Keysight PXIe Chassis Family

M9010A, M9019A, M9046A
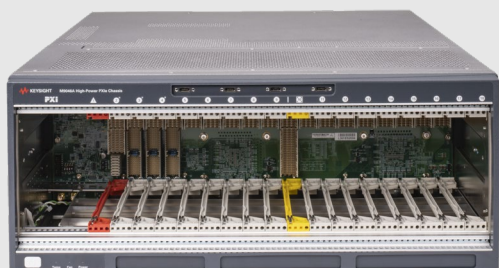
M9046A

M9010A

M9019A

Notices

Trademarks

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PCI-SIG$^®$, PCI Express$^®$, and PCIe$^®$ are registered trademarks of PCI-SIG.

LabVIEW is a registered trademark of National Instruments

Thunderbolt and the Thunderbolt logo are trademarks of Intel Corporation or its subsidiaries in the U.S. and/or other countries.

Sales and Technical Support

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

www.keysight.com/find/M9010A

www.keysight.com/find/M9019A

www.keysight.com/find/M9046A

(product-specific information and support, software and documentation updates)

www.keysight.com/find/assist (worldwide contact information for repair and service)

Declaration of Conformity

Declarations of Conformity for this product and for other Keysight products may be downloaded from the Web. Go to http://keysight.com/go/conformity and click on "Declarations of Conformity." You can then search by product number to find the latest Declaration of Conformity.

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Warranty

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Safety Information

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings or operating instructions in the product manuals violates safety standards of design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

General

Before Applying Power

Verify that all safety precautions are taken. Make all connections to the unit before applying power. Note the external markings described under "Safety Symbols".

Ground the Instrument

Keysight chassis' are provided with a grounding-type power plug. The instrument chassis and cover must be connected to an electrical ground to minimize shock hazard. The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

PXIe Chassis are for indoor use only.

Mains supply voltage fluctuations must not exceed ±10% of the nominal supply voltage.

Transient overvoltages typically present on the Mains supply (installation CAT II)

Do Not Operate in an Explosive Atmosphere

Do not operate in the presence of flammable gases or fumes.

Do Not Operate Near Flammable Liquids

Do not operate the module/chassis in the presence of flammable liquids or near containers of such liquids.

Cleaning

Clean the outside of the Keysight module/chassis with a soft, lint-free, slightly dampened cloth. Do not use detergent or chemical solvents. Disconnect instrument from mains power prior to cleaning.

Do Not Remove Instrument Cover

Only qualified, service-trained personnel who are aware of the hazards involved should remove instrument covers. Always disconnect the power cable and any external circuits before removing the instrument cover.

Keep away from live circuits

Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

DO NOT operate damaged equipment

Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Keysight Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

DO NOT block the primary disconnect

The primary disconnect device is the appliance connector/power cord when a chassis used by itself, but when installed into a rack or system the disconnect may be impaired and must be considered part of the installation.

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Keysight Sales and Service Office to ensure that safety features are maintained.

In Case of Damage

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

CAUTION

Do NOT block vents and fan exhaust: To ensure adequate cooling and ventilation, leave a gap of at least 50mm (2") around vent holes on both sides of the chassis.

Do NOT operate with empty slots: To ensure proper cooling and avoid damaging equipment, fill each empty slot with a PXIe filler panel module.

Do NOT stack free-standing chassis: Stacked chassis should be rack-mounted.

All modules are grounded through the chassis: During installation, tighten each module's retaining screws to secure the module to the chassis and to make the ground connection.

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 lifespan, 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 the chassis. Do not use this product in any manner not specified by the manufacturer. The protective features of this product must not be impaired if it is used in a manner specified in the operation instructions.

Safety and Regulatory Symbols

Products display the following symbols:

Documentation symbol. The product is marked with this symbol when it is necessary for user to refer to the instruction in the documentation.

Protective Conductor Terminal.

Frame or chassis Terminal

Alternating Current (AC).

Direct Current (DC).

Standby Power. Unit is not completely disconnected from AC mains when power switch is in standby position

Indicates that antistatic precautions should be taken.

Operate the PXIe chassis in the horizontal orientation. Do NOT operate this chassis in the vertical orientation.

ON position of the power line switch.

OFF position of the power line switch.

Three-phase alternating current

Possibility of electrical shock due to high earth leakage.

Unit is heavy and requires two people to lift and carry.

Equipment is protected throughout by double or reinforced insulation.

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UK CA

UK conformity mark is a UK government owned mark. When affixed to the product is declaring all applicable Directives and Regulations have been met in full.

ccr.keysight@keysight.com

The Keysight email address is required by EU directives applicable to our product.

The CSA mark is a registered trademark of the Canadian Standards Association.

CE

The CE marking is a registered trademark of the European Community (if accompanied by a year, it is the year when the design was proven). It indicates that the product complies with all relevant directives.

CAN ICES/NMB-001(A)

Canada EMC label. Interference-Causing Equipment Standard for industrial, scientific and medical (ISM) equipment. Matériel industriel, scientifique et médical (ISM).

ICES/NMB-001 [C E] ISM GRP.1 CLASS A

CE/ICES/ISM Label. This is a space saver label that combines three markings - CE with CAN ICES (see above) and ISM (see below).

The RCM mark is a registered trademark of the Australian Communications and Media Authority.

ICES/NMB-001 ISM GRP.1 CLASS A
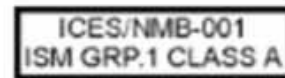
This is a combined marking to indicate product compliance with the Industry Canadian Interference-Causing Equipment Standard (ICES/NMB-001). This is also a symbol of an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 5).

ISM 1-A

This is a symbol of an Industrial Scientific and Medical Group 1 Class A product. (CISPR 11, Clause 5)

IP x y

This mark indicates product has been designed to meet the requirements of "IP x y", where "x" is the solid particle protection and "y" is the liquid ingress protection.

Safety and Regulatory Symbols (continued)

South Korean Certification (KC) mark. It includes the marking's identifier code.

A 급 기기 (업무용 방송통신기자재)
이 기기는 업무용 (A 급) 전자파적합기
기로서 판 매자 또는 사용자는 이 점을 주
의하시기 바라 며 , 가정외의 지역에서
사용하는 것을 목적으 로 합니다.

UK conformity mark is a UK China Restricted Substance Product Label. The EPUP (environmental protection use period) number in the center indicates the time period during which no hazardous or toxic substances or elements are expected to leak or deteriorate during normal use and generally reflects the expected useful life of the product.

Waste Electrical and Electronic Equipment (WEEE) Directive

This WEEE 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.

To return unwanted products, contact your local Keysight office, or for more information see http://about.keysight.com/en/companyinfo/environment/takeback.shtml.

Universal recycling symbol. This symbol indicates compliance with the China standard GB 18455-2001 as required by the China RoHS regulations for paper/fiberboard packaging.

Contents

Step 4: Overview of Installing and Verifying PXI/PXIe Modules

Related Documentation

Chassis Related Products and Accessories

Introduction

A PXIe chassis is the backbone of a PXIe system. It contains a high performance backplane giving the PXI modules in the system the ability to communicate rapidly with each other and the host PC. It also provides power and cooling for the modules.

Keysight provides the below PXIe chassis in the PXIe Chassis Family:

- M9010A – a 10-Slot PXI 24 GB/s, Gen 3 chassis
- M9019A – a 18-Slot PXI 24 GB/s, Gen 3 chassis
- M9046A - a 18-Slot PXI 24 GB/s, Gen 3, high power, exceptional cooling chassis

NOTE	Unless specified, everything in this PXIe Chassis Family Startup Guide pertains to all three PXI chassis. If there is anything that uniquely pertains to one of the four chassis, it is noted.

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About this guide

This *Keysight PXIe Chassis Family Startup Guide* describes how to connect the chassis to a host PC, power-up the chassis and verify basic operation, including:

- The features and capabilities of the PXIe chassis.
- How the chassis is shipped and what is included with the chassis.
- Computer hardware and software requirements, installation of an embedded controller, connection of a remote controller, and software installation on the controller.
- How to use Keysight Connection Expert and the chassis Soft Front Panel (SFP) to verify operation of the chassis.
- Overview of installing and verifying Keysight modules in the chassis.

About the Chassis

The Keysight Chassis Family is designed to deliver the highest power and cooling capability. The Keysight PXIe chassis have these key features:

- The M9019A have up to 16 PXIe hybrid slots (the M9010A has 8 hybrid slots).
- The M9046A has 3 PXIe hybrid slots and 13 PXIe slots.
- Each chassis has 1 PXIe timing slot and 1 PXIe system slot.
- 4U chassis with innovative cooling design.
- Ultra high performance PCIe interface
    - -- The M9010A has Gen 3 fixed fabric, with a two-link (x8, x16) system slot and x8 links to the hybrid/timing slots.
    - -- The M9019A provides Gen 3 fixed fabric, with a two-link (x8, x16) system slot and x8 links to the hybrid/timing slots.
    - -- The M9046A provides configurable with a two-link (x8, x16) system slot and x8 links to the PXIe slots.
- High data bandwidth (maximum 24 GB/s system and 8 GB/s slot-to-slot).
- Multi-chassis power-sequencing using rear panel RJ-45 connectors.
- Front panel external trigger input/output ports.
- One common driver supports IVI-C and IVI.NET for all three chassis
- M9046A additional key features include
    - -- High power with up to 1675W usable power.
    - -- Up to 85 w/slot cooling with exceptional acoustical performance.
    - -- Standard OCXO 10 MHz reference clock.
    - -- Optional rear trigger access (8 triggers).
    - -- Optional per-slot power supply control.
    - -- Specified up to 55°C and 10,000 ft operating conditions.

Figure 1 shows the front view of the M9019A chassis. The M9010A chassis is similar but has ten slots.

