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# M8000 Series of BER Test Solutions

M8020A High-Performance BERT

M8040A High-Performance BERT 64 GBd

M8050A High-Performance BERT 120 GBd

# Notices

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### CAUTION

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


## Safety Summary

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. Product manuals are provided with your instrument on CD-ROM and/or in printed form. Printed manuals are an option for many products. Manuals may also be available on the Web. Go to [www.keysight.com](http://www.keysight.com) and type in your product number in the Search field at the top of the page.



General	<p>This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.</p> <p>All Light Emitting Diodes (LEDs) used in this product are Class 1 LEDs as per IEC 60825-1.</p>
Environment Conditions	<p>This instrument is intended for indoor use in an overvoltage category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 95% and at altitudes of up to 2000 meters.</p> <p>Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.</p>
Before Applying Power	<p>Verify that all safety precautions are taken. The power cable inlet of the instrument serves as a device to disconnect from the mains in case of hazard. The instrument must be positioned so that the operator can easily access the power cable inlet. When the instrument is rack mounted the rack must be provided with an easily accessible mains switch.</p>
Ground the Instrument	<p>To minimize shock hazard, the instrument chassis and cover must be connected to an electrical protective earth ground. The instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) 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.</p>
Do Not Operate in an Explosive Atmosphere	<p>Do not operate the instrument in the presence of flammable gases or fumes.</p>
Do Not Remove the Instrument Cover	<p>Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified personnel.</p> <p>Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.</p>
External Connections	<p>Any other instruments connected to this instrument shall be approved to a suitable safety standard and must include reinforced insulation from hazardous voltages, in particular mains.</p>

# Safety Symbols

Table 1      Safety Symbol



Symbol	Description
	Indicates warning or caution. If you see this symbol on a product, you must refer to the manuals for specific Warning or Caution information to avoid personal injury or damage to the product.
	Frame or chassis ground terminal. Typically connects to the equipment's metal frame.
	KC is the Korean certification mark to demonstrate that the equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.
	Contains parts or assemblies susceptible to damage by electrostatic discharge (ESD). Use electrostatic discharge protective handling procedures to avoid malfunctions or potential damage to the instruments.
	Indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.
	The RCM Mark is a compliance mark to the ACMA (Australian Spectrum Management Agency). This indicates compliance with all Australian EMC regulatory information.
	Indicates that the product was tested and has met the certification requirements for electrical, plumbing and/or mechanical products.



Symbol	Description
	<p>The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.</p> <p>CAN ICES/NMB-001(A) - This ISM device complies with the Canadian ICES-001(A).</p> <p>Cet appareil ISM est conforme a la norme NMB-001(A) du Canada.</p> <p>ISM GRP 1-A - This is an Industrial Scientific and Medical (ISM) Group 1 Class A product.</p>
	<p>This symbol on all primary and secondary packaging indicates compliance to China standard GB 18455-2001.</p>

# Compliance and Environmental Information

Table 2      Compliance and Environmental Information

Safety Symbol	Description
	<p>This product complies with WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.</p> <p>Product Category: With reference to the equipment types in WEEE Directive Annex I, this product is classed as a “Monitoring and Control instrumentation” product.</p> <p>Do not dispose in domestic household waste.</p>
	<p>To return unwanted products, contact your local Keysight office, or see <a href="http://about.keysight.com/en/companyinfo/environment/takeback.shtml">http://about.keysight.com/en/companyinfo/environment/takeback.shtml</a> for more information.</p>

## About This Guide

This guide provides detailed information for installing Keysight M8000 modules, including the Keysight M9537A AXIe Embedded Controller, AXIe System Module (ASM) in the Keysight M9505A/M9506A/M9514A AXIe chassis. The procedures in this guide are not required for “bundled” systems such as the M8020A-BU1, M8020A-BU2, M8040A-BU1, M8040A-BU2, M8040A-BU3, M8050A-BU2, M8050A-BU3, M8050A-BU4 or M8050A-BU5. For these systems, refer to the *Keysight M8000 Series BER Test Solutions Getting Started Guide*, *Keysight M8040A Getting Started Guide* and *Keysight M8050A Getting Started Guide*.

After performing the procedures in this document, you are directed to procedures in the *Keysight M8000 Series BER Test Solutions Getting Started Guide*, *Keysight M8040A Getting Started Guide* and *Keysight M8050A Getting Started Guide* to complete the installation.



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# 1 System Requirements

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This chapter provides information about possible configurations for Keysight M8020A, M8040A and M8050A systems.

## Hardware and Software Requirements

The following are the hardware and software requirements that should be met before the installation of software components on the controller (host computer):

### Minimum hardware requirements

- Pentium® processor 1 GHz or equivalent
- 16 GB available RAM
- USB 3.0 connection
- PCIe 2.0/8x (only for highest data throughput and desktop PC)
- VGA resolution 1024 x 768
- 1.5 GB or more free hard disc space

### Software requirements

- Windows 10 or Windows 11
- Keysight IO Libraries Suite 2024 Update 2 Build 21.1.17 or higher

### NOTE

The M8070B software is required to control the M8020A, M8040A and M8050A systems.

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### NOTE

In case of M8020A, PCIe connectivity between the M9505A AXIe Chassis and an external desktop PC controller is recommended when full channel plus large patterns need to be downloaded.

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## Hardware Configurations for M8020A

The following section describes and illustrates various setup combinations in which you can install the M8020A modules.

### NOTE

The M8041A module must be installed in slots 1 through 3 of the M9505A/M9506A AXIe Chassis for proper local bus communication unless the M9537A AXIe Embedded Controller is installed (must be in slot 1).

### M8020A Base System Configuration

The base configuration is a single channel system (a second channel can be added with license) consisting of the 5-slot M9505A AXIe Chassis and an M8041A module. The M8041A occupies three slots. A maximum of two M8020A modules can be installed in a 5-slot chassis.



Figure 1 M8020A configuration for 16 Gb/s BERT with 1 to 2 channel

## M8020A Four Channel System Configuration

The four channel configuration consists of the 5-slot M9505A AXIe Chassis, an M8041A module, and an M8051A module. The M8041A occupies three slots and the M8051A occupies two slots.

### NOTE

This configuration requires a cable (provided with the M8051A) that connects the M8041A SYNC OUT to the M8051A SYNC IN to synchronize the two modules to a common system clock.

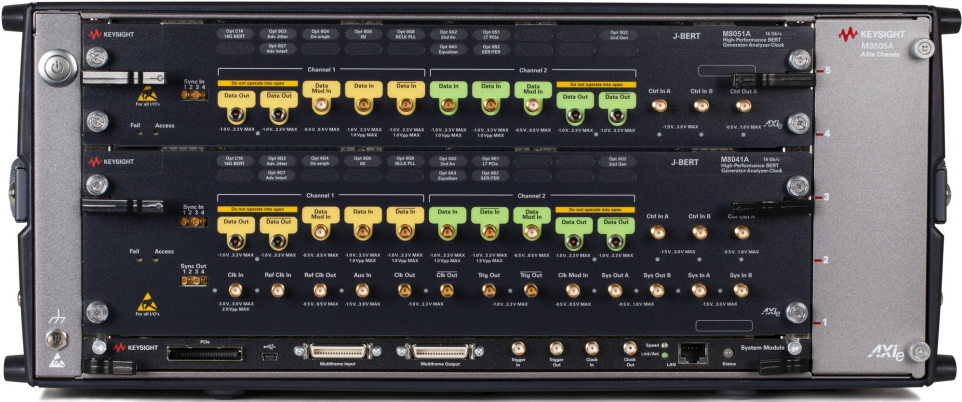


Figure 2 M8020A configuration for 16 Gb/s BERT for up to 4 channels

## M8062A 32Gb/s Front-end for J-BERT M8020A High-Performance BERT

A typical configuration for an M8020A 32 Gb/s full BERT consists of the 5-slot M9505A AXIe Chassis, an M8041A module, and an M8062A module. The M8041A occupies three slots and the M8062A occupies two slots.



Figure 3 M8020A configuration for 32 Gb/s BERT

### Single M8020A LAN Network Configuration

Multiple engineers can all be connected to a single M8020A via a LAN network and controlled using the M8070B software running on a host PC. The host PC tracks the number of licenses checked out and the number of licenses available for use. In addition, the host PC can be a dedicated computer running the license server or it can also run the M8070B software concurrently. The M9537A AXIe Embedded Controller can also be used as the host PC in this configuration.

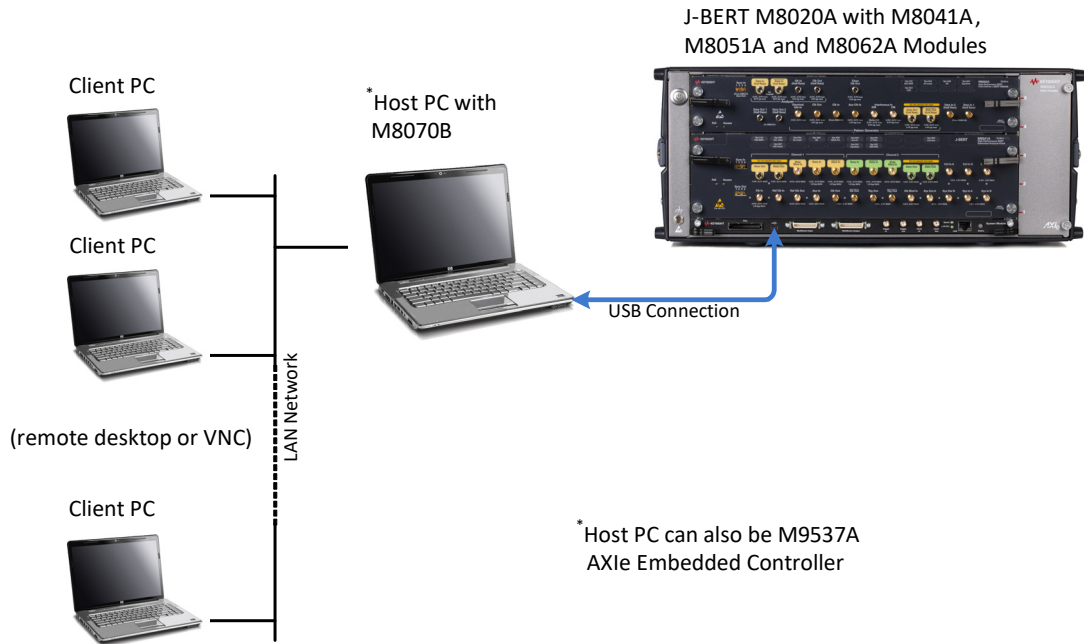


Figure 4 Single M8020A LAN network configuration

## Hardware Configurations for M8040A

The M8040A is a modular test solution which simplifies accurate receiver characterization of devices operating up to 32 and 64 Gbaud with NRZ and PAM4. It supports the following modules.

