N-m).

Cable the Instruments

Cabling Introduction

Important: Install the modules in the exact order shown. Place the M9214A IF Digitizer in an x8 slot (slot 6) for optimum performance. Slots 2, 11, and 15 are also x8 slots. For further details on x8 slots (see www.keysight.com/find/M9018A).Place the M9300A Reference in Slot 10 (the timing slot). The M9308A Synthesizer must be adjacent to (and to the left of) the M9365A Downconverter.

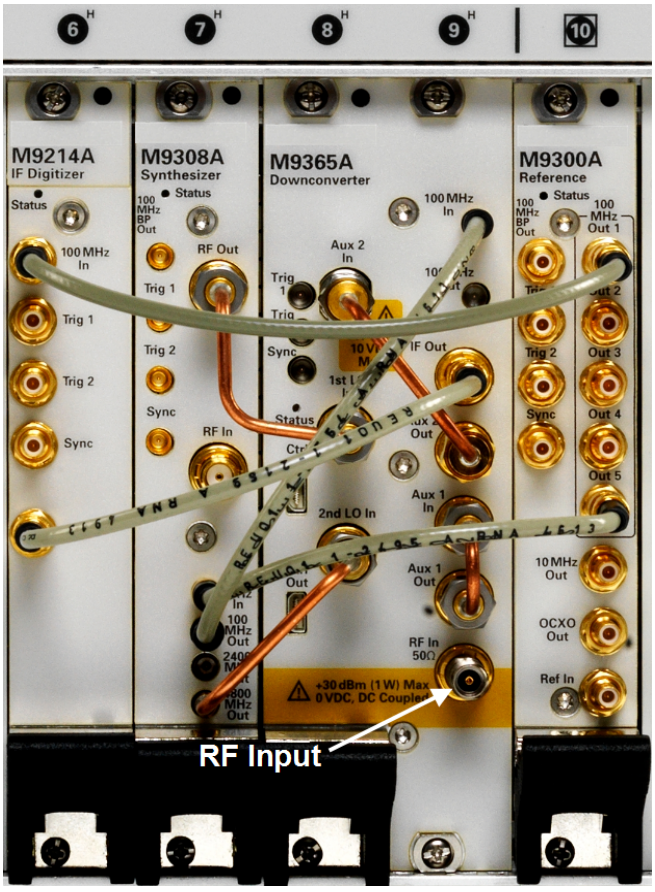
Front Panel Descriptions

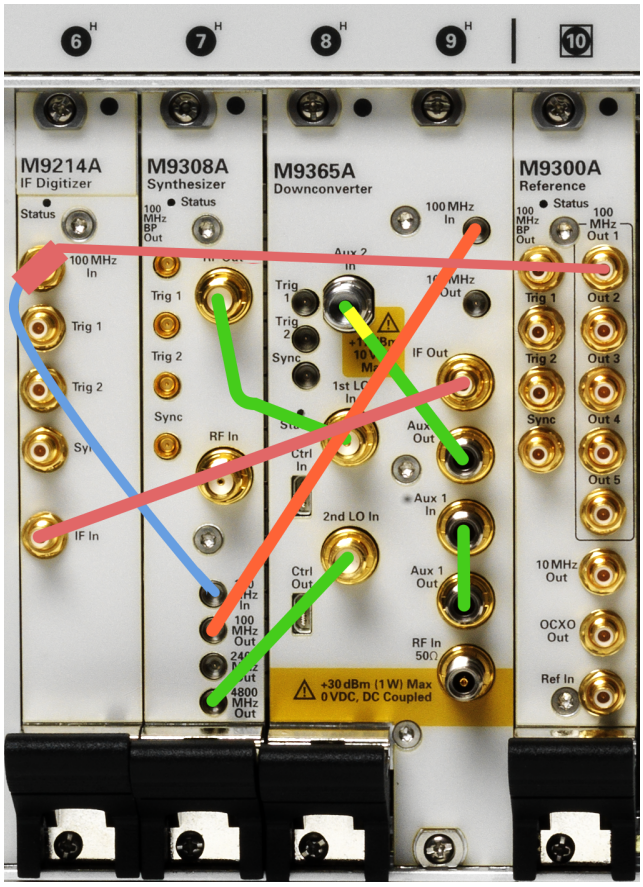
- M9300A module: see M9300A Front Panel Connectors (page 39)
- M9308A module: see M9308A Front Panel Connectors (page 40)
- M9365A module: see M9365A Front Panel Connectors (page 41)
- M9214A module: see M9214A Front Panel Connectors (page 42)

NOTE In the pictures below, you see two different routings of the 100 MHz Reference signal. The cabling on the left can be used for up to three M9393A instruments in one chassis. If you choose to install four M9393A instruments in one chassis, you may share the 100 MHz signal by using a tee at the 100 MHz In connector of the M9214A.The pictures on the next page show the recommended slot usage for multi-channel chassis and the recommended distribution of the 100 MHz reference.

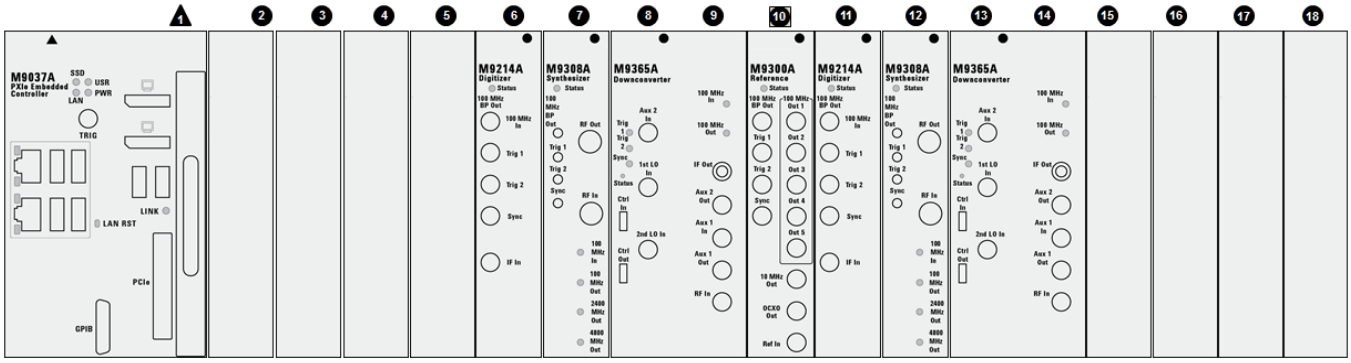
Single instrument in an M9018A chassis

Single instrument with tee in an M9018A chassis

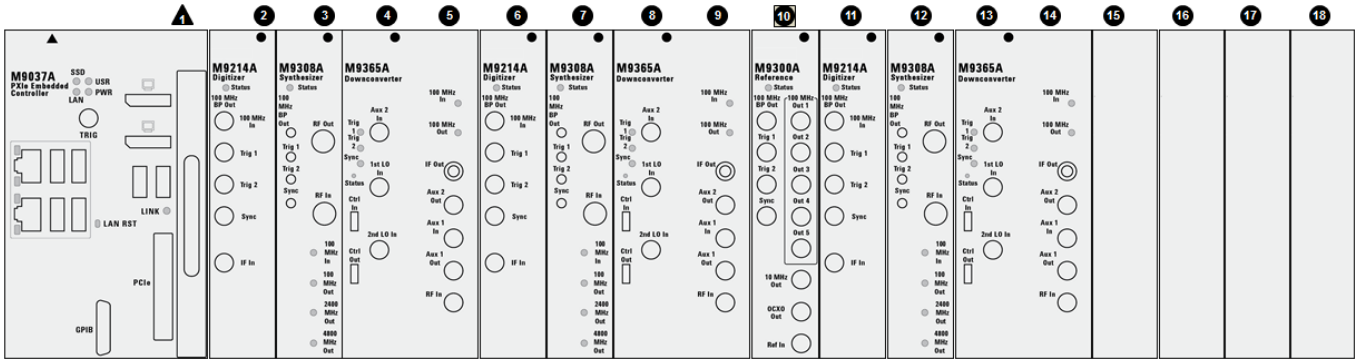




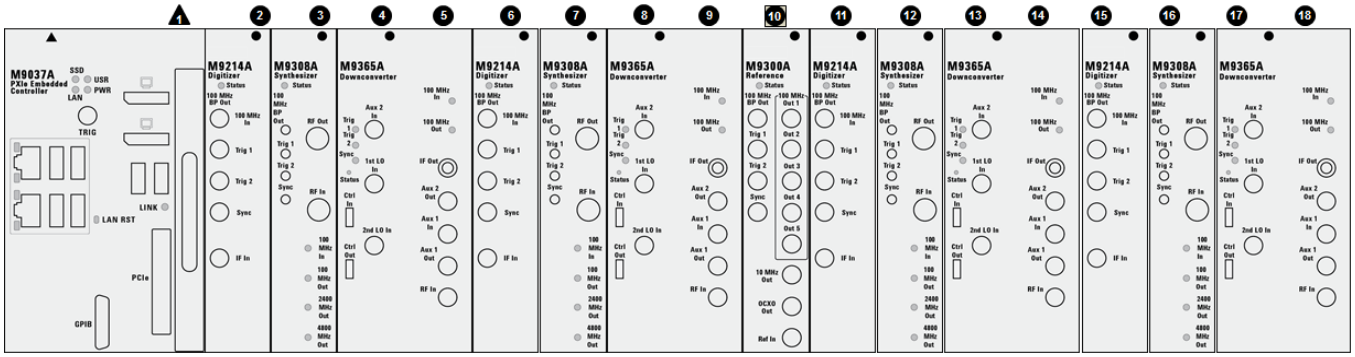
Two instruments in an M9018A chassis

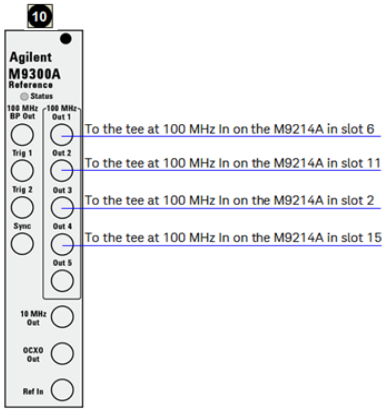


Three instruments in an M9018A chassis



Four instruments in an M9018A chassis





M9393A Cable and Module Table (Listed in the recommended installation order)

Part Number	Connection	Cable Description
M9365-20039	M9308A RF Out to M9365A 1st LO In	Cable, semi-rigid, SMA (male) - SMA (male)
M9365-20040	M9308A 4800 MHz Out to M9365A 2nd LO In	Cable, semi-rigid, SMA (male) - SMP (male)
1250-3807	M9214A 100 MHz In, left side of Tee to M9300A 100 MHz Out, right side to M9308A 100 MHz In	Adapter, T-type, SMB (male) - SMB (male) - SMB (female)
8121-2174	M9300A 100 MHz Out to M9214A 100 MHz In	Cable, coaxial, SMB (female) - SMB (female) 255 mm
8121-2169	M9365A IF Out to M9214A IF In	Cable, coaxial, SMB (female) - SMB (female) 165 mm
8121-2723	M9300A 100 MHz Out to M9308A 100 MHz In	Cable, coaxial, SMB (female) - SMP (female) 150 mm
8121-2554	M9308A 100 MHz Out to M9365A 100 MHz In	Cable, coaxial, SMP (female) - SMP (female) 150 mm
M9365-20042	M9365A Aux 2 Out to M9365A Aux 2 In	Cable, semi-rigid, SMA (male) - SMA (male) installed
M9365-20043	M9365A Aux RF Out to M9365A Aux RF In	Cable, semi-rigid, SMA (male) - 2.4 mm (male) installed
8120-5091	Alternate for 8121-2175	Cable, coaxial, SMB (female) - SMB (female) 120 mm
8121-2636	Alternate for 8121-2495	Cable, coaxial, SMB (female) - SMP (female) 240 mm
8121-20631	This cable can be used to direct an external reference into the M9300A Ref In connector.	Cable, coaxial, BNC (male) - SMB (female) 1200 mm

[1] This component is not shown in the cabling diagram, but is included in the M9393A shipment.

