Keysight M9502A 2-Slot and M9505A 5-Slot AXIe Chassis
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

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.

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.

Do Not Operate in an Explosive Atmosphere

Do not operate the module/chassis 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. 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 an AXIe 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.
Safety Symbols

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

Products display the following symbols:

- Warning, risk of electric shock
- Refer to manual for additional safety information.
- Earth Ground.
- Chassis Ground.
- Alternating Current (AC).
- Standby Power. Unit is not completely disconnected from AC mains when switch is in standby.
- Antistatic precautions should be taken.
- CAT I
- CAT II
- CAT III
- CAT IV

For localized Safety Warnings, Refer to Keysight Safety document (p/n 9320-6792).

---

The CSA mark is a registered trademark of the Canadian Standards Association and indicates compliance to the standards laid out by them. Refer to the product Declaration of Conformity for details.

**CE**

The Regulatory Compliance Mark (RCM) mark is a registered trademark. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.

ICES/NMB-001
ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001.

This symbol represents 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 this product.

This product complies with the WEEE Directive (2002/96/EC) marking requirement. The affixed product label (see below) indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category: With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a “Monitoring and Control instrumentation” product. Do not dispose in domestic household waste.

To return unwanted products, contact your local Keysight office for more information.
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M9502A and M9505A AXIe Chassis
Startup Guide

Introduction

The Keysight M9502A (2-slot) and M9505A (5-slot) AXIe chassis are modular instrument chassis fully compatible with the AXIe 1.0 specification. They allow multiple application-specific instrument modules to share a common chassis frame, power supply, cooling system, PCI Express (PCIe) Gen 2 data bus, Gigabit LAN hub, local bus for module-to-module signaling, and host PC connections. Multiple chassis may be interconnected for scalability, a feature Keysight calls MultiFrame. The full rack chassis provides two or five general purpose peripheral slots that accept 1U AXIe instrument modules. Each module slot has a Gen 2 x4 link (maximum of 2 GB/s data rate per module) to the chassis primary data ‘fabric’ hub—a x8 PCIe switch and data bus.

Both chassis include a half-height Embedded System Module (ESM), which is a system module which manages chassis functions. The ESM provides all ATCA (Advanced Telecommunications Computing Architecture) shelf manager functions, plus these AXIe extensions:
- provides host PC connectivity (Gen 2 PCIe x8 and/or Ethernet)
- sources timing signals (CLK100, SYNC and FCLK)
- routes STRIG (Star Trigger) to instruments through the backplane
- routes trigger signals through an external parallel trigger bus
- provides backplane PCIe and Ethernet communication between modules

NOTE

This version of the M9505A/M9502A Startup Guide supports and describes features of the chassis firmware revision 1.3.23 (and later). This version of firmware adds features that were not available in previous firmware versions. Refer to the M9502A/M9505A User Guide for detailed information. These features include, but are not limited to:
- Support for E-Keying
- Fan speed adjustable from 35 to 100 (previously it was 8 to 15)
- Ability to force the ESM to PCIe Gen 1 speeds

To identify the chassis firmware revision, see "Launch the Chassis Web Interface from Keysight Connection Expert" on page 26.

To update chassis firmware, refer to the Keysight AXIe chassis web pages:
www.keysight.com/find/M9502A or www.keysight.com/find/M9505A

Other than a Power button and instrument status light, all monitoring, control and communication with the chassis requires a host PC. This can be an embedded PC specifically designed for use in an AXIe chassis (such as the Keysight M9536A) or remote (a rackmount, desktop, or laptop PC).
The shared Gen 2 x8 PCIe interface from the ESM to an external host PC provides up to a 4 GB/s data rate shared among installed modules.

In order for a computer to serve as a host PC, its BIOS must support enumeration of the PCIe slots in the AXIe chassis; many computers are not capable of enumerating a sufficient number of PCIe slots to ensure that slots in an external chassis are enumerated. Keysight maintains a document listing the integrated, rack mount, desktop and laptop computers that have been verified to properly enumerate PCIe devices in the AXIe chassis, at:

For general host PC requirements, such as operating system and RAM requirements, please refer to “System Requirements” on page 21.

For the ESM and for each other installed modules, appropriate control software and instrument drivers must be installed on the host PC.

This Startup Guide provides the basics to get you started with your AXIe chassis, including:

- A high-level overview of the 2-slot and 5-slot AXIe chassis and basic nomenclature
- Unpacking the contents and planning your installation
- Connecting to a host PC
- Loading software
- Verifying basic chassis operation

Detailed instructions for installation, configuration, operation, troubleshooting and service can be found in the M9502A/M9505A AXIe Chassis User Guide, provided in PDF format on the Software and Product Information CD that came with your chassis.

IMPORTANT: The installation and setup information in this manual is generic. Some AXIe modules and systems require a different installation and setup procedure than described in this manual. Refer to the installation documentation supplied with your AXIe module and or system for detailed installation information.

For example, installation of the Keysight IO Libraries (“Step 5: Install IO Libraries Suite and Connect to the Web Interface” in this manual) is not required for all AXIe systems.
Introduction

M9502A 2-Slot AXIe Chassis at a Glance

Designed for portable or small system testing, the M9502A is shipped with bumpers and a carry handle installed for benchtop use (these remove for rack mounting), Slot 1 open and a filler panel module installed in Slot 2. The front panel is shown below:

- **Front Panel**
- **On-Standby button**
- **Slots**
  - The Embedded System Module (ESM) is in the bottom slot; the two full-width slots are for instrument modules.

M9505A 5-Slot AXIe Chassis at a Glance

The M9505A is shipped with bumpers and two carry handles installed for benchtop use (these remove for rack mounting), Slot 1 open and filler panel modules installed in Slots 2 through 5. The front panel is shown below:

- **Front Panel**
- **On-Standby button**
- **Slots**
  - The Embedded System Module (ESM) is in the bottom slot; the other five slots are for instrument modules.