Figure 1   Keysight M9019A PXI Chassis (the other chassis are similar)

Figure 2 shows the front view of the M9046A PXIe chassis.
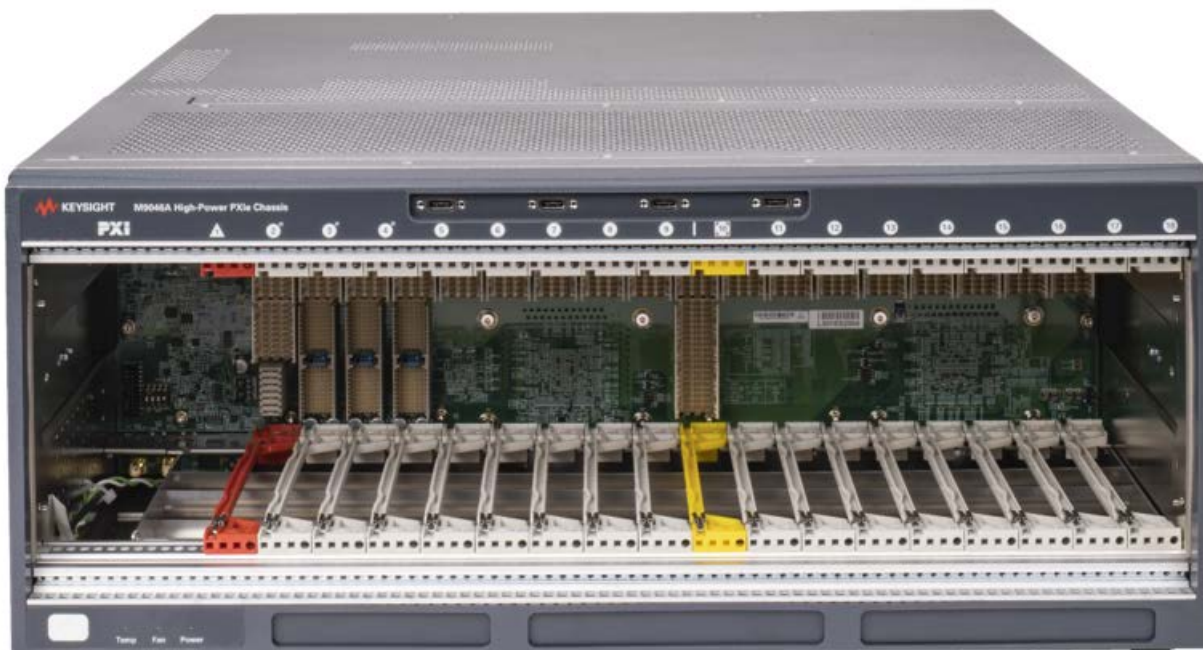
Figure 2   Keysight M9046A PXIe Chassis

The following figure shows the M9019A chassis rear panel. The M9010A chassis has two fans.

Figure 3   Keysight M9019A PXIe Chassis Rear and Side View

M9010A and M9019A Front Panel Trigger

Two front panel SMB trigger connectors connect to the PXI [0:7] backplane trigger bus in Trigger Bus Segment 1 in the M9010A chassis and Trigger Bus Segment 2 in the M9019A chassis. See the Keysight PXIe Chassis User Guide for detailed information.

Figure 4   Chassis Front Panel Trigger Connectors (M9019A chassis shown)

NOTE	Make certain that your test system application is not running when you reconfigure these two trigger ports. Reconfiguring the ports may cause unexpected pulses on the trigger port lines.

M9046A Advanced Rear Trigger Access (Option 001)

Eight rear panel SMB trigger ports connect to all 3 Trigger Bus Segments in the M9046A chassis. See the Keysight M9046A PXIe Chassis User Guide for detailed information.

NOTE	This option requires drivers version 1.7.913.1 or later and firmware version 2023A or later. Refer to www.keysight.com/find/M9046A to install the latest drivers and firmware.
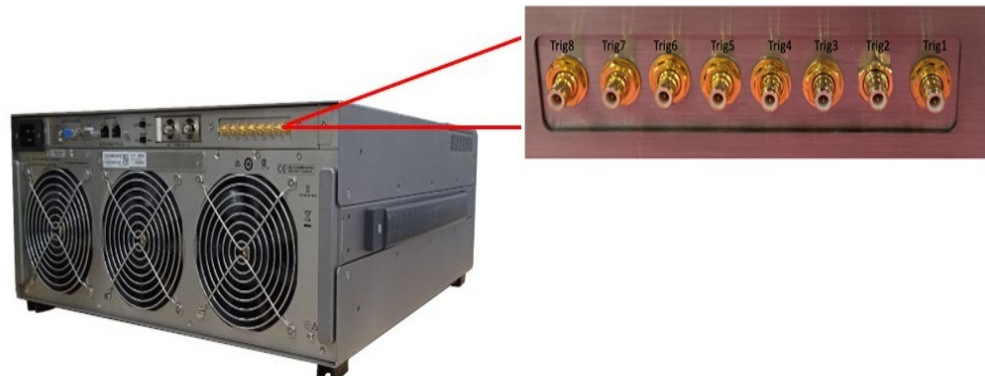
Figure 5   Chassis Rear Panel Trigger Connectors (M9046A chassis shown)

NOTE	Make certain that your test system application is not running when you reconfigure these trigger ports. Reconfiguring the ports may cause unexpected pulses on the trigger port lines.

M9046A Advanced Power Monitoring and Control (Option 002)

This option provides per slot power monitoring and control through a licensed software. For example, DC/DC switching frequency phase. See Figure 6 on page 15. No additional hardware is installed. Refer to the M9046A Per-Slot Power Monitor and Control Soft Front Panel (SFP) help file in the software for more detail.

NOTE	This option requires drivers version 1.7.913.1 or later and firmware version 2023A or later. Refer to www.keysight.com/find/M9046A to install the latest drivers and firmware.

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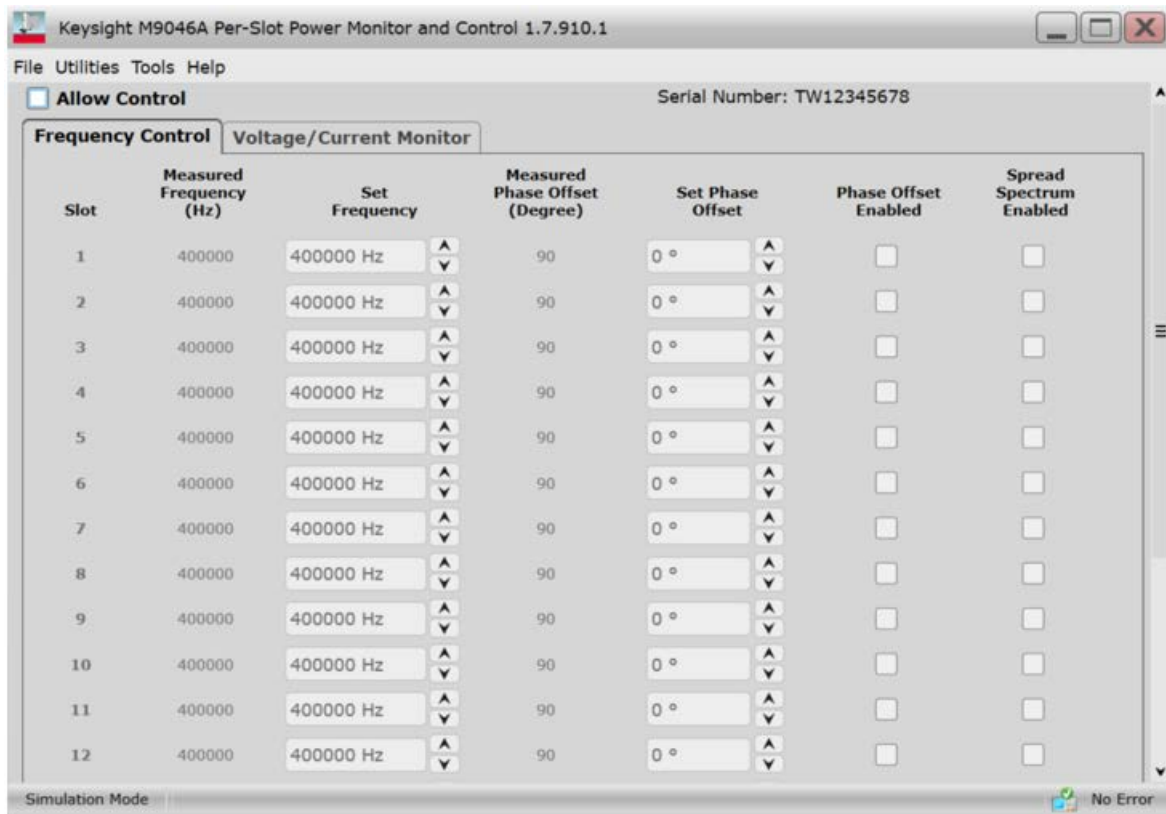
Figure 6   Per-Slot Power Monitor and Control Soft Front Panel

M9046A Push-Pull Cooling (Option 003)

The M9046A chassis has three fans that push air from the rear of the chassis and an optional top fan tray with four fans pulls air out from above the module slots.
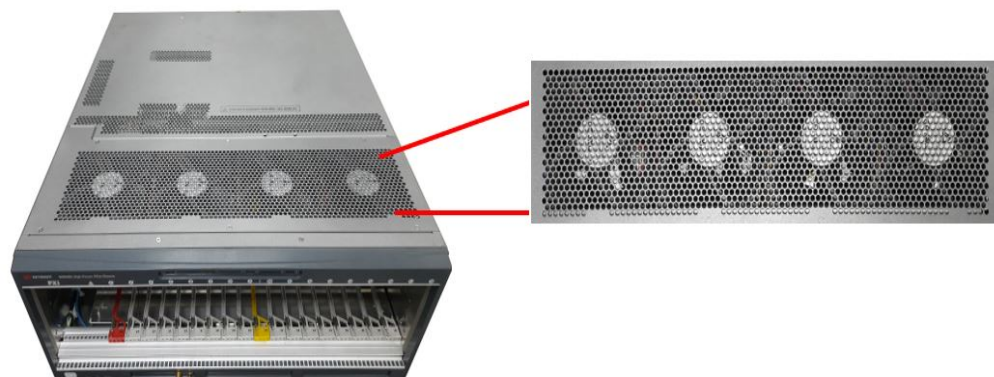
Figure 7   Keysight M9046A PXIe Chassis Top View with Option 003

M9046A Additional Chassis Options (Options QS1, QS2, and QS3)

The M9046A can be configured to support complex applications which require internal high-performance, specialized reference signals and front panel reference distribution. These chassis also come pre-configured with the top fan tray (option 003) to provide additional cooling capacity. They are not compatible with the advanced rear trigger access (option 001).