Cabling for Multi-channel configurations

NOTE Cables for a multi-channel configuration do not have to be the same length, but reconfiguration calibration is required. M9393A configurations may be altered to include or remove the tee adapter for 100 MHz reference signal distribution, but reconfiguration calibration must be run after any change.

Install Slot Blockers and Filler Panels

To assure proper operating temperatures, install slot blockers (Keysight model Y1212A, 5 per kit) and EMC filler panels (Keysight model Y1213A, 5 per kit) in empty module slots.

Power up the Chassis

CAUTION If you are using a remote controller, you must power up the chassis BEFORE you power up the PC. When you power down your configuration, shut down the PC BEFORE you power down the chassis.

Step 4: Install the Software

Requirements

System	Requirements
Operating system	Windows 7 (32- & 64-bit), Windows Embedded Standard 7
Processor speed	1 GHz 32-bit (x86), 1 GHz 64-bit (x64), no support for Itanium64
Available memory	4 GB minimum (8 GB recommended for 64-bit operating systems)
Available disk space 3	1.5 GB available hard disk space (includes 1 GB for Microsoft .NET Framework 3.5 SP1 4, and 100 MB for Keysight IO Libraries Suite)
Video	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA is supported)
Browser	Microsoft Internet Explorer 7.0 or greater

Hardware	Requirements
Controllers	A PXI or PXI Express embedded controller or remote controller (external PC connected to the chassis by a PCI-to-PXI interface) is required.
Embedded controller	Keysight M9036A or M9037A or an embedded controller that meets the following requirements: • PXIe system controller (PXI-1 embedded controllers are not compatible) • Utilize a 2x8, or 4x4, PXIe system slot link configuration. • Run one of the operating systems listed in System Requirements (above).
Remote con-troller	(Keysight M9018A chassis only) A PC running one of the operating systems listed in System Requirements above and a Keysight M9021A Cable Interface x8 with one of the following PC interface options: • Keysight M9045B PCIe ExpressCard Adaptor x1, with cable (for a laptop PC) • Keysight M9048A PCIe Desktop Adaptor x8, with cable (for desktop PCs)

Due to the Microsoft end of support for Windows XP, M9393A is not supported on Windows XP. At the time of release 1.1 there were no known major problems running on Windows XP. However if you encounter an issue unique to Windows XP, Keysight may not attempt to address the issue.

Software Installation

Install the software in the order indicated in the following table into the embedded controller, or PC if your configuration contains an M9021A PXIe Cable Interface.

Restart your controller when prompted by the respective software installer.

CAUTION If you are using a remote controller, use this sequence to restart the PC and chassis:

1) Shut down the PC. 2) Power down the chassis. 3) Power up the chassis. 4) Power up the PC.

Order	Software	Install from the provided CD, or...
1 *	Keysight IO Libraries Suite version 16.3 Update 2 (version 16.3.17914.4) or newer; includes Keysight Connection Expert	www.key sight.com/find/iosuite
2 *	M9018A 18 Slot PXIe Chassis Drivers	www.keysight.com/find/M9018A
3 **	Keysight 89600 VSA Software (optional, install before M9393A software). The minimum version is 17.21.117.0 or newer.	www.keysight.com/find/89600
4	M9393A PXIe Vector Signal Analyzer (version 1.0 or newer)	www.keysight.com/find/M9393A-driver
5	Signal Studio (optional)	www.keysight.com/find/signalstudio
6	Keysight X-Series Measurement Applications for Modular Instruments (optional)	www.keysight.com/find/M90XA

* Software that is already installed if you ordered the M9036A or M9037A Embedded Controller.

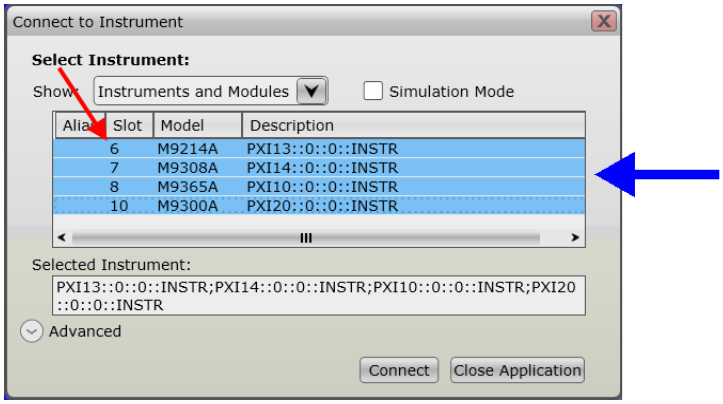
** If you install or upgrade the Keysight 89600 VSA Software after installing the M9393A drivers, you need to run the 89600 VSA Integration utility. Go to **Start** > **All Programs** > Keysight > **M9393** > **89600 VSA Integration**.

Step 5: Verify Operation of the Keysight M9393A PXIe Vector Signal Analyzer

In this step you will verify correct operation of the Keysight M9393A PXIe Performance Vector Signal Analyzer. Before running a Self Test assure that all required software is installed, the chassis is powered on, and all cabling is correct. See "Cable the Instruments" on page 22 for proper cabling.

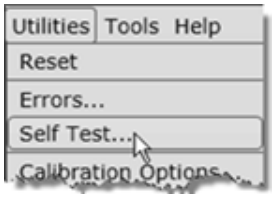
The first step in this process is to conduct a Self Test of the M9393A.

1. Open the M9393A SFP by selecting **Start > All Programs > Keysight> M9393 > M9393 SFP**.
2. Upon opening the SFP, you are presented with the "Connect to Instrument" dialog. Use **Control/Select** to select all of the modules that are components of the M9393A and press **Connect**. For example:

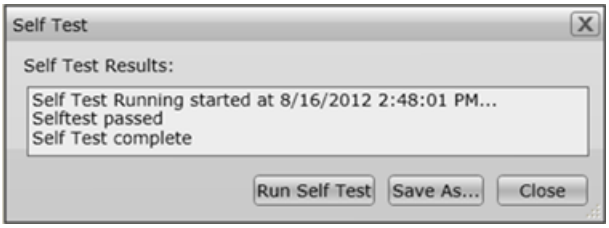


NOTE If not all modules **and their slot locations** are visible in the SFP "Connect to Instrument" dialog, close the SFP and see Communications on the following page. After running Keysight Connection Expert, you may restart the SFP.

3. Check the front panel Status LEDs. See "Status LED States" on page 31 .
4. Conduct a Self Test (**Utilities > Self Test... > Run Self Test**)



If the Self Test passes (see results below), go to Step 6: Make a Measurement (page 32).



CAUTION It is important that no signal is present at the RF Input of the Keysight M9365A PXIe Downconverter when doing a Self Test. If a signal is present, it may result in a false failure.

NOTE If the M9393A Self Test fails, it indicates which module is likely to need service. However, you must return all modules (except the M9300A) and all cables. See "Return an Instrument for Service" on page 11.

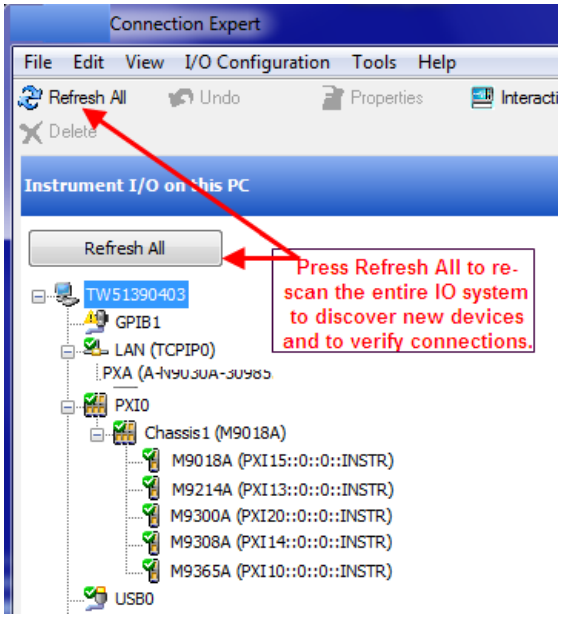
Communications

If you are unable to communicate with the Keysight M9393A PXIe Performance Vector Signal Analyzer verify that the following installations are correct:

- Keysight IO Libraries Suite
- M9393A SFP program
- Module and chassis drivers
- System Interface Card, cable and PC PXIe card connections, if you are using an external host PC

If not all modules and their slot locations are visible in the SFP "Connect to Instrument" dialog:

1. Close the SFP.
2. Start Keysight Connection Expert, by selecting **Start > All Programs > Keysight Connection Expert**. If any or all modules and their slot locations are still not visible, select **Refresh All**.
3. Restart the SFP.



Status LED States

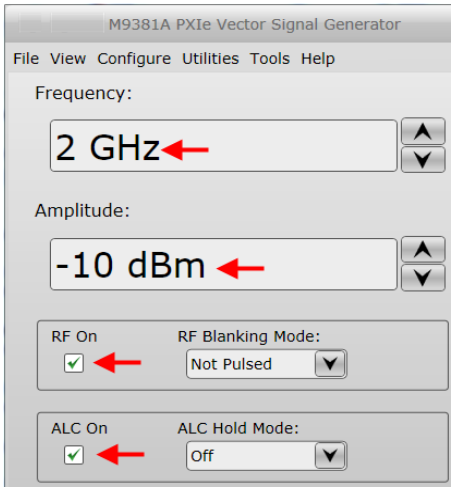
Module	Green	Orange	Red	Off
M9300A	The Soft Front Panel has initialized the connection to the module	n/a	Indicates that the VCXO is unlocked.	• Not connected by the SFP. • Failure in the power supplies. Module hardware health can't be determined until the power supply failure is resolved.
M9308A	The Soft Front Panel has initialized the connection to the module	Tuning is in progress, or the M9308A is unlocked from the reference.	n/a	• Not connected by the SFP. • Failure in the power supplies. Module hardware health can't be determined until the power supply failure is resolved.
M9214A	The Soft Front Panel has initialized the connection to the module	Missing 100 MHz Reference.	n/a	• Not connected by the SFP. • Failure in the power supplies. Module hardware health can't be determined until the power supply failure is resolved.
M9365A	The Soft Front Panel has initialized the connection to the module	Missing 100 MHz Reference.	n/a	• Not connected by the SFP. • Failure in the power supplies. Module hardware health can't be determined until the power supply failure is resolved.

Step 6: Make a Measurement

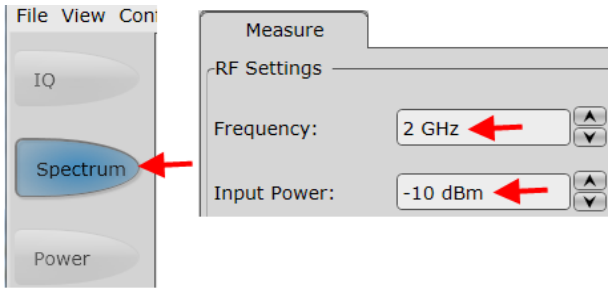
After verifying operation of the Keysight M9393A PXIe Performance Vector Signal Analyzer in Step 5 you are ready to make a measurement.

NOTE The following measurement uses a Keysight M9381A PXIe Vector Signal Generator to generate the 2 GHz signal that will be displayed by the M9393A. You may substitute any frequency appropriate signal generator to create the signal.