---

Keysight M9502A/M9505A AXIe Chassis Startup Guide 3
AXIe Embedded System Module (ESM)

The ESM is installed in a half-height slot at the base of the chassis. It performs the following functions:
- tracks inserted modules and manages power requirements
- monitors chassis temperature and controls variable-speed chassis fans
- monitors module sensors and reports component failures to a system log
- acts as a Gigabit Ethernet switch; forwards frames along the backplane
- connects an external host PC to the chassis
- synchronizes timing across all modules through the Trigger Bus, using an internal or external clock source

ESM Front Panel

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 PCIe</td>
<td>Connects a remote host PC to the chassis via PCIe. Gen 2 compliant PCIe x8 connector.</td>
</tr>
<tr>
<td>2 MULTIFRAME</td>
<td>Synchronizes timing signals with multiple daisy-chained chassis (either 2-slot or 5-slot). 36-pin mini D connectors use accessory Keysight cables.</td>
</tr>
<tr>
<td>3 INPUT</td>
<td>Gets timing signals from the previous chassis.</td>
</tr>
<tr>
<td>4 OUTPUT</td>
<td>Provides timing signals to the next chassis. If this chassis is at the head of the chain, it becomes the master, using an internal or external clock to send timing signals to other chassis in the chain.</td>
</tr>
<tr>
<td>4 TRIGGER</td>
<td>External trigger connections. SMA connectors with ESD suppression.</td>
</tr>
<tr>
<td>4 IN</td>
<td>Accepts an external trigger. Adjustable threshold input range -5V to +5V, 250 mV minimum swing.</td>
</tr>
<tr>
<td>4 OUT</td>
<td>Extends the parallel trigger bus to external instruments. 3.3V CMOS, 50W line drive, 3-state.</td>
</tr>
<tr>
<td>5 CLOCK</td>
<td>External clock connections. SMA connectors with ESD suppression.</td>
</tr>
<tr>
<td>5 IN</td>
<td>Accepts an externally sourced timing input. Input range -5V to +5V, AC coupled, unterminated, 100 mV minimum swing.</td>
</tr>
<tr>
<td>5 OUT</td>
<td>Extends the internal clock source to external instruments. 3.3V CMOS, 50W line drive, 3-state.</td>
</tr>
<tr>
<td>8 RESET</td>
<td>Reset chassis. Insert a small pin, hold until Status light turns amber, remove pin.</td>
</tr>
<tr>
<td>9 LAN</td>
<td>Connects the host PC to the chassis, RJ45 connector. Tri-rate 10/100/1000 Base-T, auto crossover. Green LINK light and amber ACT light indicate power and port activity. An embedded controller module does not use this port; it communicates with the ESM through the chassis backplane. The LAN port is for communication with the AXIe chassis, not individual modules.</td>
</tr>
<tr>
<td>10 STATUS Light</td>
<td>The status indicator light is a bi-color LED. Green indicates normal operation. Red indicates a power-up error. Both lights on (amber) indicates the chassis is powered on and booting.</td>
</tr>
</tbody>
</table>
Introduction

AXIe Embedded System Module (ESM) Option U20 with USB

The Option U20 ESM provides the same features as the standard ESM and adds a USB 2.0 port*.

**NOTE**

The USB port is supported only for specific Keysight AXIe modules and software. Refer to the documentation for the supported modules and software for USB use and operating instructions.

This USB port provides the following features:

- It enables using the AXIe chassis and the supported USB compatible AXIe modules and software with any host controller that has a USB 2.0 port.

- Either the USB port or the PCIe port may be used -- but not both simultaneously. To change connectivity between USB and PCIe, power down the chassis and host PC. Connect either a USB or PCIe cable, but not both. Power up the system.

- USB provides easy PC connectivity and uses less expensive and longer cables than PCIe. USB is physically hot pluggable, however you must restart the software controlling the module(s) when a USB connectivity change is made. You do not need to reboot the chassis or host PC.

- USB provides control for the chassis and the Keysight Logic Analysis and Protocol Test Modules but not other AXIe modules. USB-compatible and PCIe compatible modules cannot be used at the same time. If you are controlling an AXIe module via USB, you must change cable connections and reboot the host PC before controlling an AXIe module via PCIe.

**STOP!**

**IMPORTANT**: The installation and setup information in this manual is generic.

The USB port is supported only through specific Keysight software applications and modules such as the Keysight logic and protocol analyzer software and modules. These AXIe systems that use the USB port may require a different installation and setup procedure than described in this manual. Refer to the installation documentation supplied with your AXIe module or system for detailed installation information.

**CAUTION**

Some AXIe test system software applications, such as the Keysight logic and protocol analyzer software and modules, sets and uses specific trigger lines in the AXIe chassis. Do not use the AXIe chassis Soft Front Panel (SFP) software or the AXIe chassis web interface to set or reroute any of the AXIe chassis trigger lines. Rerouting any of the trigger lines may cause the application software to not function correctly.

* The USB port requires AXIe chassis firmware 1.3.37 or later. Refer to M9502A/M9505A User Guide.
AXIe Instrument Modules

The chassis slots accept AXIe instrument modules. These may comprise one or more instruments for signal injection, data acquisition, and measurement. They can be installed in any available AXIe slot.

There are two special types of instrument modules which, if used, are most typically installed in slot 1 (consult the module vendor for specific slot placement requirements).

- An instrument hub module — a specialty instrument module which also acts as a hub for a secondary vendor-defined data fabric.
- An embedded controller module — this is a host PC with a form factor and backplane connections specifically designed for an AXIe chassis such as the Keysight M9536A. It uses the chassis backplane for PCIe and LAN connection to the ESM.

The drawing below illustrates the AXIe module’s general layout, backplane connections and chassis fasteners, viewed from the top.

Test connections are made at the module’s front panel. The front panel and backplane connectors will vary depending on the module.
Introduction

AXIe System Block Diagram

A block diagram of a M9505A 5-slot AXIe chassis system is presented on page 7, showing the chassis and the host PC. The key points regarding this diagram are:

- The diagram shows the two host PC interfaces to the chassis: (1) The PCIe interface and (2) the LAN interface. The PCIe interface signals are routed through the chassis PCIe Switch to the slot x4 PCIe signals. The LAN interface signals are routed through the LAN Switch to the slot Gb Ethernet signals. The PCIe interface signals can also be routed to the slot Gb signals (through the network interface card and the LAN Switch). However, the LAN interface signals cannot be routed to the slot x4 PCIe signals.