NOTE	These options require drivers version 1.7.913.1 or later and firmware version 2023A or later. Refer to www.keysight.com/find/M9046A to install the latest drivers and firmware.

M9046A-QS2

M9046A-QS1/
M9046A-QS3
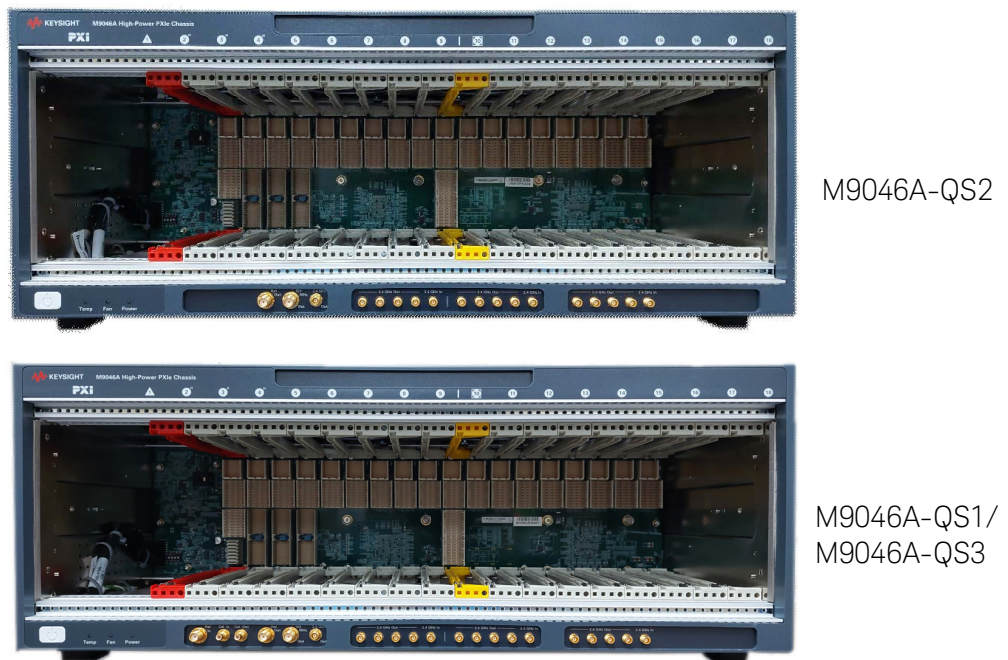
Figure 4   Front Panels of M9046A-QS1, M9046A-QS2 and M9046A-QS3

Interactive Block Diagram

An interactive Block Diagram exists for all four chassis. This Block Diagram is usable for training and understanding how the chassis works. You can download the block diagram from:

www.keysight.com/find/pxi-blockdiagram

The Block Diagram and other information is available on the web:

www.keysight.com/find/M9010A

www.keysight.com/find/M9019A

www.keysight.com/find/M9046A
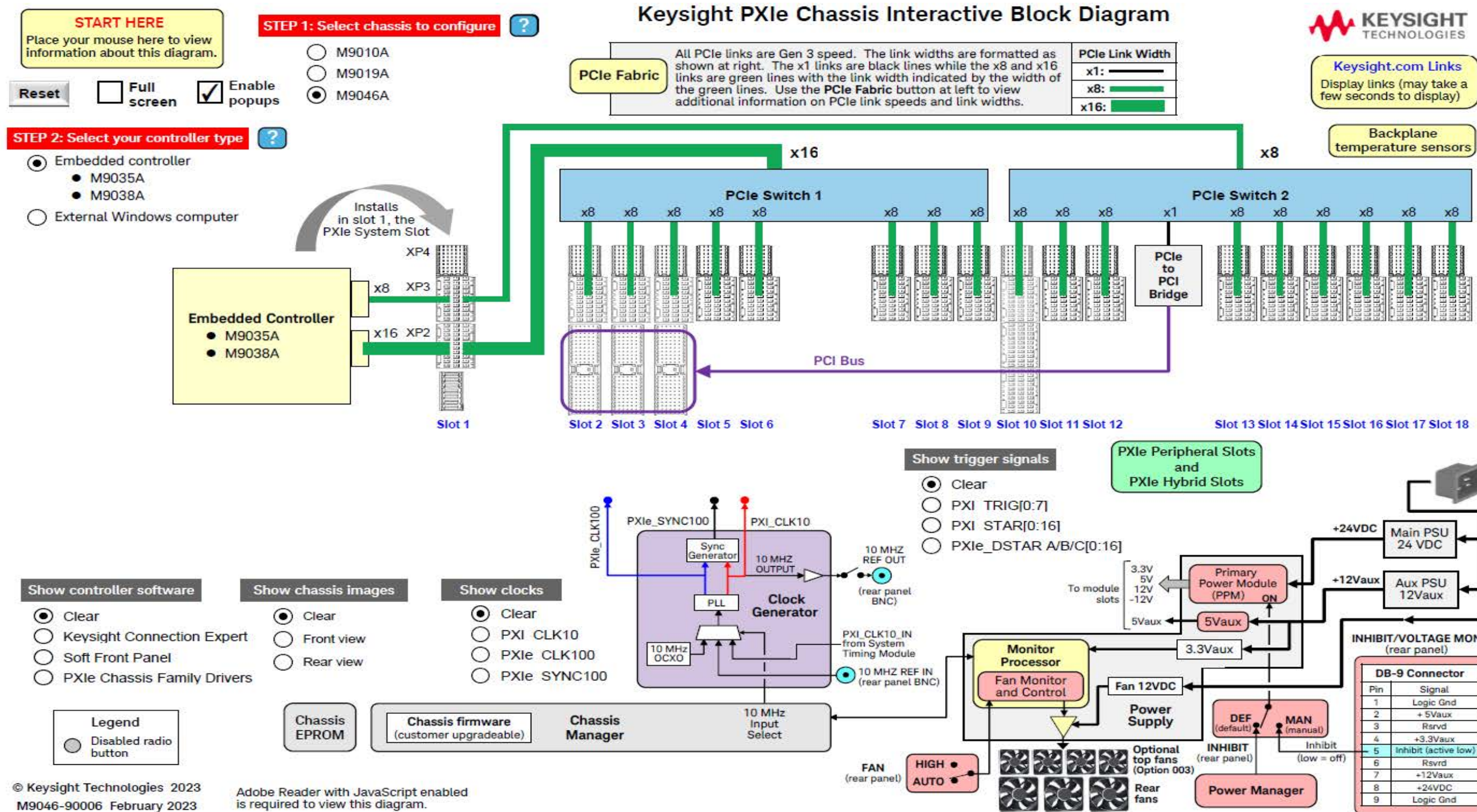
Figure 9   Chassis Block Diagram

Terminology

The combination of the chassis, the host controller (and a PCIe cable if the host controller is a remote controller), and the chassis I/O software running on the host controller is referred to as a chassis system. The computer that controls the chassis is known as the host controller or system controller, and is shown at the top of the hierarchy in the following figure:
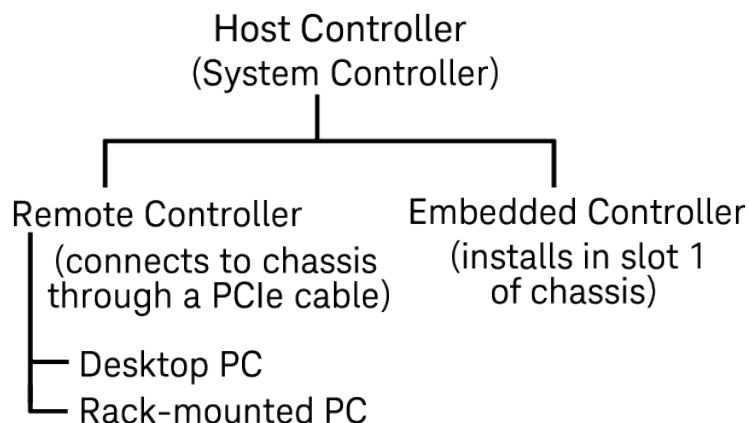
Figure 10   System Controller Types

The host controller can either be a remote controller or an embedded controller.

A **remote controller** can be a desktop or a rack mounted PC. The remote controller interfaces to the chassis with an M9048B or M9049A PCIe Host Adapter module (desktop adapter) installed in the PC, through a PCIe cable to an M9022A, M9023A, or M9024A PXIe System Module installed in slot 1 of the chassis. For an external PC or laptop with Thunderbolt 3 technology, the M9025A PXIe System Module can be used to connect the PXIe chassis to PC or laptop.

An **embedded controller**, such as the Keysight M9038A Embedded Controller, is a small form-factor, Windows-based PC that is designed for installation in the system controller slot of the chassis (slot 1). An embedded controller consumes two or three expansion slots to the left of slot 1.

NOTE	For a PC to serve as a remote controller, its BIOS must enumerate all the PCIe slots in the chassis. Many computers cannot enumerate a sufficient number of PCIe slots and may not work for your configuration.
	Keysight provides the document Tested PC and PXI/AXIe Chassis Configurations, which lists the embedded, desktop and rack-mounted PCs that have been verified to enumerate the PCIe slots in the PXIe chassis. Use this document, available under the Document Library tab at www.keysight.com/find/pxi-chassis, to guide your selection of remote controller PCs.

Static-safe Handling Procedures
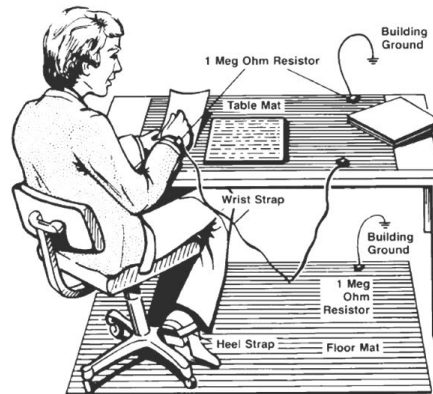
Electrostatic discharge (ESD) can damage or destroy electronic components. Use a static-safe work station to perform at work on electronic assemblies. The figure shows a static-safe work station using two types of ESD protection:

-Conductive table-mat and wrist-strap combination

-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.**

NOTE	All front and rear panel I/O port cables are not recommended to be longer than 3 meters.

Step1: Verify Shipment Contents

Depending on your order, your shipment may arrive in separate boxes. For example, if you order the M9046A chassis, the M9022A PXIe System Interface Module, and a Y1202A cable, your order may arrive in three separate boxes.