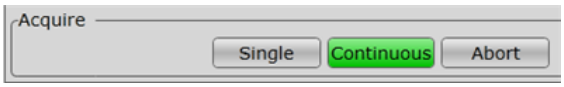
1. The first step in this process is to open the SFP of the M9381A and the M9393A.
   a. Open the M9381A SFP by selecting **Start > All Programs > Keysight > M938x > M9381 SFP**.
   b. Open the M9393A SFP by selecting **Start > All Programs > Keysight > M9393 > M9393 SFP**.
   c. For each SFP, you are presented with the "Connect to Instrument" dialog. Use **Ctrl/Select** to select all of the modules that are components of the M9381A and the M9393A and press **Connect**.
2. Connect a high quality SMA (male) to SMA (male) cable between the RF Out connector on the Keysight M9310A PXIe Source Output and the RF In connector on the M9365A.
3. Torque the connectors to 8 Lb-In (0.904 Nm).
4. On the M9381A SFP make the following settings:
   a. Frequency: 2 GHz
   b. Amplitude: -10 dBm
   c. RF On: checked
   d. ALC On: checked.



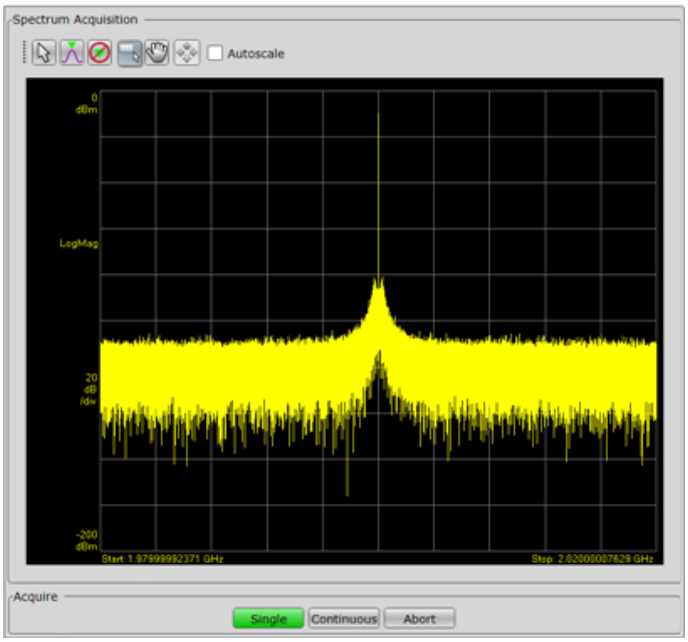
5. On the M9393A SFP Measure Tab, make the following settings:
   a. Frequency: 2 GHz
   b. Input Power: -10 dBm
   c. Acquisition: Spectrum


File View Cont
IQ
Spectrum
Power
Measure
RF Settings
Frequency:
2 GHz
Input Power:
-10 dBm

6. Below the display, select Continuous for a sustained sweep of the analyzer.



You should see the following display on your M9393A SFP. The frequency of the signal is 2 GHz and the amplitude is -10 dBm.



7. Proceed to Step 7: Installation is Complete (page 34).

Step 7: Installation is Complete

Proceed to program your product by means of the applications programming interface (API) for the supplied drivers.

API Overview

Keysight's IVI drivers simplify the creation and maintenance of instrument control applications in a variety of development environments; they allow programmatic control of instrumentation while providing a greater degree of instrument interchangeability and code reuse. IVI drivers currently come in two basic types: IVI-COM and IVI-C. Although the functionality offered by both types of drivers is often very similar, the fundamental differences in interface technology results in a very different end-user experience. The IVI drivers support compiling application programs for 32- or 64-bit platforms.

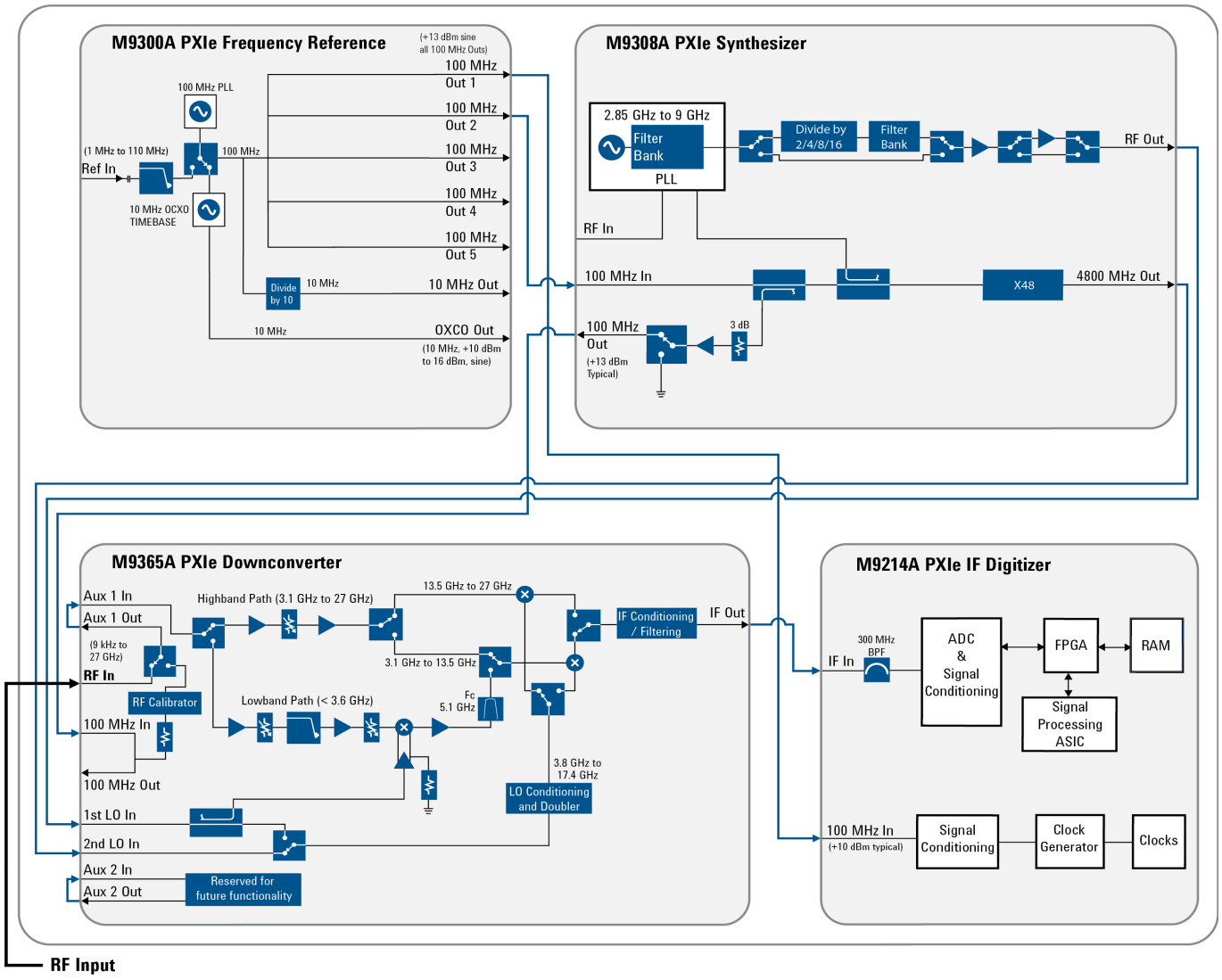
Supported ADEs (application development environments) Arguably the most important consideration in comparing IVI-COM and IVI-C drivers is the end user experience in various ADEs. Since IVI-COM drivers are based on Microsoft COM technology, it's not surprising that IVI-COM drivers offer the richest user experience in Microsoft ADEs. Users working in Visual C++, Visual C#, Visual Basic.NET, and Visual Basic 6 enjoy a host of features, such as object browsers, IntelliSense, and context-sensitive help.

When you install the product software, the IVI driver files are installed in the standard IVI Foundation directories (for example, C:\Program Files\IVI Foundation\IVI\Drivers\). Example programs are provided to demonstrate most driver functionality (for example, C:\Program Files\IVI Foundation\IVI\Drivers\\Examples). The reference material for the driver functions (a Microsoft HTML Help .chm file) is installed with the IVI driver and is available for Microsoft Visual Studio's IntelliSense context linking. In addition, you can directly access the .chm file (AgM9393.chm) from this Start menu location: Start > All Programs > Keysight IVI Drivers > AgM9393 > Documentation.

M9393A Specifications

The Data Sheet for the Keysight M9393A PXIe Performance Vector Signal Analyzer is included on the Keysight M9393A VSA Software and Product Information CD that came with your module. This document contains specification information. To find the latest update, go to www.cp.literature.keysight.com/litweb/pdf/5991-4538EN.pdf.

M9393A Block Diagram



M9393A Block Diagram Reference Tables

M9393A Block Diagram Reference Table for M9300A

M9300A PXIe Reference Operation		
Input	**Connector**	**Output**
From: External Reference Frequency: 1 MHz to 110 MHz Input Level: -5 dBm to +20 dBm	Ref In	
	100 MHz Out 1-5	Frequency: 100 MHz Output level:>+12 dBm sine (+13 dBm typical)
	10 MHz Out	Output level: 3.3 Vpp square (1.65 v into 50 Ω)
	OCXO Out	Frequency: 10 MHz, AC coupled , 50 Ω source. Output level: +10 dBm to +16 dBm, from 10 MHz OCXO.
	Sync	This connector is intended for future use.
Sine or square wave -2 V to +5 V max into 50 Ω, +16 dBm max @ 0 VDC into 50 Ω	Trigger 1 & 2	3.3 V into 50 Ω
From : Chassis back plane board Frequency: 100 MHz	100 MHz BP Out	Frequency: 100 MHz Output level: +10 dBm

M9393A Block Diagram Reference Table for M9308A

M9308A PXIe Synthesizer Operation		
Input	**Connector**	**Output**
Chassis back plane board	100 MHz BP Out	Frequency: 100 MHz Output level: >+10 dBm
Sine or square wave -2 V to +5 V max into 50 Ω, +16 dBm max @ 0 VDC into 50 Ω	Trigger 1 & 2	3.3 V into 50 Ω
	Sync	This connector is intended for future use.
Frequency: 100 MHz, Amplitude: >+12 dBm @100 Hz: -130 dBc/Hz @1 kHz: -160 dBc/Hz	100 MHz In	
	100 MHz Out	+12 dBm (typical)
	RF Out	178 MHz to 13.7 GHz
	2400 MHz Out	2400 MHz
	4800 MHz Out	4800 MHz
This connector is intended for future use.	RF In	

M9393A Block Diagram Reference Table for M9365A

M9365A PXIe Downconverter Operation		
Input	**Connector**	**Output**
	100 MHz	Frequency: 100 MHz Output level: >+10 dBm
Sine or square wave -2 V to +5 V max into 50 Ω, +16 dBm max @ 0 VDC into 50 Ω	Trigger 1 & 2	3.3 V into 50 Ω
	Sync	This connector is intended for future use.
Frequency: 100 MHz, Amplitude: >+12 dBm @100 Hz: -130 dBc/Hz @1 kHz: -160 dBc/Hz	100 MHz In	
	IF Out	200 MHz to 2300 MHz
	Aux 1, 2 Out	This connector is intended for future use.
	Aux 1, 2 In	This connector is intended for future use.
Maximum input power 30 dBm	RF In	
178 MHz to 13.7 GHz	1st LO In	
4800 MHz	2nd LO In	

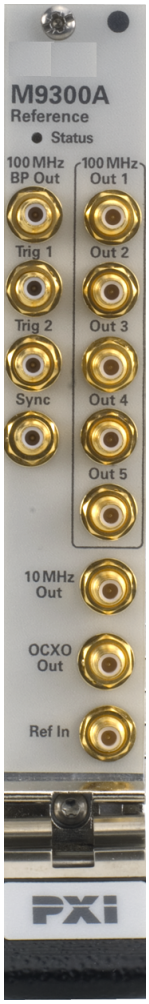
M9393A Block Diagram Reference Table for M9214A

M9214A PXIe IF Digitizer Operation		
Input	**Connector**	**Output**
Sine or square wave -2 V to +5 V max into 50 Ω, +16 dBm max @ 0 VDC into 50 Ω	Trigger 1 & 2	3.3 V into 50 Ω
	Sync	This connector is intended for future use.
Frequency: 100 MHz, Amplitude: >+12 dBm	100 MHz In	
321 MHz	IF In	

Module Front Panel Features

M9300A Front Panel Connectors

For parameter limits and specifications on the M9300A, see M9393A Block Diagram Reference Table for M9300A (page 37).



