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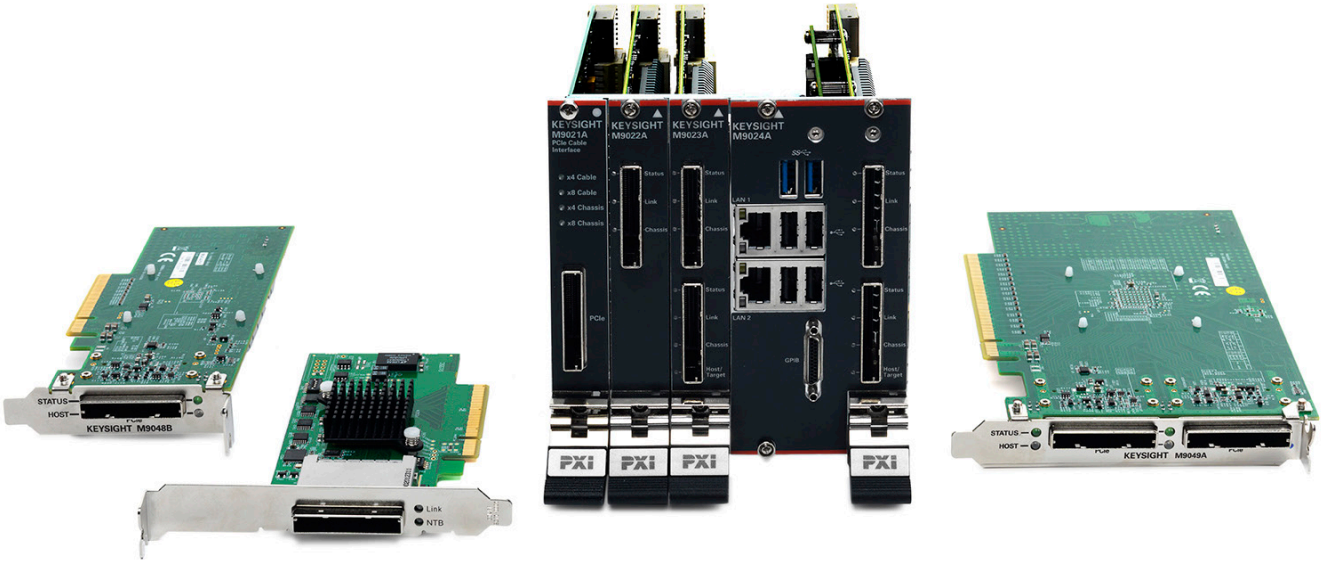
Keysight Technologies

Interface Modules and Adapters for PXIe and AXIe Systems

Remote PC PCIe® Host Desktop Adapters for PXIe and AXIe Systems
M9048A, M9048B & M9049A

System and Cable Modules for PXIe Systems
M9021A, M9022A, M9023A & M9024A

Data Sheet



KEYSIGHT TECHNOLOGIES

Overview

Achieve a high performance and reliable connection from a remote or embedded computer to a single, or multiple chassis with the Keysight Technologies, Inc. PCIe and PXIe interface modules. Keysight's high performance Gen 2 and Gen 3 interface modules enable connections from your PC, remote or embedded, to a PXIe or AXIe test system or to multiple PXIe or AXIe chassis.

With the dual port system and host modules, you can achieve the highest performance (x16) connection from a remote PC to a PXIe chassis. The dual port modules can also be used in a dual x8 mode to connect two chassis to a single PC or to daisy-chain to a second chassis without using valuable instrument slots. Place LAN, USB and GPIB directly in the chassis using the connectivity expansion module for ease of test system integration in an instrument rack.

Applications

- Aerospace and defense
- Communications
- Electronic test
- Semiconductor test

Remote PC PCIe Host Desktop Adapters for PXIe and AXIe Systems

- M9048A PCIe desktop PC adapter: x8, Gen 2
- M9048B PCIe Host Adapter: x8, Gen 3
- M9049A PCIe Host Adapter: dual x8 or x16, Gen 3

Product description

The host desktop adapter cards plug into your remote computer's PCIe slot to provide a high performance link between the computer and a PXIe or AXIe chassis. The M9048A/B and M9049A host adapters include a PCIe switch and clock isolation for a high-quality clock source driven down the PCIe cable to the PXIe or AXIe chassis. This provides a consistent Gen 2 or Gen 3 link independent of the remote computer. The cards are compatible with desktop or rackmount computers with either x8 or x16 PCIe expansion slots. Use the Y1202A or Y1203A cables to connect the host adapter cards to any PXIe chassis or AXIe chassis. Refer to the example configuration section for details.



For a single x8 connection, choose from the standard performance M9048A and mid-performance M9048B host adapter cards. A high performance x16 connection to a chassis can be achieved using the M9049A which is equipped with dual PCIe x8 cable connectors. The M9049A's dual x8 connections can also be used to connect two chassis to an external PC.

Refer to the example configuration section for details.

Main Features and Benefits

Product Features	Test System Benefit
PC host clock isolation	Provides superior computer compatibility
IDT or PLX PCIe switch	Compatibility with PCs that have Gen 3 PCIe slots
Gen 3, x8 and x16 PCIe capability*	Enables high-performance applications
Standard PCIe over cable	Connects a PXIe or AXIe chassis to PCs with expansion slots
Transparent operation with application software	Delivers ease of installation