Carefully inspect your shipment for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by warranty. When shipping the M9046A chassis, use original packaging or comparable to avoid damage to the product.

NOTE   Keysight suggests that you save the chassis shipping container in case it ever becomes necessary to return the chassis to Keysight for service. Return the Chassis to Keysight for service.

Chassis Shipment Verification

Verify that your chassis shipment contains the following items:

- Keysight PXIe Chassis (M9010A, M9019A or M9046A).
- Appropriate power cord for your location.
- Printed *Keysight PXIe Chassis Family Startup Guide* (this document).

CAUTION   The weight of an empty M9019A PXIe chassis (no modules installed in the chassis) is approximately 29.8 lbs (13.5 kg). Lift the chassis using a single side handle only when the total chassis weight (chassis plus installed modules) does not exceed 50 lbs (approximately 22.7 kg). Otherwise use both side handles to lift the chassis.

The M9010A chassis weighs 30.91 lbs (14.02 kg).

The M9046A chassis weighs 41.14 lbs (18.66 kg).

Installing modules in any chassis may increase its weight to a point where two people are required to lift the chassis. If two people are not available, use a mechanical lift to lift the chassis. The chassis should be transported using a rolling cart.

Step 2: Prepare the Hardware

CAUTION The following procedures should be followed to ensure safety and to minimize the possibility of damaging electrical components:

- This product is designed for use in Installation Category II and Pollution Degree 2, per IEC 61010 Third Edition and 664 respectively.

- These chassis are designed for indoor use only.

- Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure to ensure adequate earth grounding by not using correct components may cause product damage and serious injury.

- Use only the power cord supplied with the chassis. Keysight power cords ensure continuity between the chassis grounding-type power plug and the safety ground terminal at the power outlet.

- Install the chassis so that the detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the chassis disconnecting device. It disconnects the mains circuits from the mains supply to the chassis before other parts of the chassis. The front panel switch is only a standby switch and is not a LINE switch. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.

- **The chassis does not support hot-swapping of modules;** i.e., inserting and removing modules with the chassis powered up. Before installing modules in the chassis, power down the chassis but leave the power cord connected to the AC mains because it serves as a ground and helps protect the chassis and modules from electrostatic damage.

- To minimize the possibility of electrostatic discharge (ESD) damage to a module while installing it, follow the handling procedures described in Static-safe handling procedures.

WARNING Safety of any system incorporating the equipment is the responsibility of the assembler of the system.

NOTE Do not install modules in the peripheral slots yet. In this step, only slot 1, the system controller slot, may have a module installed. Deferring the installation of other modules until later will allow the chassis to be turned on and verified in its simplest configuration.

WARNING

Redundant Ground for 100/120V 50/60/400 Hz and 220/240V 50/60 Hz Operation for M9046A

At 100/120V 50/60/400 Hz and 220/240V 50/60 Hz AC input operation, the leakage current of the unit exceeds 3.5mA. This requires the installation of a permanent, redundant ground from the instrument chassis to earth ground. This ensures that ground will always be connected and that any leakage current will be diverted to ground.

When operating the instrument at 100/120 VAC 50/60/400 Hz or 220/240 VAC 50/60 Hz, a ground cable (not provided by Keysight) must be connected to the rear panel of the instrument to a proper ground socket of the building. Install a minimum 18 AWG yellow and green ground cable with wrapped and soldered O-ring terminals to the rear panel using the supplied M4 screw with a captive lock washer. The hardware should be tightly fastened (recommended torque value of 21" lbs) on the instrument and securely connected to the building grounding terminal.

Installing a Redundant Ground for 100/120V 50/60/400 Hz and 220/240V 50/60 Hz Operation

Operation at 100/120V 50/60/400 Hz and 220/240V 50/60 Hz requires the installation of a redundant ground from the instrument chassis to earth ground. The redundant ground must be permanently attached to the unit as well as to the earth ground point.

The following procedure describes how to make the permanent connection to the earth ground screw of the unit. The user must ensure the integrity and permanence of the connection at the earth ground point.

The following customer-supplied hardware is required:

- Ground wire (18 AWG)
- Uninsulated ring terminal for attaching wire to unit
- Hardware for attaching wire to earth ground point

The following customer-applied hardware is required:

- Philips cross head screwdriver

NOTE   The instrument can operate with mains supply voltage fluctuations up to ± 10% of the nominal voltage.

Step 1. Use the screwdriver and remove the screw in the following figure:
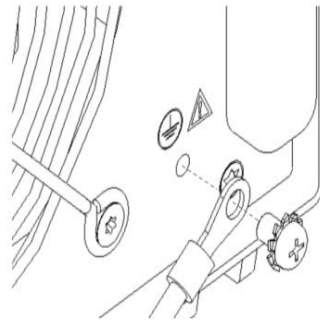
Figure 11   Remove screw from ground point

Step 2. Attach the ground wire with the ring terminal into screw thread and tighten back to a original ground point in the following figure:
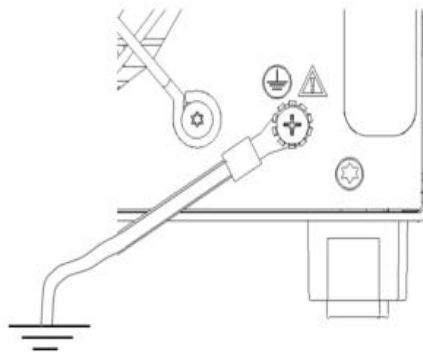
Figure 12   Attach ground wire with ring terminal

Host Controller Hardware and Software Requirements

The Keysight IO Libraries Suite is the largest software component in the chassis software installation, and its performance is the biggest contributor to system performance. Therefore, the host controller requirements in the following are based on optimizing the installation and performance of the IO Libraries Suite.

Table 1   **Host Controller Hardware and Software Requirements[*]**

Operating System	Windows 7 SP1	Windows 8.1 Update 1	Windows 10
OS versions	32-bit[1] and 64-bit.	32-bit[1] and 64-bit.	32-bit[1] and 64-bit.
Processor Speed	1Ghz 32-bit (x86), 1GHz 64-bit (x64), Itanium64 not supported	1Ghz 32-bit (x86), 1GHz 64-bit (x64), Itanium64 not supported	1Ghz 32-bit (x86), 1GHz 64-bit (x64), Itanium64 not supported
Available computer memory	1 GB minimum	1 GB minimum	1 GB minimum
Available hard disk space[2]	1.5 GB available hard disk space, includes: 1GB available for Microsoft .NET Framework 3.5 SP1 100 MB for Keysight IO Libraries Suite	1.5 GB available hard disk space, includes: 1GB available for Microsoft .NET Framework 3.5 SP1 100 MB for Keysight IO Libraries Suite	1.5 GB available hard disk space, includes: 1GB available for Microsoft .NET Framework 3.5 SP1 100 MB for Keysight IO Libraries Suite
Video	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)
Browser	Microsoft Internet Explorer 7 or greater	Microsoft Internet Explorer 7 or greater	Microsoft Internet Explorer 7 or greater

1. 32-bit operating systems do not support large, multi-chassis systems. For details, refer to Keysight's Multi-Chassis Designer tool. This tool is available on-line at: www.keysight.com/find/pxie-multichassis

2. Because of the installation procedure, less memory may be required for operation than is required for installation.

* The Drivers for the M9046A do not support Windows 7. They only support 8.1 and 10.

Refer to the *Keysight M9035A and M9038A PXIe Embedded Controller User Guides* for supported operating systems on the M9035A and M9038A.

Setting up the Chassis on a Bench

| NOTE | This guide assumes that chassis preparation, turn-on and verification are performed on the bench prior to installing the chassis in a rack. If you prefer to install the chassis in a rack first, see the *Keysight PXIe Chassis User Guide* for rack mounting instructions. |

The primary consideration in using the chassis on a bench is ensuring adequate ventilation for cooling. For bench use, ensure that the feet are installed on the chassis so that air can enter through the bottom of the chassis. Also ensure that there is at least 50 mm (2 inches) of clearance on the sides, front, and rear of the chassis. See the PXIe chassis User Guide for the ventilation requirements which will include reference to rack installation.

Removing and Installing Filler Panels

The chassis is shipped from the factory with all filler panels installed. If additional filler panels are needed, a set of five may be ordered using the Keysight part number: Y1213A. For more information, see: www.keysight.com/find/Y1213A.

For the PXI instrument module slots, the filler panels are 20.32 mm (.8 inches) wide; these are referred to as narrow filler panels. The expansion slot to the left of slot 1 is three slots wide; hence, the filler panel for the expansion slot is 60.96 mm (2.4 inches) wide and is referred to as a 3-wide filler panel.

The filler panels are held in place by captive screws (two screws for narrow filler panels and four screws for wide filler panels). When installing a filler panel, the captive screws should be tightened securely to ensure the filler panel is well-grounded to the chassis.

Ensure that filler panels are installed in all empty slots. Missing filler panels will impact cooling of the chassis and may cause RFI (radio frequency interference) with other devices.

| NOTE | Air Inlet Modules (Keysight part Y1214B) contain holes in their face plates, and can be placed adjacent to high power modules for additional cooling. For information on using air inlet modules, see: www.keysight.com/find/Y1214B. Air Inlet modules are not for use on the M9010A 10-Slot chassis and M9046A 18-Slot chassis. |
| | Keysight also offers a slot blocker kit Y1275A. These can be placed in empty slots to help improve airflow through PXI modules. They require the use of blank Y1213A PXI filler panels. See www.keysight.com/find/Y1275A. |

Connecting a Remote Host PC to the Chassis

A remote host is an external, Windows-based PC that connects to the chassis through a PCIe cable.

NOTE	In order for a PC to serve as a remote host, its BIOS must support enumeration of the PCIe slots in the chassis; many computers are not capable of enumerating a sufficient number of PCIe slots to meet your system needs.
	Keysight provides the document Tested PC and PXI/AXIe Chassis Configurations which lists the embedded, desktop, and rack-mounted PCs that have been verified to enumerate the PCIe slots in the PXIe chassis. Use this document to guide your selection of remote controller PCs. For general controller requirements, such as RAM and hard disk requirements, see the *Host Controller Hardware and Software Requirements* section in the *PXIe Chassis User Guide*.