- The network interface card (NIC) is an Intel 82573L NIC. The PCIe Switch and the NIC provide an x1 path from the chassis PCIe interface to the LAN Switch and, ultimately, the Shelf Manager (described further below).

**NOTE**

If you’re using the PCIe interface to connect to the chassis, the Intel 82573L NIC will appear to Windows as a locally-installed device. While Windows Vista and Windows 7 provide the necessary Intel NIC driver, Windows XP does not natively include the required Intel NIC driver. If you’re using the PCIe interface on Windows XP and you see the Found New Hardware Wizard shown on the block diagram, you’ll need to install the Intel PROWin32.exe network driver as described in “Step 5: Install IO Libraries Suite and Connect to the Web Interface” on page 21 in this guide.

- Either the M9045 PCIe ExpressCard Adapter or the M9048 PCIe Desktop Adapter are installed in the host PC to provide a PCIe interface. The M9045 PCIe Express Card Adapter is used in laptop computers and the M9048 PCIe Desktop Adapter is used in desktop or rack-mount computers. A PCIe cable connects the adapter to the AXIe chassis. For LAN access, a standard Ethernet cable is used to connect between the host PC and the chassis.

- The chassis contains a processor called the Shelf Manager that monitors the status of the chassis sensors and the module sensors over the Intelligent Platform Management Bus (IPMB). The Shelf Manager also controls the fan speeds and provides the chassis Web Interface. The Web Interface allows you to use your browser to monitor the status of the chassis and configure certain aspects of chassis operation, such as the trigger subsystem.

- The chassis supports a soft front panel (SFP). The SFP runs on the host PC and provides the same monitor and control functionality as the Web Interface.

- Keysight provides two host PC drivers for the AXIe chassis:

  1. **AgM950x** — Also known as the sensor driver, this driver interfaces to chassis sensor functionality such as the voltage threshold sensors.

  2. **AgM950xSC** — Also known as the trigger driver, this driver interfaces to chassis functionality such as the trigger subsystem Crosspoint Switch.
The chassis contains firmware that is customer upgradeable. To determine the current version of your chassis firmware and to check if a later version is available, go to the website below for your product, then click the tabs/links indicated:

**M9502A:** www.keysight.com/find/M9502A, then Technical Support > Drivers & Software > Firmware Update

**M9505A:** www.keysight.com/find/M9505A, then Technical Support > Drivers & Software > Firmware Update

The Firmware Update web page also describes how to download and install the chassis firmware.
Connection Expert

Connection Expert will display connection information separately for the chassis and for each module installed in the chassis.

The chassis firmware update process requires that the firmware files be hosted on an FTP server, which is directly. The FTP server can be on a computer.

The slot PCIe interfaces cannot be accessed from the chassis LAN interface.

The slot PCIe interfaces connected, the resource name may appear like:

```
"TCPIP0::192.168.5.2::5025::SOCKET"
```

Where 192.168.5.2 is an example DHCP-assigned IP address. If both LAN and PCIe are connected, the LAN/ISA resource name is used.

A. If the chassis PCIe interface is connected and the chassis LAN interface isn’t connected, the Intel NIC provides a means for the PC to access the LAN Switch – this provides PC access to the Shelf Manager as well as access to the Gb Ethernet connections to each slot.

B. While the Intel NIC allows the host PC to use the PCIe interface to access the LAN Switch (and the devices connected to the LAN Switch), the reverse does not apply – the PC cannot use the LAN interface and the Intel NIC to access the slot PCIe x4 interfaces.

The PCIe Switch internal buffering allows the chassis to communicate to the host PC at 4 GB/s, and simultaneously communicate at 2 GB/s to each of the two x4 module slots. Factoring in certain overheads, nominal data rates of 1.85 GB/s per slot can be achieved.

TCP/IP over PCIe: Communication over PCIe to the Intel NIC (and downstream devices, such as the LAN Switch, Gb slot interfaces, and the Shelf Manager) uses TCP/IP protocol. Therefore, the AXIe chassis, when accessed over PCIe, will be displayed as a LAN device in Connection Expert as shown above. PCIe probing, however, will be disabled on the IPMI and will be able to use the full bandwidth of the PCIe interface.

If you need both LAN and PCIe communications, connect both cables prior to powering-up the chassis.

TCP/IP over PCIe: Communication over PCIe to the Intel NIC (and downstream devices, such as the LAN Switch, Gb slot interfaces, and the Shelf Manager) uses TCP/IP protocol. Therefore, the AXIe chassis, when accessed over PCIe, will be displayed as a LAN device in Connection Expert as shown above. PCIe probing, however, will be disabled on the IPMI and will be able to use the full bandwidth of the PCIe interface.

NOTES:

1. PCIe and LAN connectivity:
   A. If the chassis PCIe interface is connected and the chassis LAN interface isn’t connected, the Intel NIC provides a means for the PC to access the LAN Switch – this provides PC access to the Shelf Manager as well as access to the Gb Ethernet connections to each slot.
   B. While the Intel NIC allows the host PC to use the PCIe interface to access the LAN Switch (and the devices connected to the LAN Switch), the reverse does not apply – the PC cannot use the LAN interface and the Intel NIC to access the slot PCIe x4 interfaces.

2. PCIe Generation ("Gen") peak speeds are:
   x1: 2.5 Gb/s per lane
   x4: 10 Gb/s per lane
   x8: 20 Gb/s per lane

3. The PCIe Switch internal buffering allows the chassis to communicate to the host PC at 4 GB/s, and simultaneously communicate at 2 GB/s to each of the x4 module slots. Factoring in certain overheads, nominal data rates of 1.85 GB/s per slot can be achieved.

IMPORTANT: PCIe is logically an extension of the host PC backplane. If the PCIe interface is used to connect to the chassis, the chassis Intel 82573L NIC will appear to Windows as if it is installed directly in the PC. Windows 7 provides the necessary Intel NIC driver. Windows XP does not natively include the required Intel NIC driver. If you’re using the PCIe interface on Windows XP and if you see the dialog partially shown below you need to install the Intel PROWIN32.exe network driver.

Situations where the above dialog won’t be displayed include:

1. If a Windows XP-based host PC contains Intel-based networking, the required Intel NIC driver will likely already be installed – if so, the above dialog won’t be displayed.