* Does not apply to M9048A

Characteristics

Model	M9048A	M9048B	M9049A
Card format	Low profile	Low profile	Standard profile
PCI bracket	Includes low and standard profile	Includes low and standard profile	Standard
Dimensions	55 mm (2.2 in) x 114 mm (4.5 in)	56.15 mm (2.2 in) x 141 mm (5.5 in)	111.15 mm (4.4 in) x 167.65 mm (6.6 in)
Computer slot compatibility	x8 Gen 2/Gen 3 and x16 Gen 2/Gen 3[1,2]	x8 Gen 2/Gen 3 and x16 Gen 2 /Gen 3[2]	x16 Gen 2 or Gen 3
PCIe cable link[3]	x8, Gen 2	x8 Gen 3	Dual x8, or single x16, Gen 3
Max data BW[4]	4 GB/s	8 GB/s	16 GB/s (x16 mode)
Card indicators	Link status and transport mode	Link status	Link status
Cable connectors	One x8 PCIe iPass	One x8 PCIe iPass	Two x8 PCIe iPass
Cable length	Up to 2-meter passive cable	Up to 2-meter passive cable, active optical cables also supported[5]	Up to 2-meter passive cable, active optical cables also supported[5]
Power consumption	7 W (typical) 2.1A at 3.3V	9W (max)[6] 0.68A at12V, 0.33A at 3.3V	16.8W[6] 1.4A at12V
Operating temperature	0° C – 55° C	0° C – 55° C	0° C – 55° C

1. The M9048A is designed to be compatible with most Gen 3 PCIe computer slots but the link will train to Gen 2.
2. Designed to be compatible with most x16 computer slots but the link will be x8.
3. Dependent on PXIe system module capability.
4. Dependent on PC slot capability.
5. Contact Samtec (www.samtec.com) for active optical PCIe cables. Custom lengths are available.
6. Add 5W (1.5A@3.3V) for each active optical PCIe cable used.

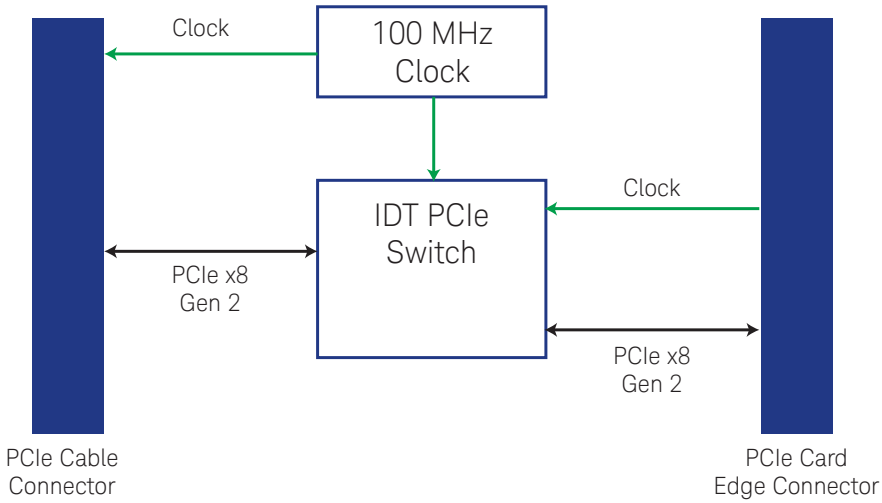


Figure 1. M9048A block diagram.

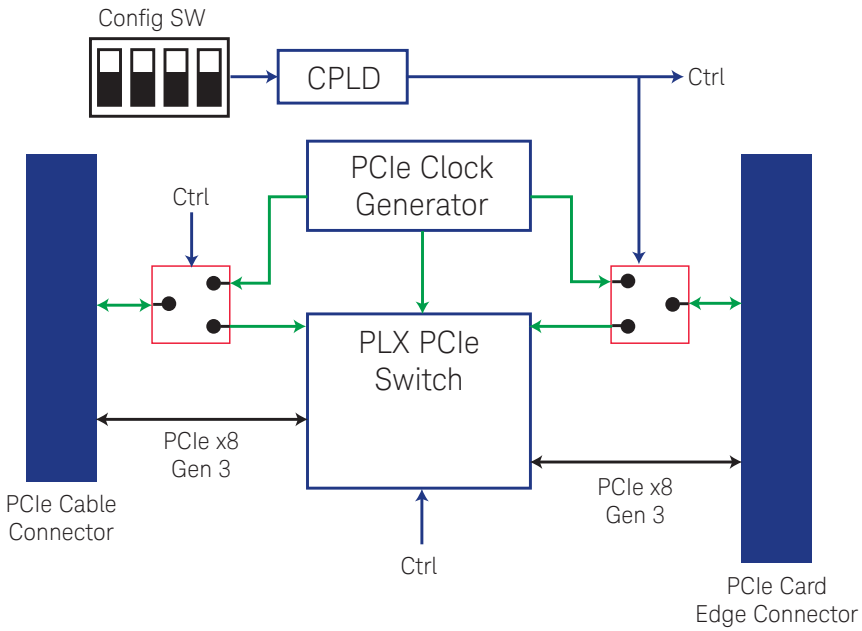


Figure 2. M9048B block diagram.