- M8045A pattern generator
- M8046A analyzer
- M8057A/B remote head

The following section describes and illustrates various setup combinations in which you can install the M8040A modules.

### M8045A Pattern Generator Module

The M8045A module can be a one or two data channel system (a second channel can be added with license). A one channel instrument has to be returned to the factory for installing the second channel (hardware) and license. It occupies three slots of the 5-slot M9505A/M9506A AXIe chassis. The following figure illustrates an M8045A module (two data channel system) installed in an M9505A/M9506A AXI chassis.



Figure 5 M8045A configuration for 2 channels

### NOTE

The M8045A module must be installed in slots 1 through 3 of the M9505A/M9506A AXIe chassis unless the M9537A AXIe Embedded Controller is installed (must be in slot 1).



M8046A Analyzer Module

The M8046A module occupies single slot of the 5-slot M9505A/M9506A AXIe chassis. The following figure illustrates an M8045A module with M8046A module installed in an M9505A/M9506A AXI chassis.



Figure 6 M8045A and M8046A configuration

M8057A/B Remote Head

The M8057A/B remote head is connected to each channel of M8045A module, using the matched pair of cables. It helps in minimizing signal degradations caused by lossy channels. The following figure illustrates an M8057A/B remote head connected with one channel of M8045A module.



Figure 7 M8045A, M8046A and M8057A/B configuration



## M8040A LAN Network Configuration

Multiple engineers can all be connected to a single M8040A via a LAN network and controlled using the M8070B software running on a host PC. The host PC tracks the number of licenses checked out and the number of licenses available for use. In addition, the host PC can be a dedicated computer running the license server or it can also run the M8070B software concurrently. The M9537A AXIe Embedded Controller can also be used as the host PC in this configuration.

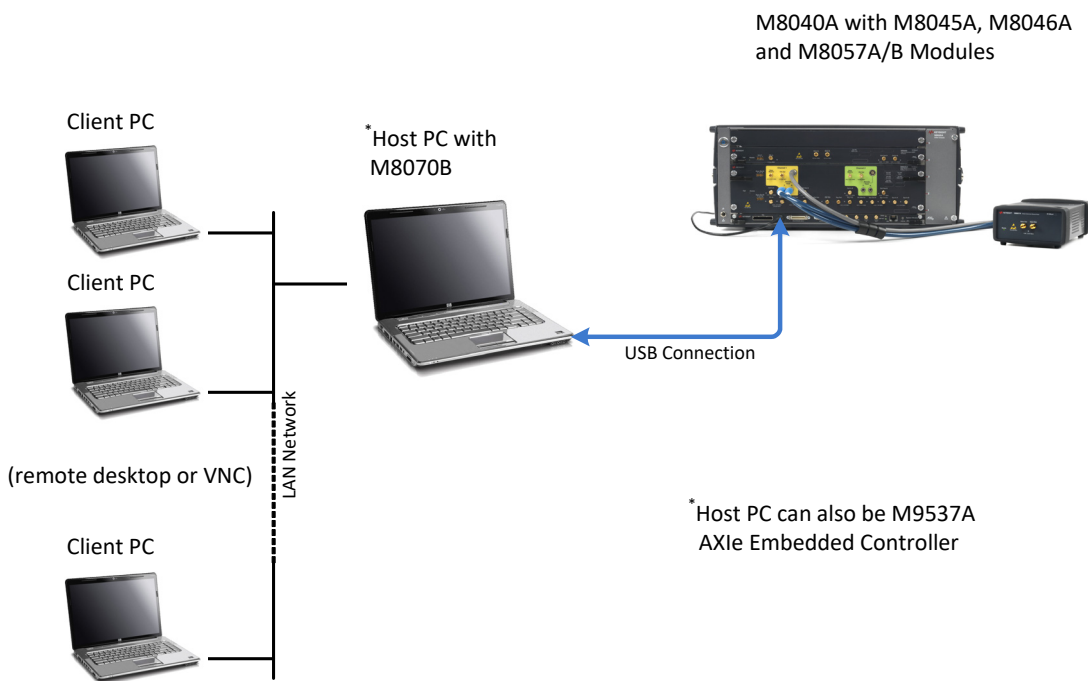


Figure 8 M8040A LAN network configuration

## Hardware Configurations for M8050A

The M8050A is a modular test solution which enables accurate characterization of receivers used in next generation data center networks and server interfaces with symbol rates up to 120 GBd. It supports the following modules.

- M8042A Pattern Generator Module
- M8043A Error Analyzer Module
- M8009A Clock Module
- M8058A/M8059A/M8068A/M8069A Remote Heads for M8042A Pattern Generator
- M8052A Remote Head for M8043A Error Analyzer

The following section describes and illustrates various setup combinations in which you can install the M8050A modules.

### M8042A Pattern Generator Module

The M8042A pattern generator module operates from 2 to 120 GBd. It is available as one channel or two channel version. The one channel version occupies two slots while the two channel version occupies three slots in the M9505A 5-slot AXIe chassis. The M8042A pattern generator module must always be installed in the slot immediately above the M8009A. The following figure illustrates an M8042A module (two data channel system) installed in an M9505A/M9506A AXI chassis.



Figure 9 M8009A, M8042A (two channels) configuration

**NOTE**

The M9537A AXIe Embedded Controller must be installed in slot 1 of the M9505A/M9506A AXIe chassis. The M8009A clock module must be installed in slot 2, the M8042A single channel module must be installed in slots 3 through 4 and the M8042A two channel module must be installed in slots 3 through 5 of the M9505A/M9506A AXIe chassis.

## M8043A Error Analyzer Module

The M8043A error analyzer module operates from 2 to 64.4 GBd and it is a one channel version. The M8043A module occupies two slots of the 5-slot M9505A/M9506A AXIe chassis. The following figure illustrates an M8043A module with M8042A module (one channel) and M8009A clock module installed in an M9505A/M9506A AXI chassis.



Figure 10 M8009A, M8042A (one channel) and M8043A configuration

In case of installing an M8042A module (two channels) and an M8009A clock module in an M9505A/M9506A AXI chassis, the M8043A module must be installed in separate M9502A/M9505A/M9506A AXI chassis.

## M8050A Remote Heads

The family of M8050A remote heads include M8058A, M8059A, M8068A, M8069A for the M8042A Pattern Generator and the M8052A for the M8043A Error Analyzer. The M8050A remote heads are connected to M8050A modules, using signal and control cables. They allow to generate and probe signals directly at the DUT. The M8050A specifications according to the M8050A data sheet are valid at the end of the ~150 mm cables of the remote heads. The M8042A pattern generator and M8043A error analyzer require a remote head. This means operation without their dedicated remote head is not possible.

### Remote Heads for M8042A Pattern Generator

The M8058A/M8059A remote head includes an external amplifier that is used in combination with the M8042A Pattern Generator. The 64 GBd M8058A remote head is used to allow close connection to the device under test for symbol rates up to 64.8 GBd. The 120 GBd M8059A remote head is used to allow close connection to the device under test for symbol rates up to 120 GBd.

The three cables on the back side of the remote head are used to connect with each channel of M8042A Pattern Generator module. [Figure 11](#) on page -24 shows the M8058A and M8059A remote heads:

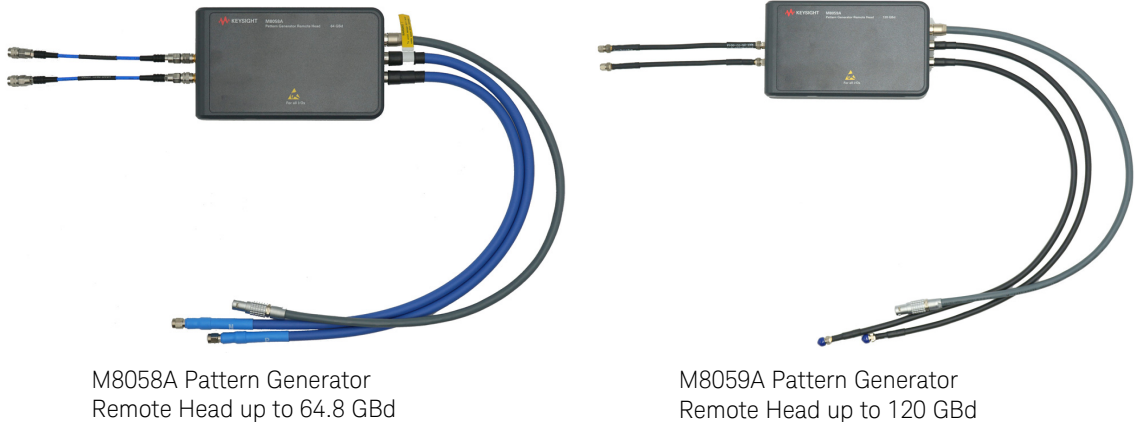


Figure 11 M8058A and M8059A Remote Heads for M8042A Pattern Generator

The M8068A/M8069A remote head includes an external amplifier that is used in combination with the M8042A Pattern Generator. The 64 GBd M8068A remote head is used to allow close connection to the device under test for symbol rates up to 64.8 GBd. The 120 GBd M8069A remote head is used to allow close connection to the device under test for symbol rates up to 120 GBd.

The three cables on the back side of the remote head are used to connect with each channel of M8042A Pattern Generator module. **Figure 12** on page -25 shows the M8068A and M8069A remote heads:



M8068A Pattern Generator  
Remote Head up to 64.8 GBd



M8069A Pattern Generator  
Remote Head up to 120 GBd

Figure 12 M8068A and M8069A Remote Heads for M8042A Pattern Generator

### Remote Head for M8043A Error Analyzer

The M8052A remote head includes an external amplifier and a CTLE that is used in combination with the M8043A Error Analyzer.