2. If you’re connected to the chassis using only the LAN interface, the NIC will not be visible to the Host Controller PC and the above dialog won’t be displayed.
Performing the Startup Steps

The remainder of this Startup Guide describes how to unpack and inspect the chassis, connect it to a host PC, power-up the chassis and verify basic operation. It is not necessary to install modules or device drivers to do this.

**Exception:** If you decide to use an embedded controller module, such as Keysight’s M9536A, as your Host PC, you will need to install it before proceeding to Step 3. Module installation instructions are in the *User Guide*.

Keysight recommends you follow these steps in preparing and turning on the chassis:

1. Step 1: Unpack and Inspect the Chassis
2. Step 2: Verify Shipment Contents
4. Step 4: Set Up the Host PC
5. Step 5: Install IO Libraries Suite and Connect to the Web Interface
6. Step 6: Install the Chassis Software
7. Step 7: Next Steps

In Step 7, you will download the *M9502A/M9505A AXIe Chassis User Guide*. Continue with the User Guide to complete installation, learn the chassis’s features and operation, and access service information.

**NOTE**

**IMPORTANT:** The installation and setup information in this manual is generic. Some AXIe modules and systems require a different installation and setup procedure than described in this manual. Refer to the installation documentation supplied with your AXIe module and or system for detailed installation information.

For example, installation of the Keysight IO Libraries (“Step 5: Install IO Libraries Suite and Connect to the Web Interface” in this manual) is not required for all AXIe systems.
Step 1: Unpack and Inspect the Chassis

Keysight’s AXIe chassis and instrument modules are shipped in materials which prevent static electricity damage. These instruments 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 installed.

ESD

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe work station. The following figure shows an example of a static-safe work station using two types of ESD protection. Purchase acceptable ESD accessories from your local supplier.

- 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.

Inspect for damage

After unpacking the chassis, carefully inspect it for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by the warranty.

To find warranty information on your M9502A or M9505A AXIe chassis, go to www.keysight.com/find/warranty and enter your model number (M9502A or M9505A) in the Product Number field, and enter the serial number from the chassis rear panel in the Serial No. field.

To avoid damage when handling the AXIe chassis and modules, do not touch exposed connector pins.
If You Should Need to Return the Chassis for Service

Should you need to return the chassis for service, follow these steps:

1. Review the warranty information for your product.

2. Contact Keysight to obtain a Return Material Authorization (RMA) and return address. If you need assistance finding Keysight contact information go to www.keysight.com/find/assist (worldwide contact information for repair and service) or refer to the Support information on the product web page at www.keysight.com/find/axie-chassis.

3. Write the following information on a tag and attach it to the malfunctioning equipment.
   - Name and return address of owner. A Post Office box is not acceptable as a return address.
   - Product model number (for example, M9502A).
   - Product serial number (for example, TWxxxxxxxxxx). The serial number label is located on the chassis back panel. The serial number can also be read via LAN interface, but only after the software is installed.
   - Completely describe the failure and service required. Provide as much detail as possible about your chassis and host PC configuration, the nature of the problem and the conditions under which it occurred.

4. Carefully pack the chassis in its original ESD bag and packing carton. If the original carton is not available, use 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**

If any correspondence is required, refer to the product by serial number and model number.
Step 2: Verify Shipment Contents

Your shipment should include the following:

**Chassis** The Keysight chassis that you ordered. Any AXIe modules you may have ordered from Keysight do not come pre-installed; they will be in separate shipments.

**Chassis Power Cord** For country of destination.

**Startup Guide** This document, *AXIe Chassis*, in print.

**CD #1** *Keysight M9502A and M9505A AXIe Chassis Software and Product Information*. This CD covers both the 2-slot and 5-slot AXIe chassis, and includes:

- **Keysight M9502A/M9505A AXIe Chassis Startup Guide**
  
  This document (printable PDF).

- **Keysight M9502A/M9505A AXIe Chassis User Guide**
  
  A complete guide for chassis installation, configuration, operation, troubleshooting and service (printable PDF).

- **Keysight M9502A/M9505A Data Sheet**
  
  The Data Sheet contains complete physical and electrical specifications for the chassis (printable PDF).

- Chassis device drivers

- Help files for the Keysight M9502A/M9505A IVI-COM/C AgM950x and AgM950xSC device drivers (CHM files)

- Help file for the Keysight M9502A/M9505A LabVIEW G device drivers (CHM file)
  
  The interactive help provides instruction for programming the chassis using National Instruments LabVIEW.

- Chassis soft front panel (SFP) and its help file

**CD #2** *Keysight IO Libraries Suite 16.x, Keysight Automation Ready CD*

This Keysight utility provides for communication with and control of the chassis from a Windows-based host PC.

Product specifications, available accessories, firmware and software may change over time. Please check the Keysight website at [www.keysight.com/find/axie-chassis](http://www.keysight.com/find/axie-chassis) for the latest updates to the product software, guides, data sheet and help files.
Step 3: Power-Up and Power-Down

Circuit Breaker

The chassis circuit breaker is a toggle switch, marked OFF (O) when open and ON (I) when closed:

![Circuit Breaker Open](image1)  ![Circuit Breaker Closed](image2)

ON/STANDBY Switch

The chassis’ button on the front of the chassis is the ON/STANDBY switch, lit when the chassis is ON:

![STANDBY](image3)  ![ON](image4)

Power Modes

The chassis has three power modes:

**OFF**  With the power cord removed or the circuit breaker in the open position, the chassis is OFF.

**STANDBY**  With the power cord connected, the circuit breaker closed, and the front panel switch in the standby (not depressed) position, the chassis is in STANDBY mode. Although no power is supplied to the ESM and installed modules when in Standby, the chassis is energized and consumes power. Fans may operate.

**ON**  With the power cord attached, circuit breaker closed, and the front panel switch in the ON (depressed) position, the chassis is ON. Power is supplied to the ESM and installed modules. Fans will operate as dictated by chassis thermal load.
To Power Up the Chassis

**Plug-In Chassis**  Using the supplied cord, connect the chassis to an appropriate AC power main. Use with a ground-fault circuit interrupter (GFCI) is not recommended.