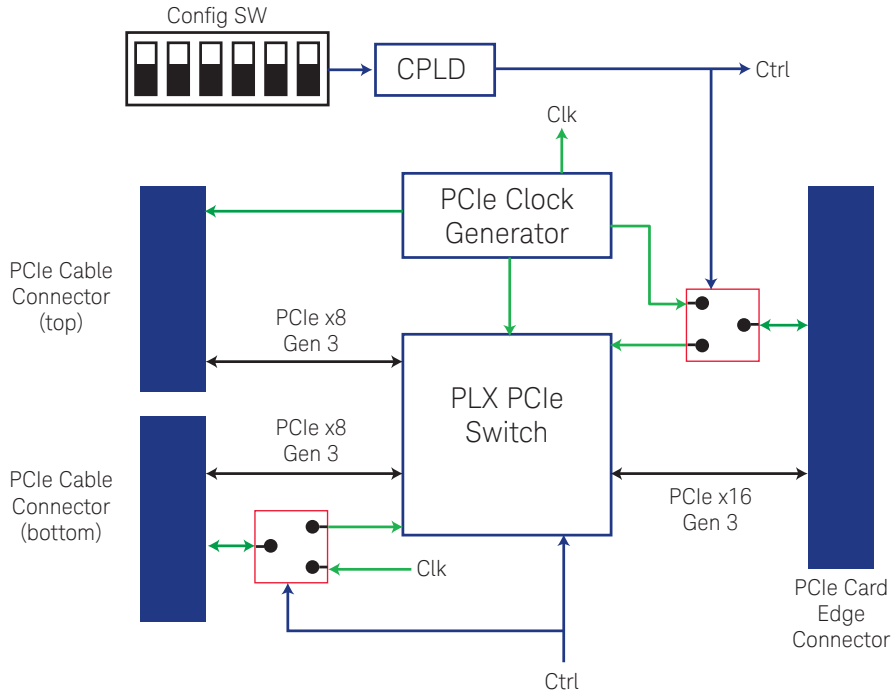


Figure 3. M9049A block diagram.

System and Cable Modules for PXIe Systems



- M9021A PCIe Cable Interface: x8, Gen 2
- M9022A PXIe Single Port Performance System Module: x8, Gen 3
- M9023A PXIe Dual Port System Module: dual x8 or x16, Gen 3
- M9024A PXIe Dual Port System Module with Connectivity Expansion: twoGigabit LAN, two USB 3.0, four USB 2.0, GPIB, dual x8 or x16, Gen 3

Product description

The PXIe interface modules are installed in the system slot and can be combined with a host adapter to provide a high data BW connection between the host PC and the chassis. They can also be used together (or with an M9037A PXIe embedded controller) to interconnect chassis in a multi-chassis system without using an instrument slot. The chassis module connections are transparent to software applications and allow direct control of PXIe and AXIe modules. Refer to the example configuration section for details.

The M9021A PCIe cable interface provides a mid-performance (x8 Gen 2) link between the M9018B PXIe 18-slot chassis and an external computer. The M9021A utilizes special features built into the M9018B PXIe chassis and is not compatible with the PXIe system slot in other PXIe chassis.

Use the high performance M9022A single port, x8 PXIe system module in a controller slot of any PXIe chassis.

The high performance M9023A PXIe dual port system module, installed in the chassis system slot, offers two possibilities for connection:

- x16 connections from an external computer to a PXI chassis
- Dual x8 connection for multi-chassis systems (one x8 to remote PC, one x8 to second chassis). They can also be used to connect an AXIe chassis to a PXIe chassis.

The M9024A PXIe dual port system module with connectivity expansion provides the same dual (x8) ports as the M9023A plus 2 LAN ports, 4 USB 2.0 ports, 2 USB 3.0 ports and GPIB connections for easy system integration connections directly in the chassis. Only a single M9024A can be used in a multi-chassis system.

Main Features and Benefits

Product Features	Test System Benefit
High performance speeds with your choice of x8 or x16 PCIe links	Large data rate supports high-performance applications
Standard PCIe over cable	Use with any computer an x8 or x16 PCIe interface
Transparent operation with application software	Provides ease of installation
Target and host modes	Enables large PXIe systems or mixed PXIe/AXIe system with a single controller

Characteristics

Model	M9021A[1]	M9022A	M9023A	M9024A
Module size	1 slot 3U PXI	1 slot 3U PXI	1 slot 3U PXI	3 slot 3U PXI (includes 2 controller expansion slots)
PCIe cable link	x8, Gen 2	x8, Gen 3	Dual x8, or single x16, Gen 3	Dual x8, or single x16, Gen 3
PXIe backplane link[2]	1x8, Gen 2	4x4 or x8, x16 Gen 3	4x4 or x8, x16 Gen 3	4x4 or x8, x16 Gen 3
Max data BW To external PC To PXIe backplane Between chassis	 4 GB/s 4 GB/s 2 GB/x	 8 GB/s 8 GB/s (Gen 3 chassis) NA	 16 GB/s (x16 mode) 16 GB/s (to Gen 3 chassis) 8 GB/s (Dual x8 mode)	 16 GB/s (x16 mode) 16 GB/s (to Gen 3 chassis) 8 GB/s (Dual x8 mode)
Card indicators	Link status and link size	Module status, host and backplane connection status	Module status, host and backplane connection status and second port transport mode	Module status, host and backplane connection status and second port transport mode
Front panel connectors	One x8 PCIe iPass	One x8 PCIe iPass	Two x8 PCIe iPass	Two x8 PCIe iPass, GP-IB, two USB 3.0, four USB 2.0, two RJ45 (GbE)
Cable length	Up to 2-meter passive cable	Up to 2-meter passive cable, active optical cables also supported up to 100m [3]	Up to 2-meter passive cable, active optical cables also supported up to 100m [3]	Up to 2-meter passive cable, active optical cables also supported up to 100m [3]
Power consumption	5W (typical)	27.5W (max)[4] 2A at12V, 1A at 3.3V, 0.05A at 5Vaux	33.5W (max)[4] 2.5A at 12V, 1A at 3.3V, 0.05A at 5Vaux	67.7W (max)[4] 4.4A at 12V, 2.5A at 3.3V, 1.3A at 5V, 0.05A at 5Vaux
Operating temperature	0° C – 55° C	0° C – 55° C	0° C – 55° C	0° C – 55° C
Storage temperature	-40° C – 70° C	-40° C – 70° C	-40° C – 70° C	-40° C – 70° C
Operating altitude	up to 3048m	up to 3048m	up to 3048m	up to 3048m
Storage altitude	up to 4572m	up to 4572m	up to 4572m	up to 4572m
Humidity	Type-tested at 95% RH (non-condensing)	Type-tested at 95% RH (non-condensing)	Type-tested at 95% RH (non-condensing)	Type-tested at 95% RH (non-condensing)

1. M9021A supported in M9018B only.
2. Dependent on chassis capability.
3. Contact Samtec (www.samtec.com) for active optical PCIe cables. Custom lengths are available.
4. Add 5 W (1.5 A at 3.3 V) for each active optical PCIe cable used.