The two cables on the back side of the remote head are used to connect with the M8043A Error Analyzer module. [Figure 13](#) on page -26 shows the M8052A remote head:



M8052A Error Analyzer  
Remote Head

Figure 13 M8052A Remote Head for M8043A Error Analyzer

## 2 Installing Modules

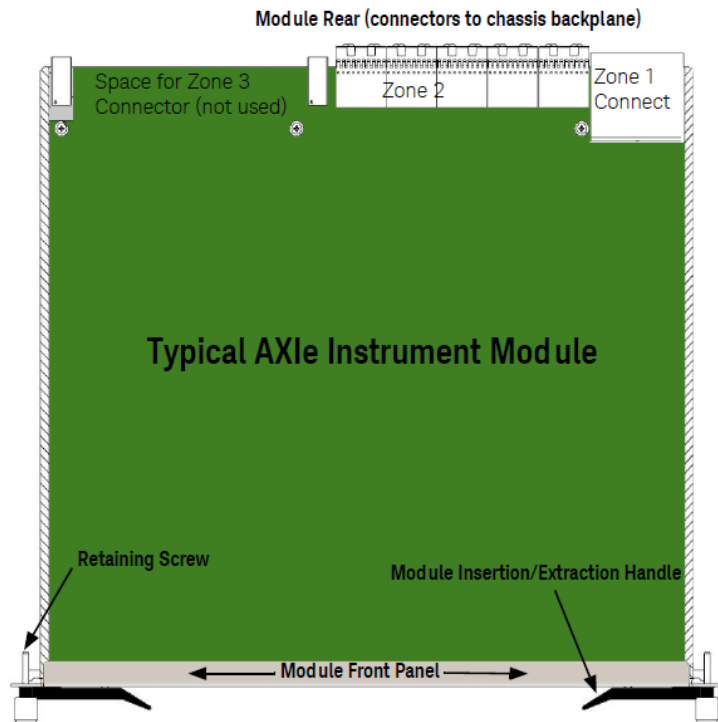
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This chapter provides hardware installation procedures for M8020A, M8040A and M8050A modules.

## AXIe Instrument Modules

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

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.



### M9505A AXIe Chassis

The M9505A AXIe chassis is a modular instrument chassis that supports complex and high density testing. The chassis provides five slots for installing multiple AXIe based instrument modules such as the M8045A, M8046A, etc. Besides providing a frame for the installation of these instrument modules, the M9505A AXIe chassis also provides power, a cooling system, a PCIe Gen2 local data bus, a Gigabit LAN interconnect, and a USB and PCIe connection for external host computer connectivity.

#### NOTE

The USB connection is recommended when using a laptop or desktop PC as an external controller. The PCIe connection is recommended for use with a desktop PC as an external controller only.

#### NOTE

PCIe connectivity between the M9505A AXIe Chassis and an external desktop PC controller is recommended when full channel plus large patterns need to be downloaded.

Refer to the *Keysight M9505A AXIe Chassis Startup Guide* to get detailed information about the AXIe chassis.



Figure 14 M9505A 5-slot chassis

## M9506A AXIe Chassis

The Keysight M9506A AXIe chassis is a modular instrument chassis fully compatible with the AXIe Wide PCIe specification. It allows multiple application-specific instrument modules to share a common chassis frame, power supply, cooling system, PCI Express (PCIe) x16 Generation (Gen) 3 backplane, Gigabit LAN hub, local bus for module-to-module signaling, and host PC connections. The full rack chassis provides five general purpose peripheral slots that accept 1U AXIe instrument modules.

Additional features include:

- Up to 300 W per slot power
- Five AXIe Wide compliant slots
- PCIe x16 Gen 3 Backplane allows module to module communication
- Default PCIe configuration merges both cable ports to one Gen 3 x16 PCIe Cable Port.
- Open AXIe Zone 3 for custom use (cable access, analog backplane, etc.)
- Thunderbolt™ 3 Connection Port<sup>1</sup>
- Cascaded PCIe for multiple chassis systems
- Parallel and Star Triggering
- Push-pull fan system for quieter operation

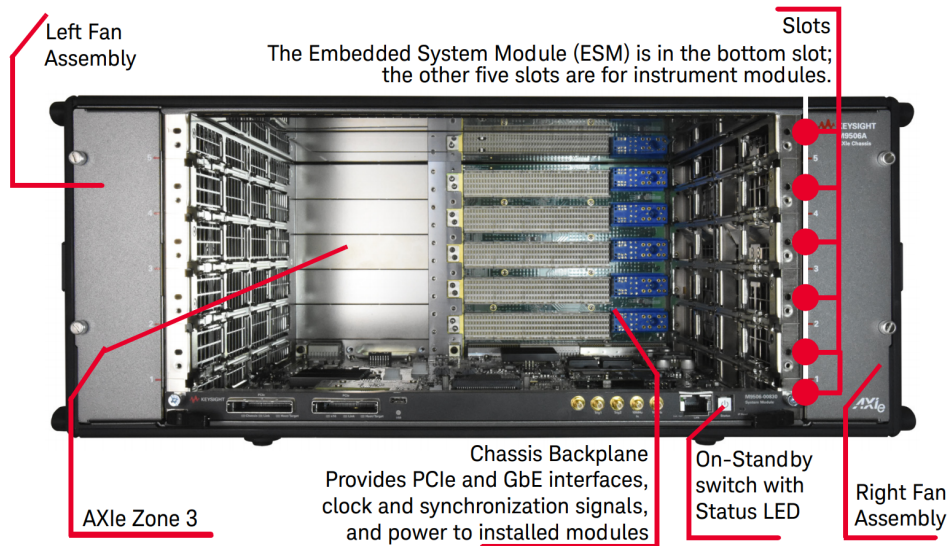
<sup>1</sup> Thunderbolt™ is the brand name of an interface standard developed by Intel (in conjunction with Apple) that allows connection of external peripherals to a computer. Thunderbolt 3 specification provides Gen 3 PCI Express (PCIe), DisplayPort, and DC power in one USB-C compatible cable; only PCIe is supported on the M9506A. Charging devices such as laptop computers over Thunderbolt 3 is not supported on the M9506A.

The chassis includes a half-height Embedded System Module (ESM) that manages chassis functions. The ESM provides all ATCA (Advanced Telecommunications Computing Architecture) shelf manager functions, plus these AXIe extensions:

- Host PC connectivity (Gen 3 PCIe x8/x16, Thunderbolt 3, Ethernet)
- Sources timing signals (CLK100, SYNC, and FCLK)
- Routes STRIG (Star Trigger) to instruments through the backplane
- Two bi-directional trigger access ports route trigger signals through to the backplane parallel trigger bus and star triggers (STRIG) to each slot
- Provides backplane PCIe and Ethernet communication between modules

Other than a power button/status light (on the ESM), 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 M9537A) or remote (a rackmount, desktop, or laptop) PC.

The Gen 3 PCIe Cable Interface ports provides up to a 8GB/s (theoretical) for Gen 3 x8 and 16 GB/s (theoretical) for Gen 3 x16. The Thunderbolt 3 port provides a Gen 3 x4 link with up to 4 GB/s (theoretical) bandwidth.



Refer to the *Keysight M9506A 5-Slot AXIe Chassis Startup Guide* to get detailed information about the AXIe chassis.

## Installing M8020A Module(s)

### NOTE

The procedures in this section are not required if your system is an M8020A-BU1 or M8020A-BU2, which have their modules pre-installed.

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The M9505A AXIe chassis and M8020A module(s) will come in separate shipments. This section shows how to carefully insert a module in an empty slot of an M9505A AXIe chassis. The slots are identified by the slot numbers written on the front panel of the chassis.

### NOTE

If you plan to use the M9537A AXIe Embedded Controller as the host computer, then you must reserve slot 1 of the chassis for this module's installation.

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### CAUTION

- The instrument modules are not hot swappable. You must power down the AXIe chassis and host PC before inserting, replacing, or removing a module.
  - The enclosure surface of the instrument module may become hot during use. If you need to remove the module, first power down the AXIe chassis, allow the module to cool, and then pull the module out of the chassis.
-

To install the M8041A module



Figure 15 Installed M8041A module in slots 1 through 3

Ensure that the chassis is NOT powered up or connected to a power source while installing an instrument/embedded controller module.

- 1 If you are not installing the M9537A AXIe Embedded Controller, remove the filler panel modules that cover slots 1, 2, and 3. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.
- 2 If you are installing the M9537A AXIe Embedded Controller, remove the filler panel modules that cover slots 2, 3, and 4. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.

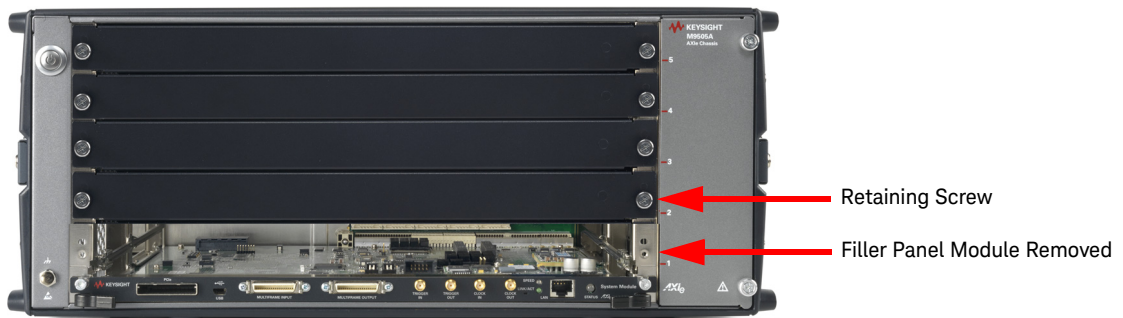


Figure 16 Filler panel module removed

- 3 Locate the module insertion/extraction handles at both ends of the instrument module. Extend the ends of both handles, by pulling them inwards towards each other. Then fully open the handles by pivoting them out towards you.
- 4 Align the module's PCA board with the guide rails on both ends of the M9505A AXIe chassis.
- 5 Push the module into the chassis slot until the leading edges of the insertion/extraction latches rest against the front surface of the chassis. The insertion/extraction latch handles should be perpendicular to the front surface of the chassis (aligned with the direction of module insertion). Nudge the module gently inward to allow the latches to engage.
- 6 Using your thumbs, press inward firmly on the insertion/extraction handles until the module is seated firmly in the chassis backplane. The module front panel should lie flush with the chassis front panel.
- 7 Push the handles ends towards the edge of the chassis to tuck them away.
- 8 Tighten the retaining screws on either end of the module to ensure the ground connection.

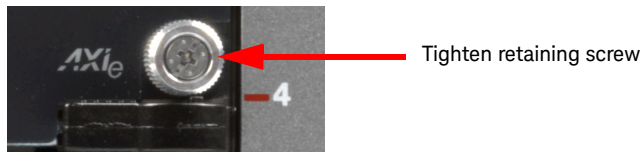


Figure 17 Tighten retaining screws

After you have installed the module in the chassis, ensure that remaining slots have filler panel modules installed.

## NOTE

Do not operate the chassis without filler panels in empty slots. This is especially important for the slots on either side of the 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 can cause the module to shut down.

