

M9037A PXIe Embedded Controller

2.4 GHz Quad Core



Introduction

The Keysight Technologies, Inc. M9037A is a four-slot PXIe embedded PC controller with Windows 7 and 10 operating systems designed for high-performance and complex, multi-chassis systems. It is also well-suited for secure environments due to its front-panel, removable solid-state drive (SSD).

The embedded controller is built upon a high-performance, low power Intel i7-4700EQ 2.4 GHz processor with 8-threads supported through 4 cores and hyper-threading. It is ideal for product validation and manufacturing test.

Key Features

- Intel i7-4700EQ 2.4 GHz processor
- 4-slot PXI controller module
- Front removable 240 GB solid state drive
- Up to 16 GB RAM Memory
- Gen 3 PCIe®, 4- or 2-link (up to x24) configuration providing up to 16 GB/s max data bandwidth from CPU to PXIe backplane
- Front panel connection connections: four USB 2.0, two USB 3.0, two LAN (10/100/1000), two DisplayPort, one GPIB, one SMB trigger
- x8 Gen 3 PCIe IPASS connector on the front for controlling a second PXIe or AXIe chassis or connection to RAID storage

Key Benefits

- High performance, extended life CPU
- Controller supports connections to multi-chassis and RAID storage directly from controller without using high value instrument slots
- Intel i7 Hyper Threading and multi-core technology provides performance required for multi-threaded applications
- Preloaded with operating system, drivers and Keysight IO libraries for reduced startup time
- The removable solid-state drive (SSD) offers faster boot time and mechanical reliability
- SSD can be easily removed from the front panel and secured when not in use

High Performance Hardware Platform

Based on the high-performance Intel i7 processor with hyper-threading technology, the M9037A is ideal for multi-threading environments found on multi-chassis systems.

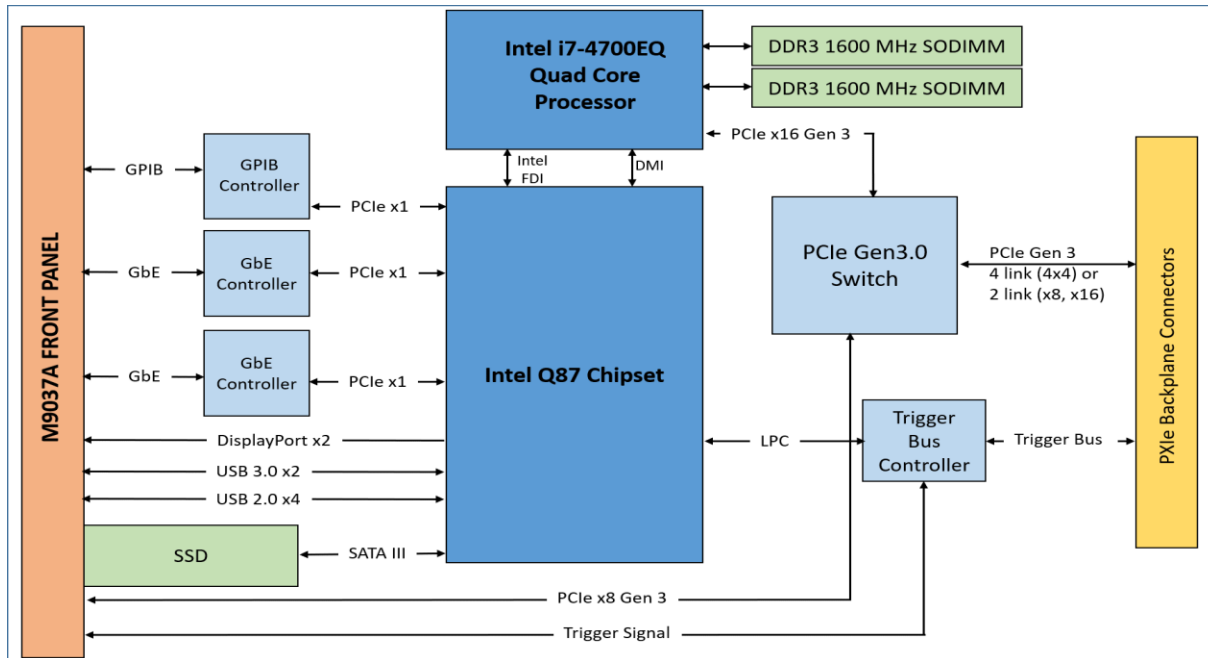


Figure 1. Keysight M9037A block diagram.