Connector	Description
100 MHz BP Out	This SMB male connector outputs a 100 MHz signal from the chassis backplane board. This output is enabled through the SFP.
100 MHz Out 1 through Out 5	Each of these SMB male connectors may output a 100 MHz reference and clock signal.
Trig 1	This connector is intended for future use.
Trig 2	This connector provides a programmable output trigger.
Sync	This connector is intended for future use.
10 MHz Out	This SMB male connector provides a 10 MHz signal. This output is enabled through the SFP.
OCXO Out	This SMB male connector provides a 10 MHz signal from the 10 MHz OCXO timebase. This output is enabled through the SFP.
Ref In	This SMB male connector inputs a 1 MHz to 110 MHz reference signal. The connector is AC coupled and terminated into 50 Ω.

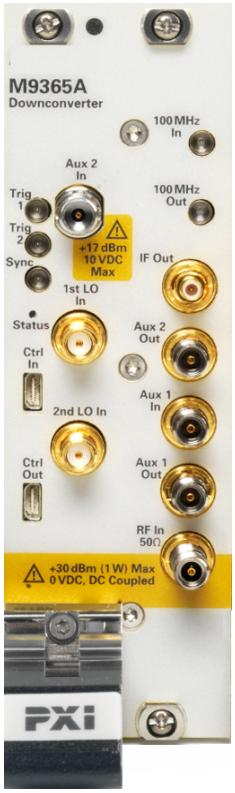
M9308A Front Panel Connectors

For parameter limits and specifications on the M9308A connectors, see M9393A Block Diagram Reference Table for M9308A (page 37).

Connector	Description
100 MHz BP Out	This SMP male connector outputs a 100 MHz signal from the chassis backplane board. This output is enabled through the SFP.
Trig 1	This connector is intended for future use.
Trig 2	This connector is intended for future use.
Sync	This connector is intended for future use.
100 MHz In	This SMP male connector inputs a 100 MHz reference signal from the 100 MHz Out connector of the Keysight M9300A PXIe Frequency Reference.
100 MHz Out	This SMP male connector outputs the 100 MHz In signal to the Keysight M9365A PXIe Down-converter 100 MHz In connector.
2400 MHz Out	This connector is intended for future use.
4800 MHz Out	This SMP male connector outputs a 4800 MHz signal to the M9365A 2nd LO In.
RF In	This connector is intended for future use.
RF Out	This SMA female connector outputs a signal to the Keysight M9365A PXIe Downconverter 1st LO In connector.

M9365A Front Panel Connectors

For parameter limits and specifications on the M9365A connectors, see M9393A Block Diagram Reference Table for M9365A (page 38).



Connector	Description
Trig 1	This connector is intended for future use.
Trig 2	This connector is intended for future use.
Sync	This connector is intended for future use.
100 MHz In	This SMP male connector inputs a 100 MHz reference signal from the 100 MHz Out connector of the Keysight M9308A PXIe Synthesizer.
100 MHz Out	This SMP male connector is not used in this configuration.
IF Out	This SMB male connector sends the IF signal to the M9214A IF Input.
RF In	This SMA female connector inputs a modulated RF signal of 100 kHz to 27 GHz.
Aux 1 Out	This SMA coaxial female connector directs the signal to the Aux 1 In connector.
Aux 1 In	This SMA coaxial female connector accepts the signal from the Aux 1 Out connector.
Aux 2 Out	This SMA coaxial female connector directs the signal to the Aux 2 In connector.
Aux 2 In	This SMA coaxial female connector accepts the signal from the Aux 1 Out connector.
1st LO In	This connector accepts the RF Out signal from the M9308A.
2nd LO In	This connector accepts the 4800 MHz Out signal from the M9308A.
Ctrl In	This connector is intended for future use.
Ctrl Out	This connector is intended for future use.

M9214A Front Panel Connectors

For parameter limits and specifications on the M9214A connectors, see M9393A Block Diagram Reference Table for M9214A (page 38).

Connector	Description
100 MHz In	This SMB male connector inputs a 100 MHz reference signal from the 100 MHz Out connector of the Keysight M9300A PXIe Frequency Reference.
Trig 1	External Trigger Input.
Trig 2	Trigger Received Output.
Sync	This connector is intended for future use.
IF In	This SMB male connector accepts the IF Input from the M9365A IF Out connector.

Sharing the M9300A Frequency Reference

The M9300A Frequency Reference module can be shared by the M9393A as well as the M9380A, M9381A and M9391A. If you connect to a hardware configuration that includes a currently connected M9300A (either independently or as part of another hardware configuration) the latest instance of the SFP will take control of the M9300A. You will see no warning or error message.

CAUTION While the M9300A module is being shared, any of the configurations that share this reference can control it fully, including setting the reference to use an external frequency reference source. If the external frequency reference setting does not match that of the supplied frequency, the reference will be unlocked, as expected. However, only the instance of the SFP that creates the reference unlock condition can correct the problem. This is done by either correcting the frequency or by setting the reference back to internal, so that a subsequent instance will not take control of the reference module unintentionally.

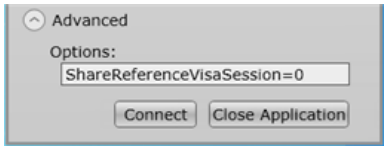
CAUTION The Reference module can also be shared among multiple measurement applications, such as the Keysight 89600 VSA software. The Reference module must be initialized before use, so including it in all configurations allows applications to be started in any order. However, when sharing a module the user interface of some applications may not reflect M9300A settings made by other applications. For example, the Keysight 89600 software can control the Reference module internal/external setting, but the changes made by other applications will not be reflected in the Keysight 89600.

NOTE FPGA updates are not allowed on a Keysight M9300A PXIe Frequency Reference while it is being shared. To perform M9300A FPGA updates, reserve the Reference.

Reserving the Reference for a Configuration

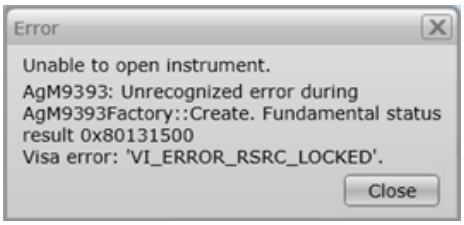
If you are running a test in the background with a certain M9300A setting and then connect a hardware configuration that also contains the same M9300A, you may alter the test setup that is already running.

If you would prefer to be keep the reference control with the first instance of the hardware configuration so that a subsequent instance will not take control of the reference module unintentionally:



1. On the SFP Connect to Instrument screen, click the **Advanced** control to open the **Options:** dialog.
2. Type the following string: `ShareReferenceVisaSession=0`

This configuration will retain control of the M9300A if you try to open a new configuration. If you connect a new configuration, that includes the same M9300A, you will see the following error:



CAUTION If an existing instance of the SFP is connected to the reference module in a shared (default) mode, and you try to connect a second instance of the SFP to the same reference with `ShareReferenceVisaSession=0` Advanced Option, you will get the resource locked error shown above.

Keysight 89600 Vector Signal Analysis Software for M9393A

Overview

One of the components of Keysight M9393A PXIe Performance Vector Signal Analyzer software installation is the Keysight 89600 VSA software role, or hardware extension. A role is a set of DLL files that is an interface between the 89600 VSA software and acquisition hardware. The role files, as well as an integration utility, are installed along with other M9393A program files. The M9393A installer runs the integration utility which detects if 89600 VSA software is installed, and if so, copies the M9393A role files into the program files for each compatible version of 89600 VSA.

NOTE If the Keysight 89600 VSA software is installed after the M9393A drivers, you need to run the 89600 VSA integration utility. Go to **Start** > **All Programs** > **Keysight** > **M9393** > **89600 VSA Integration**.

A role DLL implements several COM interfaces. The interfaces have methods for acquiring measurement hardware, setting acquisition parameters, querying data and querying hardware status. The M9393A role is a layer mapping COM interface methods to M9393A interface methods.

Presence of the role allows 89600 VSA software to detect and configure modules for an M9393A receiver. The 89600 VSA's Hardware Configurations dialog is used to specify which modules form an instrument.

To use the Keysight 89600 VSA Software measurement capabilities, you must first create a connection between the measurement software and the hardware configuration that is your M9393A Vector Signal Analyzer.

NOTE The minimum required version of Keysight 89600 VSA software is 17.21.117.0. You can find this online at www.keysight.com/find/89600.

NOTE As a best practice, after setting up an M9393A measurement, perform a Disconnect/Restart (**Control** > **Disconnect** and then **Restart**). If there is an unlocked Frequency Reference or Digitizer 100 MHz clock missing condition, the M9214A Digitizer status LED will turn to Red and the INT REF indicator at the bottom of the display will indicate "UNLOCKED" or "Waiting for Frequency Reference Lock". At this point, troubleshoot the instrument cabling. Perform a Disconnect/Restart again to verify that the frequency reference is present. Whether the problem is a broken 100 MHz clock path or an invalid External Reference (either not present or mismatched frequency), the reference status and measurement status messages are the same - "UNLOCKED" reference and "Waiting for frequency reference" measurement status. However, if the external reference signal (not the 100 MHz clock) is invalid, as soon as the signal becomes valid, measurement will resume; whereas in the 100 MHz clock signal case, you must **Disconnect** from the hardware and then reconnect (**Restart**) to start the measurement again.