To install the M8041A and M8051A modules

The M9505A AXIe chassis has 5 slots for installing M8020A instrument modules. Install the M8041A in slots 1 through 3 and the M8051A in slots 4 and 5.



Figure 18 Installed M8041A and M8051A module

Ensure that the chassis is NOT powered up or connected to a power source while installing an instrument /embedded controller module.

- 1 Remove the filler panel modules that cover slots 1 through 5. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.

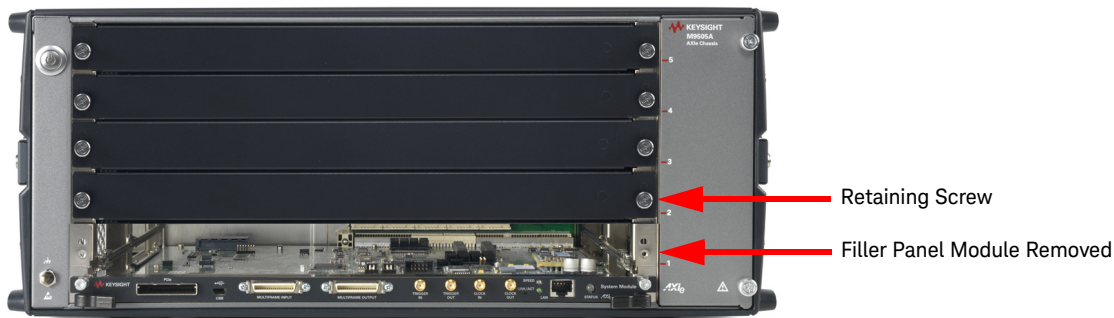


Figure 19 Filler panel module removed

- 2 Locate the module insertion/extraction handles at both ends of the instrument module. Extend the ends of both handles by pulling them inwards towards each other. Then fully open the handles by pivoting them out towards you.
- 3 Align the module's PCA board with the guide rails on both ends of the M9505A AXIe chassis. If the module has metal plates covering the board, be sure to insert the PCA board and not the metal plates into the rails.
- 4 Push the module into the chassis slot until the leading edges of the insertion/extraction latches rest against the front surface of the chassis. The insertion/extraction latch handles should be perpendicular to the front surface of the chassis (aligned with the direction of module insertion). Nudge the module gently inward to allow the latches to engage.
- 5 Using your thumbs, press inward firmly on the insertion/extraction handles until the module is seated firmly in the chassis backplane. The module front panel should lie flush with the chassis front panel.
- 6 Push the handle ends towards the edge of the chassis to tuck them away.
- 7 Tighten the retaining screws on either end of the module to ensure the ground connection.

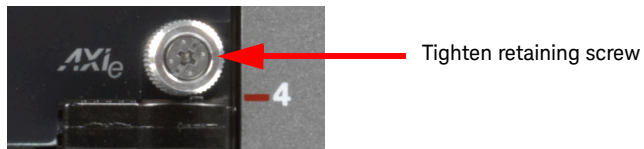


Figure 20 Tighten retaining screws

- 8 Locate the synchronization cable that was shipped with the M8051A module as shown in [Figure 21](#) on page -36.



Figure 21 Standard synchronization cable M8041-61601



**NOTE**

This configuration requires the synchronization cable (provided with the M8051A) which connects the M8041A SYNC OUT to the M8051A SYNC IN to synchronize the two modules to a common system clock.

While connecting a module which requires the sync cable connection (e.g. M8051A, M8062A) to the test setup, make sure to connect the sync cable after completing the other connections and also remove the sync cable first while disconnecting the connections.

- 9 Route the synchronization cable as shown in Figure 22 on page -37 using the two self-adhesive cable holders.

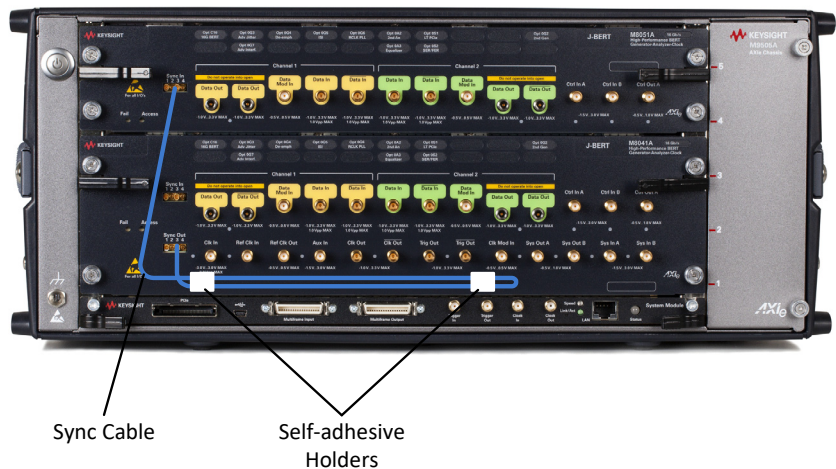


Figure 22 Synchronization cable routing

To install the M8041A and M8062A modules

The M9505A AXIe chassis has 5 slots for installing M8020A instrument modules. Install the M8041A in slots 1 through 3 and the M8062A in slots 4 and 5.



Figure 23 Installed M8041A and M8062A module

Ensure that the chassis is NOT powered up or connected to a power source while installing an instrument/embedded controller module.

- 1 First, remove the filler panel modules that cover slots 1 through 5. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.

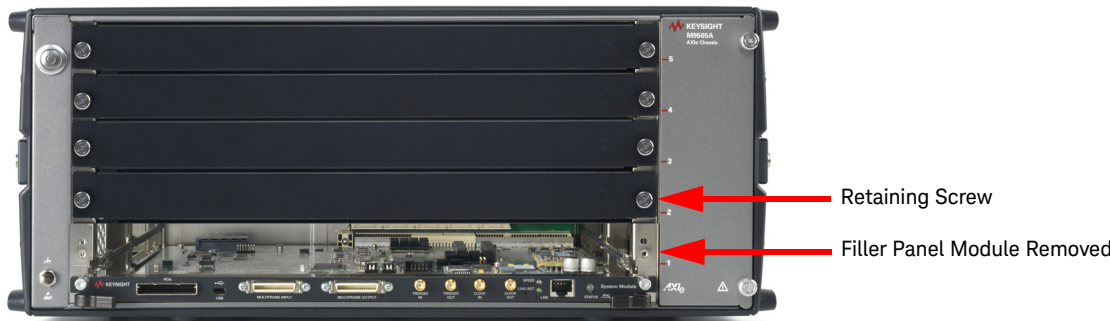


Figure 24 Filler panel module removed

- 2 Locate the module insertion/extraction handles at both ends of the instrument module. Extend the ends of both handles by pulling them inwards towards each other. Then fully open the handles by pivoting them out towards you.
- 3 Align the module's PCA board with the guide rails on both ends of the M9505A AXIe chassis. If the module has metal plates covering the board, be sure to insert the PCA board and not the metal plates into the rails.
- 4 Push the module into the chassis slot until the leading edges of the insertion/extraction latches rest against the front surface of the chassis. The insertion/extraction latch handles should be perpendicular to the front surface of the chassis (aligned with the direction of module insertion). Nudge the module gently inward to allow the latches to engage.
- 5 Using your thumbs, press inward firmly on the insertion/extraction handles until the module is seated firmly in the chassis backplane. The module front panel should lie flush with the chassis front panel.
- 6 Push the handles ends towards the edge of the chassis to tuck them away.
- 7 Tighten the retaining screws on either end of the module to ensure the ground connection.

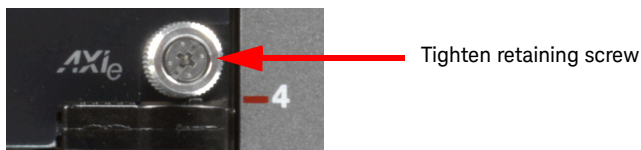


Figure 25 Tighten retaining screws

To remove an M8020A module

### CAUTION

The enclosure surface of the module may become hot during use. If you need to remove the module, first power down the M9505A AXIe chassis, allow the module to cool, and then pull the module out of the chassis.

- 1 Loosen the retaining screws on both ends of the module until the module is completely disengaged to prevent damaging your chassis or module.

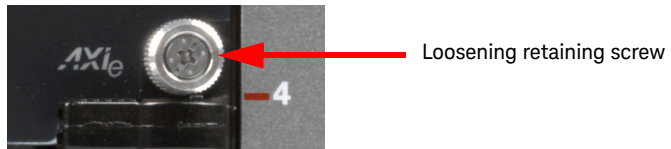


Figure 26 Loosening retaining screws

- 2 Extend the ends of both module insertion/extraction handles, by pulling them inwards towards each other.



Figure 27 Removing an instrument module

- 3 To remove the module: Open the module insertion/extraction handles by pivoting them out towards you. This unseats the module from the chassis backplane.
- 4 Once the module is unseated, use the module insertion/extraction handles by pulling directly outward to remove the module from the chassis.

**CAUTION**

Do not remove the AXIe ESM, which is integral to the operation of the chassis. An AXIe ESM that needs servicing should be removed by Keysight personnel only.

---

## Setting up the M8020A

### Benchtop Configuration

If you want to use the M8020A in a benchtop configuration, then retain the plastic bumpers and carry handle(s) for benchtop use.

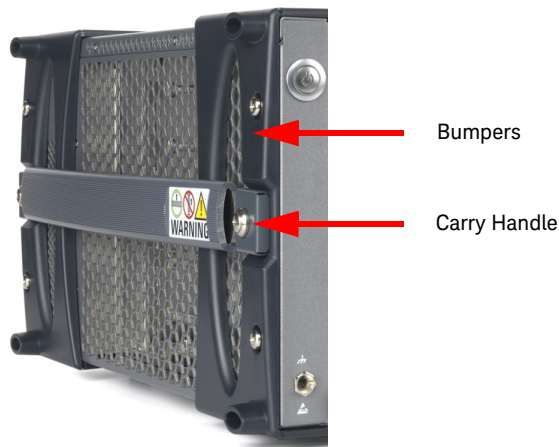


Figure 28 Chassis bumpers and carry handles

If you want to install the M8061-64761 support AXIe chassis to support an oscilloscope placed on top of the M8020A:

- 1 Place the M8061- 64761 on top of the M8020A.
- 2 Attach the assembly to the top of the M8020A with screws provided.