Quad-Core Processor

The Intel i7-4700EQ quad-core processor offers superior CPU, graphics, enhanced security and media performance. Built into the M9037A, it provides:

- Lower power consumption, higher performance per watt, faster loading times for demanding applications, with best multitasking performance
- Intel Hyper-Threading Technology offers a total of 8 simultaneous threads – Direct media interface (DMI) with 5 GT/s data bandwidth in each direction
- GPU acceleration, accessible for integration with your applications, offers the benefit of significantly faster application run times.
- Security and management functions are supported by Intel's vPro Technology

The provided Microsoft Windows 7 and 10 operating systems take full advantage of the processor's capabilities.

Memory

The M9037A has two 204-pin SODIMM memory sockets which support DDR3L-1333/1600 RAM. Each socket can support 4 GB or 8 GB memory modules for a total memory capacity of 16 GB. The standard configuration utilizes a single 4 GB memory module.

Solid-State Drive

Secure environments benefit from the easily accessible, front removable 240 GB solid state drive (SSD) that is secured with front panel thumb screws. The SSD provides a faster boot time and is immune to vibration damage that mechanical drives may experience.

Video

The two DisplayPort++ front panel connectors offer high band-width, built-in cable retention and multiple monitor support. Each Dual Mode DisplayPort++ connector can support either a DisplayPort or DVI-D monitor. Optional DisplayPort cables include Y1261A DisplayPort to DVI adapter, Y1262A DisplayPort cable, and Y1263A Display Port to VGA adapter. Customer supplied DVI, VGA, and HDMI adapters may also be used.

Peripheral I/O

The M9037A front panel connections include four USB 2.0 and two USB 3.0 connections, two Gigabit Ethernet ports, and GPIB. A Gen 3 x8 PCIe connector is also available for external RAID drives and multi-chassis operation. This allows PXI system expansion without requiring an additional expansion card in the host PXI chassis. Gen 3 operation is available on M9307As with a Serial Number of TW57240011 and greater. It is Gen 2 on earlier controllers.

PXI Trigger

The front panel includes a bi-directional trigger connector for routing an external trigger signal to/from the PXI backplane.

PXle Backplane Configuration

Experience large backplane data bandwidth utilizing the x16 Gen 3 PCIe connection from the CPU to the PXle chassis backplane. The embedded controller PCIe backplane switch provides a flexible backplane connection that can operate in a 2- or 4-link configuration.

- The PCIe x16 Gen 3 link between CPU and backplane provides up to 16 GB/s theoretical, 14.2 GB/s practical.

Multi-Chassis Configurations

The M9037A PXle controller with a 64-bit Windows operating system, can be used to control up to 4 PXle or AXle chassis in a cascade configuration. It is recommended that the controller is configured with 8 GB or more of RAM for multi-chassis operation. Embedded controllers with 32-bit operating systems will only support two chassis.

The x8 PCIe connector on the front panel can be used for cascading to a second chassis or connection to RAID storage (Gen 3).

The M9037A with 64-bit Windows 7 or 10 (options WE6 or W16) are pre-loaded with the required software for maximum multi-chassis capability. For additional information regarding multi-chassis configuration, go to www.keysight.com/find/pxie-multichassis

Easy maintenance and support

The M9037A can easily be updated. The SSD drive can be installed or removed via the front panel without the need for tools or to remove covers. The SSD includes a recovery partition that can be used to restore the drive to factory default conditions. With the controller uninstalled from a chassis, SODIMM memory is easily accessed and requires no tools to remove or replace.

