Startup Guide

Keysight AXIe 14-Slot Chassis M9514A

KEYSIGHT TECHNOLOGIES

Notices

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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 an 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 an 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.


Protective Earth Ground terminal


Chassis Ground.


Alternating Current (AC).

Three-Phase Alternating Current


Direct Current (DC).


Both direct and alternating current


Terminal is at earth potential.

N

Terminal for Neutral conductor on properly installed equipment

L

Terminal for Line conductor on properly installed equipment


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

IEC Measurement Category I, II, III, or IV

For localized Safety Warnings, Refer to Agilent Safety document (p/n 5185-8500) on the product CD.

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.


Notice for European Community: This product complies with the relevant European legal Directives: EMC Directive (2004/108/EC) and Low Voltage Directive (2006/95/EC).


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.

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South Korean Class A EMC Declaration. this equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

A 급 기기 (업무용 방송통신기자재)
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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.

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

Contents

Introduction

The Keysight M9514A AXIe 14-slot chassis (one slot for the AXIe System Module plus 13 instrument module slots) is a modular instrument chassis fully compatible with the AXIe 1.0 Hardware specifications. It allows 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. The chassis provides 13 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.

The chassis requires a full module height AXIe System Module (ASM) such as the Keysight M9521A, to manage chassis functions. The ASM provides the following:

- provides external 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
- provides six external ports for bi-directional triggering
- provides backplane PCIe and Ethernet communication between modules

NOTE

IMPORTANT: The installation and setup information in this manual is specific to the M9521A ASM.

Some AXIe modules and software 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.

Other than a power button and the power supply and chassis Status LEDs, all monitoring, control and communication with the chassis requires a host PC. This can be either an *embedded* PC specifically designed for use in an AXIe chassis (such as the Keysight M9536A) or an external (rackmount or desktop) host PC.

NOTE

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 www.keysight.com/find/axie-chassis.

For general host PC requirements, such as operating system and RAM requirements, please refer to "Host PC Requirements" on page 25.

Documentation

The documentation listed below can be found on the *Software and Product Information* CD (P/N *M9514-10001)* that came with your chassis.

M9514A Site Preparation Guide Provides detailed site preparation and planning information for the chassis.

M9514A AXIe Chassis Startup Guide Provides steps to verify and start using your new chassis.

M9521A AXIe System Module Startup Guide Provides steps to verify and start using your new chassis.

M9514A and M9521A User Guide A complete guide for configuring, operating, and troubleshooting the chassis.

M9514A Service Guide It provides troubleshooting and service information for the chassis and ASM.

Help files for the IVI-C and IVI-COM device drivers The interactive help provides instruction for programming the chassis using Microsoft development environments.

Help file for the Keysight M9514A and M9521A LabVIEW G device drivers

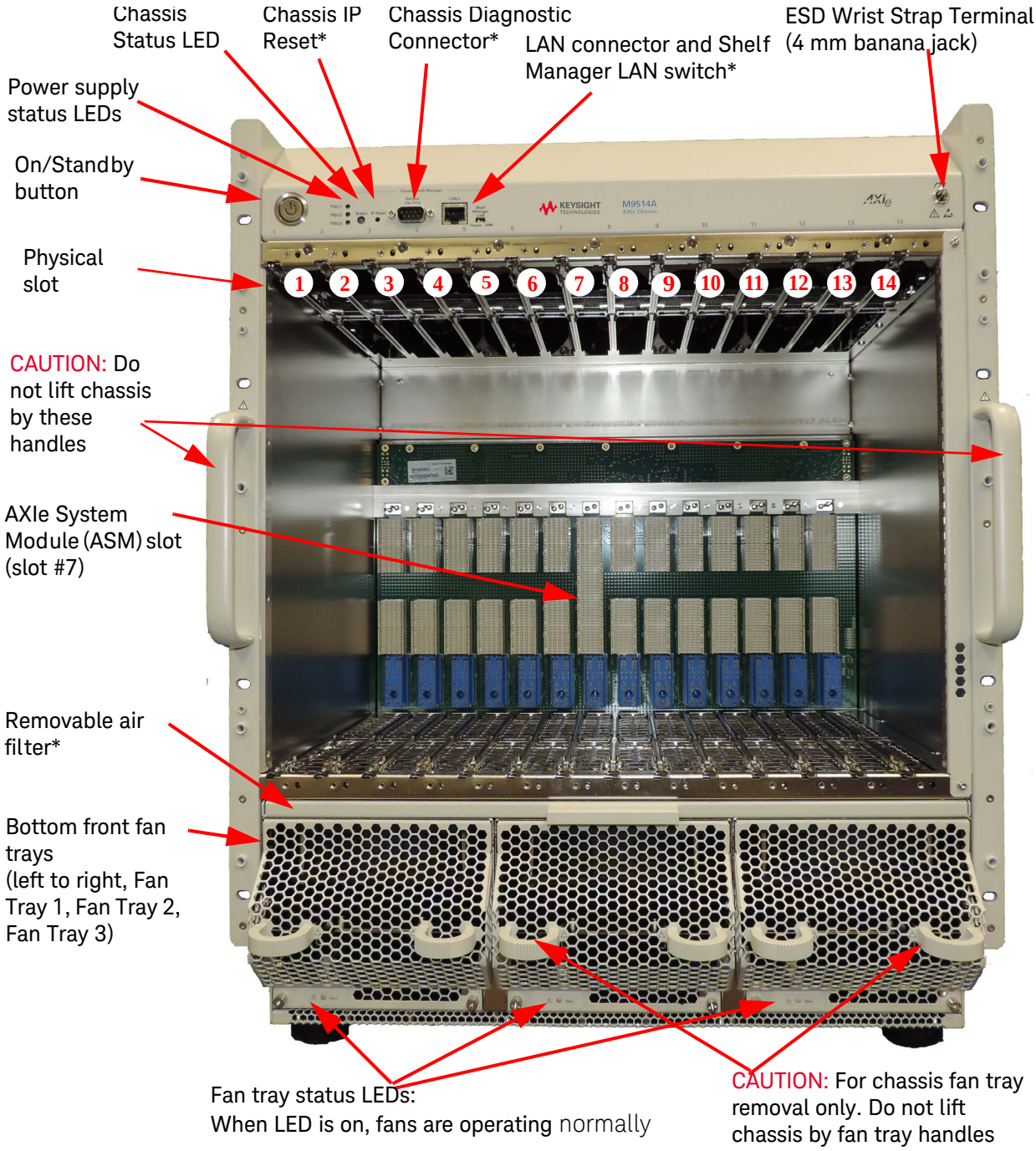
The interactive help provides instruction for programming the chassis using National Instruments Labview(TM).

Keysight M9514A and M9521A Data Sheets. The Data Sheets contain complete physical and electrical specifications for the chassis and the ASM.

Keysight M9514A and M9521A Security Guide. The Security Guides describe how to declassify or sanitize the chassis and the ASM.