To connect a remote host PC to the chassis, perform the following installation procedure below. When handling PC adapter cards and chassis modules, follow the static-safe procedures described in "Static-safe Handling Procedures" on page 20 of this guide.

1 Install a PCIe Host Adapter in the Host PC. Keysight offers the M9048B (x8) and M9049A (x16) PCIe host adapters for desktop and rack-mounted PCs. To install an adapter in your remote controller PC, follow the instructions provided with your adapter.

2 Install a system module, such as the Keysight M9022A, M9023A, M9024A, or M9025A PXIe System Module, in the chassis system controller slot.

CAUTION	Before installing a system module in the chassis, turn the chassis off. Do not unplug it from AC power.

CAUTION	Do not touch exposed connectors or components on the printed circuit board as you install the module.
	- Modules are usually shipped with thread protectors on the mounting screw threads. These protectors must be removed before installing modules in the chassis.
	- Take care to ensure that the module is aligned perpendicularly to the chassis as you begin sliding it in. Otherwise, it is possible for components on the module (or on adjacent modules) to be damaged by contact between modules.

WARNING   **Inserting modules into the chassis when it is in a vertical position increases the possibility of bending pins on the backplane and permanently damaging the chassis. It is recommended that you insert modules only with the chassis in a horizontal position, such as in a rack or on a bench. Once the modules are inserted and secured, the chassis may be used in a vertical position. However, before moving the chassis to the vertical position, install all the blanking plates to prevent debris falling onto the chassis and getting lodged in the backplane connectors.**

a Turn the chassis off. Ensure the AC power cord is connected, it provides the grounding to prevent ESD.

NOTE   Before inserting the module, inspect the chassis slot connectors to ensure there are no bent pins in the connectors.

b Remove the filler panel in slot 1. Because the PXIe System Module consumes one slot, the expansion slot must be covered with the three-wide filler panel to maintain proper airflow and RFI shielding.

c Insert the module in the chassis slot by placing the module card edges into the top and bottom module guides.

d With the injector/ejector handle in the down position, carefully slide the module to the rear of the chassis. When you begin to feel resistance from the backplane connectors, lift up on the injector/ejector handle to complete insertion of the module.
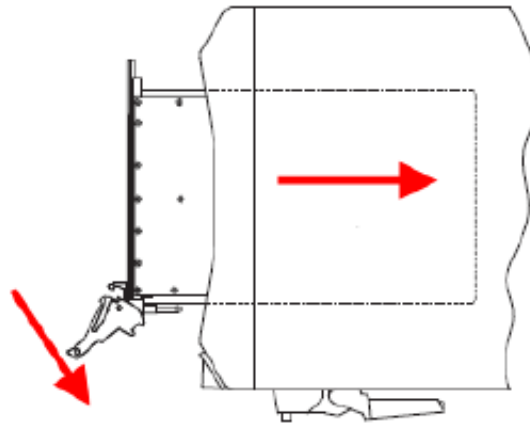
Figure 13   Inserting Module into the Chassis

    e Secure the module front panel to the chassis using the captive front panel mounting screws. Tighten the screws for both mechanical security and to ensure proper grounding of the front panel.

> **NOTE** Ensure that all empty chassis slots are covered by filler panels or air inlet modules.

    f Power up the chassis. Verify that the chassis fans are operating and free of obstructions that may restrict airflow.

3 Connect the appropriate PCIe cable between the remote controller PCIe host adapter and the chassis PXIe System Module.

> **NOTE** All PCIe cable connector components, M9022A, M9023A, M9024A, M9025A, M9048B, or M9049A modules, are limited to 250 mating cycles. Beyond this, signal integrity will be impaired. Therefore, the chassis and its accessories should not be used in applications where the number of connector mating cycles will exceed 250 cycles.

4 Install the driver software for the PXIe System Module (required for the Keysight M9022A, M9023A, M9024A, or M9025A PXIe System Modules).

5 Install the PXIe Chassis Family Driver software. See "Install the PXIe Chassis Family Driver" on page 31.

NOTE   The latest driver software for the system modules and the chassis is available on-line. go to:
www.keysight.com/find/<model number>

Installing an Embedded Controller in the Chassis

An embedded controller, such as the Keysight M9038A Embedded Controller, is a small form factor, Windows-based PC that is designed to be installed in the system controller slot of the chassis (slot 1). An embedded controller also occupies the expansion slots to the left of slot 1; the expansion slots do not contain chassis backplane connectors.

CAUTION   Before installing an embedded controller, turn the chassis off. Do not unplug it from AC power.

To install an embedded controller in the chassis, remove the filler panel in slot 1 and the three-wide filler panel to the left of slot 1. Any empty expansion slots to the left of the controller must be covered with a filler panel to maintain proper airflow and RFI shielding.

CAUTION   To avoid damaging the embedded controller during installation, do not touch exposed connector pins or components on the printed circuit boards.

Once the embedded controller is installed in the chassis, connect a monitor and a USB keyboard and mouse. Alternatively, you can interface to the controller through its network port using software such as Microsoft Remote Desktop Connection.

Install Keysight IO Libraries Suite (Remote Host PC)

IO Libraries Suite is a collection of libraries and utilities that enable you to connect your chassis to the host controller and run programs on the host controller that interact with the chassis and modules. The IO Libraries Suite is used with all Keysight instruments, and is not specific to the PXIe chassis.

Download the latest version from: www.keysight.com/find/iosuite.

Always install IO Libraries Suite before installing any instrument driver software.Use the latest version of the IO Libraries Suite.

NOTE Only one installation of the Keysight IO Libraries Suite is required on the host controller PC. This installation is used by both the PXIe Chassis drivers that are installed in the next section and the drivers associated with each module that you install in the chassis.

Two libraries, IVI Shared Components and VISA Shared Components, are required by the IO Libraries Suite. If these libraries are not already installed on your controller, the IO Libraries Suite installer will install them. If IVI Shared Components and VISA Shared Components are already installed, the IO Libraries Suite installer will upgrade these libraries to the latest version, if necessary, using the same installation location used by the previous version.

At the time of shipment, the latest version of IO Libraries Suite was installed on your Keysight Embedded PC.

Install the PXIe Chassis Family Driver

The PXIe Chassis Family Driver consists of the chassis Soft Front Panel (SFP) and the IVI.NET, IVI-C, LabVIEW, and MATLAB drivers for the PXIe chassis. The KtMTrig IVI-C and IVI.NET drivers are installed as part of the PXIe Chassis Family Driver. These drivers each provide an API (application programming interface) that may be used to develop programs that interface to the chassis.

To install the latest version of PXIe Chassis Family Driver, perform the following steps:

NOTE Prior to installing the PXIe Chassis Family Driver, you should close all application programs that might interfere with the driver installation.

1 Browse to any one of the chassis web pages (the PXIe Chassis Family Driver is the same for the four chassis):

www.keysight.com/find/M9010A

www.keysight.com/find/M9019A

www.keysight.com/find/M9046A.

2 Click **Visit Technical Support**.

3 Click the **Drivers, Firmware & Software** tab.

4 Select **Keysight PXIe Chassis Software**.

5 Click the **Download** button.

6 Select the appropriate executable file.

7 Choose **Run**.

NOTE	Do not uninstall the **KtMPxiChassis IVI.NET Driver 1.x.xxx**, **KtMPxiChassis IVI-C Driver 1.x.xxx**, **KtMTrig IVI.NET Driver 1.x.xxx**, or **KtMTrig IVI-C Driver 1.x.xxx** files without also uninstalling the Keysight PXIe Chassis Family Driver.

Step 3: Turn On Chassis and Verify Operation

NOTE

Do not install modules in the peripheral slots yet—this is done in STEP 4. The only module that should be installed in the chassis at this time is either an embedded controller or a PXIe System Module in slot 1 as described in Step 2.

This guide assumes that chassis preparation, turn-on and verification are performed on the bench prior to installing the chassis in a rack. If you prefer to install the chassis in a rack first, see the Keysight PXIe Chassis Family Startup Guide for rack mounting information.

CAUTION

The Keysight Chassis Family has auto-ranging power supplies, meaning that the chassis does not have a voltage selector switch. Ensure that the AC supply line voltage for M9046A is within the range of 100/120 VAC or 50/60/400 Hz, or 220/240 VAC, and 50/60 Hz frequency. Since 400 Hz frequency is not supported for M9019A/M9010A, ensure that AC supply line voltage is within the range of 100/120 VAC, or 220/240 VAC, and 50/60 Hz frequency for M9019A/M9010A.

WARNING

This product must be used in a normal condition (all means for protection are intact).

NOTE

When you press the chassis power-on button, if the chassis does not power up and the front panel LEDs do not light, it is possible for the chassis to be in a safety shutdown state. Remove the chassis AC power cord from the chassis for one minute. Reconnect the power cord and turn on the chassis again.

Chassis Power Sequencing

The following chassis power sequencing description assumes an external, remoter host PC is connected to the chassis. An embedded PC handles the power sequencing automatically.

When powering up the system, the chassis must be powered up first. After powering up the chassis, you should wait at least three seconds before turning on the PC. The chassis front panel temperature LED, which is on for three seconds after the chassis is powered up, provides a convenient way to measure this delay, as shown below.
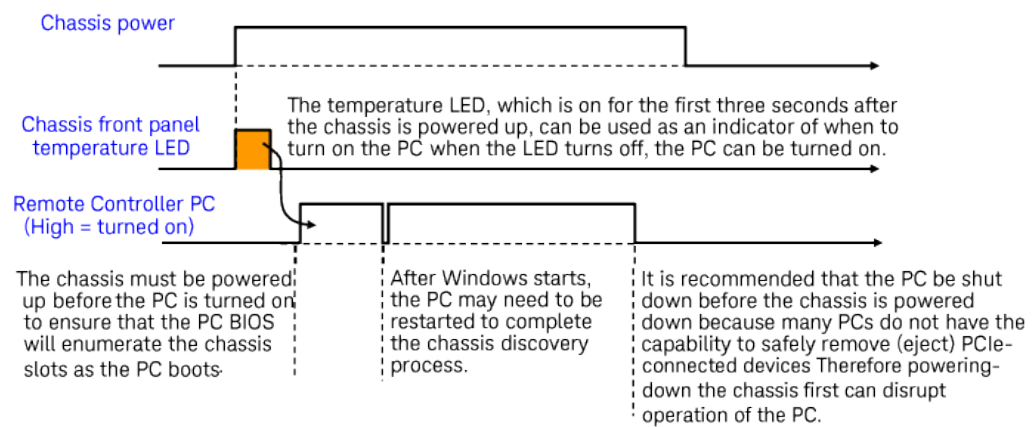
Figure 14   PXIe Chassis Power-on Sequence

The PC should be shut down before the chassis is powered down. This will prevent the chassis, as it is being powered down, from disrupting operation of the PC.