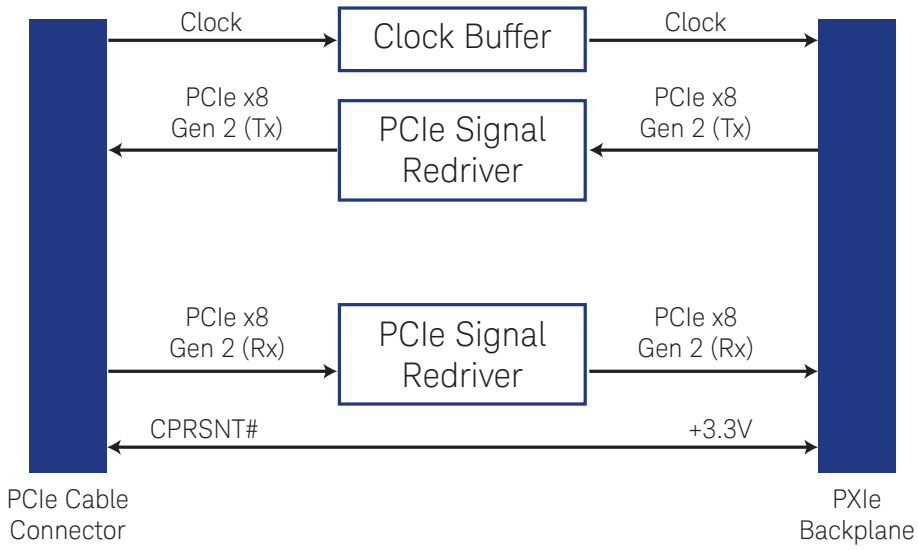


Figure 4. M9021A block diagram.

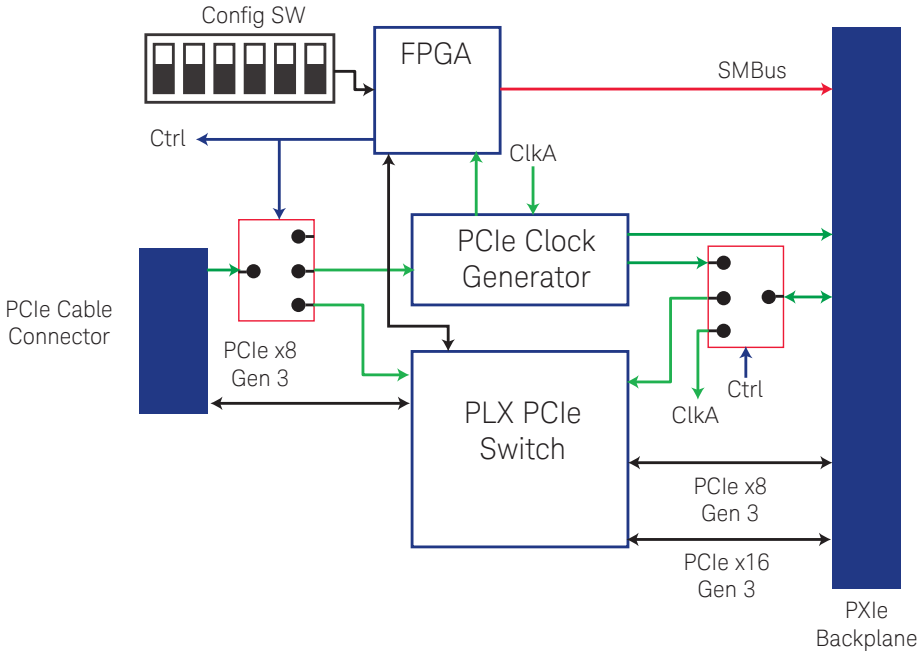


Figure 5. M9022A block diagram.

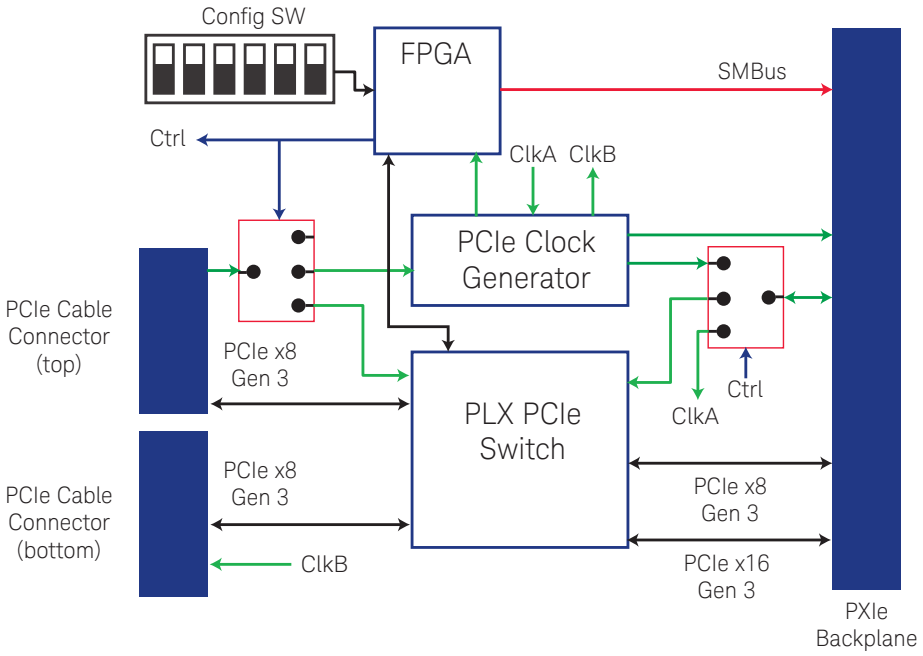


Figure 6. M9023A block diagram.