**Close Circuit Breaker**  Close the rear panel circuit breaker (ON position).

**Press On/Standby Button**  Press the chassis’ ON/STANDBY switch. It should light when depressed.

The STATUS light on the ESM will cycle as follows:

1. Light off - with button in STANDBY mode
2. Amber, steady - after pressing switch, ESM is performing a power-on self-test
3. Green, blinking - for a few seconds after POST
4. Green, steady - successful chassis power-up is complete

If the chassis does not power up to a steady green Status light, or powers up to a steady red light as shown below, the chassis has a failure and requires service.

To Power Down the Chassis

For routine power-down or to cycle power to the chassis, press the chassis ON/STANDBY switch. The main chassis fans will gradually drop in speed to off, and the power supply unit (PSU) fans will gradually return to idle speed as the PSU cools. This is normal.

If you are using an embedded controller such as the Keysight M9536A, always shut down the Windows operating system before pressing the chassis ON/STANDBY switch.

**CAUTION**  For routine power-down, do not use the circuit breaker to turn the chassis off. Doing so interrupts power to the power supply fans, which may shorten the life of the PSU. Use the front panel On/Standby switch to power down the unit, and allow the PSU fans to return to idle before removing power from the chassis.

Once the chassis has cooled, you may isolate the chassis from AC power as needed. This is usually done by opening the circuit breaker.
Step 4: Set Up the Host PC

Communication with the Embedded System Module (ESM) and installed instrument modules requires a host PC, a Windows based computer that may be:

**Embedded (takes up slot one in the chassis).** An AXIe embedded PC (also commonly called an embedded controller module) allows for mainframe portability and stand-alone test system operation. PCIe and LAN connections from PC to ESM are made directly at the chassis backplane.

**NOTE**

If you decide to use an embedded controller module as your host PC, you will need to install at least that module in the chassis before proceeding with this section. See the M9502A/M9505A AXIe Chassis User Guide for complete module installation instructions.

**A separate rack-mounted or desktop PC.** To use the chassis PCIe data transfer capabilities, this host PC must have an available PCIe x8 slot and BIOS support for proper enumeration of devices on the PCIe bus. PCIe connection from host PC to ESM requires a PCIe adapter card and cable. Keysight recommends use of a PC, card and cable tested with the AXIe mainframe; a current list can be found at www.keysight.com/find/axie-chassis.

**A laptop PC.** To use the chassis PCIe data transfer capabilities, this PC must have an ExpressCard slot and support proper enumeration of devices on the PCIe bus. PCIe connection from laptop to ESM requires an ExpressCard PCIe cable adapter and cable. Keysight recommends use of a laptop, card and cable tested with the AXIe mainframe; a current list can be found at www.keysight.com/find/axie-chassis.

**NOTE**

To ensure proper system operation, you should use an approved (embedded, rackmount, desktop or laptop) host computer along with an approved PCIe adapter and cable. While you may use other controllers, the approved computers have verified hardware support for PCIe x8 and their BIOS can properly enumerate multiple instruments on the shared PCIe bus.

Keysight provides a list of tested host PCs at www.keysight.com/find/axie-chassis. For the recommended PCIe host adapter cards and cables, see page 18.

General controller requirements (such as operating system and RAM) are listed in “System Requirements” on page 21.

**CAUTION**

You should not enable the Microsoft Windows sleep or hibernate modes on the host PC. The controller may not have proper chassis enumeration when it wakes up and unpredictable operation may result.
Hardware Connections to the Host PC

**CAUTION**

Except where noted, connections between the host PC and the chassis Embedded System Module (ESM) should be made with both the PC and chassis powered off.

Physical connections to the host PC may include monitor, mouse, and keyboard; LAN and/or PCIe (to the AXIe chassis); and corporate LAN. Make the following connections as needed.

**For Local Control**

If you need local access to the host PC, connect a monitor, mouse, and keyboard.

**For Remote Control**

If you need remote desktop access to the host PC, connect a cable from the PC to your corporate LAN, using Gigabit Ethernet cable.

**From AXIe Chassis to the Host PC**

The connection between the chassis and the host PC may vary depending on whether you’re performing chassis turn-on or using the chassis in production:

- **Turn-on:** Keysight recommends that you make a LAN-only connection to the chassis for initial turn-on — this is the simplest connection and doesn’t require installation of a PCIe adapter card in the host PC. The host PC can either be connected directly to the ESM with a crossover Gigabit Ethernet cable, or can be connected through your network with a straight Ethernet cable.

- **Production:** The production connection between the host PC and the chassis depends on your application. For LAN instrument modules or LXI instrument support, connect the host PC to the ESM directly with a crossover Gigabit Ethernet cable, or through your network with a straight cable.

If you’re using PCIe modules in the chassis, use the chassis PCIe interface. This will require installing a PCIe adapter card in the host PC. As described in section “AXIe System Block Diagram” on page 7, the PCIe interface may be used to access both the slot PCIe interfaces and the slot Gb interfaces. However, the chassis LAN interface cannot access the slot PCIe interfaces.

For PCIe cable recommendations, see “Specific PCIe Adapter and Cable Recommendations” on page 18. The PCIe adapter card will likely require that you load its device driver for your Windows environment, perhaps before installing the adapter card. Follow the adapter vendor’s installation instructions.
As shown on the AXIe system block diagram, an Intel network interface card (NIC) is connected to the PCIe switch in the chassis. The NIC will appear to the PC as if it is installed in the PC itself. Therefore, an Intel network driver must be installed on the PC in order for PCIe interface communications through the NIC to work. This driver is not automatically installed for Windows XP Operating systems. Refer to “Install Intel Network Driver on Windows XP, if Needed” on page 24 for installation information.

The chassis supports hybrid operation with both types of modules (PCIe and LAN) installed in the chassis. If needed or desired for flexibility, make both PCIe and Ethernet connections.

Specific PCIe Adapter and Cable Recommendations

If Using an Embedded Controller This PC (such as the Keysight M9536A) communicates with the ESM through the backplane; external PCIe and Ethernet connections from embedded controller to chassis are not required.

With the Keysight M9536A Embedded Controller installed in the AXIe chassis, the x8 PCIe connection on the ESM module is disabled. However, the PCIe cable detect mechanism may reset the hardware when attaching a PCIe cable. This hardware reset may change the LAN (TCP/IP) address.