### Rack Mounted Configuration

If you want to use the M8020A in a rack mounted configuration:

- 1 Remove the bumpers and carry handle(s) from the chassis. The procedure and tools needed to remove these is documented in the Keysight M9502A/M9505A AXIe chassis User's Guide which is available on [www.keysight.com](http://www.keysight.com).
- 2 Attach the rack mount brackets to the chassis and mount onto a rack. The rack mount brackets are available in the Keysight rack mount kit that you can order for the chassis. Refer to this kit for rack mounting instructions.

### Installing the AXIe Embedded Controller Module

If you plan to use the Keysight M9537A Embedded Controller as the host computer, then:

- 1 Install this module in slot 1 of the M9505A/M9506A AXIe chassis.

#### NOTE

**This module must be installed in slot 1 of the M9505A/M9506A AXIe chassis.**

---

- 2 Connect the keyboard, mouse, and monitor to various ports available on the front panel of the M9537A Embedded Controller.
- 3 If needed, connect the M9537A Embedded Controller to LAN using the GbE LAN port on the front panel of this module. You need Internet connectivity later to perform firmware upgrades, download instrument module control software, or the latest Keysight I/O libraries suite.

#### NOTE

**Do not use the ESM LAN port as the remote control port. Use the LAN port of the controller (on M9537A or external PC).**

---

#### NOTE

**You do not need to manually establish any external PCIe/USB or LAN connection between the M9537A AXIe Embedded Controller and M8020A because this controller communicates with the ESM through the chassis backplane.**

**You do not need to manually install any operating system or drivers for this module. The Windows 7 (64 bit) operating system is pre-installed based on your choice and the module is ready to use as the host computer.**

---

The following figure displays the M9537A Embedded Controller installed in slot 1 of the M9505A/M9506A AXIe chassis.



Figure 29 M9537A embedded controller with M8041A

For more information on M9537A Embedded Controller module, refer to the datasheet:

<https://www.keysight.com/us/en/assets/7018-05230/data-sheets/5992-1530.pdf>

## NOTE

The M9537A Embedded Controller module will successfully connect with M8020A only when installed in slot 1 of the M9505A/M9506A chassis. Make sure that you install the module in the M8020A before powering up the complete setup.

## NOTE

You should not connect the M8020A to multiple operating host computers at the same time. If you plan to use the M9537A AXIe Embedded Controller as the host computer, then do not connect an external host computer to the M8020A.



## Installing M8040A Module(s)

### NOTE

The procedures in this section are not required if your system is an M8040A-BU1, M8040A-BU2 or M8040A-BU3 which have their modules pre-installed.

---

The M9505A/M9506A AXIe chassis and M8040A module(s) will come in separate shipments. This section shows how to carefully insert a module in an empty slot of an M9505A/M9506A AXIe chassis. The slots are identified by the slot numbers written on the front panel of the chassis.

### NOTE

If you plan to use the M9537A AXIe Embedded Controller as the host computer, then you must reserve slot 1 of the chassis for this module's installation.

---

### CAUTION

- The instrument modules are not hot swappable. You must power down the AXIe chassis and host PC before inserting, replacing, or removing a module.
  - The enclosure surface of the instrument module may become hot during use. If you need to remove the module, first power down the AXIe chassis, allow the module to cool, and then pull the module out of the chassis.
-

To install the M8045A module



Figure 30 Installed M8045A module in slots 1 through 3

Ensure that the chassis is NOT powered up or connected to a power source while installing an instrument/embedded controller module.

- 1 If you are not installing the M9537A AXIe Embedded Controller, remove the filler panel modules that cover slots 1, 2, and 3. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.
- 2 If you are installing the M9537A AXIe Embedded Controller, remove the filler panel modules that cover slots 2, 3, and 4. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.

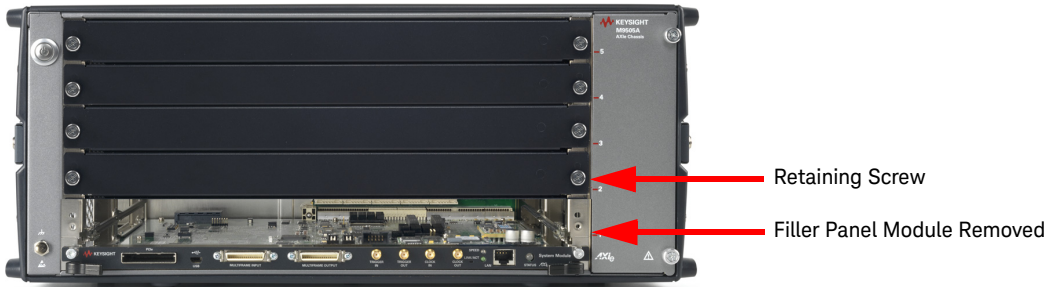


Figure 31 Filler panel module removed

- 3 Locate the module insertion/extraction handles at both ends of the instrument module. Extend the ends of both handles, by pulling them inwards towards each other. Then fully open the handles by pivoting them out towards you.
- 4 Align the module's PCA board with the guide rails on both ends of the M9505A/M9506A AXIe chassis.
- 5 Push the module into the chassis slot until the leading edges of the insertion/extraction latches rest against the front surface of the chassis. The insertion/extraction latch handles should be perpendicular to the front surface of the chassis (aligned with the direction of module insertion). Nudge the module gently inward to allow the latches to engage.
- 6 Using your thumbs, press inward firmly on the insertion/extraction handles until the module is seated firmly in the chassis backplane. The module front panel should lie flush with the chassis front panel.
- 7 Push the handles ends towards the edge of the chassis to tuck them away.
- 8 Tighten the retaining screws on either end of the module to ensure the ground connection.



Figure 32 Tighten retaining screws

After you have installed the module in the chassis, ensure that remaining slots have filler panel modules installed.

#### NOTE

Do not operate the chassis without filler panels in empty slots. This is especially important for the slots on either side of the 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 can cause the module to shut down.

To install the M8045A and M8046A modules

The M9505A/M9506A AXIe chassis has 5 slots for installing M8040A instrument modules. Install the M8045A in slots 1 through 3 and the M8046A in slot 4.



Figure 33 Installed M8045A and M8046A module

Ensure that the chassis is NOT powered up or connected to a power source while installing an instrument/embedded controller module.

- 1 Remove the filler panel modules that cover slots 1 through 5. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.

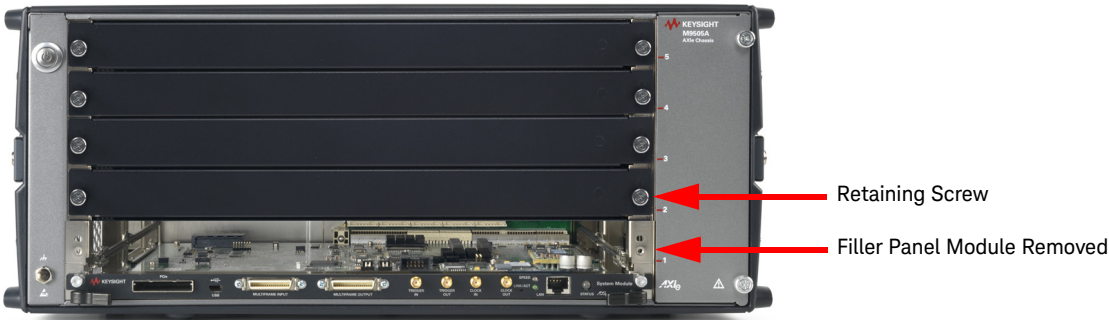


Figure 34 Filler panel module removed

- 2 Locate the module insertion/extraction handles at both ends of the instrument module. Extend the ends of both handles by pulling them inwards towards each other. Then fully open the handles by pivoting them out towards you.
- 3 Align the module's PCA board with the guide rails on both ends of the M9505A/M9506A AXIe chassis. If the module has metal plates covering the board, be sure to insert the PCA board and not the metal plates into the rails.
- 4 Push the module into the chassis slot until the leading edges of the insertion/extraction latches rest against the front surface of the chassis. The insertion/extraction latch handles should be perpendicular to the front surface of the chassis (aligned with the direction of module insertion). Nudge the module gently inward to allow the latches to engage.
- 5 Using your thumbs, press inward firmly on the insertion/extraction handles until the module is seated firmly in the chassis backplane. The module front panel should lie flush with the chassis front panel.
- 6 Push the handle ends towards the edge of the chassis to tuck them away.
- 7 Tighten the retaining screws on either end of the module to ensure the ground connection.



Figure 35 Tighten retaining screws

To connect the M8057A/B Remote Head

The M8057A/B remote head is connected to each channel of M8045A module. Connect the M8057A/B to the M8045A remote head controls (P and N) as shown in the [Figure 36](#) on page -50.



Figure 36 Installing M8045A, M8046A modules and M8057A/B remote head

Ensure that the chassis is NOT powered up or connected to a power source while making connections to M8057A/B.

Also, make sure NOT to remove the M8057A/B connections when it is powered on. However, if you wish to remove the M8057A/B connections, ensure that the instrument is powered off.

To remove an M8040A module

### CAUTION

The enclosure surface of the module may become hot during use. If you need to remove the module, first power down the M9505A/M9506A AXIe chassis, allow the module to cool, and then pull the module out of the chassis.

- 1 Loosen the retaining screws on both ends of the module until the module is completely disengaged to prevent damaging your chassis or module.



Loosening retaining screw

Figure 37 Loosening retaining screws

- 2 Extend the ends of both module insertion/extraction handles, by pulling them inwards towards each other.



Figure 38 Removing an instrument module

- 3 To remove the module: Open the module insertion/extraction handles by pivoting them out towards you. This unseats the module from the chassis backplane.
- 4 Once the module is unseated, use the module insertion/extraction handles by pulling directly outward to remove the module from the chassis.

**CAUTION**

Do not remove the AXIe ESM, which is integral to the operation of the chassis. An AXIe ESM that needs servicing should be removed by Keysight personnel only.

---



## Setting up the M8040A

### Benchtop Configuration

If you want to use the M8040A in a benchtop configuration, then retain the plastic bumpers and carry handle(s) for benchtop use.

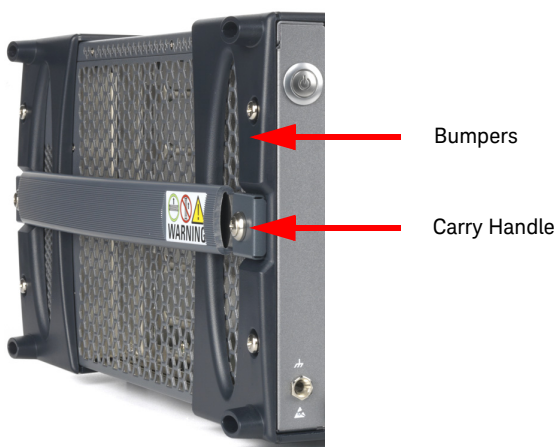


Figure 39 Chassis bumpers and carry handles

- 1 Place the assembly on top of the M8040A.
- 2 Attach the assembly to the top of the M8040A with screws provided.