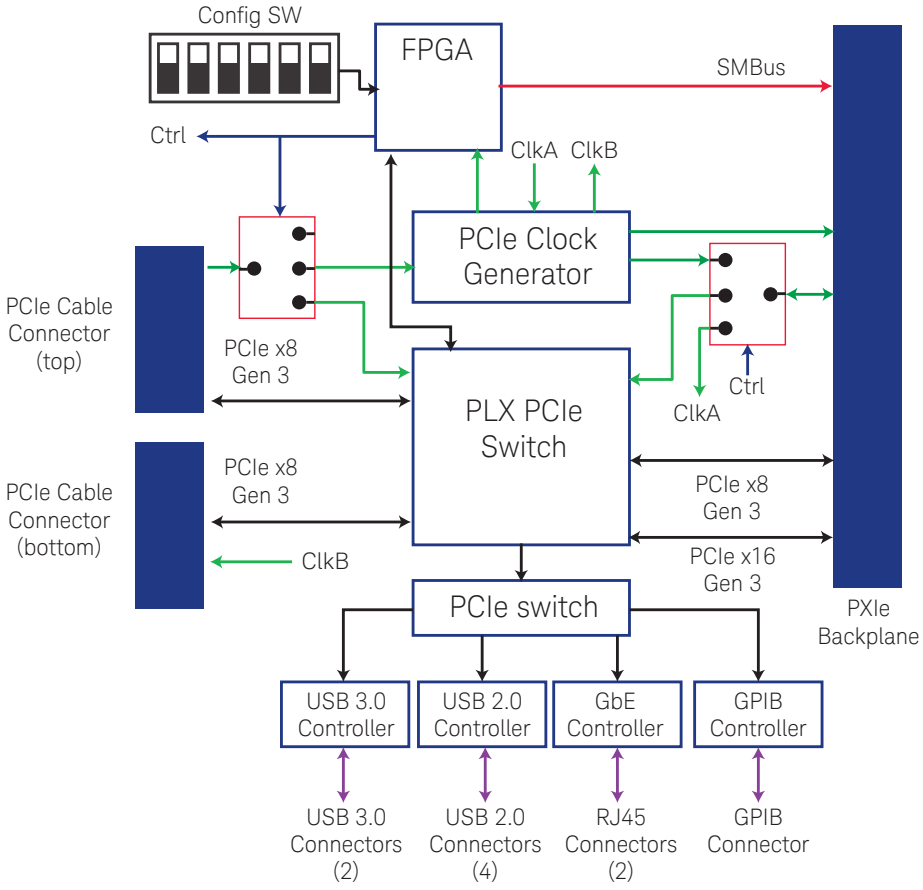


Figure 7. M9024A block diagram.

Typical Configurations

External PC configurations

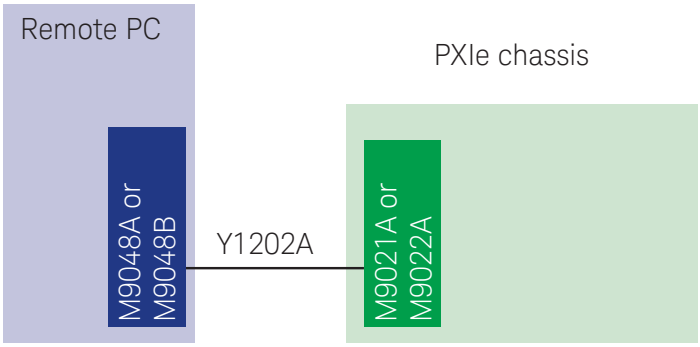


Figure 8. Use the M9048A with the M9021A in the M9018B (x8 Gen 2) or M9048B with the M9022A in all PXIe chassis (x8 Gen 3 cable link). Chassis link depends on chassis capability.

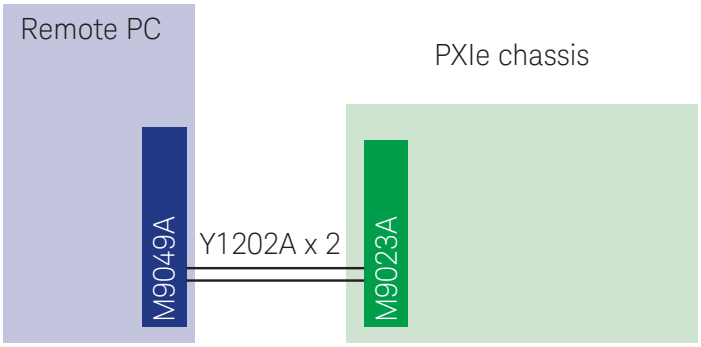


Figure 9. Use the M9048B with M9023A for the highest-performance. Cable link is x16 Gen 3, chassis link depends on chassis capability (up to Gen 3).