If Using a Desktop or Rackmount PC Install a compatible PCIe Cable Adapter in the PC. Connect the adapter to the ESM PCIe port.

The following desktop PCIe adapter card and cable are recommended:

| Keysight M9048 | Keysight Y1202A (2 meters) |
Step 4: Set Up the Host PC

If Using a Laptop PC  Install a compatible PCIe ExpressCard Adapter in the laptop PC. Connect the adapter to the ESM on the AXIe chassis.

The following laptop PCIe adapter card and cable are recommended:

| Keysight M9045 | Keysight Y1200A (2 meters) |

Connection Examples

Example A: Connecting an Embedded Controller

1. Install the controller module in chassis slot 1
   This PC makes PCIe and LAN connection to the ESM through the backplane

   ![Diagram of Laptop Controller, ExpressCard, PCIe Adapter Cable, and ESM PCIe In Port]

2. Connect the monitor, mouse, and keyboard

   ![Diagram showing connection of monitor, mouse, and keyboard]

3. (Optional) Connect to company LAN for remote access

   ![Diagram showing connection to company LAN]

   ![Diagram of Embedded Controller Module and Embedded System Module (ESM)]
Step 4: Set Up the Host PC

Example B: Connecting a Separate, Rackmounted Host PC (desktop PC is similar)

1. Rackmount the host PC
2. Connect the monitor, mouse and keyboard
3. (Optional) Connect to company LAN for remote access
4. Provide AC power to controller
5. Connect host PC PCIe port to ESM PCIe port using x8 cabled PCIe*
6. Connect host PC LAN to ESM LAN port using Gigabit Ethernet cable*

* You may connect LAN, PCIe or both.

Example C: Connecting a Laptop PC

1. Connect laptop to ESM PCIe port using an Expresscard and PCIE adapter cable*
2. Connect laptop LAN to ESM LAN port using Gigabit Ethernet cable*

* You may connect LAN, PCIe or both.
Step 5: Install IO Libraries Suite and Connect to the Web Interface

This step describes how to install the Keysight IO Libraries Suite and verify that the chassis can be found by Keysight Connection Expert, which is part of IO Libraries Suite.

**NOTE**

IMPORTANT: The installation and setup information in this manual is generic. Some AXIe modules and systems require a different installation and setup procedure than described in this manual. Refer to the installation documentation supplied with your AXIe module and or system for detailed installation information.

For example, installation of the Keysight IO Libraries is not required for all AXIe systems.

As described in section AXIe System Block Diagram on page 7, you can use either the Web Interface or the soft front panel (SFP) to monitor and control the chassis. In this step, the Web Interface is used to verify that the host PC can communicate to the chassis. Using the SFP to monitor and control the chassis is described in the *M9502A/M9505A AXIe Chassis User Guide*.

System Requirements

To install and run the required software (Microsoft .NET, Keysight IO Libraries version 16.x, and chassis device drivers), the host PC will need:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Win XP SP3 32bit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Win 7 SP1 32/64bit</td>
</tr>
<tr>
<td></td>
<td>Win 8.1 32/64bit</td>
</tr>
<tr>
<td>Browser</td>
<td></td>
</tr>
<tr>
<td>Minimum RAM</td>
<td>4 GB</td>
</tr>
<tr>
<td>Available Hard Disk Space</td>
<td>Support for DirectX 9 graphics with 128MB graphics memory recommended</td>
</tr>
</tbody>
</table>
Installing the Keysight IO Libraries Suite

Note that IO Libraries Suite version 16.0 or later is required to access the chassis features. We recommend that you always use the latest version of Keysight IO Libraries.

**NOTE**

Only one installation of the Keysight IO Libraries Suite is required on the host PC. This installation is used by both the M950x software that is installed in the next section as well as the drivers associated with each module that you install in the chassis.

**NOTE**

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.

1. Insert the **Keysight IO Libraries Suite 16.x, Keysight Automation Ready CD** into the optical drive of your PC.

2. Wait a few seconds for the auto-run window to appear. If the auto-run window does not appear automatically,
   - Click **Start > Run...**
   - Type: `<drive>:Autorun\IOLibraries.hta`
     where `<drive>` is your optical drive letter.

3. Follow the installer prompts to install the Keysight IO Libraries Suite.

**NOTE**

The latest version can be downloaded from: [www.keysight.com/find/iosuite](http://www.keysight.com/find/iosuite).
Turning on the Chassis

In powering the chassis up or down, please follow the steps listed in “Step 3: Power-Up and Power-Down” on page 14 and the sequences shown below.

**CAUTION**

The chassis and host PC must be powered up and down in the following sequence. The chassis should be powered up first, which will initiate its built-in self test. During self test, the chassis STATUS LED will be amber. The STATUS LED will blink green and then stay green continuously when the ESM is ready. The ESM then powers up each module slot. The PC should be turned on only after all installed modules have performed their initialization—see your module documentation for initialization information.

In brief, the host PC must be off whenever the chassis is powered up or down. The power sequencing shown above doesn’t apply to an embedded controller (because an embedded controller and chassis are powered simultaneously).

In the figure below, the previous diagram is applied to the situation where the chassis configuration is changed. Because modules are not hot-swappable, the chassis must be powered down before modules are added or removed. As you can see, the host PC is shut down before the chassis is powered down, and then the PC is turned on after the chassis is powered up.
There are other situations where a host controller restart may need to be performed, including:

- When Windows detects the presence of a new module (that is a new module was added to the chassis without powering down the PC)
- When Keysight Connection Expert fails to detect the presence of the chassis
- Whenever you detect or suspect that the host PC has an incorrect view of how the chassis is configured

Install Intel Network Driver on Windows XP, if Needed

As described in the section “AXIe System Block Diagram” on page 7, the chassis contains an Intel 82573L NIC as a PCIe endpoint. This NIC will appear to Windows as a device installed directly in the host PC. While Windows Vista and Windows 7 provide the necessary Intel NIC driver, Windows XP does not natively include the NIC driver and you will be prompted to install it during the driver installation. If you are using the chassis on Windows XP and if you see the dialog partially shown below, you’ll need to install the Intel PROWin32.exe network driver.