Procedure for a Single Channel Configuration

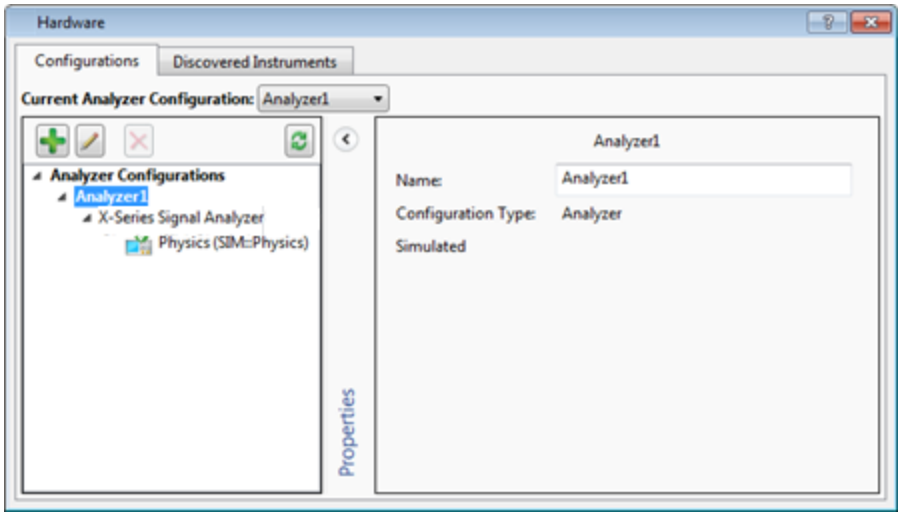
This procedure is for setting up and configuring a single channel system. To set up and configure multiple channel systems:

See "Procedure for a Two Channel Configuration" on page 50

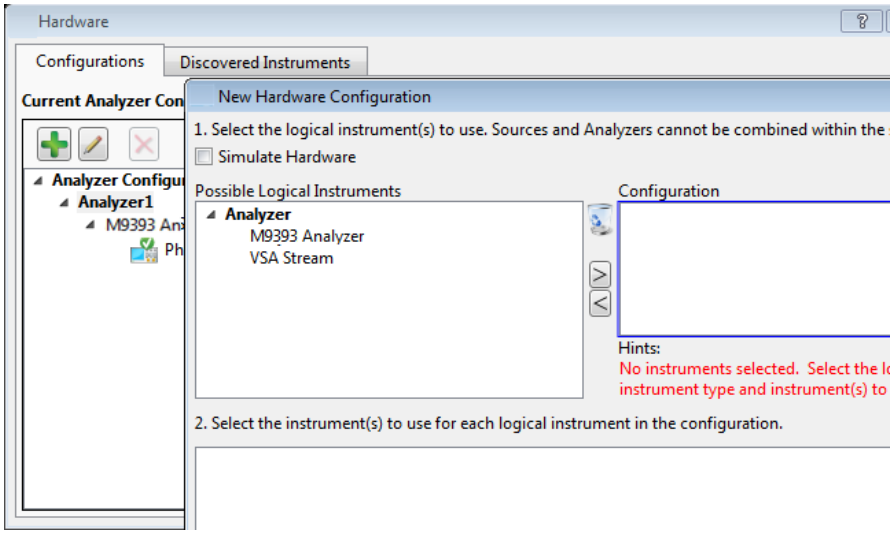
See "Procedure for a Three or Four Channel Configuration" on page 55

To create a new M9393A instrument, use the Keysight 89600 VSA Software and follow these steps:

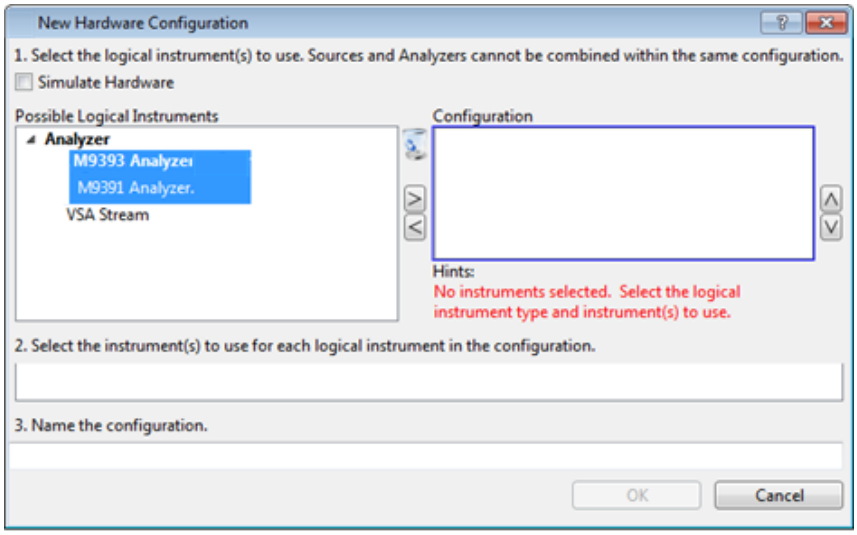
1. Open the "New Hardware Configuration" window in the Keysight 89600 VSA software by selecting: **Utilities > Hardware > Configurations** from the menu bar. When you hover over the last element in this sequence you will see a listing of the relevant configurations. Click on the "Add New Hardware" icon .



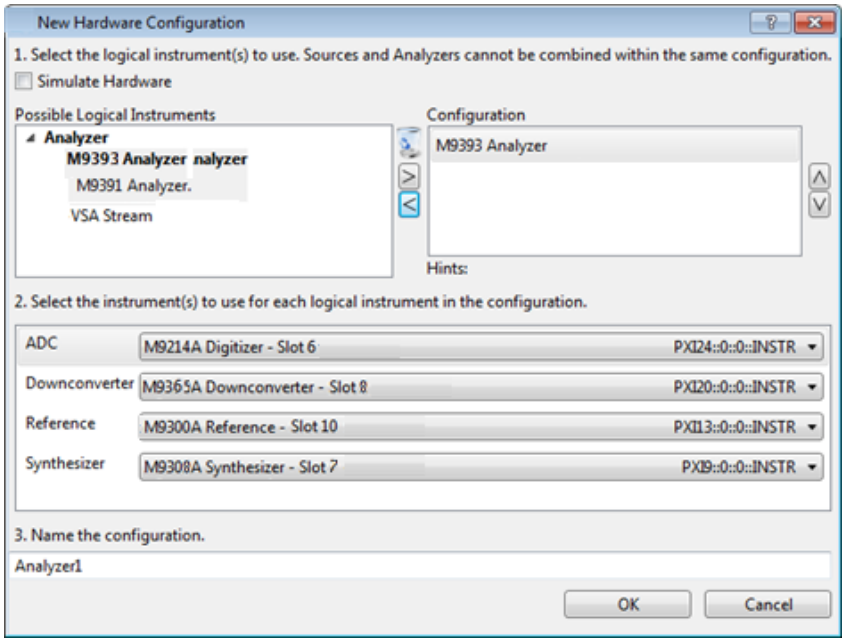
2. In the "New Hardware Configuration" window:



a. Select the Keysight M9393A Analyzer entry and click on the icon to copy the entry to the "Configuration" window.



b. Configure the new M9393A instrument by selecting the modules identified by their VISA address in the "2. Select the instrument(s) to use for each logical instrument in the configuration" section.



c. Name the new configuration in the "3. Name the configuration" section. The default name "Analyzer1" may be changed. Use a meaningful name for later identification.

d. Save the new configuration by selecting the "OK" button.

Refer to the Keysight 89600 Vector Signal Analysis Software for further details about making measurements with your Keysight M9393A PXIe Performance Vector Signal Analyzer.

Parameter Control and Input Extensions

The Keysight 89600 role allows the VSA software to set the following parameters:

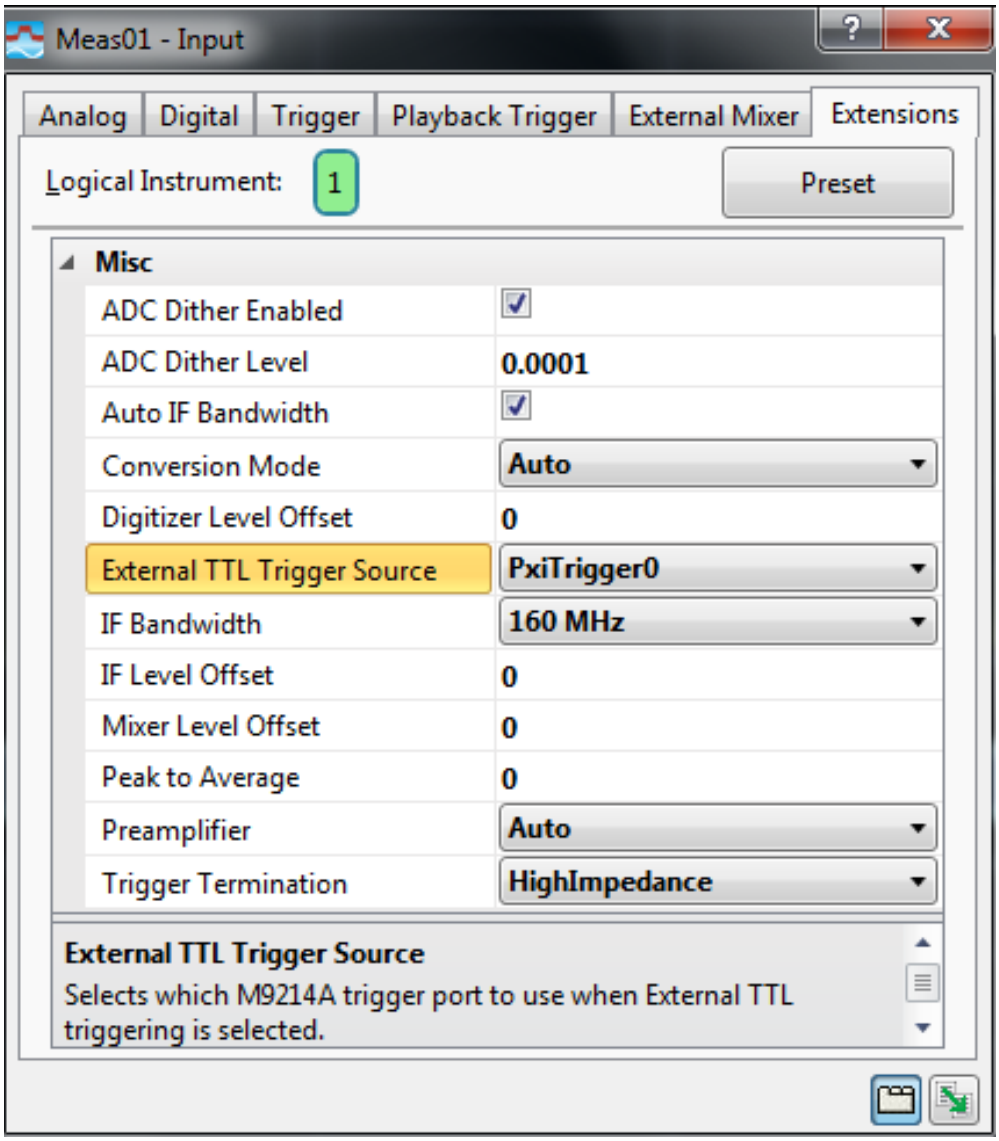
- Expected Input Power (Range)
- Center Frequency
- Bandwidth
- Acquisition Time
- Trigger Style (Free Run, External, IF Mag)
- Trigger Delay
- Trigger Slope
- Trigger Level

Extensions

Input extensions are the hardware configuration and setup parameters that apply to the Keysight 89600 VSA software with M9393A. To modify a hardware parameter, open the input extension dialog (**Input > Extensions** tab), click the parameter name and specify the value. For True/False values, a selected check box sets the value to True. A cleared check box sets the value to False.

Extensions:

- ADC Dither Enabled
- ADC Dither Level
- Auto IF Bandwidth
- Conversion Mode
- Digitizer Level Offset
- Extwernal TTL Trigger Source
- IF Bandwidth
- Peak to Average
- Preamplifier
- Trigger Termination



NOTE For additional information on each extension item, highlight the item and a summary is displayed near the bottom of the extension dialog box.

Running Calibration on the M9393A from the 89600 VSA Software

It is possible to run calibrations on the M9393A VSA from the 89600 VSA software when the two are correctly configured. The calibration path in the 89600 VSA software is **Utilities > Calibration**.

CAUTION Before running a calibration on the M9393A, it is important to make sure that there is no RF signal connected to the RF In connector of the M9365A Downconverter.module in the M9393A instrument. A signal present at

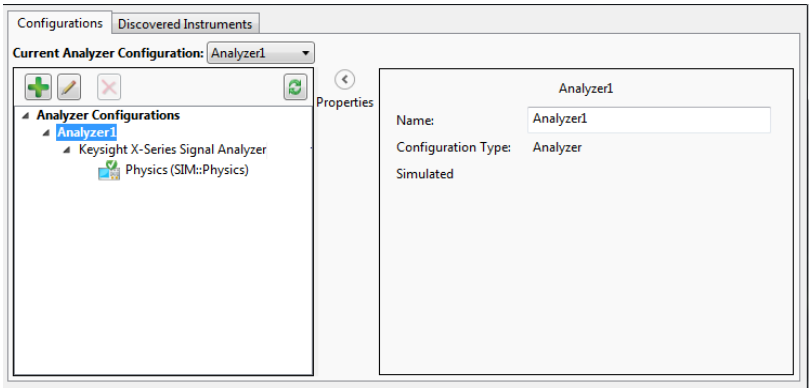
the RF Input connector of the M9365A Downconverter can result in an unsuccessful calibration of the M9393A instrument.