In brief, the PC should be off whenever the chassis is powered up or down. Because chassis modules are not hot-swappable, chassis modules should only be added or removed when the chassis is powered down.

The above power sequence does not apply to an embedded controller installed in the chassis because the embedded controller and chassis are powered together.

Methods of powering up the chassis

The method of powering up the chassis depends on the position of the INHIBIT rear panel switch, which can be set to the DEF (default) position or to the MAN (manual) position. These two methods are shown on the interactive block diagram and work as follows:

- **INHIBIT switch in the DEF position** — In this position, the front panel power push button is used to switch the chassis between ON and Standby—hence, this push button is known as the ON/Standby push button. Using this push button requires that a module is installed in the system controller slot (slot 1). This can be a module such as the Keysight M9022A, M9023A, M9024A, M9025A PXIe System Module or an embedded controller.

- **INHIBIT switch in the MAN position** — In this position, the Inhibit signal on the rear panel DB-9 connector controls chassis power. The chassis is powered up by applying a logic high signal to the Inhibit signal. When the Inhibit signal is low, the chassis is in Standby (off except for 5Vaux, an auxiliary power supply).

Keysight recommends leaving the INHIBIT switch in the DEF position when connecting the AC power cord to the chassis. After inserting the power AC power cord, if using the INHIBIT signal to power on the chassis, then move the INHIBIT switch to the MAN position.

Use of the ON/Standby push button to power up the chassis is assumed unless otherwise noted.

For information on using the Inhibit signal on the rear panel DB-9 connector to power the chassis up and down, see the *Keysight PXIe Chassis User Guide*.

Chassis Front Panel LEDs

The chassis contains three LEDs on its front panel to the left of the ON/Standby (power) push button, as shown in the following figure.
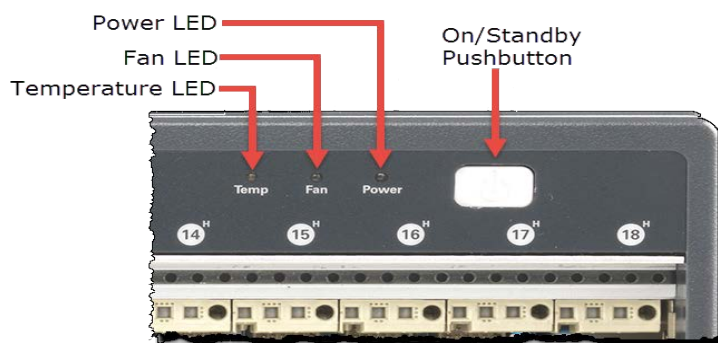
Figure 15   Chassis Front Panel LEDs

The front panel LEDs, depending on whether they are off, on continuously, or flashing, provide important information on the status of the chassis, and should be monitored regularly. The following table lists each LED and describes the information it provides.

Table 2 Chassis LEDs

LED(color)	Off	On Continuously	Flashing	All three LEDs flash
Temp LED (amber)	This LED is off if the chassis temperatures are OK. To allow you to validate that this LED is working, the LED is turned on for the first three seconds after the chassis is powered up.	This LED is never on continuously.	Indicates one or more temperature sensors is reporting a temperature above the limit, either the 70°C default limit or the user set limit. The limit, if changed, is reset back to 70°C at the next chassis power cycle. If the temperature condition causing the flashing to occur is no longer present, the Temperature LED will turn off, indicating that the chassis temperatures are OK.	All three LEDs on for 10 seconds and off for 1 second indicates that the Monitor Processor, which controls flashing of the LEDs, has been unable to communicate with the Chassis Manager. Refer to the *PXIe Chassis User Guide* for troubleshooting information. The Soft Front Panel **Identify On** feature allows you to identify which chassis is connected to the SFP application. For example, if you have multiple M9019A chassis in a system with an SFP application running for each chassis, you can easily identify with chassis is connected to the application. When you click the **Identify On** check box, all three front panel LEDs (Fan, Temp, and Power) blink at a 7 to 10 second rate (50% duty cycle).
Fan LED (green)	Indicates that the chassis is turned off. See the *Keysight PXIe Chassis Family Service Guide* for details.	Indicates all fans are operating above the minimum limit RPM. The default minimum limit for the M9010A is 900 RPM and for the M9019A is 1200 RPM. The fan speed minimum limit can be changed in the SFP or by a program. The limit, if changed, is reset back to default minimum limit RPM at the next chassis power cycle.	Indicates that one or more of the fans are operating below the minimum limit, either the default limit or, if changed, the user set limit. If the fan speed condition causing the flashing to occur is no longer present, the Fan LED will return to on continuously.	
Power LED (blue)	Indicates that the chassis is turned off. If you attempt to turn the chassis on but the Power LED remains off, this can indicate several possible problems See the *Keysight PXIe Chassis User Guide* for details.	Indicates all supply voltages are within their limits. Factory default limits are ±10% for 3.3V and ±5% for the other power supply voltages. The limits can be changed in the SFP or by a program. The limits, if changed, are reset to factory default at the next chassis power cycle.	Indicates that one or more of the four supply voltages are outside of their limits, either the factory default limits or, if changed, the user-set limits. Refer to the *Keysight PXIe Chassis User Guide* for troubleshooting suggestions. If the power supply condition causing the flashing to occur is no longer present, the Power LED returns to continuously on state. M9010A will shut down and continually flash 3 times, if the AC input current exceeded 8.5 Amps	

The M9010A has a protective algorithm to monitor the AC input current and if the AC input current goes above 8.5A, it will automatically power-off. When automatically powered-off, the chassis will continually blink the blue power LED 3 times.

Flashing LEDs should be tended to promptly. See the *Keysight PXIe Chassis User Guide* for further information.

The chassis does not intentionally modify its operation because of conditions that cause one or more LEDs to flash. In other words, if possible, the chassis attempts to continue normal operation despite flashing LED(s). However, a flashing LED may indicate a condition that will prevent the chassis from operating correctly. For example, a flashing Fan LED indicates that one or more rear panel fans are under speed, which may cause the temperature of the chassis to rise and exceed specifications. This, in turn, may cause a thermal shutdown of the power supply.

Using Keysight Connection Expert

Use Connection Expert (one of the utilities in the Keysight IO Libraries Suite) to confirm that the host controller can connect to the chassis.
1   Start Connection Expert on the host controller.
2   Click the PXI/AXIe Chassis tab.
3   Click the Chassis Content tab.
The list of connected chassis appears on the right hand pane as shown in the following image. When you click on the chassis, the contents of each slot in the PXIe chassis are displayed in the right pane.
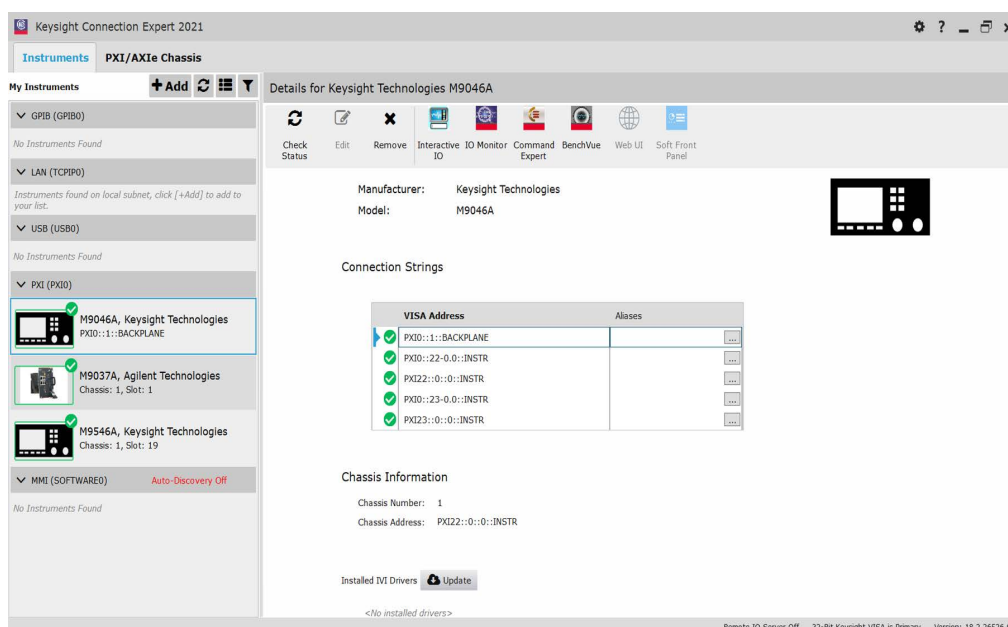
Figure 16   Connection Expert Instrument Tab shows the chassis contents

If Connection Expert successfully displays the chassis slots, continue to the next section, and verify that the Soft Front Panel can interact with the chassis. If Connection Expert fails to display the chassis slots, see the *Keysight PXIe Chassis User Guide* for troubleshooting suggestions.

PC Startup Requirements for Keysight IO Libraries Suite

This section describes the PC startup events for Keysight Connection Expert (one of the utilities in the Keysight IO Libraries Suite). Keysight recommends using the latest version Keysight IO Libraries Suit.

Two situations exist where Connection Expert, which is part of Keysight IO Libraries Suite, will not display a PCIe device, either the chassis or a module in the chassis.

- If Windows cannot find a driver for a device, Windows will not be able to identify the device and therefore Connection Expert will not be able to display it. If this occurs, you will typically be presented with the Windows New Hardware Found Wizard, which will give you the opportunity to assist Windows in finding a driver. If a driver is found, restart the PC and verify that Windows identifies the device (which will be evident by the lack of the New Hardware Found Wizard for that device).

- The other situation where Connection Expert will not display a PCIe device is in the event that, when Connection Expert is started, Windows has not yet completed assigning drivers to the devices (the chassis or modules in the chassis) found during enumeration. Connection Expert will not display modules that it cannot identify. In this situation, however, the driver exists but it has not yet been assigned to the device by the time Connection Expert is started.