To install the Intel PROWin32.exe driver, perform the following steps:

1. Run the PROWin32.exe installation program from either:

   Program Files/Keysight/M950x/Network Driver/Windows XP
   (for 32-bit Windows XP systems)

2. After driver installation is complete, restart your PC. The Ethernet Controller Found New Hardware Dialog should no longer appear.
Using Keysight Connection Expert to Confirm Connection to the Chassis

This section describes use of Keysight Connection Expert to confirm that the host PC can connect to the chassis. Keysight Connection Expert is installed during the installation of Keysight IO Libraries Suite.

NOTE
This section assumes Keysight IO Libraries Suite version 16.2 is installed. Earlier versions of IO Libraries Suite behaved differently. Always use the latest version of Keysight IO Libraries Suite.

NOTE
Keysight Connection Expert will use either the LAN interface or the PCIe interface to connect to the chassis, whichever interface is cabled between the host PC and the chassis. Both of these interfaces will appear under the LAN category in Keysight Connection Expert. The listing of the PCIe interface under the LAN category is due to the presence of the Intel 82573L NIC as a chassis PCIe endpoint.

NOTE
The section “Host PC/Chassis Interface Topics” on page 29 includes a number of interface topics that may be of assistance in establishing a connection between the host PC and the chassis.

1. Launch Keysight Connection Expert using one of these methods:
   - If you allowed the Automation Ready CD to place an icon on your desktop, double-click the icon to launch the program.
   - From the Windows Start menu, select All Programs\Keysight IO Libraries Suite\Keysight Connection Expert to launch the program.
   - From a Command Prompt window, type:
     
     <c>:\Program Files\Keysight\IO Libraries Suite\KeysightConnectionExpert.exe

     to launch the program.
Step 5: Install IO Libraries Suite and Connect to the Web Interface

The **Keysight Connection Expert** window displays:

2 The **Instrument I/O on this PC** pane shows instrument connections on your PC. Note that the AXIe chassis (M9502A in this screen capture) is listed under the PXI0 Interface and the LAN (TCPII0) interface. You may need to manually add it to the LAN interface.

**Launch the Chassis Web Interface from Keysight Connection Expert**

This section describes how to launch and use the chassis Web Interface. Note that the Chassis Web Interface can be accessed over LAN or PCIe, whichever interface is connected. Note also that the chassis soft front panel (SFP) provides many of the same capabilities as the Web Interface. However, using the Web Interface requires only a browser on the host PC, whereas using the SFP requires installing the AXIe chassis software (which includes the SFP) on the host PC.

1 To launch the Chassis Web Interface, click the **Chassis Web Interface** button. The Web Interface will be displayed in a new window:

If IO Libraries Suite is not installed, access to the Web interface is through your browser using the default local address: 169.254.1.0

**NOTE**

If you have problems launching the chassis Web interface, check your browser's proxy settings. When Keysight Connection Expert launches a web interface for a chassis, it hands off the http://<address> to the browser or dedicated web application. Therefore, it should not use a proxy.

The home page displays information about your chassis and the connection to the chassis. Click the **Advanced Information** button to view additional information.
Step 5: Install IO Libraries Suite and Connect to the Web Interface

The six buttons at left are the Web Interface’s menu: At right is a brief description of what you can do on each page.
Step 5: Install IO Libraries Suite and Connect to the Web Interface

The **M9502A/M9505A User Guide** has a chapter covering the Web Interface, with examples showing all parameters you can view or configure.

- **Home Page** - View General Information about the chassis, such as product identification, firmware version and LAN parameters.

- **LAN Configuration Page** - View/change IP address, domain, and subnet. Display service discovery information and LAN status.

- **Module Configuration Page** - View basic product and model information for instrument modules loaded in the chassis.

- **Trigger Routing Page** - Configure static trigger routing from all chassis-based sources to the backplane and external connectors.

- **Chassis Health Page** - Displays PSU voltages, fan speeds and temperature. Provides detailed event alarms for the chassis and any installed Intelligent Platform Management Bus (IPMB)-equipped instrument modules.

- **Help Page** - General help topics and context-based help for the current page.
Step 6: Install the Chassis Software

You can monitor and control the chassis entirely from the Web Interface. To use the chassis SFP to monitor and control the chassis, and to develop programs to control the chassis, you will need to install the chassis software (IVI or LabVIEW) appropriate for your programming environment. To do so:

1. Insert the AXIe Chassis Software and Product Information CD in the host PC. If you do not have the CD, you can download the most recent version at www.keysight.com/find/axie-chassis.

2. Click the Install Driver Software button and follow the browser prompts to install the drivers you will need.

The User Guide describes how to bring up the SFP and how to get started with programming the chassis.

Step 7: Next steps

Now that you have completed basic Startup, Keysight recommends you access and read the User Guide. To do so:

1. Insert the M9502-10001 AXIe Chassis Software and Product Information CD in the host PC.

When the Software and Product Information CD screen loads, note that the chassis literature is listed at center. You may access all chassis documentation—both CD-based and via Internet links—from the links in this screen.

2. Click the User Guide link to access the document.

Host PC/Chassis Interface Topics

This section lists a number of host PC/chassis interface topics that may be of assistance in establishing a connection between the host PC and the chassis. Unless otherwise noted, these topics relate to interfacing to the chassis components themselves, such as the ESM, not to modules in the chassis slots.

The LAN connection to the ESM provides communication to the chassis only -- chassis firmware updates, using the web interface to monitor and control the chassis, etc. It does not provide communication with individual AXIe modules. Use the PCIe connection to control individual AXIe modules.

1. Chassis communications over PCIe uses the TCP/IP network protocol because the chassis PCIe endpoint is an Intel 82573L NIC. Therefore, when accessed over PCIe, the AXIe chassis will appear as a LAN device in Keysight.
Connection Expert. When accessed over LAN, the AXIe chassis will, as expected, also appear as a LAN device in Keysight Connection Expert.

2. Modules installed in the chassis slots that use the PCIe interface will be displayed by Keysight Connection Expert under the PXIIO label, not under the LAN label.

3. For a PCIe connection to the chassis, a private IP address beginning with 169.254 will be assigned. If a direct LAN connection is made from the host PC to the chassis, a private IP address beginning with 169.254 will likewise be assigned.