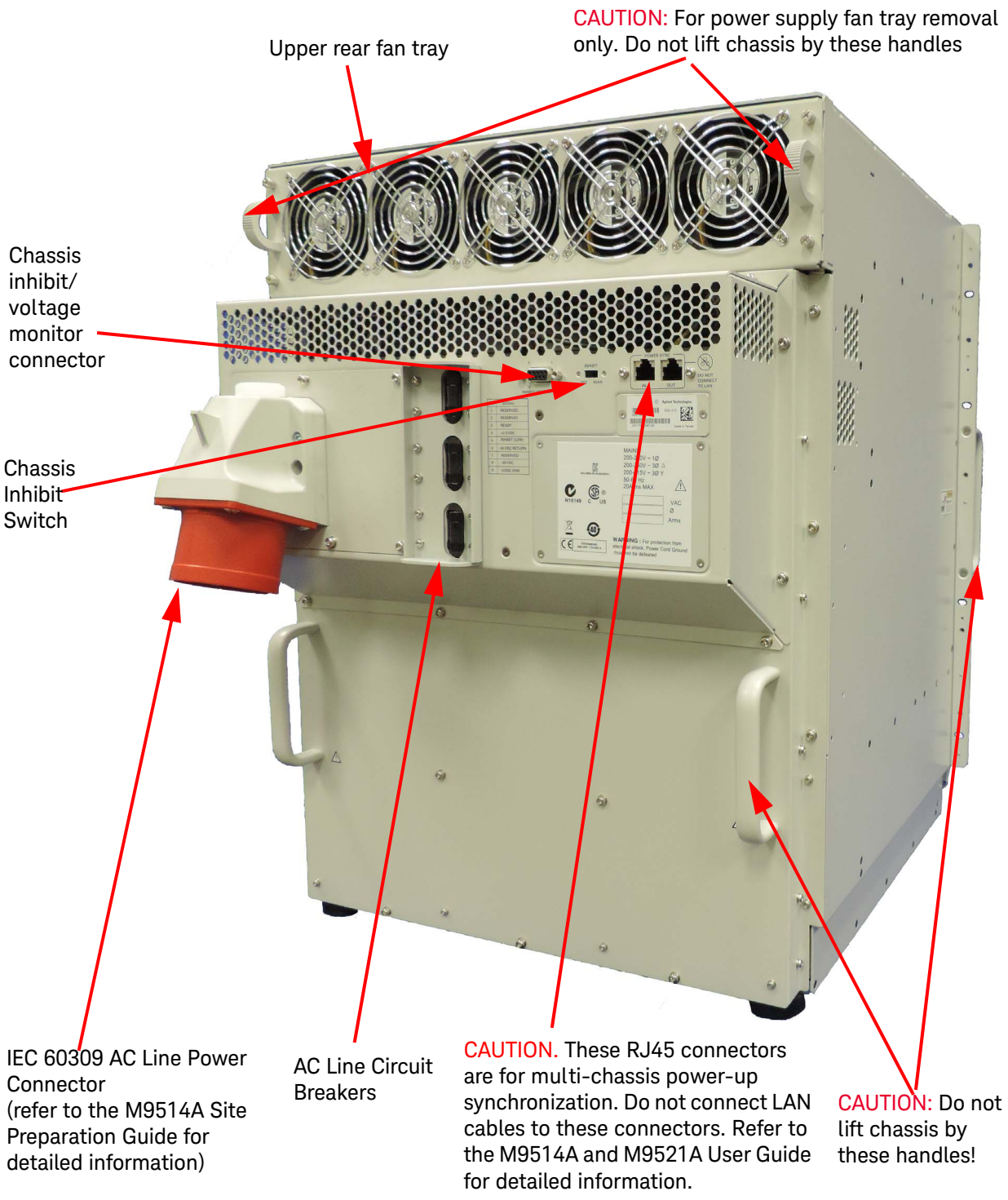
M9514A AXIe 14-slot Chassis at a Glance

Designed for large system testing, the M9514A provides 14 AXIe slots (1 slot for the AXIe System Module plus 13 instrument module slots). Refer to the *M9514A and M9521A User Guide* for detailed information.

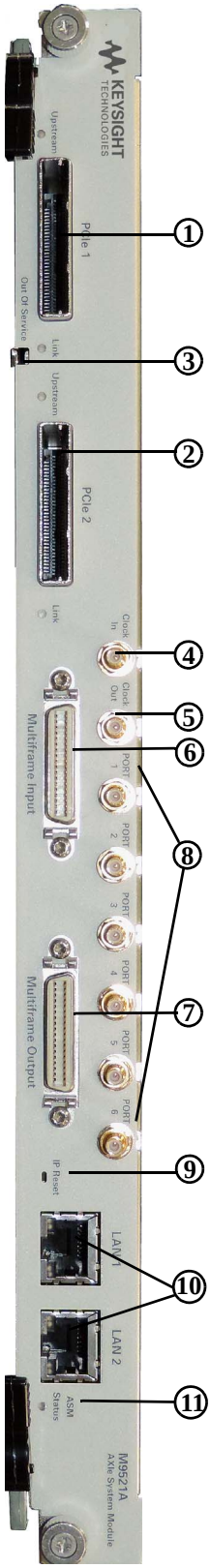


* For detailed information, refer to the *M9514A and M9521A User Guide*. The DB-9 connector on the top front panel of the chassis labeled "Service Use Only" is for internal Keysight use only. There is no user diagnostic, troubleshooting, or service information available from this connector. Default Shelf Manager LAN switch position is to the right, ASM.

The following figure shows the M9514A chassis rear panel.



M9521A AXIe System Module (ASM)*



The ASM is a full-height AXIe module and must be installed in slot 7 of the chassis. It must be ordered separately. It performs the following functions:

- monitors chassis temperature and controls variable-speed chassis fans
- 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

ASM Front Panel

1	PCIe 1	PCIe 1 connector connects a external host PC to the chassis or connects multiple chassis via PCIe. This upstream connection is Gen 2 compliant PCIe x8.
2	PCIe 2	PCIe 2 connector connects multiple chassis. This downstream connection is Gen 2 compliant PCIe x8.
3	Out Of Service	When red, LED indicates operational failure of the ASM.
	CLOCK	External clock connections. 10 MHz ±100 ppm. SMB connectors with ESD suppression.
4	IN	Accepts an externally sourced timing input. Input range 5V peak, AC coupled, 50 Ω terminated, 250 mV minimum swing.
5	OUT	Extends the internal clock source to external instruments. 3.3V AC coupled, 50W output impedance.
	MULTIFRAME	Synchronizes timing signals with multiple daisy-chained chassis (either 2-slot or 5-slot). 36-pin mini D connectors use accessory Keysight cables.
6	INPUT	Communicates to the next higher chassis in a multi-chassis system. The highest chassis is referred to as the Master Chassis
7	OUTPUT	Communicates to the next lower chassis in a multi-chassis system.
8	Ports	External bidirectional, programmable trigger connections.
	Port 1 - Port 6	Adjustable threshold input range -5V to +5V, 250 mV minimum swing.
9	ASM IP Reset	Resets the ASM LAN1/LAN2 ports to factory preset address. (169.254.1.1).
10	LAN 1 LAN 2	Connects the external host pc to the chassis, RJ45 connector. Tri-rate 10/100/1000 Base-T, auto crossover. Amber link/activity LED, bicolor speed (Amber = 1Gbps, Green = 100 Mbps, off = 10 Mbps) An embedded controller module does not use this port; it communicates with the ASM through the chassis backplane.
11	ASM Status	The Status indicator is a tri-color LED. Green indicates normal operation. Red indicates a power-up error. Amber indicates chassis is powered and booting.

* The M9521A ASM is different than the Embedded System Module (ESM) used in the Keysight M9502A and M9505A AXIe chassis. They are not interchangeable.