### Rack Mounted Configuration

If you want to use the M8040A in a rack mounted configuration:

- 1 Remove the bumpers and carry handle(s) from the chassis. The procedure and tools needed to remove these is documented in the Keysight M9502A/M9505A/M9506A AXIe chassis User's Guide which is available on [www.keysight.com](http://www.keysight.com).
- 2 Attach the rack mount brackets to the chassis and mount onto a rack. The rack mount brackets are available in the Keysight rack mount kit that you can order for the chassis. Refer to this kit for rack mounting instructions.

### Installing the AXIe Embedded Controller Module

If you plan to use the Keysight M9537A Embedded Controller as the host computer, then:

- 1 Install this module in slot 1 of the M9505A/M9506A AXIe chassis.

#### NOTE

**This module must be installed in slot 1 of the M9505A/M9506A AXIe chassis.**

---

- 2 Connect the keyboard, mouse, and monitor to various ports available on the front panel of the M9537A Embedded Controller.
- 3 If needed, connect the M9537A Embedded Controller to LAN using the GbE LAN port on the front panel of this module. You need Internet connectivity later to perform firmware upgrades, download instrument module control software, or the latest Keysight I/O libraries suite.

#### NOTE

**Do not use the ESM LAN port as the remote control port. Use the LAN port of the controller (on M9537A or external PC).**

---

#### NOTE

You do not need to manually establish any external PCIe/USB or LAN connection between the M9537A AXIe Embedded Controller and M8040A because this controller communicates with the ESM through the chassis backplane.

You do not need to manually install any operating system or drivers for this module. The Windows 7 (64 bit) or Windows 10 operating system is pre-installed based on your choice and the module is ready to use as the host computer.

---

The following figure displays the M9537A Embedded Controller installed in slot 1 of the M9505A AXIe chassis.



Figure 40 M9537A embedded controller with M8045A and M8046A

Detailed information and user guide for the M9537A Embedded Controller module is available at [www.keysight.com/find/M9537A](http://www.keysight.com/find/M9537A).

## NOTE

The M9537A Embedded Controller module will successfully connect with M8040A only when installed in slot 1 of the M9505A/M9506A chassis. Make sure that you install the module in the M8040A before powering up the complete setup.

## NOTE

You should not connect the M8040A to multiple operating host computers at the same time. If you plan to use the M9537A AXIe Embedded Controller as the host computer, then do not connect an external host computer to the M8040A.

## Installing M8050A Module(s)

### NOTE

The procedures in this section are not required if your system is an M8050A-BU2, M8050A-BU3, M8050A-BU4, or M8050A-BU5 which have their modules pre-installed.

---

The M9505A/M9506A AXIe chassis and M8050A module(s) will come in separate shipments. This section shows how to carefully insert a module in an empty slot of an M9505A/M9506A AXIe chassis. The slots are identified by the slot numbers written on the front panel of the chassis.

### NOTE

If you plan to use the M9537A AXIe Embedded Controller as the host computer, then you must reserve slot 1 of the chassis for this module's installation.

---

### CAUTION

- The instrument modules are not hot swappable. You must power down the AXIe chassis and host PC before inserting, replacing, or removing a module.
  - The enclosure surface of the instrument module may become hot during use. If you need to remove the module, first power down the AXIe chassis, allow the module to cool, and then pull the module out of the chassis.
-

To install the M8042A module



Figure 41 Installed M8042A module in slots 3 through 5

Ensure that the chassis is NOT powered up or connected to a power source while installing an instrument/embedded controller module.

- 1 If you are not installing the M9537A AXIe Embedded Controller, remove the filler panel modules that cover slots 1, 2 and 3. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.
- 2 If you are installing the M9537A AXIe Embedded Controller, remove the filler panel modules that cover slots 2, 3, and 4. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.

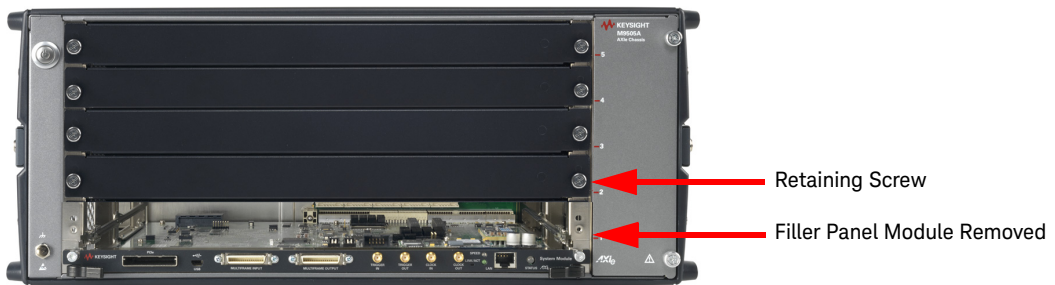


Figure 42 Filler panel module removed

- 3 Locate the module insertion/extraction handles at both ends of the instrument module. Extend the ends of both handles, by pulling them inwards towards each other. Then fully open the handles by pivoting them out towards you.
- 4 Align the module's PCA board with the guide rails on both ends of the M9505A/M9506A AXIe chassis.
- 5 Push the module into the chassis slot until the leading edges of the insertion/extraction latches rest against the front surface of the chassis. The insertion/extraction latch handles should be perpendicular to the front surface of the chassis (aligned with the direction of module insertion). Nudge the module gently inward to allow the latches to engage.
- 6 Using your thumbs, press inward firmly on the insertion/extraction handles until the module is seated firmly in the chassis backplane. The module front panel should lie flush with the chassis front panel.
- 7 Push the handles ends towards the edge of the chassis to tuck them away.
- 8 Tighten the retaining screws on either end of the module to ensure the ground connection.

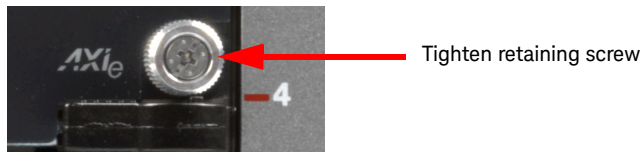


Figure 43 Tighten retaining screws

After you have installed the module in the chassis, ensure that remaining slots have filler panel modules installed.

#### NOTE

Do not operate the chassis without filler panels in empty slots. This is especially important for the slots on either side of the 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 can cause the module to shut down.

To install the M8042A and M8043A modules

The M9505A/M9506A AXIe chassis has 5 slots for installing M8050A instrument modules. Install the M8009A in the slot 1, then install the M8042A (one channel module) in slots 2 and 3 and the M8043A in slots 4 and 5.



Figure 44 Installed M8045A and M8046A module

Ensure that the chassis is NOT powered up or connected to a power source while installing an instrument/embedded controller module.

- 1 Remove the filler panel modules that cover slots 1 through 5. Loosen the retaining screws on both sides of the filler panel module until the filler panel module is completely disengaged. Then gently pull the module out of the chassis holding the screws.

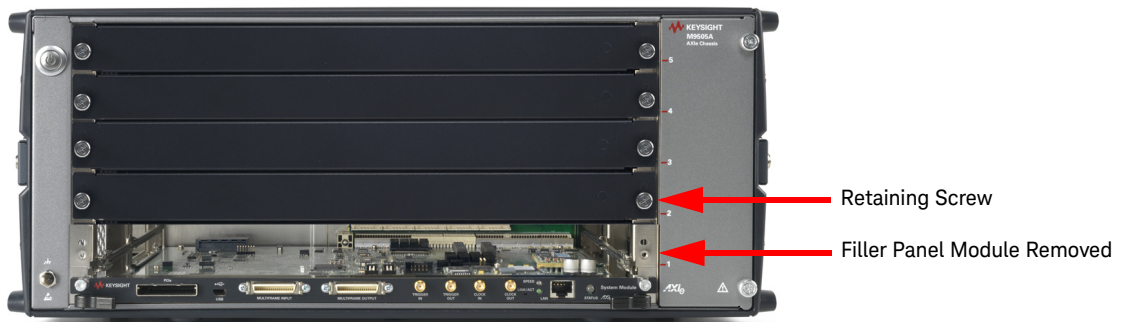


Figure 45 Filler panel module removed

- 2 Locate the module insertion/extraction handles at both ends of the instrument module. Extend the ends of both handles by pulling them inwards towards each other. Then fully open the handles by pivoting them out towards you.
- 3 Align the module's PCA board with the guide rails on both ends of the M9505A/M9506A AXIe chassis. If the module has metal plates covering the board, be sure to insert the PCA board and not the metal plates into the rails.
- 4 Push the module into the chassis slot until the leading edges of the insertion/extraction latches rest against the front surface of the chassis. The insertion/extraction latch handles should be perpendicular to the front surface of the chassis (aligned with the direction of module insertion). Nudge the module gently inward to allow the latches to engage.
- 5 Using your thumbs, press inward firmly on the insertion/extraction handles until the module is seated firmly in the chassis backplane. The module front panel should lie flush with the chassis front panel.
- 6 Push the handle ends towards the edge of the chassis to tuck them away.
- 7 Tighten the retaining screws on either end of the module to ensure the ground connection.

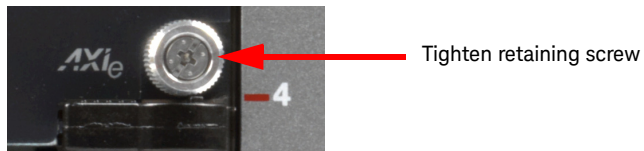


Figure 46 Tighten retaining screws



To connect the M8050A Remote Heads

### Remote Heads for M8042A Pattern Generator

The M8058A/M8059A/M8068A/M8069A remote head is used in combination with the M8042A Pattern Generator. The 64 GBd M8058A/M8068A remote head is used to allow close connection to the device under test for symbol rates up to 64 GBd. The 120 GBd M8059A/M8069A remote head is used to allow close connection to the device under test for symbol rates up to 120 GBd.

The three cables on the back side of the remote heads are used to connect with the M8042A pattern generator module and are not removable.

The M8058A/M8059A/M8068A/M8069A remote head is connected to each channel of M8042A module. Connect the remote head to the M8042A remote head controls (P and N) as shown in the [Figure 47](#) on page -61.

### Remote Head for M8043A Error Analyzer

The M8052A remote is used in combination with the M8043A Error Analyzer.