4. The LAN port is used for controlling and monitoring the chassis (i.e., monitoring chassis temperatures, monitoring/setting chassis fan speeds, and setting chassis routing). It is not intended for controlling AXIe modules. The PCIe port is provided for module data transfer and control.

5. If you have established a direct LAN connection to the chassis (establishing, for example, a private IP address of 169.254.1.0) and if your browser is configured to use a proxy server, your browser may not be able to display the chassis Web Interface. The example figure below shows how to bring up the **LAN Settings** dialog (in Internet Explorer 8) that is used to configure proxy server settings.
6 PCIe is logically an extension of the host PC backplane. If the PCIe interface is used to connect to the chassis, the chassis Intel 82573L NIC will appear to Windows as if it is installed directly in the PC. While Windows Vista and Windows 7 provide the necessary Intel NIC driver, Windows XP does not natively include the required Intel NIC driver.

If you're using the PCIe interface on Windows XP and if the Found New Hardware Wizard dialog appears indicating that an “Ethernet Controller” needs software installed, you'll need to install the Intel PROWin32.exe network driver as described in “Install Intel Network Driver on Windows XP, if Needed” on page 24.

7 The example window below shows the Device Manager view of the PCI bus for an M9502A chassis that contains one recognized PCIe module (the Keysight module), one unrecognized PCIe module (“PCI Device”), plus the Intel NIC. This window was displayed by selecting Devices by connection under the Device Manager View drop down menu. This information can be useful in both verifying connection to the chassis (the Intel NIC) and verifying connection to the modules installed in the chassis.

8 If the chassis is connected only to LAN, the chassis will attempt to obtain an IP address using DHCP.

9 If both PCIe and LAN are connected to the chassis, the LAN VISA resource name is used to connect to the chassis.

10 Do not attach a LAN cable after communications has been established over the PCIe cable. Doing this will disrupt PCIe communications, and will not provide LAN communications — the chassis will become inaccessible and rebooting of the PC will be required to restore communications.
If you need both LAN and PCIe communications, connect both cables prior to power-up the chassis.

11 If you have connected to the chassis using PCIe and/or LAN, and want to visually confirm that you are, in fact, interfacing to the chassis that you believe you are interfacing to, you can click the **Turn on Front Panel Identification Indicator** link on the Web Interface home page as highlighted below. This will flash the STATUS LED of the chassis you are interfacing to.

Safety-Related Specifications

This section (next page) provides a partial set of safety-related specifications for the Keysight M9502A and M9505A AXIe chassis. Complete specifications are included in the Keysight **M9502A/M9505A Data Sheet**.
Safety-Related Specifications

Regulatory

Safety

Conforms to the following:

- Complies with European Low Voltage Directive 2006/95/EC
  - IEC/EN 61010-1, 2nd edition
  - Canada: CSA-C22.2 NO. 61010-1-04
  - USA:/UL 61010-1:2004

EMC

Conforms to the following:

- Complies with European EMC Directive 2004/108/EC
  - IEC/EN 61326-1
  - ICES/NMB-001
  - CISPR Pub 11 Group 1, class A
  - AS/NZS CISPR 11

Operating Conditions

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<tr>
<th>Temperature</th>
<th>Humidity</th>
<th>Altitude</th>
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</thead>
<tbody>
<tr>
<td>0°C to 50°C</td>
<td>Type tested at 95%, +40°C (non-condensing)</td>
<td>up to 3000 meters</td>
</tr>
</tbody>
</table>

Chassis Weight

<table>
<thead>
<tr>
<th>Chassis</th>
<th>Weight (as shipped, no modules)</th>
<th>Weight (maximum, all slots filled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M9502A</td>
<td>7.7 kg</td>
<td>15.7 kg</td>
</tr>
<tr>
<td>M9505A</td>
<td>13.3 kg</td>
<td>33.3 kg</td>
</tr>
</tbody>
</table>

AC Power Supply Requirements

<table>
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<tr>
<th></th>
<th>M9502A</th>
<th>M9505A (Serial Number TW51150212 and earlier)</th>
<th>M9505A (Serial Number TW51160201 and later)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage range:</td>
<td>100-120VAC 200-240VAC</td>
<td>100-120VAC 200-240VAC</td>
<td>100-240VAC</td>
</tr>
<tr>
<td>Input frequency range:</td>
<td>50-60 Hz</td>
<td>50-60 Hz</td>
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</tr>
<tr>
<td>Input power consumption:</td>
<td>800 VA</td>
<td>865 VA</td>
<td>1350 VA</td>
</tr>
<tr>
<td>Overcurrent protection:</td>
<td>auto recovery</td>
<td>auto recovery</td>
<td>auto recovery</td>
</tr>
<tr>
<td>Efficiency (typical):</td>
<td>85-90%</td>
<td>85-93%</td>
<td>85-93%</td>
</tr>
</tbody>
</table>
Safety-Related Specifications

Chassis Power Dissipation

<table>
<thead>
<tr>
<th>Airflow</th>
<th>Direction</th>
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</thead>
<tbody>
<tr>
<td>Slot airflow direction</td>
<td>Right to left</td>
</tr>
<tr>
<td>Chassis cooling intake</td>
<td>Right side of chassis</td>
</tr>
<tr>
<td>Chassis cooling exhaust</td>
<td>Left side of chassis</td>
</tr>
<tr>
<td>Power dissipation, per instrument slot</td>
<td>200W maximum * see table below</td>
</tr>
</tbody>
</table>

DC Power Supply Output

<table>
<thead>
<tr>
<th></th>
<th>M9502A</th>
<th>M9505A (Serial Number TW51150212 and earlier)</th>
<th>M9505A (Serial Number TW51160201 and later)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Output</td>
<td>50V</td>
<td>52V</td>
<td>52V</td>
</tr>
<tr>
<td>Total DC Power</td>
<td>520W</td>
<td>100VAC - 120VAC: 680 W 200VAC - 240VAC: 1020 W*</td>
<td>100-240VAC: 1020W*</td>
</tr>
</tbody>
</table>

* M9505A configurations that consume more than 850W (200-240V) or 400W (100-120V) total power across all 5 slots may experience occasional system reset if installed in environments prone to line voltage dropouts in excess of 20ms. In such an event, the PC controlling the chassis will require a restart of reboot. To avoid system resets due to line dropouts, use an uninterruptable power supply.