Procedure for a Two Channel Configuration

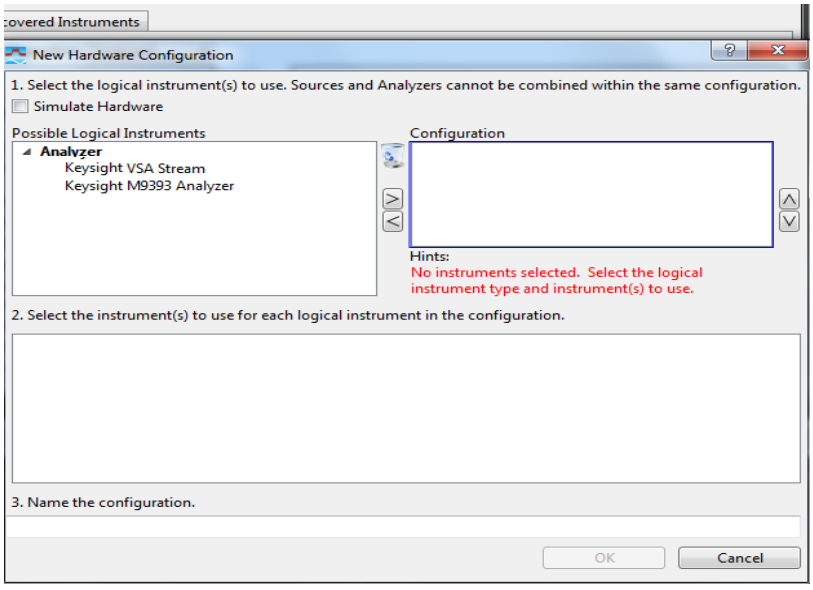
Procedure

To create a new M9393A instrument, use the Keysight 89600 VSA Software and follow these steps:

1. Open the "New Hardware Configuration" window in the Keysight 89600 VSA software by selecting: **Utilities > Hardware > Configurations** from the menu bar. When you hover over the last element in this sequence you will see a listing of the relevant configurations. Click on the "Add New Hardware" icon  .

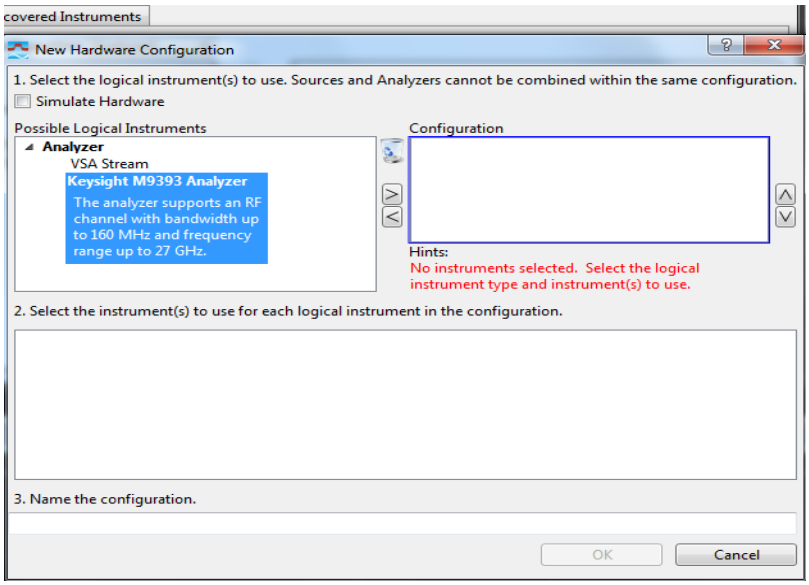


2. In the "New Hardware Configuration" window,

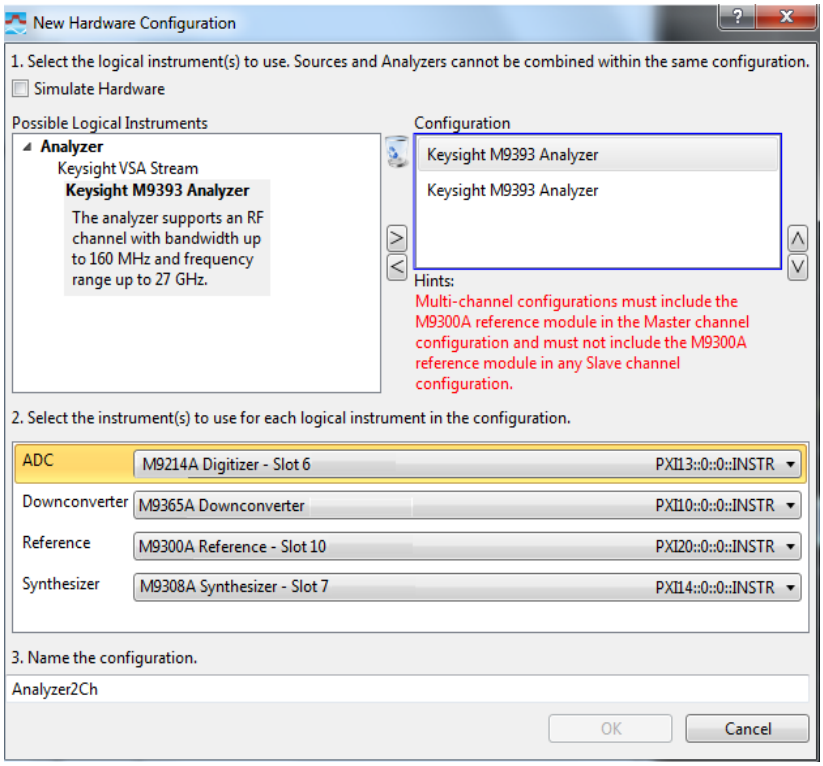


a. Select the Keysight M9393A Analyzer (modules) entry and click on the  icon to copy the entry to the "Configuration" window.

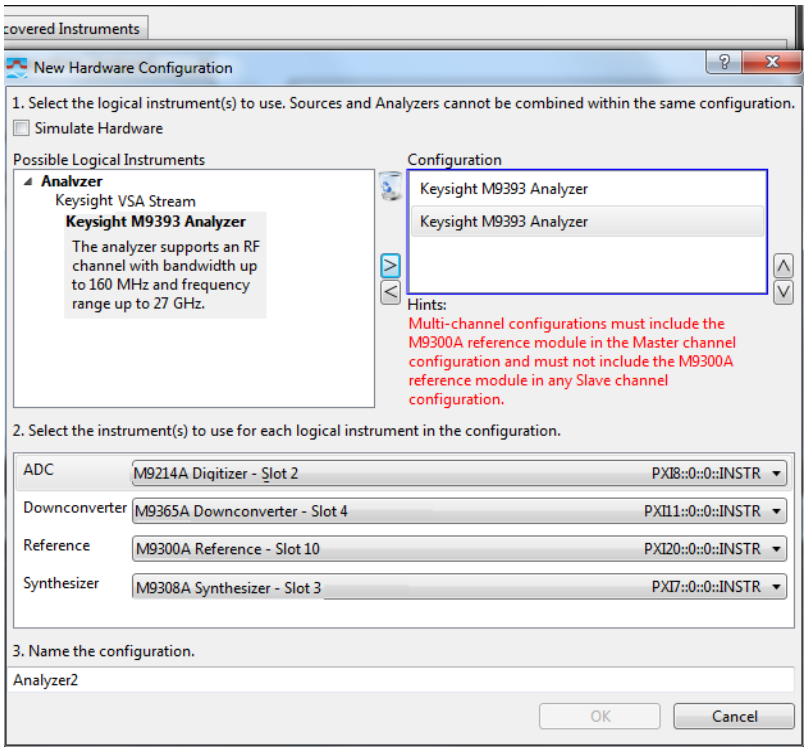
To create a second channels, select the Keysight M9393A Analyzer (modules) entry, and click on the icon to copy the entry to the "Configuration" window a second time.(as shown in 2b)



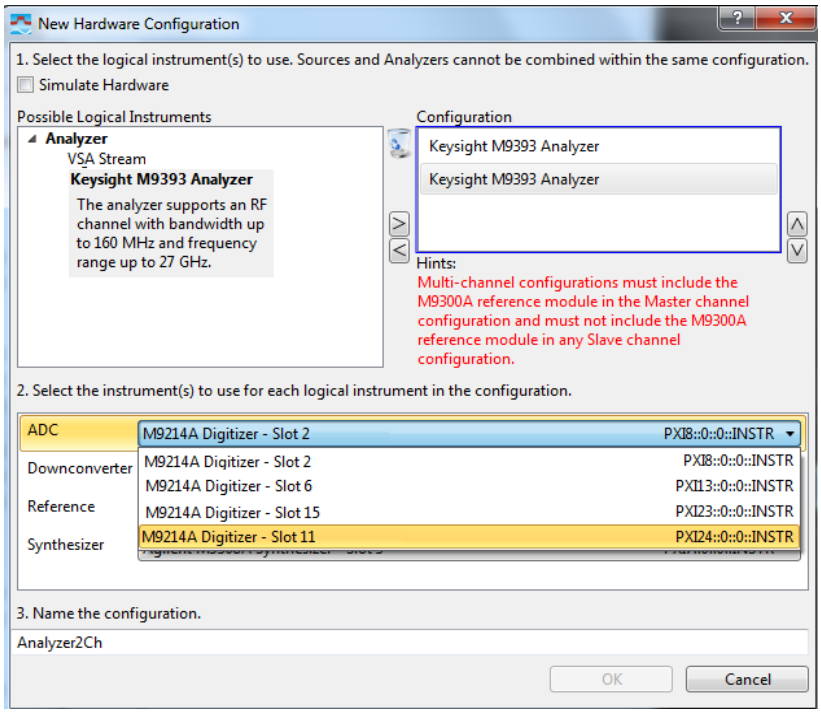
b. Configure the new M9393A (Modules) instrument by selecting the modules identified by their VISA address in the "2. Select the instrument(s) to use for each logical instrument in the configuration" section.