The two cables on the back side of the remote head are used to connect with the M8043A error analyzer and are not removable. Connect the M8052A to the M8043A remote head controls as shown in the [Figure 47](#) on page -61.



Figure 47 Installing remote heads to M8050A modules

Ensure that the chassis is NOT powered up or connected to a power source while making connections to the remote heads.

Also, make sure NOT to remove the remote head connections when it is powered on. However, if you wish to remove the remote head connections, ensure that the instrument is powered off.

### Connecting 150 mm cables to M8050A Remote Heads

The following images illustrates how to connect 150 mm cables to the M8058A remote head. Similarly, you can connect the 150 mm cables to M8059A, M8068A, M8069A and M8052A remote heads.



Figure 48 Connecting 150 mm cables to M8050A remote head

Use the appropriate tools (torque wrench) to connect remote head connectors to module and short cables to remote heads. For details, refer *M8050A Tips for Preventing Damage*.

To remove an M8050A module

### CAUTION

The enclosure surface of the module may become hot during use. If you need to remove the module, first power down the M9505A/M9506A AXIe chassis, allow the module to cool, and then pull the module out of the chassis.

- 1 Loosen the retaining screws on both ends of the module until the module is completely disengaged to prevent damaging your chassis or module.



Figure 49 Loosening retaining screws

- 2 Extend the ends of both module insertion/extraction handles, by pulling them inwards towards each other.



Figure 50 Removing an instrument module

- 3 To remove the module: Open the module insertion/extraction handles by pivoting them out towards you. This unseats the module from the chassis backplane.
- 4 Once the module is unseated, use the module insertion/extraction handles by pulling directly outward to remove the module from the chassis.

**CAUTION**

Do not remove the AXIe ESM, which is integral to the operation of the chassis. An AXIe ESM that needs servicing should be removed by Keysight personnel only.

---

## Setting up the M8050A

### Benchtop Configuration

If you want to use the M8050A in a benchtop configuration, then retain the plastic bumpers and carry handle(s) for benchtop use.

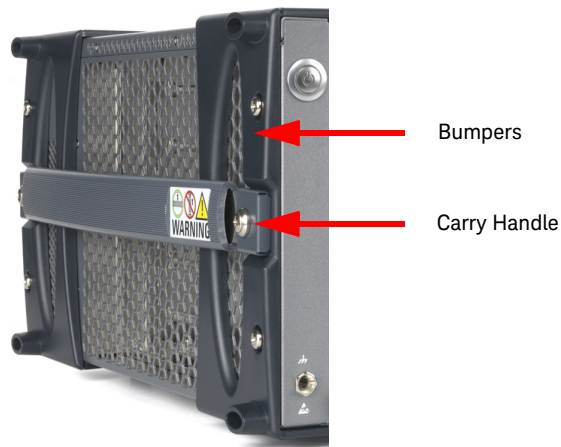


Figure 51 Chassis bumpers and carry handles

- 1 Place the assembly on top of the M8050A.
- 2 Attach the assembly to the top of the M8050A with screws provided.

### Rack Mounted Configuration

If you want to use the M8050A in a rack mounted configuration:

- 1 Remove the bumpers and carry handle(s) from the chassis. The procedure and tools needed to remove these is documented in the Keysight M9502A/M9505A/M9506A AXIe chassis User's Guide which is available on [www.keysight.com](http://www.keysight.com).
- 2 Attach the rack mount brackets to the chassis and mount onto a rack. The rack mount brackets are available in the Keysight rack mount kit that you can order for the chassis. Refer to this kit for rack mounting instructions.

## Installing the AXIe Embedded Controller Module

If you plan to use the Keysight M9537A Embedded Controller as the host computer, then:

- 1 Install this module in slot 1 of the M9505A/M9506A AXIe chassis.

**NOTE**

This module must be installed in slot 1 of the M9505A/M9506A AXIe chassis.

---

- 2 Connect the keyboard, mouse, and monitor to various ports available on the front panel of the M9537A Embedded Controller.
- 3 If needed, connect the M9537A Embedded Controller to LAN using the GbE LAN port on the front panel of this module. You need Internet connectivity later to perform firmware upgrades, download instrument module control software, or the latest Keysight I/O libraries suite.

**NOTE**

Do not use the ESM LAN port as the remote control port. Use the LAN port of the controller (on M9537A or external PC).

---

**NOTE**

You do not need to manually establish any external PCIe/USB or LAN connection between the M9537A AXIe Embedded Controller and M8050A because this controller communicates with the ESM through the chassis backplane.

You do not need to manually install any operating system or drivers for this module. The Windows 10 (64 bit) or Windows 11 operating system is pre-installed based on your choice and the module is ready to use as the host computer.

---

The following figure displays the M9537A Embedded Controller installed in slot 1 of the M9505A AXIe chassis.



Figure 52 M9537A embedded controller with M8009A and M8042A

Detailed information and user guide for the M9537A Embedded Controller module is available at [www.keysight.com/find/M9537A](http://www.keysight.com/find/M9537A).

## NOTE

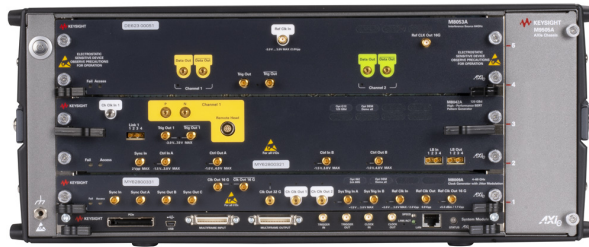
The M9537A Embedded Controller module will successfully connect with M8050A only when installed in slot 1 of the M9505A/M9506A chassis. Make sure that you install the module in the M8050A before powering up the complete setup.

## NOTE

You should not connect the M8050A to multiple operating host computers at the same time. If you plan to use the M9537A AXIe Embedded Controller as the host computer, then do not connect an external host computer to the M8050A.

## Setting up the M8053A with M8050A Modules

The M8053A interference source can be configured with a M8050A high-performance BERT in a single 5-slot M9505A/M9506A AXIe chassis. The M8053A Interference Source module occupies two slots of the AXIe chassis. The M8053A module should be installed in the upper slot. The following figure illustrates an M8053A module with M8042A module (one channel) and M8009A clock module installed in a 5-slot AXIe chassis.



**M8042A (1-channel), M8009A, M8053A in single chassis**

It is also possible to configure the M8053A in a second AXIe chassis (M9502A/M9505A/M9506A). In case of installing an M8042A module (two channels) and an M8009A clock module in a 5-slot AXIe chassis, the M8053A module must be installed in separate 5-slot AXIe chassis.



**M8042A (2-Channels), M8009A in chassis - 1**



**M8043A, M8053A in chassis - 2**

The whole BERT system including the M8053A is controlled by the M8070B system software.

### NOTE

It is recommended to connect two or multiple chassis via USB to two (multiple) USB ports of the controller. Thereafter, no further MultiFrame cable connections are required.



## Completing the Installation and Setup Process

Refer to the *Keysight M8050A Getting Started Guide* for procedures required to complete the installation and setup process.

The *Keysight M8050A Getting Started Guide* contains procedures for the following:

- Set up an external host computer
- Power up and power down the system
- Verify basic operation
- Install Keysight IO Libraries Suite
- Install M8070B software
- Install the measurement plugins
- Install module licenses (for on-site upgrades only)

The *Keysight M8050A Getting Started Guide* also contains the following information:

- Starting the M8070B software interface
- Making a basic measurement

Detailed information, consisting of *User Guide*, *Programming Guide* and other supported documents for the Keysight M8020A, M8040A and M8050A are available at:

[www.keysight.com/find/M8020A](http://www.keysight.com/find/M8020A)

[www.keysight.com/find/M8040A](http://www.keysight.com/find/M8040A)

[www.keysight.com/find/M8050A](http://www.keysight.com/find/M8050A)



# 3 Controlling Multiple Instruments

Controlling Multiple Instruments by Multiple Instances of M8070B System Software / 74

Remote Control of Multiple M8070B Software Instances / 76

Creating M8070B Software Shortcut on the Desktop / 77

This chapter describes how the M8070B system software allows a PC to control multiple instruments.

The M8070B system software (3.x.x.x version) allows a PC to control different connected instruments. These instrument can be either BERT modules, AWG modules or combination of both. The possible setup combinations are described and illustrated in this section.

- **CASE 1** - A PC can be connected to an AXIe 5 Slot frame and runs a M8041A as clock/data module and a M8051A as data module. It's a four channel instrument. The M8051A module can be replaced by a M8062A, depending upon the requirement.
- **CASE 2** - A PC is connected to an AXIe 5 Slot frame and runs a M8045A as generator module, a M8046A as analyzer module and a M8195A/M8196A as AWG module. Ensure that the M8195A/M8196A soft front panel should be properly installed on the host PC. Also ensure that the M8195A/M8196A should be always be mounted in a slot number higher than M8045A modules in the AXIe chassis. In other words, the M8195A/M8196A module should always be mounted last in the chassis.
- **CASE 3** - A PC is connected to an AXIe 5 Slot frame and runs a M8009A as a clock module, a M8042A as generator module, a M8043A as analyzer module. Ensure that the M8042A module should be always be mounted in a slot number higher than M8009A module in the AXIe chassis. In other words, the M8009A module should always be mounted first in the chassis and M8042A module should always be on top of the M8009A module.
- **CASE 4** - A PC is connected to two AXIe 5 slot frames, with each frame running one M8045A module and two M8046A modules. This setup would require M8070B and respective module licenses. To ensure that the both instruments operate on same clock, the Ref Clk Out port of the M8045A (frame 1) is connected to the Ref Clk In port of M8045A (frame 2).