Performing the Startup Steps

The remainder of this Startup Guide describes how to connect the chassis 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.

Step 1: Uncrate and Install the Chassis

If you have not already done so, please refer to the *M9514A Site Preparation and Installation Guide* for detailed uncrating and installation instructions. The *Site Preparation and Installation Guide* includes:

- Instructions for verifying shipment contents
- Guidelines for planning the chassis installation
- Receiving and uncrating instructions
- Rack mounting instructions
- AC power requirements (including single phase high line and 3-phase WYE and Delta wiring instructions)

NOTE Proceed with the instructions in this Startup Guide only after you have properly installed the chassis according to instructions in the *M9514A Site Preparation and Installation Guide*.

Product specifications, available accessories, firmware and software may change over time. Please check the Keysight website at www.keysight.com/find/M9514A for the latest updates to the product software, guides, data sheet and help files.

WARNING

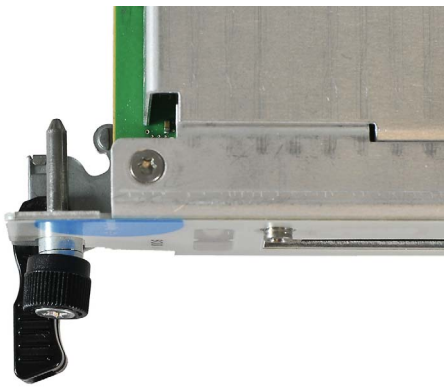
Chassis exceeds 48 kg. Use a mechanical lift to lift the chassis. The chassis should be transported using a rolling cart. Do not lift the chassis by the handles on the front and rear of the chassis.

WARNING **Hearing protection must be worn when working on or around the chassis when it is powered on. The airflow noise around the chassis can exceed 79 dB(A). This is outside the range that is normally considered safe (70 dB(A)). Over and above that level is considered hazardous and can result in permanent hearing damage.**

Step 2: Install the ASM in the Chassis

Before powering on the chassis, install the M9521A AXIe System Module (ASM) in chassis slot 7.

1. Make certain the AXIe chassis is not powered on.
2. Locate the top and bottom guide rails for slot 7.
3. Align the ASM's circuit board with the chassis guide rails. Slide the ASM gently into the two rails. If the fit is tight, slide the ASM back out and recheck alignment.
4. Locate the insertion/extraction handles at each side of the ASM's front panel. Extend the ends of both handles, by pulling them inwards towards each other; the plastic handle end slides about 1 cm on the metal handle shaft. Then fully open the handles by pivoting them out towards you until they are perpendicular to the front panel. The left handle is shown below, from the top view, correctly extended.



5. Slide the ASM completely into the chassis. When the module's backplane connectors contact the chassis backplane, you will feel resistance and the two handles will begin to close toward each other. The module's faceplate will be about 1 cm from the chassis front panel.
6. Continue nudging the ASM faceplate gently but firmly with your thumbs, until the handles are pressed up against the chassis and the module's front panel lies flush with the chassis' front panel. This seats the module firmly in the chassis backplane. If necessary, gently press inward (toward the chassis) on the handles to ensure full insertion.
7. Tighten the captive retaining screws at both top and bottom of the ASM.

CAUTION **Modules are grounded through the chassis. Tighten the module retaining screws to ensure a proper ground connection.**

8 Retract the handle ends by sliding them outward on their metal shafts, away from each other, toward the chassis edge; this secures them out of the way of test connections.

NOTE Detailed module installation and removal instructions may be found in the *M9514A and M9521A User Guide*.

At this step, you should also install the AXIe embedded controller (such as the Keysight M9536A) if you are using one. The embedded controller may be installed in any chassis slot; however, it is best to install it in outer slots (slot 1 or slot 14) to minimize impact with any modules using the chassis local bus for E-Keying. If you are using an external host PC, do not connect it to the chassis or the ASM yet.

Proceed to Step 3 to power up the AXIe chassis. Verify that the chassis fans are operating and free of obstructions that may restrict airflow.

CAUTION

Static Electricity—The components and connectors on modules are sensitive to static electricity. To minimize electrostatic damage, take the necessary anti-static precautions. The M9514A chassis provides a grounding terminal on the front panel, to which you can connect a wrist strap. To locate this terminal, see "M9514A AXIe 14-slot Chassis at a Glance" on page 11.

Empty Slots—Except for performing initial chassis verification or troubleshooting, do not operate the chassis with empty slots. Always insert a filler panel or an instrument module into empty slots. This is especially important for the slots on either side of an instrument module. This allows proper air flow and cooling, and provides EMI shielding for the chassis and installed components. Leaving slots empty can increase fan speed, raise ambient noise, overheat components, and shut down modules.

ASM—The AXIe System Module is integral to the operation of the chassis. Except for troubleshooting purposes, do not remove the ASM. The ASM is installed in slot 7 of the chassis.

Hot Swap—AXIe does not explicitly support hot swap for instrument modules. Keysight recommends fully powering down the chassis before installing or removing modules

Embedded Controller Module—Manually initiate a graceful shutdown of the Windows operating system and power off the chassis before removing the module.

Step 3: Power-Up and Power-Down the Chassis

This step ensures that the ASM is properly installed in the AXIe chassis and that the chassis and ASM power-up properly. It is not necessary to connect the chassis or ASM to a host computer for this step. After verifying that all of the chassis and ASM Status LEDs have turned solid green, please power-down the chassis (see instructions on page 20) and then proceed to "Step 4: Set Up the Host PC" on page 21

You must install the chassis per the instructions in the *M9514A Site Preparation and Installation Guide*. This includes providing the correct AC power. It is not necessary to connect the chassis to a host PC to power it on.

WARNING **The mains wiring and connectors must be compatible with the connector used in the premise electrical system. Failure to ensure adequate earth grounding by not using the correct components may cause product damage and serious injury.**

To Power Up the Chassis

Ensure Circuit Breakers are Closed Close all three rear panel circuit breakers (ON position).

CAUTION **Do not operate the chassis with one or two of the circuit breakers in the OFF position. All three breakers must be in the ON position for the chassis to operate at full capacity.**

Press Chassis On/Standby Button Press the chassis' front panel **ON/STANDBY** switch. It will be dimly lit to indicate that AC power is available and the chassis is in the Standby mode; it will be brightly lit when depressed and the chassis is powered on.

The Status LEDs on the chassis and ASM cycle as follows:

1. Light off - with button in **STANDBY** mode
2. Green, blinking - for a few seconds after POST
3. Green, steady - successful chassis power-up is complete.

If either the chassis or the ASM do not power up to a steady green Status LED, or either powers up to a steady red Status LED, the chassis or ASM has detected a failure. Immediately power down the chassis.

If the chassis **ON/STANDBY** switch flashes continuously after turning on the chassis, press and hold the **ON/STANDBY** switch for five seconds. If this does not resolve the issue, power down the chassis. Refer to the M9514A and M9521A Service Guide.