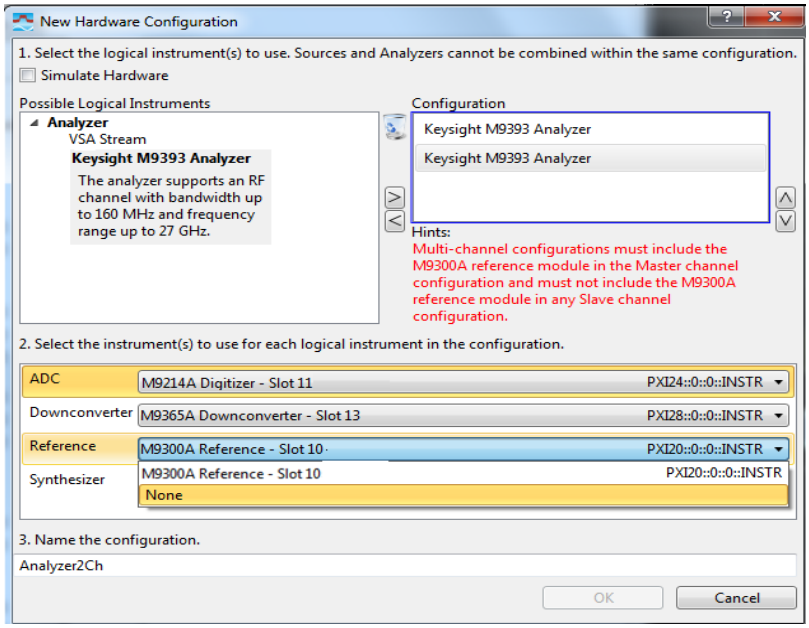


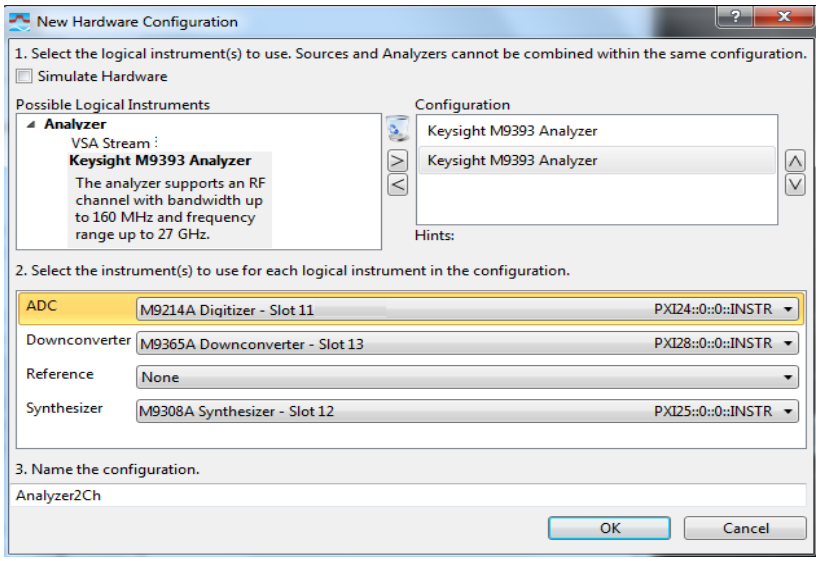
In the image below, the modules associated with the first channel are shown in slots 2, 4, 10, and 3. The reference module is in slot 10 of the first channel, making this channel the master. All other channels will have "None" selected for the reference .



To configure the second channel, select it in the configuration window as shown in the next image. Configure the modules by selecting the next higher slot number offered, and set the Reference to "None" as shown in the next three images.


New Hardware Configuration
1. Select the logical instrument(s) to use. Sources and Analyzers cannot be combined within the same configuration.
Simulate Hardware
Possible Logical Instruments
Analyzer
VSA Stream
Keysight M9393 Analyzer
The analyzer supports an RF channel with bandwidth up to 160 MHz and frequency range up to 27 GHz.
Configuration
Keysight M9393 Analyzer
Keysight M9393 Analyzer
Hints:
Multi-channel configurations must include the M9300A reference module in the Master channel configuration and must not include the M9300A reference module in any Slave channel configuration.
2. Select the instrument(s) to use for each logical instrument in the configuration.
ADC
M9214A Digitizer - Slot 2
PXI8::0::0::INSTR
Downconverter
Reference
Synthesizer
M9214A Digitizer - Slot 2 PXI8::0::0::INSTR
M9214A Digitizer - Slot 6 PXI13::0::0::INSTR
M9214A Digitizer - Slot 15 PXI23::0::0::INSTR
M9214A Digitizer - Slot 11 PXI24::0::0::INSTR
3. Name the configuration.
Analyzer2Ch
OK
Cancel


New Hardware Configuration
1. Select the logical instrument(s) to use. Sources and Analyzers cannot be combined within the same configuration.
Simulate Hardware
Possible Logical Instruments
Analyzer
VSA Stream
Keysight M9393 Analyzer
The analyzer supports an RF channel with bandwidth up to 160 MHz and frequency range up to 27 GHz.
Configuration
Keysight M9393 Analyzer
Keysight M9393 Analyzer
Hints:
Multi-channel configurations must include the M9300A reference module in the Master channel configuration and must not include the M9300A reference module in any Slave channel configuration.
2. Select the instrument(s) to use for each logical instrument in the configuration.
ADC
M9214A Digitizer - Slot 11
PXI24::0::0::INSTR
Downconverter
M9365A Downconverter - Slot 13
PXI28::0::0::INSTR
Reference
M9300A Reference - Slot 10
PXI20::0::0::INSTR
Synthesizer
M9300A Reference - Slot 10 PXI20::0::0::INSTR
None
3. Name the configuration.
Analyzer2Ch
OK
Cancel



c. Name the new configuration in the "3. Name the configuration" section. The default name "Analyzer1" may be changed. Use a meaningful name for later identification.

d. Save the new configuration by selecting the "OK" button.

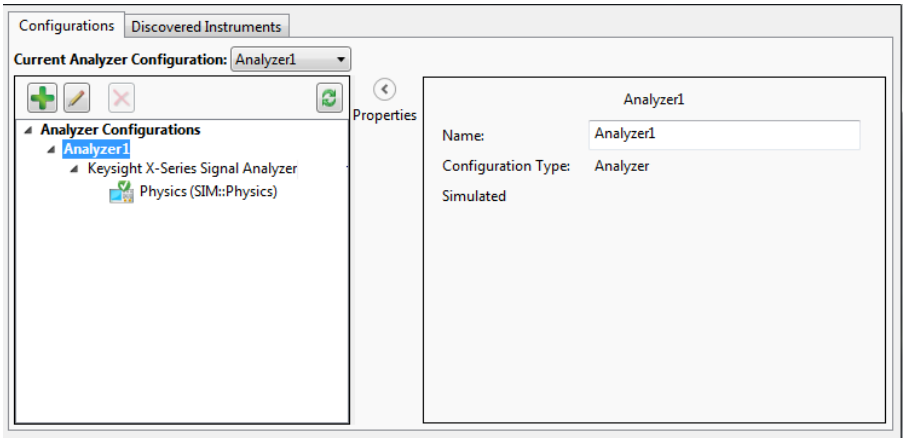
e. Having been saved, the new configuration can be reloaded in the future.

Procedure for a Three or Four Channel Configuration

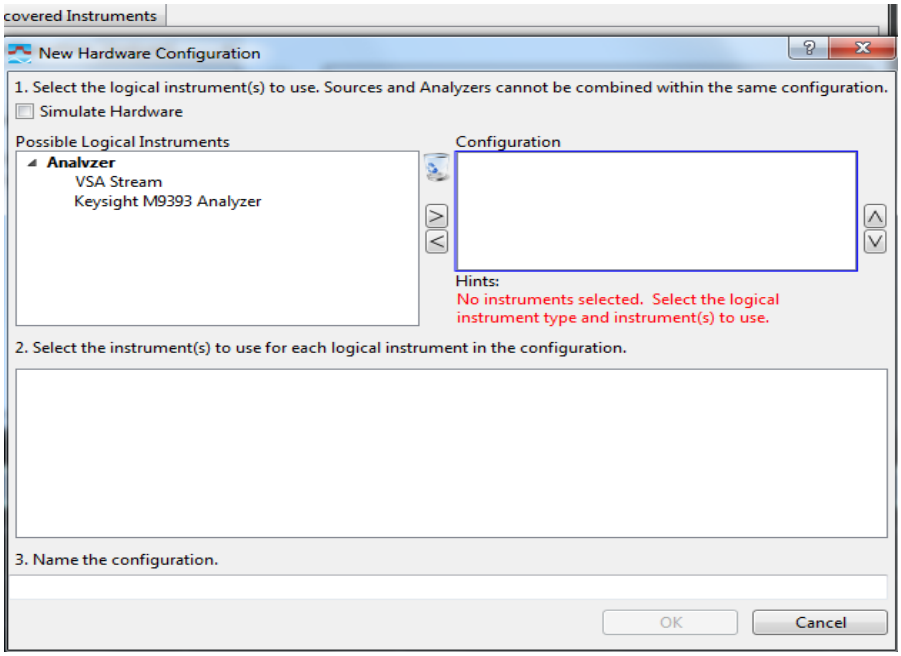
Procedure

To create a new M9393A instrument, use the Keysight 89600 VSA Software and follow these steps:

1. Open the "New Hardware Configuration" window in the Keysight 89600 VSA software by selecting: **Utilities > Hardware > Configurations** from the menu bar. When you hover over the last element in this sequence you will see a listing of the relevant configurations. Click on the "Add New Hardware" icon .

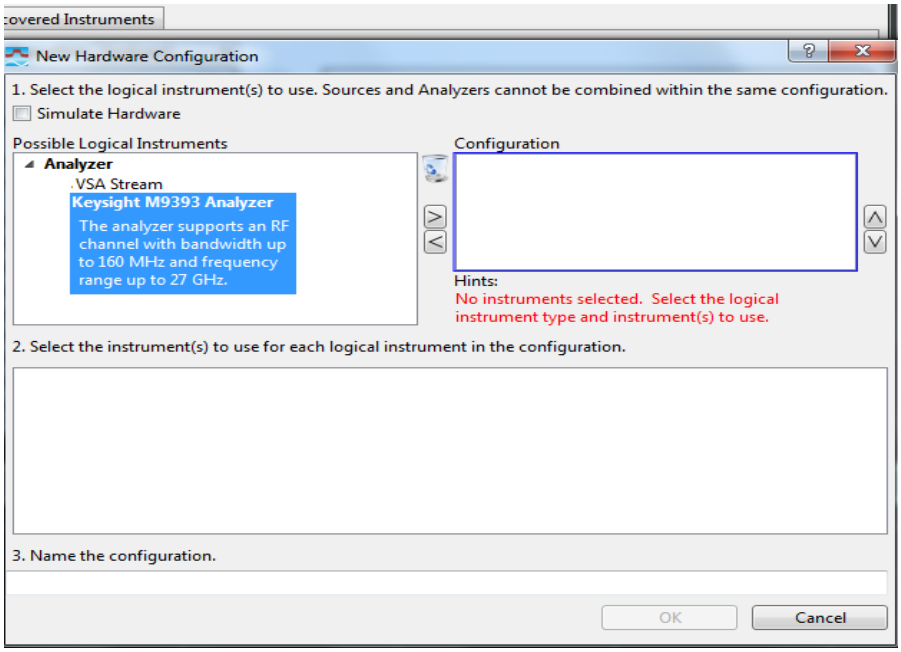


2. In the "New Hardware Configuration" window,

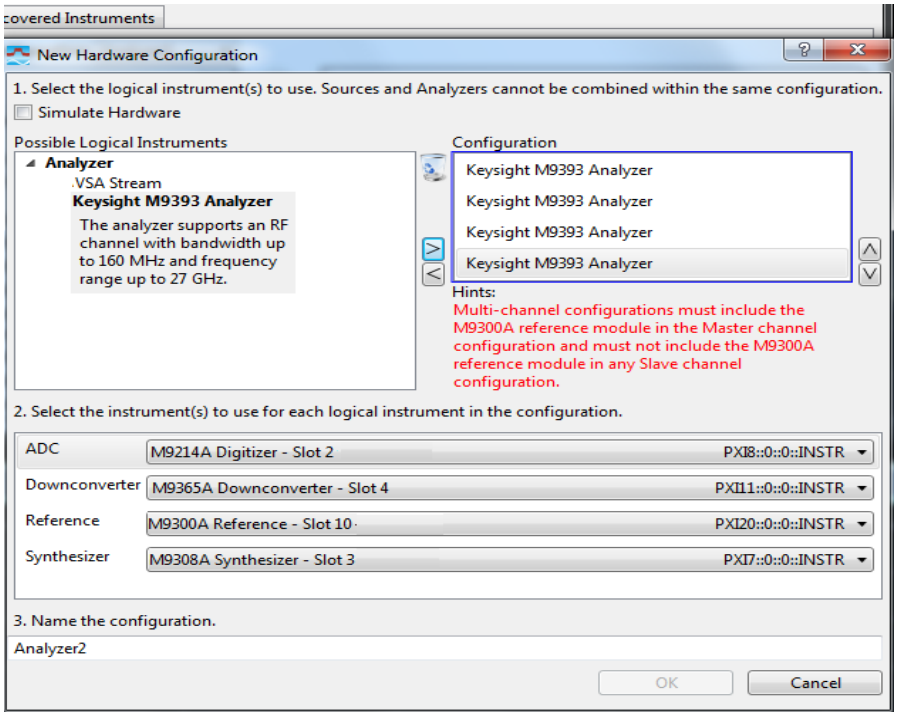


a. Select the Keysight M9393A Analyzer (modules) entry and click on the icon to copy the entry to the "Configuration" window.