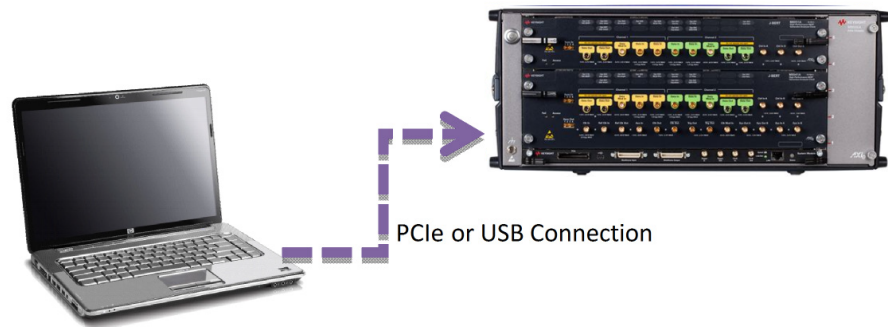


Figure 53 PC connected to AXle 5 slot frame

It is also possible to connect a PC to smaller AXle frame (2 slots) as shown in the following figure:

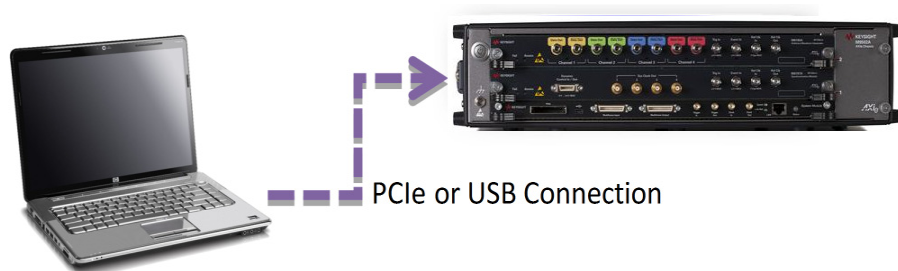


Figure 54 PC connected to AXle 2 slot frame

All these configurations are controlled by a single instance of a M8070B system software.

## Controlling Multiple Instruments by Multiple Instances of M8070B System Software

A single PC can also control multiple instruments by multiple instance of the M8070B software. For every connected instrument a separate instance of the M8070B software has to be started. You have to pass command line options to the M8070B system software to address/specify connected instruments.

Instrument settings, pattern etc. are stored in a so called workspace. To avoid conflicts between multiple running M8070B system software instances working on a single workspace you must specify a new name for every workspace. For every running M8070B software, a separate workspace must be defined.

Here is the possible configuration:

### 1 One PC connected to multiple instruments

Figure 55 on page -74 shows one PC connected to multiple instruments via USB.

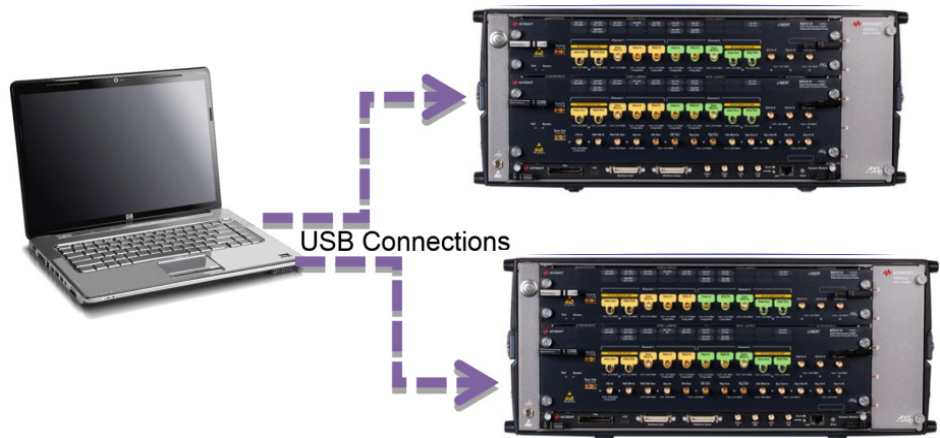


Figure 55 PC connected to multiple instruments via USB

For this configuration you have to start the M8070B software twice with different command line options.

1 Start a command line window

2 Type in the following syntax:

```
> keysight.M8070B.exe /chassisid 1 /workspace
"InstrumentOne"
> keysight.M8070B.exe /chassisid 2 /workspace
"InstrumentTwo"
```

In this configuration only one PC is required to run two M8070B instances simultaneously and both control their assigned instrument.

## NOTE

A second or further instance of M8070B software is only required if there is another BERT PG module in the second / further chassis. This means that, if there are only AWG module(s) and/or M8043A/M8046A modules within the second / further chassis, then these are also recognized within the first (single) instance of M8070B software.

## 2 Workaround to identify a particular frame when multiple frames are connected to a PC

Follow the given steps to identify a particular frame when multiple frames connected to one PC:

- a Switch on all the frames connected to the PC.
- b Start one instance of the M8070B system software.
- c Using the command line arguments (described in previous steps), switch to /chassisid 1 and observe the frames. The blinking LEDs show the addressed frame.
- d Start the next instance M8070B system software with /chassisid 2 and so on.
- e This will let you know which frame is associated with the entered /chassisid.
- f If you restart the M8070B system software with the same command line arguments, it will address the same frame again. In other words as long as the set-up is not changed e.g. /chassisid 1 will address always the same frame.

# Remote Control of Multiple M8070B Software Instances

You can also use SCPI to remotely control multiple instances of the M8070B software. To know the VISA Resource Strings for SCPI Access, click on the front panel on **Utilities** > **SCPI Server Information....**

The dialog shows the VISA Resource Strings for SCPI access as shown in the following figures:

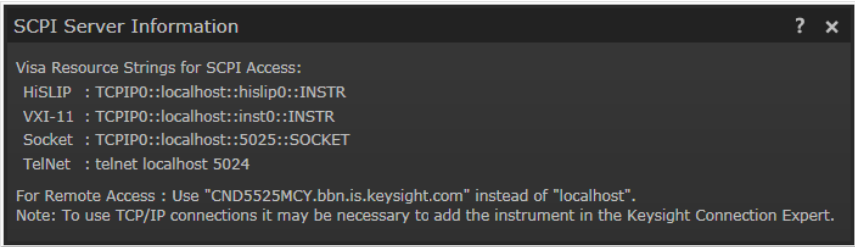


Figure 56     SCPI Server Information showing VISA Resource Strings for SCPI Access

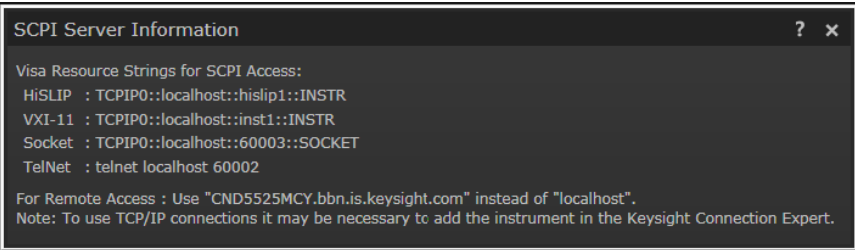


Figure 57     SCPI Server Information showing VISA Resource Strings for SCPI Access

## Command Line Options

The following command line options are required for connecting a PC with instrument(s).

- |             |   |
|-------------|---|
| /chassisid  | Chassis Identifier – defines a number for using the corresponding frame             |
| /slotnumber | Slot Number – defines a slot number of the first module to constitute an instrument |
| /workspace  | Workspace Name – defines a name for a workspace in which the settings are stored    |



## Creating M8070B Software Shortcut on the Desktop

Follow the given steps to create M8070B software shortcut on desktop:

- 1 Open file explorer and go to *C:\Program Files\Keysight\M8070B\bin* location as shown in the **Figure 58** on page -77:

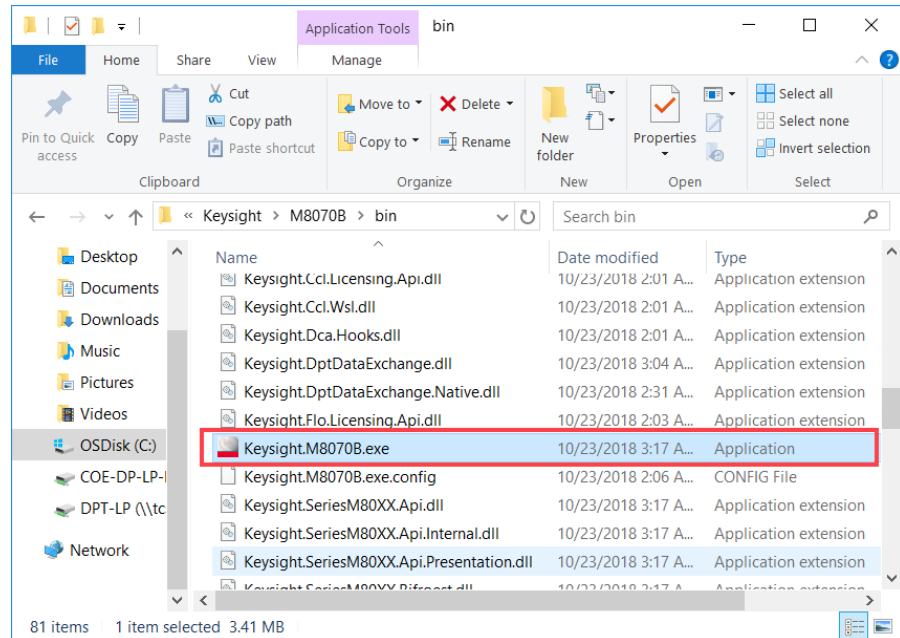


Figure 58 File explorer

- 2 Click on the highlighted executable with the right mouse button and move the cursor with pressed button on the desktop, release the mouse button and select in the context menu **Create shortcut**.
- 3 Rename the created shortcut to a meaningful name, right click and select in the context menu **Properties**.
- 4 Choose the **Shortcut** tab and change the **Target** entry field as shown in the following example:  
`"C:\Program Files\Keysight\M8070B\bin\KeysightM8070B.exe"  
 /chassisid 1 /slotnumber 1 /workspace "InstrumentOne"`

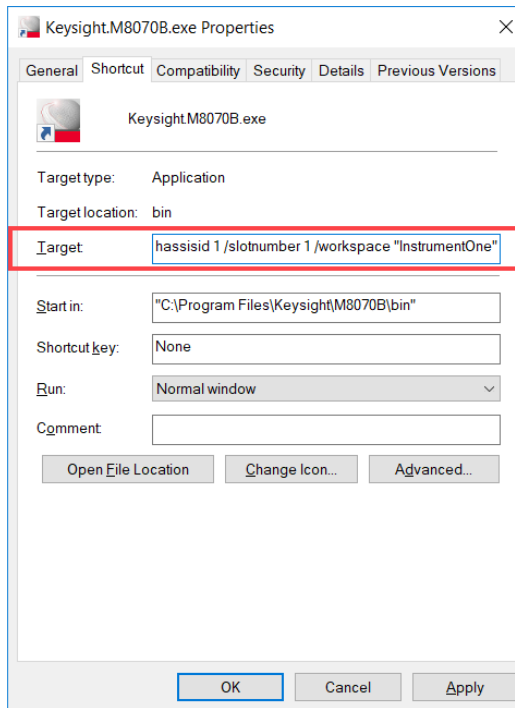


Figure 59 Changing shortcut target

5 Click **Apply**.

You can now start the 'configured' M8070B system software by a simple double click on the desktop icon.

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