Indicator LEDs

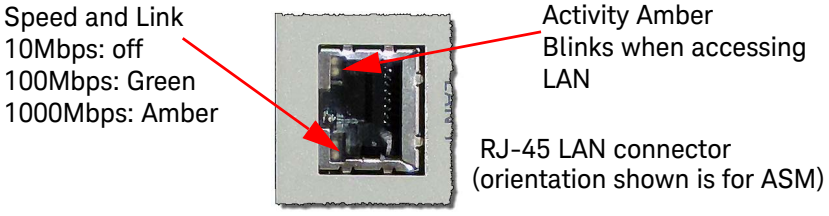
The M9514A chassis and the M9521A ASM have several indicator LEDs on their front panels (see "M9514A AXIe 14-slot Chassis at a Glance" on page 11). In general, when the LEDs are solid green (not flashing), the monitored state or circuit is working normally. Refer to the **M9514A and M9521A Service Guide** for more details. The following table indicates the various states (colors) of the ASM and chassis LEDs and their meaning:

LED State (color)	Description
M9514A Chassis Power Supply Indicator LEDs (PSU1, PSU2, PSU3)	
PSU LEDs	
off	Power Supply Unit (PSU) not receiving AC power. Check circuit breaker.
solid green	Power Supply Unit (PSU). PSU functioning normally.
M9514A Chassis Status LED	
off	Chassis is powered off.
solid amber	Initial power-up state but changes to green.
flashing amber	Indicates POST failure
flashing green	PCIe startup delay while waiting for instrument modules to be activated. Front panel identification indicator, invoked by web page, IVI function call, or Soft Front Panel to identify specific chassis.
solid green	POST tests passed. Chassis is ready.
solid red Note: if the Status LED turns red due to any of the conditions listed, once the condition is corrected, the LED returns to green and modules are reactivated.	Indicates a non-recoverable threshold is exceeded. Run self test and review error messages either through the Soft front Panel or IVI function call. Possible failures include: • AC input voltage to any of the three PSUs is ≤130 VAC. All modules except ASM turned off. • Output voltage of one of the three PSUs ≥ –48 VDC (i.e. more positive). All modules except ASM turned off. • Chassis temperature above upper non-recoverable threshold. All modules including ASM are turned off. • Temperature sensors in fan tray above upper non-recoverable threshold. All modules including ASM are NOT turned off • Temperature sensors in any module above upper non-recoverable threshold. That module is turned off. • ASM temperature sensors above upper non-recoverable threshold. The ASM is turned off, but not other modules in the chassis. • One or more fans stop. All modules except ASM turned off.
M9514A Chassis Fan Tray LEDs	
Fan Tray LED	Normally, when the chassis is powered on, these LEDs are on. When the LEDs are off, the fan tray fans are not running.

M9521A ASM Status LED	
off	ASM not receiving power. Chassis powered off.
solid amber	Internal power-on self test (POST) is running
flashing amber	Indicates POST failure
flashing green	PCIe startup delay while waiting for instrument modules to be activated. Front panel identification indicator, invoked by web page, IVI function call, or Soft Front Panel to identify specific ASM.
solid green	Shelf Manager & chassis working normally, power-on self tests passed, etc.
solid red	Indicates a serious problem. Connection to the chassis or ASM may not be available due to the nature of the problem, Service required.
M9521A ASM Out of Service (OOS)	
off	Normal operation
solid red	Red while modules being activated, then turns off. If stays red, indicated ASM failure.
M9521A ASM PCIe Link (2 LEDs, one for each connector)	
green	PCIe Link is functional
M9521A ASM Upstream	
amber	Identifies the upstream PCIe port

Gigabit Ethernet (GbE) LEDs

The following graphic and table describe the Gb Ethernet (LAN port) LEDs at the top of the chassis and on the ASM:



Status		Speed LED (Green/Amber)	Activity LED (Yellow)
Network link is not established or system is powered off		OFF	OFF
10 Mbps	Link	Off	ON
	Active	Off	Blinking
100 Mbps	Link	Green	ON
	Active	Green	Blinking
1000 Mbps	Link	Amber	ON
	Active	Amber	Blinking

To Power Down the Chassis

There are two power-down modes:

- For routine power-down or to cycle power to the chassis, momentarily press the chassis **ON/STANDBY** switch. The system does a controlled shutdown of the embedded controller (if installed) and instrument modules and then shuts down the power supply. The main chassis fans will gradually drop in speed to off. This is normal.
- If you press and hold the ON/STANDBY button for more than five seconds, the system shuts down the power supplies immediately.

CAUTION

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.

Also, ensure that the embedded PC never goes into sleep or hibernate mode. It is possible for the PC to lose its chassis enumeration.

CAUTION

For routine power-down, do not use the circuit breakers 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.

Step 4: Set Up the Host PC

Communication with the M9514A chassis, AXIe System Module (ASM) and installed instrument modules requires a *host PC*, a Windows based computer that may be:

An Embedded Controller (takes up slot one in the chassis). An AXIe embedded PC (also commonly called an *embedded controller)* such as the Keysight M9536A*, allows for stand-alone test system operation. PCIe and LAN connections from PC to ASM 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 the controller in the chassis before proceeding with this section. See the *M9514A and M9521A User Guide* for detailed module installation instructions.

A separate rack-mounted or desktop PC. To use the chassis PCIe data transfer capabilities, this external host PC must have an available PCIe x8 slot and BIOS support for proper enumeration of devices on the PCIe bus. PCIe connection from the host PC to ASM 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.

NOTE To ensure proper system operation, you should use an approved (embedded, rackmount, or desktop) host computer along with an approved PCIe adaptor 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 *PXI and AXIe Modular Instrumentation Tested Computer List -- Technical Note* of tested external host PCs at www.keysight.com/find/axie-chassis. For the recommended PCIe host adapter cards and cables, see “Host PC/Chassis Interface Topics” on page 34.

General controller requirements (such as operating system and RAM) are listed in “Host PC Requirements” on page 25.

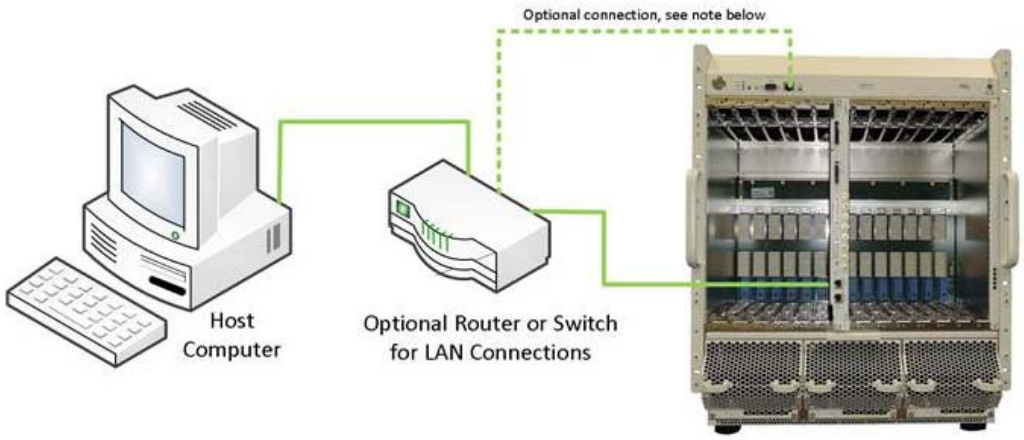
CAUTION Do not enable the Microsoft Windows sleep or hibernate modes on the host PC. The controller may not perform proper chassis enumeration when it wakes up and unpredictable operation may result.

* Keysight’s M9536A Embedded Controller must have BIOS AG16 or later.