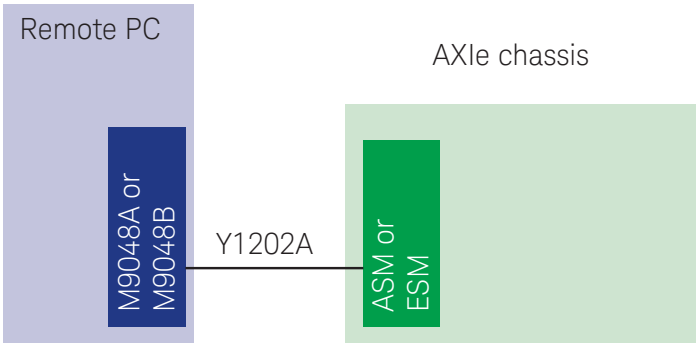


Figure 10. Use either the M9048A with the M9502A/05A (x8 Gen 2) and M9048B with the M9521A/M9514A (x8 Gen 2)

Multi-chassis remote PC configurations

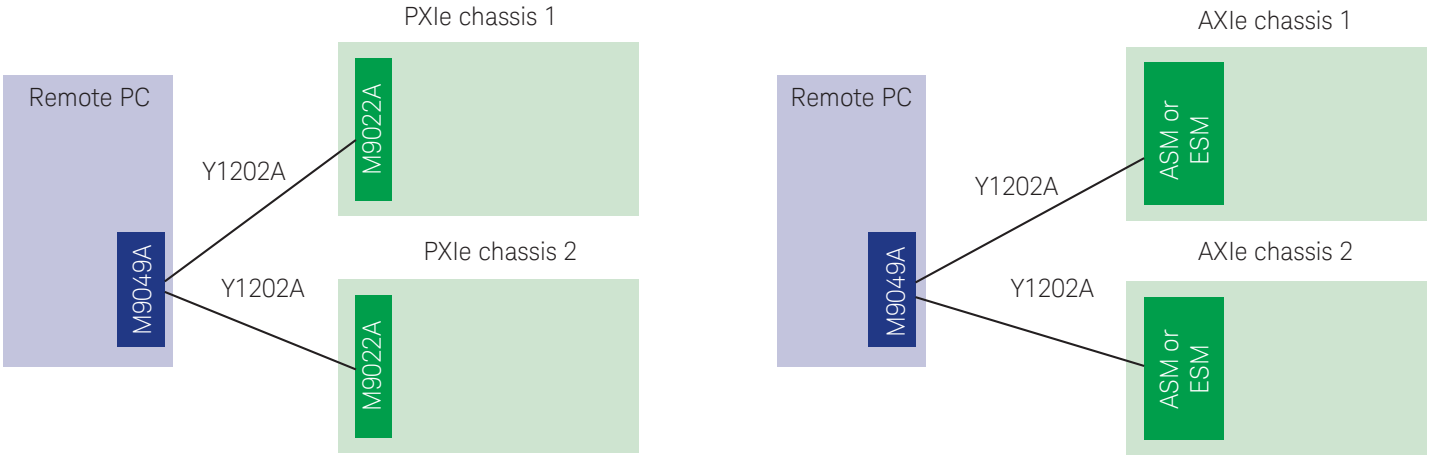


Figure 11. Use the M9049A for mid-performance (x8) connections from a remote PC to two PXIe or AXIe chassis. Chassis types can be mixed. Cable and chassis link depends on chassis capability (up to Gen 3).

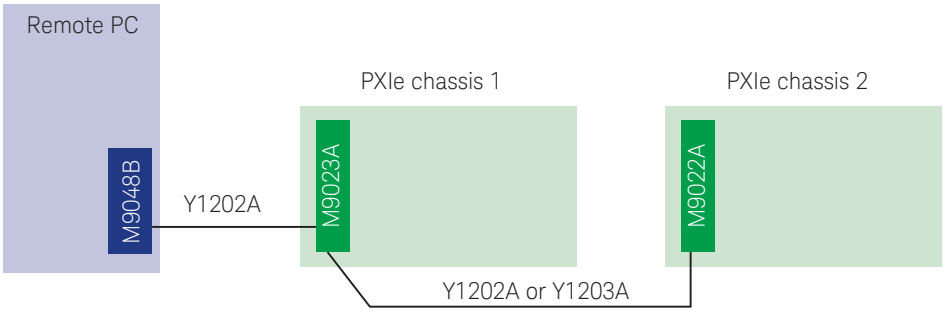


Figure 12. Combine the M9048B, M9022A, and M9023A for mid-performance (x8) connections from a remote PC for multiple PXIe chassis (up to a total of four), depending on PC capability. Cable link is Gen 3, chassis link depends on chassis capability (up to Gen 3).

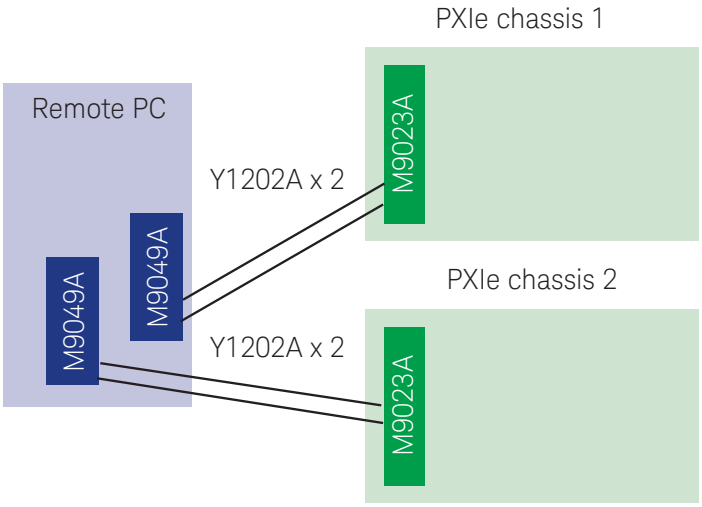


Figure 13. Use multiple M9049A and M9023A for the highest performance with multiple PXIe chassis. Cable link is x16 Gen 3, chassis link depends on chassis capability (up to Gen 3).