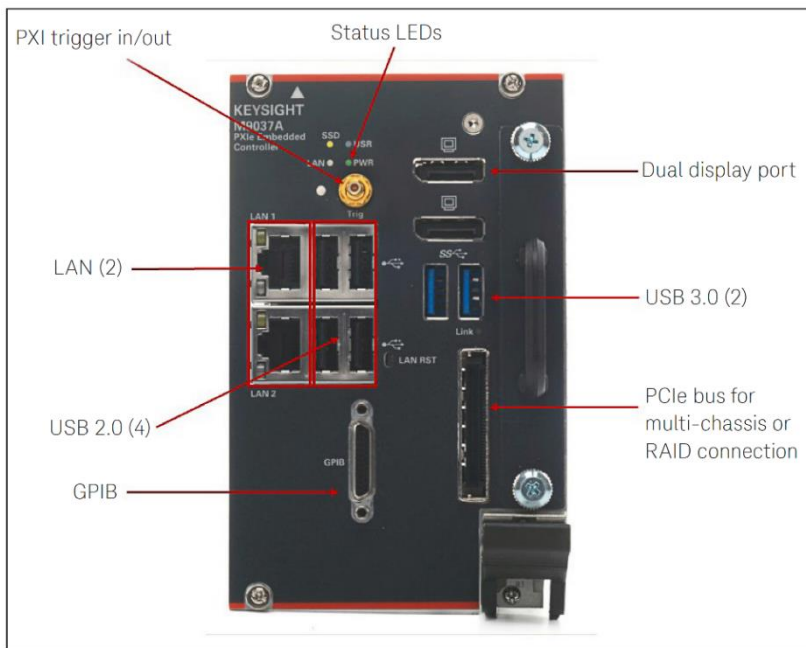


Figure 2. Front panel connections for M9037A



Figure 3. Removable SSD included with the M9037A

Software platform

The controller supports Microsoft Windows 7 (32-bit or 64-bit)¹ or Windows 10 (64-bit only) which is installed along with drivers (for Keysight PXIe chassis and M9037A embedded controller), Keysight I/O libraries, VISA, Keysight Connection Expert, and the I/O monitor software. The external trigger can be controlled by either the IVI driver or soft front panel which are also pre-installed on the controller.

¹ Microsoft will end the extended support of Windows Embedded Standard 7 on October 13, 2020 and won't provide technical support or software/security updates after this date. Keysight will continue to provide support for the M9037A after this date, but this does not include support of the Windows Embedded Standard 7 operating system. It is therefore recommended the M9037A is purchased with Windows 10 IoT Enterprise (option W16) to ensure extended support.

Technical Specifications and Characteristics

General Characteristics					
Controller Characteristics					
CPU		Intel i7-4700EQ quad-core processor			
CPU threads		8			
CPU clock frequency		2.4 GHz			
Chipset		Mobile Intel QM57Express			
Backplane speed		PCIe revision 3.0 (Gen 3)			
Video	Type Maximum resolution	Integrated Intel HD Graphics 4600 ² DP: 3840 x 2160 @ 60 Hz DVI: 1920 x 1200 @ 60 Hz DisplayPort adapters to other display standards are available in the market. Maximum resolution achieved is dependent on the adapter chosen.			
Memory	Cache RAM Type RAM Capacity	6 MB Two DDR3L 1600 204-pin SODIMM sockets 4 GB standard, 8 GB or 16 GB optional ³			
Storage	Type Size	2.5" SATA III SSD 240 GB			
Operating system support		Windows Embedded 7 (32- and 64-bit) Windows 10 IoT Enterprise LTSC (64-bit)			
Pre-loaded software		Operating system, trigger driver, Keysight I/O libraries, PXIe chassis and M9037A drivers			
Mechanical Characteristics					
Dimensions		3U/4-slot PXI/CompactPCI standard			
Chassis slot compatibility		PXIe system module slot (with three controller expansion slots)			
Weight		1 kg (2.2 lbs)			
DC power requirements					
DC supply	+3.3 V	+5 V	+12 V	+5 VSB Mean	Total
Idle (SATA, Mice & KB)	3.0 A	2.1 A	1.6 A	0.13 A	40.3 W
Full-loading	3.0 A	3.9 A	5.3 A	0.13 A	93.7 W

² VGA, DVI, HDMI require adapters

³ 32-bit Windows 7 can only access a maximum of 4 GB of memory (physical + virtual)

Technical Specifications and Characteristics (continued)