Hardware Connections to the Host PC

CAUTION Except where noted, connections between the external host PC and the chassis AXIe System Module (ASM) should be made with both the PC and chassis powered off.

For initial turn-on and testing, make a LAN-only connection to the chassis and ASM — this is the simplest connection and doesn't require installation of a PCIe adapter card in the external host pc. The host PC can either be connected directly to the chassis and/or ASM with a crossover Gb Ethernet cable, or connected through your network with a straight Ethernet cable. The following diagram shows the basic connection.



NOTE The chassis LAN port and Shelf Manager switch provide an access to the chassis Shelf Manager if a non-Keysight ASM is used that does not contain a LAN fabric. In this case, the chassis Shelf Manager is accessible via LAN 0. When using the Keysight M9521A ASM, the LAN0 connector is not used and the Shelf Manager LAN switch should remain in the default ASM (right) position.

For additional host PC and chassis/ASM interface information, refer to "Host PC/Chassis Interface Topics" on page 34 of this guide. Also, refer to the *M9514A and M9521A User Guide*.

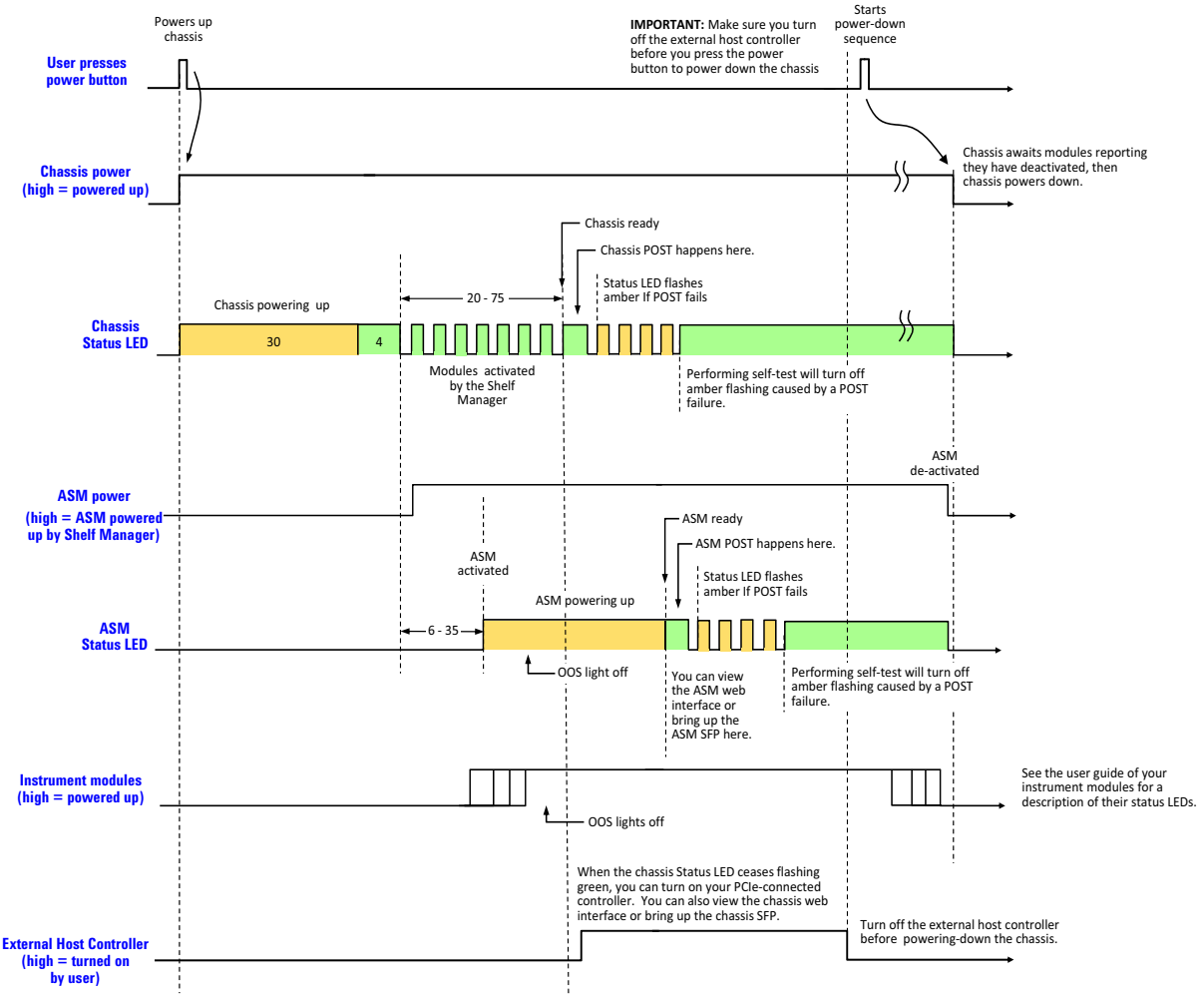
Power on the Chassis First then the Host Controller

CAUTION

The chassis and external 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 chassis is ready. The ASM then powers up each module slot. The external host PC should be turned on only after all installed modules have performed their initialization—see your module documentation for initialization information. An embedded controller such as the M9536A handles this sequence automatically.

Chassis, ASM, and External Host Controller Power-up/Power-down Sequence

1. Times are shown in seconds.
2. The times can vary based on the number of modules installed in the chassis and their activation/de-activation times.



In brief, the external host pc must be off whenever the chassis is powered up or down. Because modules are not hot-swappable, the chassis must be powered down before modules are added or removed.

While the power sequencing shown above does not apply to an embedded controller (because an embedded controller and chassis are powered simultaneously), an embedded controller must also be restarted (after Windows starts) if the chassis configuration was changed in any way while the chassis and embedded controller were powered on.

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

This step describes how to install the Keysight IO Libraries Suite in the host PC and verify that the chassis and ASM 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 ("Step 5: Install IO Libraries Suite and Connect to the Web Interface" in this manual) is not required for all AXIe systems.

Host PC Requirements

To install and run the required software (Microsoft .NET, Keysight IO Libraries version 16.3 Update 2 or later, and chassis device drivers), the host PC requires the following:

	For Best Performance
Operating System	Windows 7 (SP1), 32-bit or 64-bit Windows 8.1, 32-bit or 64-bit
Browser	Microsoft Internet Explorer 6 (or later)
Processor	800 MHz or greater
Minimum RAM	4 GB for 32-bit OS 16 GB for 64-bit
Available Hard Disk Space	1.5 GB
Graphics	Support for DirectX 9 graphics with 128MB graphics memory recommended

Keysight's M9536A AXIe Embedded Controller requires Windows Embedded System 7 32- or 64-bit Operating System. 8 GB RAM minimum recommended.

In addition, the host PC must be able to enumerate the AXIe chassis.

NOTE

Many computers are not capable of enumerating a sufficient number of PCIe slots to ensure that slots in an external chassis are enumerated. Keysight provides a *PXI and AXIe Modular Instrumentation Tested Computer List -- Technical Note* of tested PCs that have been verified to properly enumerate PCIe devices in the AXIe chassis, at www.keysight.com/find/axie-chassis.

Keysight's M9536A Embedded Controller must have BIOS AG16 or later.

Installing the Keysight IO Libraries Suite

Note that IO Libraries Suite version 16.3 Update 2 or later is required to access the chassis features. We recommend that you always use the latest version of Keysight IO Libraries.