Multi-chassis embedded PC configurations

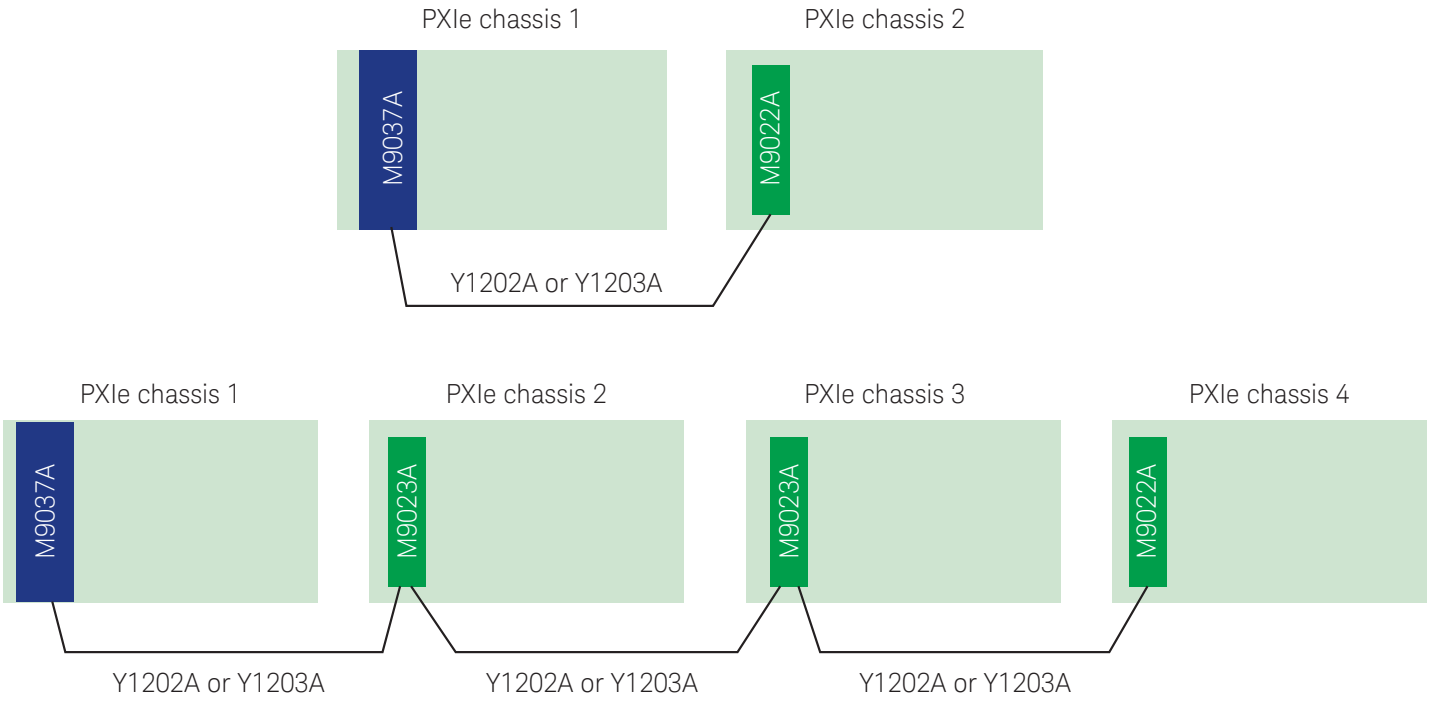
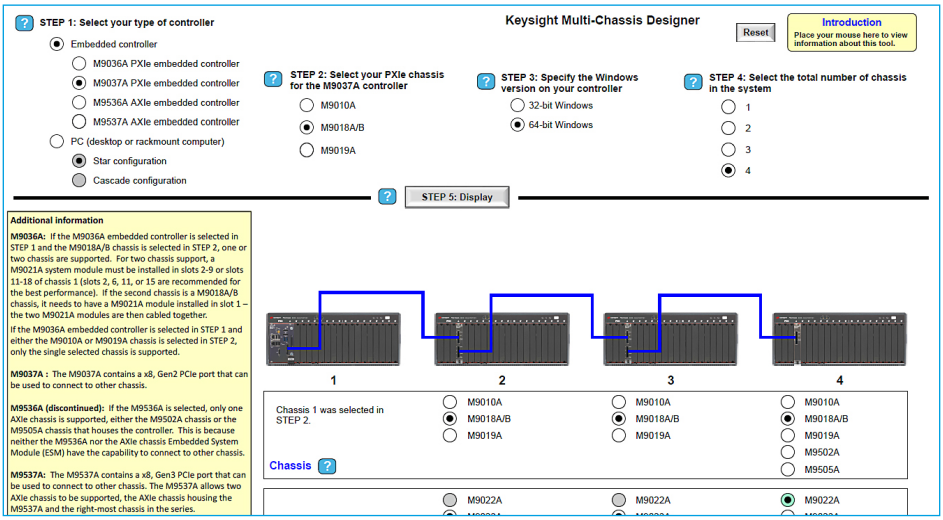


Figure 14. Combine the M9037A with the M9022A for x8 connections from the embedded PC for multiple PXIe chassis (up to a total of four). M9037A cable link depends on the serial number of the M9037A (Gen 3 starting with SN TW57240011 and Gen 1 or 2 before. Contact Keysight for units before TW57240011, for more information). Other cable links are Gen 3. Chassis link depends on chassis capability (up to Gen 3).

Multi-chassis designer



For more information about multi-chassis configurations, download the Keysight Multi-Chassis Designer by going to www.keysight.com/find/pxie-multichassis. This tool can be used to design a system consisting of up to four PXIe and AXIe chassis connected to either an embedded controller (installed in the chassis) or an external PC connected by cable(s) to the chassis. The Multi-Chassis Designer allows you to interactively specify your system parameters, and then it will design a multi-chassis system according to your specifications.