I/O Characteristics		
Front Panel Connections		
USB		Four USB 2.0 (type A), Two USB 3.0 ports
Ethernet		Two 10/100/1000BASE-T (RJ45)
Video		Dual Mode DisplayPort++ (DVI-D, VGA, HDMI with an adapter)
GPIO		Micro-D 25-pin
PCIe connector		x8 PCIe connector (Gen 3) ⁴
PXI trigger		SMB (programmable direction)
PXIe Backplane		
PCIe Link	Configuration	Two-link (x8 and x16) and four-link (4x4) automatically configured based on chassis configuration
	Data Bandwidth	16 GB/s max to/from the processor to PXIe backplane (Gen 3 chassis)
PXI trigger bus		Selectable routing to/from all 8 PXI_TRIG lines

Environmental Characteristics ^{5,6}		
Operating and Storage Conditions		
Temperature	Operating 0°C to 55°C	Storage -40°C to 70°C
Humidity	Type-tested at 95%, +40°C (non-condensing)	
Operating altitude	Up to 3048 m (10 kft)	
Storage altitude	15 kft (4572 m)	
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		

⁴ Front panel PCIe connector is rated up Gen 3 with M9037A Serial Number TW57240011 and greater

⁵ 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.

⁶ Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.

Technical Specifications and Characteristics (continued)

Regulatory Characteristics
Safety
IEC/EN 61010-1, 3rd Edition
Canada: CSA C22.2 No. 61010-1-12
USA: UL std no. 61010-1, 3rd Edition
EMC
Complies with European EMC Directive 2004/108/EC
- 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

Definitions for specifications

Specification (spec)
Warranted performance. Specifications include guardbands to account for the expected statistical performance distribution, measurement uncertainties, and changes in performance due to environmental conditions. All specifications and characteristics apply over the operating environment outlined in the “Environmental and Regulatory” section of this data sheet. In addition, the following conditions must be met: <ul style="list-style-type: none">• Instrument is within its calibration cycle if calibration is required.• Instrument has been stored for a minimum of 1 hour within the operating temperature range prior to turn-on and after a 30-minute warm-up period.
Characteristics
Characteristics describe product performance that is useful in the application of the product, but that is not covered by the product warranty. Characteristics are often referred to as Typical or Nominal values.
Typical (typ)
Expected performance of an average unit when operated over a 20 to 30 °C temperature range. Typical performance is not warranted. The instrument must be within its calibration cycle if calibration is required.
Nominal (nom)
Nominal describes representative performance that is useful in the application of the product when operated over a 20 to 30 °C temperature range. Nominal performance is not warranted.
Additional Information
All data are measured from multiple units at room temperature and are representative of product performance within the operating temperature range unless otherwise noted.
The data contained in this document is subject to change.

Ordering Information

Software

Supported Software Components	
Supported Operating systems (Pre-installed)	Microsoft Windows 7 (32/64-bit) or Windows 10 (64-bit only)
Standard compliant drivers	IVI-COM, IVI-C, LabVIEW
Application development environments (ADE)	Visual Studio (VB.NET, C#, C/C++), LabVIEW, LabWindows/CVI
Keysight IO libraries (Pre-installed)	Version 2018 (or greater)

Hardware

Model	Description
M9037A	PXle embedded PC controller, Intel I7
M9037A-M08	Memory upgrade from 4 GB RAM to 8 GB RAM
M9037A-M16	Memory upgrade from 4 GB RAM to 16 GB RAM
M9037A-WE3	Microsoft Windows Embedded Standard 7 operating system (32-bit)
M9037A-WE6	Microsoft Windows Embedded Standard 7 operating system (64-bit)
M9037A-W16	Microsoft Windows 10 IoT Enterprise LTSB (64-bit)
Accessories	
Y1206A	Keyboard and optical mouse
Y1260A	GPIB cable
Y1261A	Display Port to DVI adapter
Y1262A	DisplayPort cable
Y1264A	Spare SSD with carrier: WES 7/32
Y1265A	Spare SSD with carrier: WES 7/64
Y1265B	Spare SSD with carrier: Windows 10 IoT Enterprise LTSB (64-bit)
Related Products	
M9018B and M9019A	18-slot PXle chassis Gen 2 or Gen 3
M9010A	10-slot PXle chassis, Gen 3

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Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