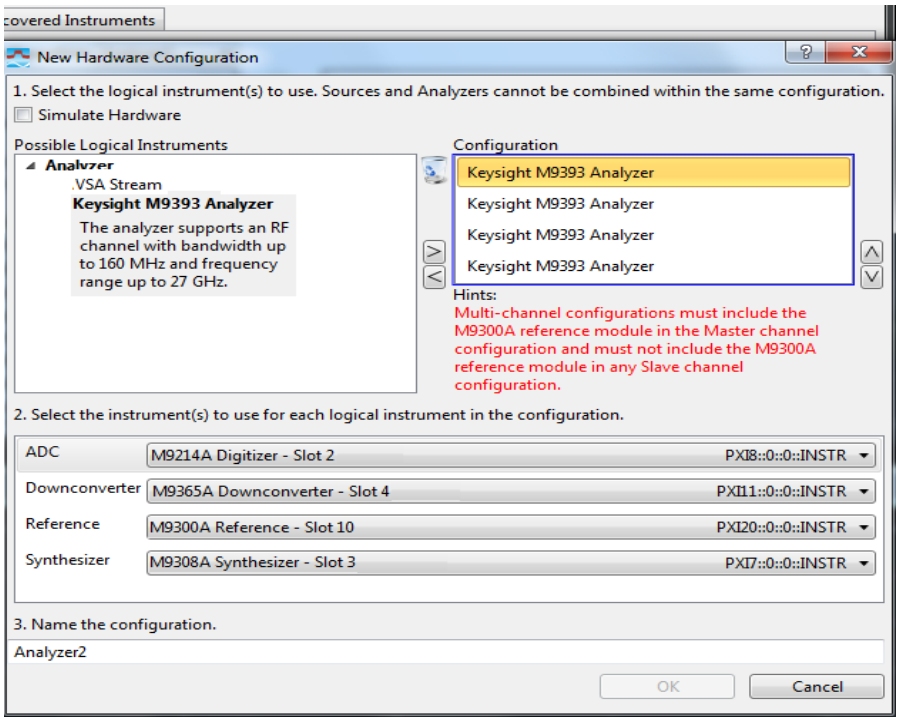
To create multiple channels, select the Keysight M9393A Analyzer (modules) entry, and click on the icon to copy the entry to the "Configuration" window two more times for a three channel system, and three more times for a four channel system (as shown in 2b).



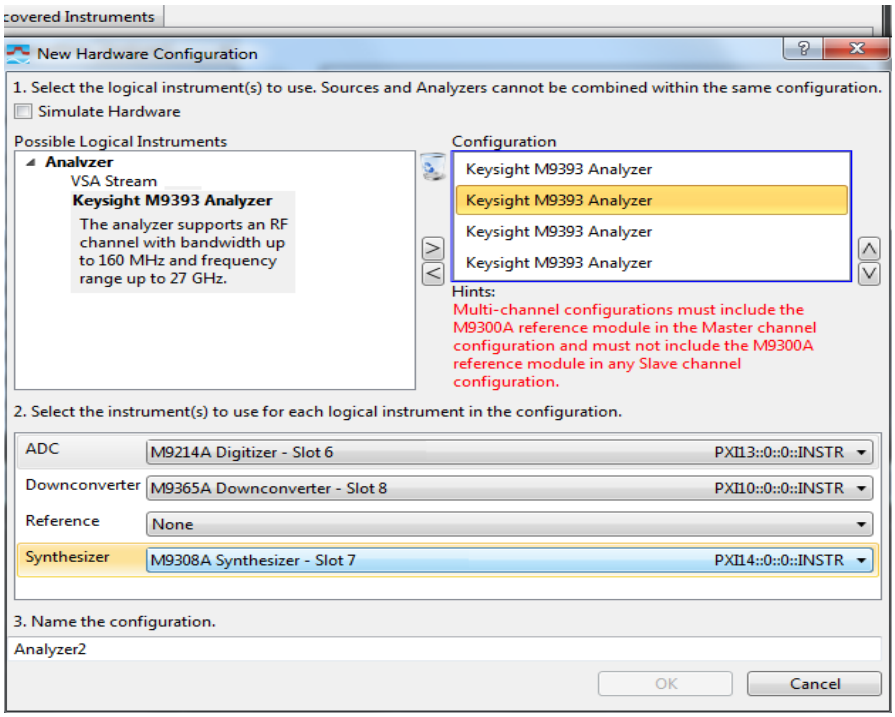
b. Configure the new M9393A (modules) instrument by selecting the modules identified by their VISA address in the "2. Select the instrument(s) to use for each logical instrument in the configuration" section.



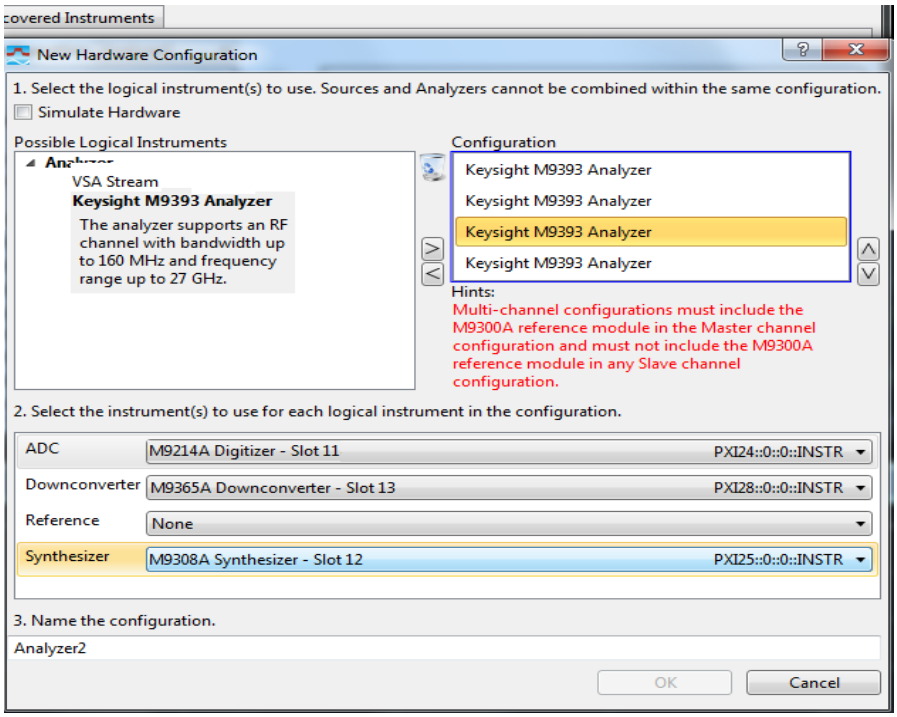
In the image below, the modules associated with the first channel are shown in slots 2, 4, 10, and 3. The reference module is in slot 10 of the first channel, making this channel the master. All other channels will have "None" selected for the reference .



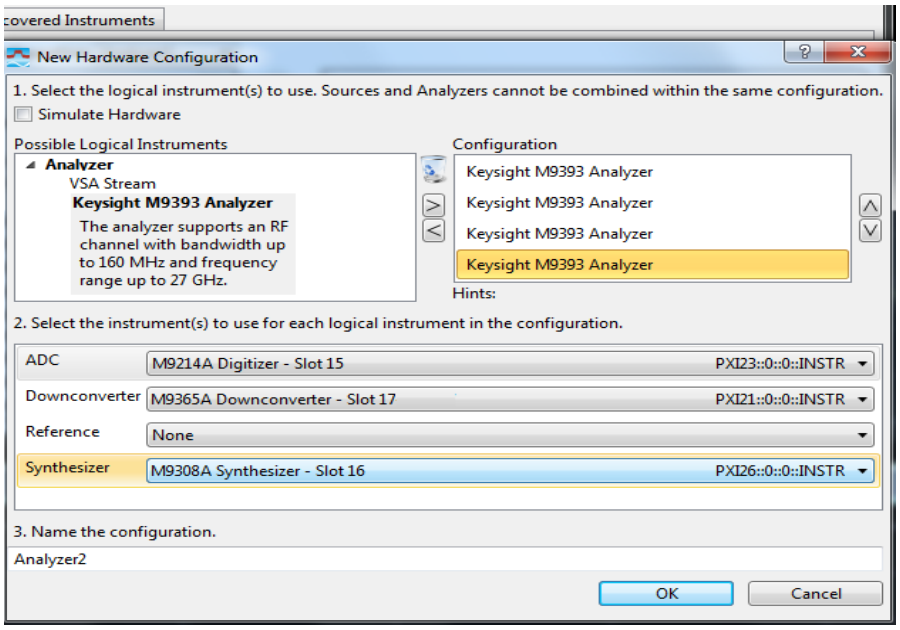
To configure the second channel, select it in the configuration window as shown in the next image. Configure the modules by selecting the next higher slot number offered, and set the Reference to "None."

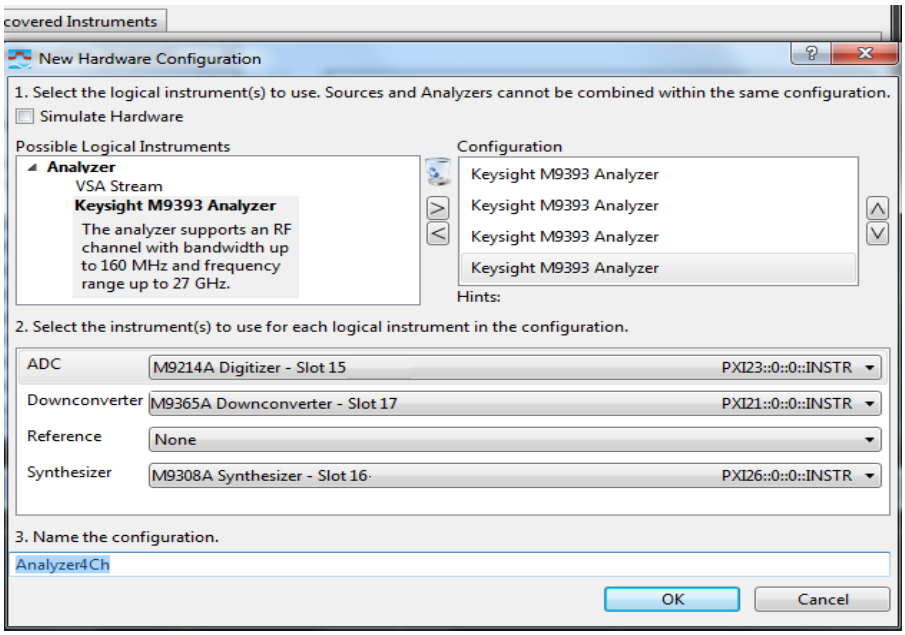


To configure the third channel, select it in the configuration window as shown in the next image. Configure the modules by selecting the next higher slot number offered, and set the Reference to "None." If this is a three channel system, stop here.



To configure the fourth channel, select it in the configuration window as shown in the next image. Configure the modules by selecting the next higher slot number offered, and set the Reference to "None."





c. Name the new configuration in the "3. Name the configuration" section. The default name "Analyzer1" may be changed. Use a meaningful name for later identification.

d. Save the new configuration by selecting the "OK" button.

e. The new configuration can be given a name saved for future reloading

This ends the configuration setup for a four channel system.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