M9024A configuration

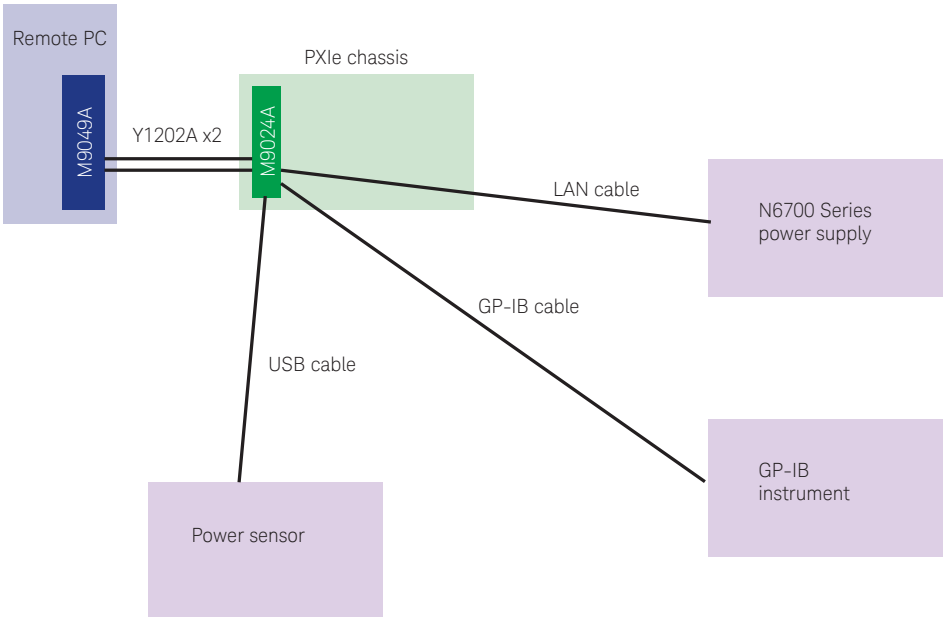


Figure 15. Use the M9024A to connect to multiple instruments from a PXIe chassis. These instruments are connected to the remote PC via the x16 Gen 3 PCIe link.Only a single M9024A can be used in a multi-chassis system.

Using active optical PCIe cables

If longer PCIe cable lengths are required, the M9048B, M9049A, M9022A, M9023A, and M9024A can be used with optical PCIe cables from Samtec (www.samtec.com). These cables can also be used with the M9502A and M9505A AXIe chassis (when paired with the M9048B or M9049A). This provides up to a x8 Gen 3 connection with long cable lengths and high isolation. Keysight has qualified up to a 100 m cable and custom lengths are available. These cables draw additional power from the host and system modules, see the characteristics tables for details. Optical cables are not supported with the M9048A, M9021A, and M9521A.

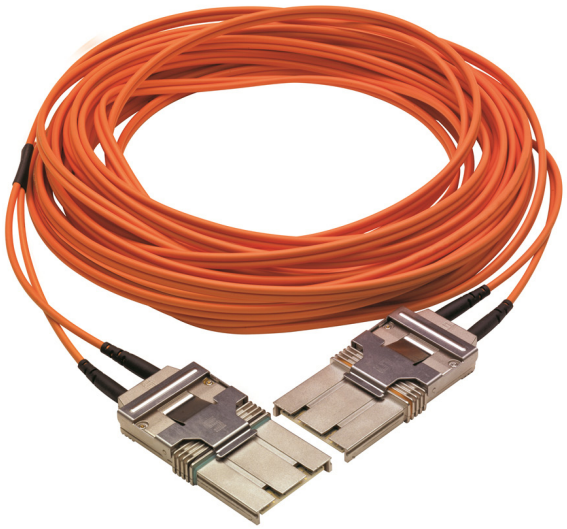


Figure 16. Active optical PCIe cable from Samtec.

Example Samtec cables:

Length	Samtec Part Number
1m	PCIEO-8G3-001.0-11
2m	PCIEO-8G3-002.0-11
5m	PCIEO-8G3-005.0-11
10m	PCIEO-8G3-010.0-11
30m	PCIEO-8G3-030.0-11
100m	PCIEO-8G3-100.0-11

Ordering Information

Model	Description
M9048B	PCIe host adapter: single port (x8), Gen 3
M9049A	PCIe host adapter: dual port (x16), Gen 3
M9021A	PCIe cable interface
M9022A	PXIe system module: single port (x8), Gen 3
M9023A	PXIe high performance system module: dual port (x16) Gen 3
M9024A	PXIe high performance system module with connectivity expansion: dual port (x16) Gen 3
Related Products	
M9010A	PXIe chassis: 10-slot, Gen 3, 3U, 24 GB/s
M9018B	PXIe chassis: 18-slot, 3U, 8GB/s
M9019A	PXIe chassis: 18-slot, Gen 3, 3U, 24 GB/s
M9037A	PXIe high performance embedded controller
M9502A	2-slot AXIe chassis
M9505A	5-slot AXIe chassis
M9514A	14-slot AXIe chassis
Accessories	
Y1202A	PCIe cable: x8, 2.0m
Y1203A	PCIe cable: x8, 0.5m

Software Information

Software Component	Description
Supported operating systems	Microsoft Windows 7 (64-bit) Microsoft Windows 8.1 Update 1 (64-bit) Microsoft Windows 10 (64-bit)
Driver support*	Requires M902x PXIe system module driver
Keysight I/O libraries	Supported versions: 17.1 Update 1 (or later). Use of latest version recommended. Includes: VISA libraries, Keysight cnnection expert, IO monitor

* A driver is not required for the M904xA PCIe interfaces

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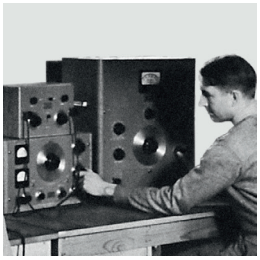
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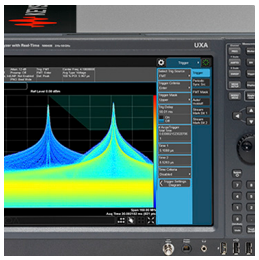
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