NOTE

If you are using a Keysight embedded controller such as the M9536A, the Keysight IO Libraries is already installed. Make certain that it is version 16.3 Update 2 or later. In Keysight Connection Expert, go to **Help > About**.

NOTE

Only one installation of the Keysight IO Libraries Suite is required on the host PC. This installation is used by both the M9514A and M9521A 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 16.3 Update 2 (or later), *Keysight Automation Ready CD* into the optical drive of your PC. If you are using an embedded controller such as the Keysight M9536A, you can download the latest IO Libraries Suite at:

www.keysight.com/find/iosuite

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.

Using Keysight Connection Expert to Confirm Connection to the M9514A and M9521A

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

You can use either the Web Interface to monitor and control the chassis. In this step, the Web Interface is used to verify that the external host pc can communicate to the ASM and chassis.

NOTE This section assumes Keysight IO Libraries Suite version 16.3 Update 2 (or later) 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 external host pc and the chassis. Both of these interfaces 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 a NIC as an ASM PCIe endpoint.

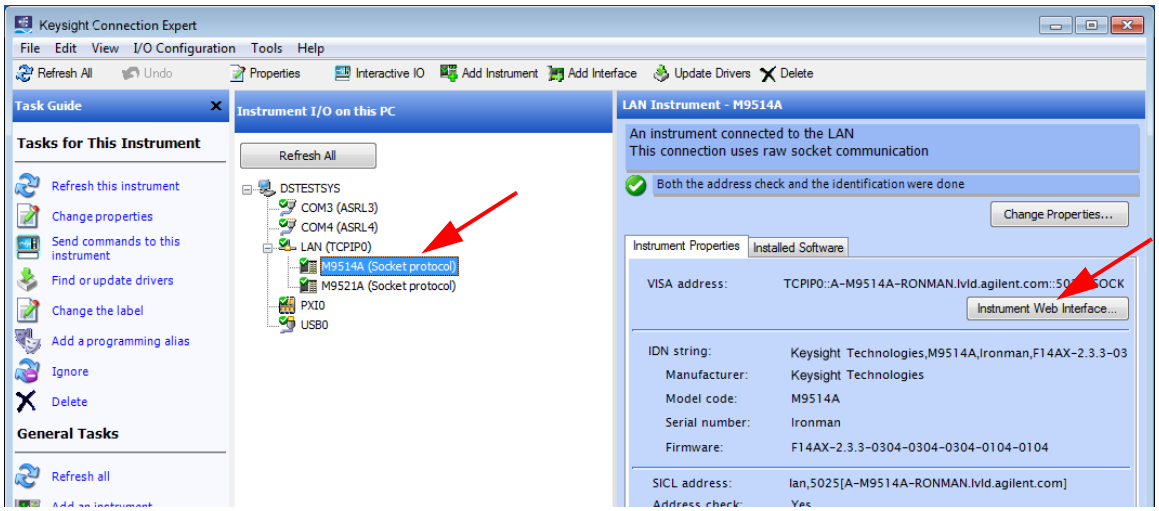
NOTE The section "Host PC/Chassis Interface Topics" on page 34 includes a interface topics that may be of assistance in establishing a connection between the external host pc and the chassis.

1 Launch *Keysight Connection Expert* using one of the following methods:
   a If you allowed the Automation Ready CD to place an icon ( ) on your desktop, double-click the icon to launch the program.
   b From a Command Prompt window, type:

<c>:\ProgramData\Microsoft\Windows\Start Menu\Programs\KeysightConnectionExpert.exe

to launch the program.

The **Keysight Connection Expert** window displays.



2 The **Instrument I/O on this PC** pane shows instrument connections on your PC. Note that both the M9514A AXIe chassis and the M9521A ASM are listed under the LAN (TCPIP0) interface.

Note that if you connect the ASM to the external host pc using a PCIe cable connection, the ASM will also appear under the PXI0 interface.

Launch the Web Interface from Keysight Connection Expert

This section describes how to launch and use the chassis Web Interface. Note that the Web Interface can be accessed over LAN or PCIe, whichever interface is connected. Note also that the chassis soft front panel (SFP) provides significant additional functionality to 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 

button. See the previous screen capture. The Web Interface will be displayed in a new window:

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 passes 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.

Chassis Firmware Version

The seven buttons at left are the Web Interface's menu: The following table provides a brief description of what you can do on each page.

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.

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

Electronic Keying Page - Displays the connection protocol each module has in the chassis over the backplane.

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

Configure Fan Control Page - Displays the fan operating level for module cooling.

The *M9514A and M9521A User Guide* has a chapter covering the Web Interface, with examples showing all parameters you can view or configure.

Note that the M9514A chassis and the M9521A ASM have different web interfaces. Refer to the *M9514A and M9521A User Guide* for detailed information or to the *M9521A Startup Guide*.

NOTE

On the M9514A LAN Configuration Web Page and the M9521A LAN Configuration Web Page, there is a button labeled, "**Reset User-Settable Memory**." This button resets all user-settable non-volatile memory, returning the chassis or ASM to its factory default state.

CAUTION: Clicking on this button resets all user-settable non volatile memory in the chassis or ASM to its factory state. Doing this will interrupt connectivity with the chassis or ASM and will require setting up the chassis or ASM as a new device in Keysight Connection Expert., See the *M9514A and M9521A User Guide* for detailed information.

Step 6: Install the Software

You can monitor and control the chassis or AXIe System Module (ASM) from their respective Soft Front Panel (SFP) screens. Also, to develop IVI or LabVIEW programs to control the chassis and the ASM, you will need to install the software (IVI or LabVIEW) appropriate for your programming environment. You should install the software for both the M9514A chassis AND the M9521A ASM on your host controller.

To install the SFP and IVI and LabVIEW drivers:

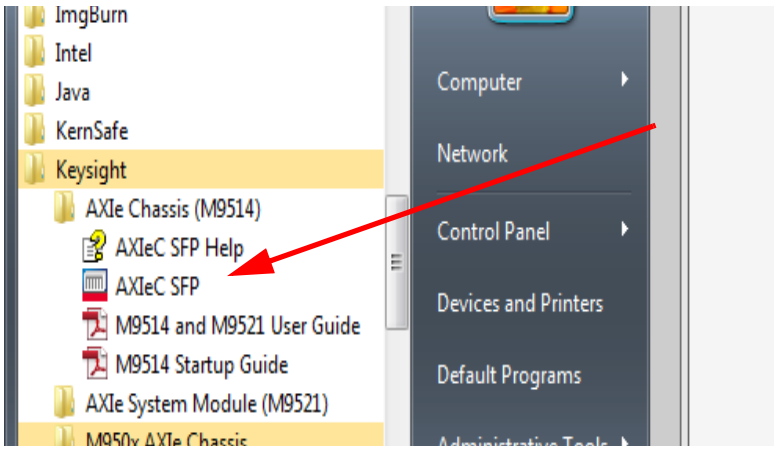
1. Insert the *Software and Product Information* CD in the host PC. If you do not have the CD or a CD drive on your PC, you can download the most recent version of the software at www.keysight.com/find/M9514A and www.keysight.com/find/M9521A.
2. Select the M9514A menu and click the **Install Driver Software** button and follow the browser prompts to install the drivers you will need.
3. Select the M9521A menu and click the **Install Driver Software** button and follow the browser prompts to install the drivers you will need.