This second situation should be very rare. If it occurs, it generally occurs with slower PCs. For the first-ever connection of the chassis to the PC, or after changing the chassis configuration, only a single boot of the PC is needed. However, sufficient time needs to be allowed between when Windows is up and when Keysight Connection is started.

If the New Hardware Found Wizard is displayed, follow the steps in the Using Connection Expert to connect to the chassis to associate a driver with the device. If Connection Expert, does not display a particular device, click the Rescan icon to see if Windows has now assigned a driver to the device, which will allow Connection Expert to display the device.

In general, if it ever appears that your chassis configuration as displayed by Connection Expert differs from your actual configuration, click the Rescan icon. This should align the displayed configuration to the actual configuration.

NOTE It is always advisable to boot the PC a second time to ensure that the PC properly enumerates all of the modules within the chassis.

Using the Soft Front Panel (SFP) to Monitor the Chassis

PXIe chassis Soft Front Panel (SFP) can be used both to monitor the status of the chassis as well as configure various chassis parameters, such as the maximum temperature threshold for the temperature alarm. This section describes how to use the SFP to monitor the status of the chassis; configuring chassis parameters is described in the *Keysight PXIe Chassis User Guide*.

Starting the SFP and Selecting Hardware Mode or Simulation Mode

The SFP runs in two modes, Hardware Mode or Simulation Mode. In hardware mode, the SFP interacts with the chassis itself. The SFP displays chassis information and allow you to set chassis parameters such as temperature thresholds and voltage alarms.

In Simulation Mode, the SFP simulates chassis operation and does not communicate with the chassis. Simulation mode is useful to learn the capabilities of the SFP and the chassis. In Simulation Mode, the alarms are not active. Independent of whether you plan to run the SFP in Hardware Mode or Simulation Mode, the SFP is started from the Start menu as follows:

**Start > All Programs > Keysight > PXIe Chassis Family > PXIe Chassis SFP**

Simulation Mode   If no chassis has been detected by Connection Expert, the SFP startup dialog appears as shown in the following image. The absence of a chassis listed under Modules indicates that no chassis has been detected; therefore, the SFP can only be run in simulation mode.
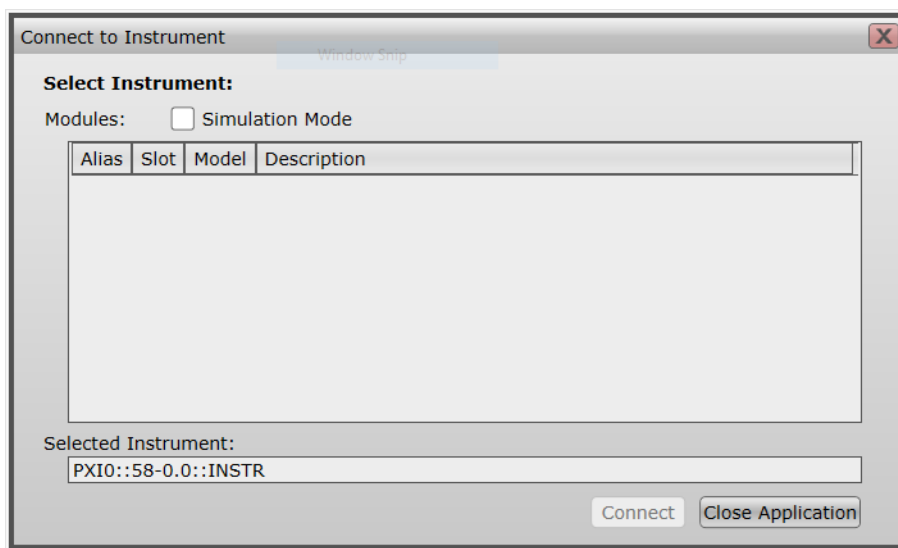
Figure 17   SFP startup dialog when no chassis is detected

To run in Simulation Mode, select the Simulation Mode check box in the above image. Select a chassis then click Connect to start the SFP in simulation mode.

Hardware Mode   If one or chassis were detected, the chassis number and address are listed as shown in the following image.
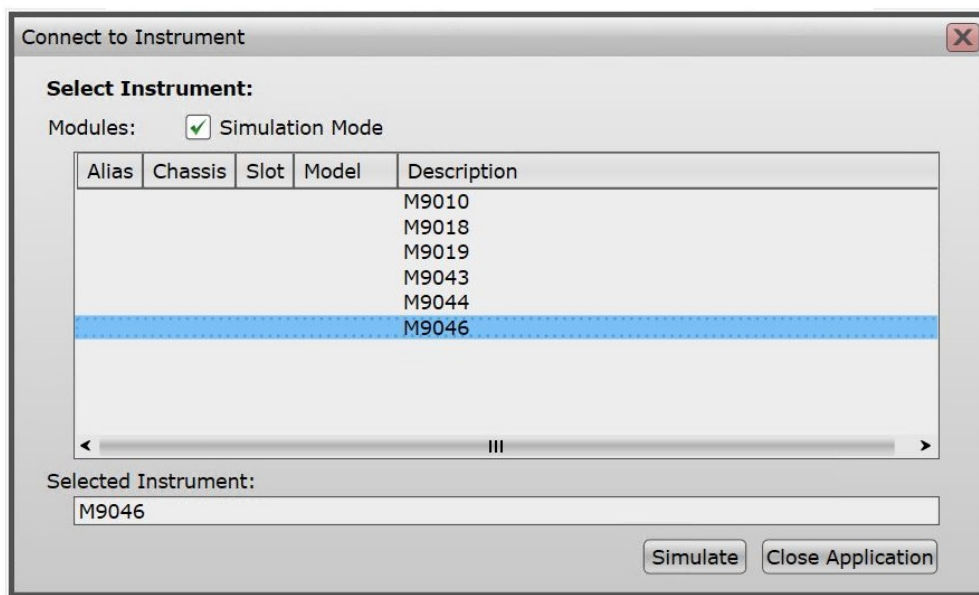
Figure 18   SFP Startup Dialog when Multiple Chassis are Detected

Click the chassis row to select the chassis, which will display the chassis address in the Selected Instrument field. Click **Connect** to start the SFP in Hardware Mode.

Note that multiple instance of the SFP can be run at one time on the host controller PC.

Using the SFP to Monitor the Chassis

This section describes how to use the SFP to monitor the chassis in Hardware Mode.

> **NOTE**   To prevent inadvertently changing parameters such as the chassis temperature alarm, the SFP includes an Allow Control check box that is unchecked by default. The unchecked box prevents any configuration change from being made. In the Keysight PXIe Chassis User Guide, which describes how to use the SFP to configure the chassis, this check box will be checked.
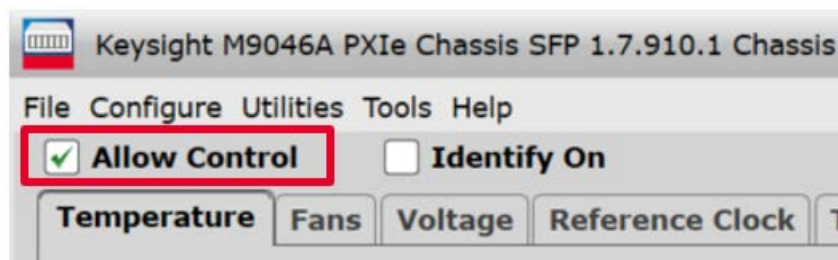
Figure 19   SFP with Allow Control Check Box

The image below shows the SFP screen. This screen has six tabs:
- Temperature
- Fan speed
- Voltage
- Reference clock
- Trigger Ports
- PCIe link

These tabs display the speed of the fans, the temperatures reported by the backplane temperature sensors, and the four main power supply voltages respectively. This screen also displays the source of the 10 MHz reference clock and the current PCIe link configuration. For more information, see the Keysight PXIe Chassis User Guide.
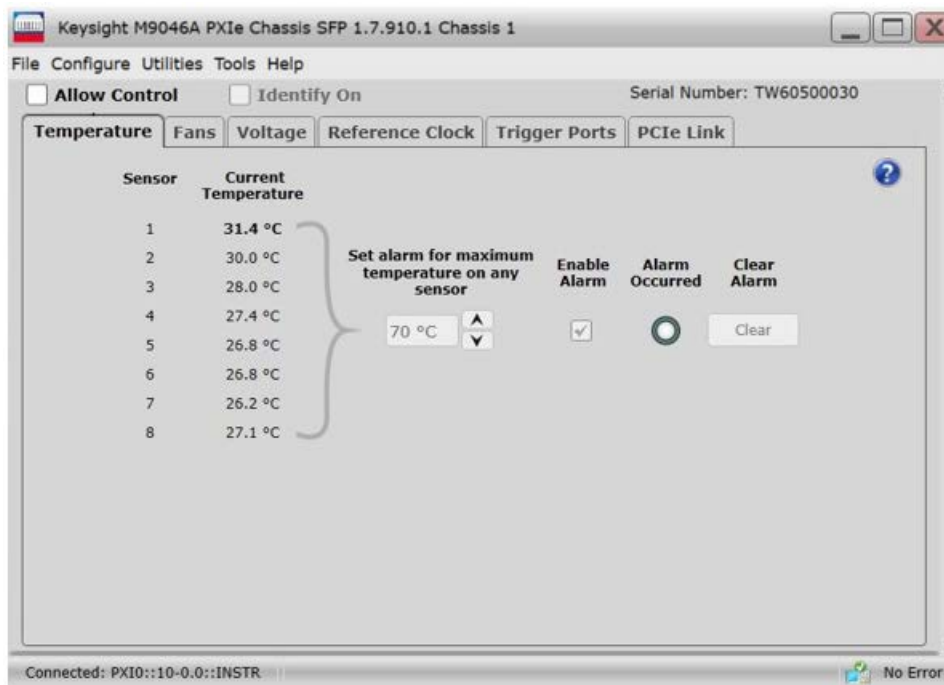
Figure 20   The Temperature Screen of the PXIe Chassis Soft Front Panel

As you can see, the Alarm Occurred indicator on the right side of the screen. This alarm is enabled by default and operate as described in the following table. If the chassis is operating normally and is using the default alarm thresholds, none of the alarms should be set. For information on configuring these alarms to other than their default thresholds, see the *Keysight PXIe Chassis User Guide* or the *PXIe Chassis Soft Front Panel Help* file.