Once the software is installed, you can launch the SFP:

- For the M9514A AXIe Chassis SFP: Select the Windows **Start** button **> Keysight > AXIeC (Chassis Software) > AXIeC SFP**
- For the M9521A ASM SFP: Select the Windows **Start** button **> Keysight > AXIeSM (AXIe System Module) > AXIeSM SFP**

Launch the Soft Front Panel

As mentioned previously, you can use either the Web Interface or the soft front panel (SFP) to monitor and control the chassis. To launch the SFP, click on the Windows **Start** button. Under **All Programs**, click on **Keysight**, then **AXIe Chassis (M9514)**, then **AXIeC SFP**.



Step 7: Next Steps

Now that you have completed basic Startup, Keysight recommends you read the *M9514A and M9521A User Guide*. To do so:

1. Insert the *Software and Product Information* CD in the host PC.

   When the *Software and Product Information CD* screen loads, you may access all chassis documentation as well as the ASM documentation—both CD-based and via Internet links—from the links in this screen.

2. Click product and then select the **User Guide** link to access the document on the CD.

Host PC/Chassis Interface Topics

This section describes 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 ASM, not to modules in the chassis slots.

1 If you are using an embedded controller such as the Keysight M9536A, communication with the ASM is through the chassis backplane; external PCIe and Ethernet connections from the embedded controller to the chassis are not required.

NOTE **With the Keysight M9536A Embedded Controller installed in the AXIe chassis, do not connect any PCIe cables to the PCIe 1 or PCIe 2 connectors on the ASM.**

2 If you are using a desktop or rackmount PC as the external host PC, you will need to install a compatible PCIe Cable Adapter in the PC. The following table lists compatible Keysight adapters:

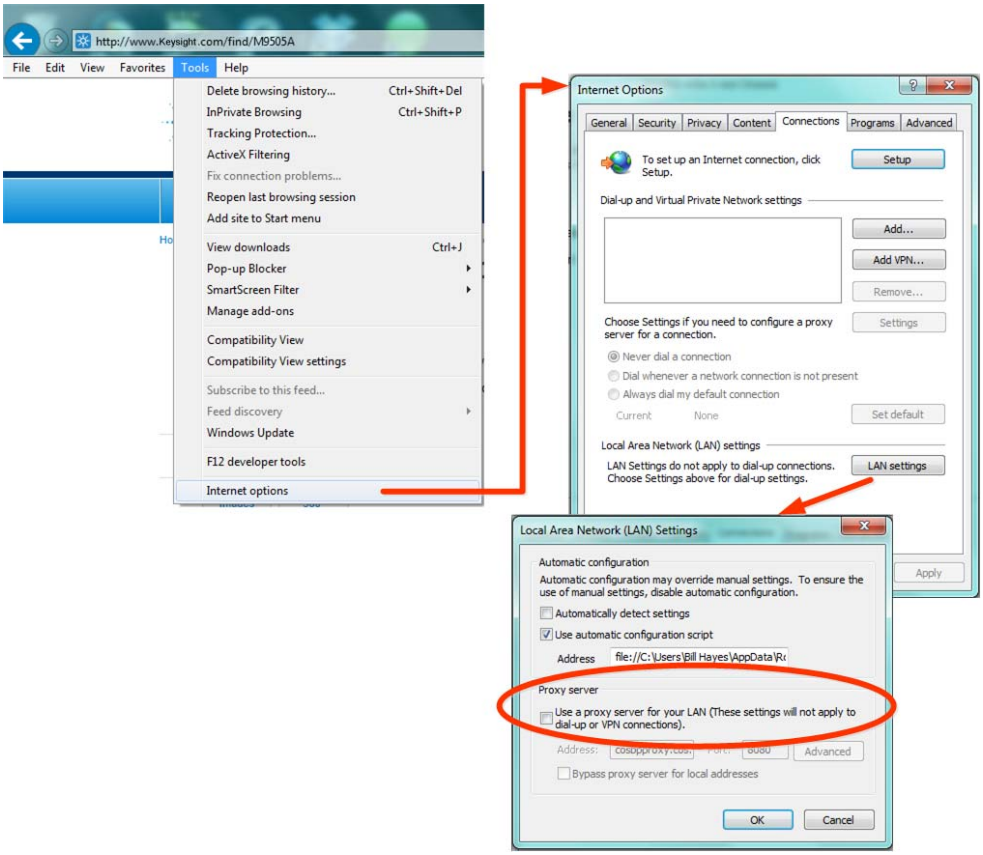
PCIe x8 Gen 2 Host Cable Adapter	PCIe x8 Cable
Keysight M9048A	Keysight Y1202A (2 meters)

3 ASM network communications over PCIe uses the TCP/IP network protocol because the chassis PCIe endpoint is a 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.

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

5 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 external host pc to the chassis, a private IP address beginning with 169.254 will likewise be assigned.

6 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) that is used to configure proxy server settings.



7 PCIe is logically an extension of the host PC backplane. If the PCIe interface is used to connect to the chassis, the chassis NIC appears to Windows as if it is installed directly in the PC.

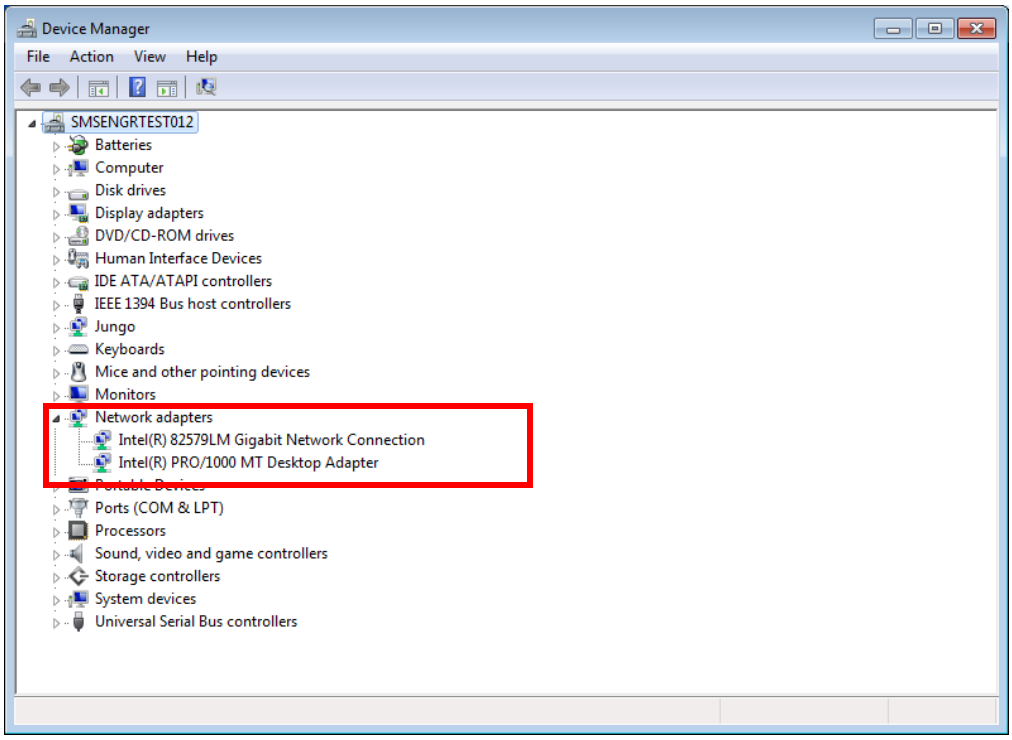
If you are using the PCIe interface to connect to the Keysight AXIe chassis, an Intel PCIe-to-LAN network adapter in the chassis will appear to Windows as a locally installed device in your PC. Most Windows versions provide the necessary Intel network driver for this adapter.