NOTE	On the M9010A, if you use a Reference Clock signal with an amplitude of < 500mVpp, the Reference Clock alarm may repeatedly trigger even after clearing it. The chassis PLL may be locked to the Reference Clock signal but the signal may have excessive jitter. If this situation occurs, you need to increase the clock signal amplitude.

Table 3   Chassis Alarms in the Soft Front Panel

Tab	Alarm	Description
Temperature tab	Temperature alarm	The temperature alarm is illuminated if the temperature reported by any of the temperature sensors is above 70 °C. The alarm is latched and will persist even if all temperature sensors subsequently report temperatures below 70 °C. The temperature alarm can be cleared using its **Clear** button; however, if any of the temperature sensors are still reporting a temperature above 70 °C when the **Clear** button is clicked, the temperature alarm will remain illuminated.
Fan tab	Fan speed alarm	The fan speed alarm is illuminated if the speed of any of the fans drops below minimum limit RPM. The alarm is latched and will persist even if all fans resume operation above minimum limit RPM. The fan speed alarm can be cleared using its **Clear** button; however, if any of the three fans are still operating below the minimum limit RPM when the Clear button is clicked, the fan speed alarm will remain illuminated.
Voltage tab	3.3V alarm 5V alarm +12V alarm -12V alarm +5.0V_STANDBY	For 3.3V alarm, the factory default limits are plus and minus 10% around the nominal values. Each of the other four voltage alarms has upper and lower voltage limits of 5% about the nominal voltage. For example, the 12V alarm has an upper voltage limit of 12.6V and a lower voltage limit of 11.4V. M9046A does not have -12V and +5.0V_STANDBY alarms. A particular voltage alarm is illuminated if that voltage falls outside of the range specified by the upper and lower voltage limits. The alarm signal is latched and will persist even if the voltage subsequently returns to within the specified range. The voltage alarm can be cleared using the Clear button; however, if the voltage is still outside of the specified range when the Clear button is clicked, the voltage alarm will remain illuminated.

Reference Clock tab	10 MHz reference clock source changed	This alarm is illuminated if the 10 MHz reference clock source changes. The chassis reference clock can originate in three different places:
		    - Internal: Electronics within the chassis source the clock.
		    - External: The clock arrives from outside the chassis at the rear panel.
		    - System Time Slot: The reference clock is sourced by a timing module within the chassis.
		The Alarm indicator on this screen indicates whether or not a change in clock source has occurred since the last time the chassis was booted up, or the alarm condition was cleared.
		This alarm, like the other alarms, is latched and can be cleared using its **Clear** button.

Trigger Ports tab	none	Allows you to configure the two front panel trigger post (TRIG 1 and TRIG 2) as either Input (default) or Output ports and connect it to one PXI backplane trigger Line (PXI_TRIG[0:7])
PCIe Link tab	none	The PCIe link configuration information can be viewed from the Monitor tab of the SFP.

Step 4: Overview of Installing and Verifying PXI/PXIe Modules

Installing Modules

a Turn the chassis off. Ensure the AC power cord is connected, it provides the grounding to prevent ESD.

NOTE	Before inserting the module, inspect the chassis slot to ensure there are no bent pins on the slot connectors.

b Remove the filler panel(s) from the desired slot(s).

| CAUTION	Do not touch exposed connectors or components on the printed circuit board as you install the module.

- Modules are usually shipped with thread protectors on the mounting screw threads. These protectors must be removed before installing modules in the chassis.

- Take care to ensure that the module is aligned perpendicularly to the chassis as you begin sliding it in. Otherwise, it is possible for components on the module (or on adjacent modules) to be damaged by contact between modules.

- inserting and removing modules with the chassis powered up. Before installing modules in the chassis, power down the chassis but leave the power cord connected to the AC mains because it serves as a ground and helps protect the chassis and modules from electrostatic damage.

c Insert the module in the chassis slot by placing the module card edges into the top and bottom module guides.

WARNING **Inserting modules into the chassis when it is in a vertical position increases the possibility of bending pins on the backplane and permanently damaging the chassis. It is recommended that you insert modules only with the chassis in a horizontal position, such as in a rack or on a bench. Once the modules are inserted and secured, the chassis may be used in a vertical position. However, before moving the chassis to the vertical position, install all the blanking plates to prevent debris falling onto the chassis and getting lodged in the backplane connectors.**

d With the injector/ejector handle in the down position, carefully slide the module to the rear of the chassis. When you begin to feel resistance from the backplane connectors, lift up on the injector/ejector handle to complete insertion of the module.
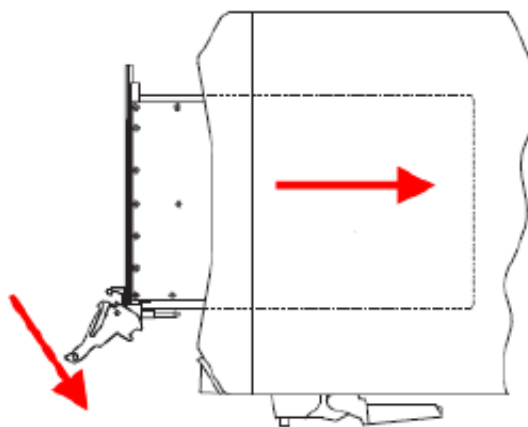
Figure 21   Inserting Module into the Chassis

e Secure the module front panel to the chassis using the captive front panel mounting screws. Tighten the screws for both mechanical security and to ensure proper grounding of the front panel.

NOTE Ensure that all empty chassis slots are covered by filler panels or air inlet modules.

f Power up the chassis. Verify that the chassis fans are operating and free of obstructions that may restrict airflow.

Installing the Module Software

Following the driver installation instructions, install the driver for each of the PXI/PXIe modules that have been installed in the chassis. Always check with the manufacturer to insure the driver is of the latest available version.

> **NOTE**
>
> **The PXIe chassis drivers that you installed in the** "Install the PXIe Chassis Family Driver" **on page 31 section are completely separate from the module driver software. The chassis drivers permit interfacing to chassis functionality such as temperature sensors and fan speeds, while the module driver software is required to interface to your particular module.**

The documentation for your Keysight module should indicate that Keysight IO Library Suite should be installed. Only one installation of IO Library Suite is required on the host controller PC. If you did not install IO Libraries Suite earlier, it must be installed before you install your module-specific software.

After ensuring that IO Libraries Suite is installed, follow the instructions provided with your module to install its driver and software.

Verifying your Module

Follow the instructions provided with your module to verify its operation. Module verification typically includes the following steps:

- Verify that your module is displayed within the chassis in Keysight Connection Expert as described in "Using Keysight Connection Expert" on page 37, and as described in your module documentation.

- Bring up the Soft Front Panel (SFP) for your module, if available, and verify that the SFP can interface correctly to the module.

> **NOTE**
>
> **If the module driver is installed, the module will be correctly identified in Windows Device Manager.**

Related Documentation

The documentation listed below can be found on the product web pages listed below.

- Keysight PXIe Chassis Startup Guide
- Keysight PXIe Chassis User Guide
- Keysight PXIe Chassis Specification Guide
- Keysight PXIe Chassis Security Guide
- Keysight PXIe Chassis Data Sheets

For the latest versions of the above documents, visit the individual chassis websites:

www.keysight.com/find/M9010A

www.keysight.com/find/M9019A

www.keysight.com/find/M9046A

The following documents are also available on the product website:

- Keysight M9022A, M9023A, M9024A, M9025A PXIe System Module Data Sheet
- Tested PC and PXI/AXIe Chassis Configurations— This document lists the PCs that have been verified to work with the chassis. See http://www.keysight.com/find/PXIAXIeTestedPC
- PXIe Chassis Interactive Block Diagram (see http://www.keysight.com/find/pxi-blockdiagram)
- PXIe/AXIe Multi-Chassis Designer (see http://www.keysight.com/find/pxie-multichassis)
- Diagnose and Resolve PXIe and AXIe Chassis Communication Problems - This document provides diagnostic procedures on chassis communication issues. See www.keysight.com/find/ResolvePXIAXIeComProblems

Product specifications, available accessories, firmware and software may change over time. Check the individual chassis web pages for the most current documentation.

Chassis Related Products and Accessories

The following table lists products related to the PXIe family of chassis and chassis accessories. Information on these parts can be found by starting at www.keysight.com/find/pxi-chassis.

Table 4   Chassis Related Products

	Keysight Model Number	Description
Related Products	M9035A	PXIe Embedded Controller: Intel i3, 16 GB RAM, 256 GB SSD
	M9038A	PXIe High Performance Embedded Controller: Intel i7, 32 GB RAM, 512 NVMe M.2 SSD
	M9048B	PCIe Host Adapter: single port (x8), Gen 3
	M9049A	PCIe Host Adapter: dual port (x16), Gen 3
	M9022A	PXIe System Module: single port (x8), Gen 3
	M9023A	PXIe high performance System Module: dual port (x16) Gen 3
	M9024A	PXIe high performance System Module with connectivity expansion: two gigabit LAN, two USB 3.0, four USB 2.0, GPIB
	M9025A	Dual Port Thunderbolt PXIe System Module: up to 40Gbps

Table 4   Chassis Accessories

	Keysight Model Number	Description
Accessories	Y1213A	PXI EMI Filler Panel Kit: 5 single-slot panels
	Y1214B	Air Inlet Module Kit (not for use with M9010A 10-Slot chassis and M9046A 18-Slot chassis)
	Y1215C	Flush mount rack kit (M9018B, M9019A)
	Y1216B	Recess mount rack kit (M9018B, M9019A)
	Y1217A	Rack mount rail kit (M9010A, M9018B, M9019A)
	Y1257A	M9046A rack mount kit with rails (M9046A)
	Y1258A	M9046A recess rack mount kit with rails (M9046A)
	Y1259A	M9046A advanced cooling spacer kit (M9046A)
	Y1218A	Cable tray kit
	Y1270A	Front panel interfacing kit for 18-slot PXIe chassis
	Y1271A	Rack mount kit for M9010A chassis
	Y1275A	Slot Blockers kit

NOTE

Proper Ergonomics should be considered when using accessories such as a keyboard or a mouse.

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