However, if you see the 'Found New Hardware Wizard' dialog on your PC, and if the dialog indicates that software needs to be installed for an Ethernet Controller, you will need to install the Intel PROWin32.exe network driver on your PC. To install this driver, please see the Intel instructions for the PROWin32.exe driver.

If you are interfacing to the chassis using only its LAN interface, the PCIe-to-LAN network adapter will not be visible to your PC, and the aforementioned driver does not need to be installed.

8 The example window below shows the Device Manager view of the PCI bus for a chassis that the NIC. This window was displayed by selecting **Control Panel** > **Device Manager**, then **Devices by connection** under the **Device Manager View** drop down menu. This information can be useful in both verifying connection to the

chassis (the Network Interface Controller or NIC) and verifying connection to the modules installed in the chassis.



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

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

11 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 powering-up the chassis.

12 If you have connected to the chassis using PCIe and/or LAN, and want to visually confirm that you are, in fact, communicating to the chassis that you believe you are communicating 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. Remember that the M9521A ASM has its own Front Panel Identification Indicator link which is available from the M9521A Web Interface.


M9514A | Products | Agilent
KEYSIGHT TECHNOLOGIES
M9514A AXIe 14 Slot Chassis
Welcome to your
Web-Enabled M9514A AXIe 14 Slot Chassis
Information about this Web-Enabled M9514A:
Instrument: M9514A
Serial Number: Fury
Description: M9514A AXIe 14 Slot Chassis
DNS Hostname: A-M9514A-Fury
IP Address: 156.140.95.64
mDNS Hostname: A-M9514A-Fury.local
mDNS Instrument Name: Agilent M9514A AXIe 14 Slot Chassis - Fury
VISA TCPIP Connect String: TCPIP::156.140.95.64::5025::SOCKET
Firmware Revision: F14AX-2.3.9-0305-0305-0305-0110-0110
Turn On Front Panel Identification Indicator
Advanced information about this Web-Enabled M9514A
Use the navigation bar on the left to access your M9514A and related information.
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AXIe
AdvancedTCA® with extensions for instrumentation and test

Service And Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your Keysight customer engineer through your local Keysight Technologies Service Center.

Keysight On The Web

You can find information about technical and professional services, product support, and equipment repair and service on the web: www.keysight.com

Select your country from the drop-down menu at the top. Under *Electronic Test and Measurement*, click on *Services*. The web page that appears next has contact information specific for your country.

Keysight by phone

If you do not have access to the Internet, call one of the numbers in the table below:

Keysight Call Centers and Regional Headquarters	
United States and Canada:	Test and Measurement Call Center (800) 452 4844 (toll-free in US)
Europe:	(41 22) 780 8111
Japan:	Measurement Assistance Center (81) 0426 56 7832
Latin America:	305 269 7548
Asia-Pacific:	(85 22) 599 7777

Product Warranty

To find warranty information on your M9514A AXIe chassis, go to www.keysight.com/find/warranty and enter your model number in the **Product Number** field, and enter the serial number from the chassis rear panel in the **Serial No.** field.

Chassis Accessories

The following user-replaceable assemblies and accessories are available from Keysight. Only Keysight approved accessories shall be used:

Accessory	Keysight Model Number
Single Slot AXIe Filler Panel	Y1221A
AXIe MultiFrame Cable 0.5 m	Y1223A
AXIe MultiFrame Cable 3.0m	Y1223A
Rail Kit (for rack mounting)	Y1229A
Protective Cover	Y1234A
Power Cord: 1-phase, 250 VAC, NEMA L6-30, 2.5 M (8.2 feet)*	Y1235A
Power Cord: 3-phase, 240 VAC, IEC 60309, 2.5 M (8.2 feet)*	Y1236A
Power Cord: 3-phase, 240 VAC, NEMA L22-30, 2.5 M (8.2 feet)*	Y1237A
Power Cord: 3-phase, 240 VAC, Stripped End, 2.5 M (8.2 feet)*	Y1238A

* These are the power cord ratings. The Keysight M9514A chassis AC input is rated to 240 VAC line-to-line. See Appendix A in the M9514A Site Preparation Guide for power cord information.

Other parts originally supplied with the chassis may be available from Keysight. Go to Keysight's Test and Measurement Online Store for a current parts list, or contact Keysight Service.

Safety-Related Specifications

This section (next page) provides a partial set of safety-related specifications for the Keysight M9514A AXIe chassis. Complete specifications are included in the Keysight *M9514A Data Sheet*.

CHASSIS CHARACTERISTICS	
Size[1]	482.6 mm W x 589.7 mm H x 579.1 mm D (19 in W x 23.2 in H x 22.8 in D)
Weight (nom)	48.7 kg (107 lbs)[2]

[1] From front handle to IEC 60309 AC power connector. Top cover to rubber feet.
[2] Without modules

Power supply characteristics	
AC input	
Operating voltage range	
Single Phase or 3-Phase Delta	200-240 VAC
3-Phase Wye	200/415 VAC
Input frequency range	50-60 Hz
Input current	24 Arms
Overcurrent protection	auto recovery
Efficiency (typical)	85-93%
DC supply	
DC Output	–52 V
Total DC module power	2800 W
Total max module current	53.8A
Load regulation	2%
Maximum ripple and noise (20 MHz BW)	500 mV pk-pk
Chassis cooling and power dissipation	
Slot airflow direction	Bottom to top
Chassis cooling intake	Bottom front of chassis
Chassis cooling exhaust	Top rear of chassis
Chassis cooling fans	HIGH/Auto speed selector six 252.85 cfm fans in three front fan trays ten 138.0 cfm fans in rear fan tray
Power dissipation, instrument slot	200 W maximum

Environmental*,†,‡		
Operating and storage conditions		
	Operating	Storage
Temperature	0°C to 50°C	-25°C to 60°C
Altitude	up to 3000 meters	up to 4600 meters
Humidity	Type tested at 95%, +40°C (non-condensing)	
Vibration		
Operating random vibration: type tested at 5 to 500 Hz, 0.21 g rms		
Survival random vibration: type tested at 5 to 500 Hz, 2.09 g rms		
M9514A Acoustical emissions (LWA dB, ref 1pW)		
	Maximum	Nominal (25°C ambient)
Sound Pressure**	79 dBA	67 dBA
Sound Power	89dBA	77 dBA

* Characteristics apply to both M9514A and M9521A unless otherwise noted.

† Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation and end-use; those stresses include but are not limited to temperature, humidity, shock, vibration, altitude, and power line conditions.

‡ Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.

**At operator position.

Regulatory*
Safety
Complies with European Low Voltage Directive IEC/EN 61010-1 Canada: CSA C22.2 No. 61010-1 USA: UL std no. 61010-1
EMC
Complies with European EMC Directive IEC/EN 61326-1 CISPR Pub 11 Group 1, Class A AS/NZS CISPR 11 ICES/NMB-001 This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme Cet appareil ISM est conforme a la norme NMB-001 du Canada

* Characteristics apply to both M9514A and M9521A

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