

# Keysight M9036A

## PXle Embedded Controller

2.4 GHz Dual-Core, 4 GB

Data Sheet



# Overview

The Keysight Technologies, Inc. M9036A is an embedded PXIe PC controller which enables a compact platform solution. With the 2-link, 2x8 Gen 2 backplane configuration, it is an ideal match for the Keysight M9018B PXIe chassis. It can also be used in the M9010A and M9019A chassis but is limited to Gen 2 performance in these chassis.

## Product description

The Keysight M9036A is a three-slot module that can be used to build compact PXIe systems. It easily integrates into hybrid test systems using GPIB, USB, and LAN with the built-in front panel interfaces.

The embedded controller is built upon a mid-performance Intel Core i5 dual-core processor with Hyper-Threading Technology and is designed for applications in multi-tasking environments.

## Applications

- Aerospace and defense
- Communications
- General purpose applications
- Electronic functional test

## Features

- Intel Core i5-520E 2.4GHz processor
- 3-slot PXIe controller module
- 160 GB solid-state drive
- 4 GB RAM memory with 8 GB option
- Gen 2 PCIe®, 4- or 2-link configuration providing up to 4 GB/s max data bandwidth between links
- Front panel connections with USB (4), 10/100/1000 LAN (2), DVI-I, GPIB, ExpressCard 34, and SMB trigger connector
- Support for Microsoft Windows 7 (32 and 64 bit) and Windows 10 (64 bit)

## Customer values

- Supports transportable applications
- Fast data transfer rates across the backplane
- Intel Hyper-Threading Technology provides performance required for multi-threaded applications
- Preloaded with operating system, drivers, and Keysight I/O libraries for reduced startup time
- Solid-state drive for improved mechanical reliability
- Specifically designed for PXIe systems that provide a choice between embedded and external controllers

# Easy Setup ... Test ... and Maintenance

## Hardware platform

### Hardware overview

Based on the Intel i5 processor with Hyper-Threading Technology, the M9036A is ideal for modular applications requiring the compact size of an embedded computer.

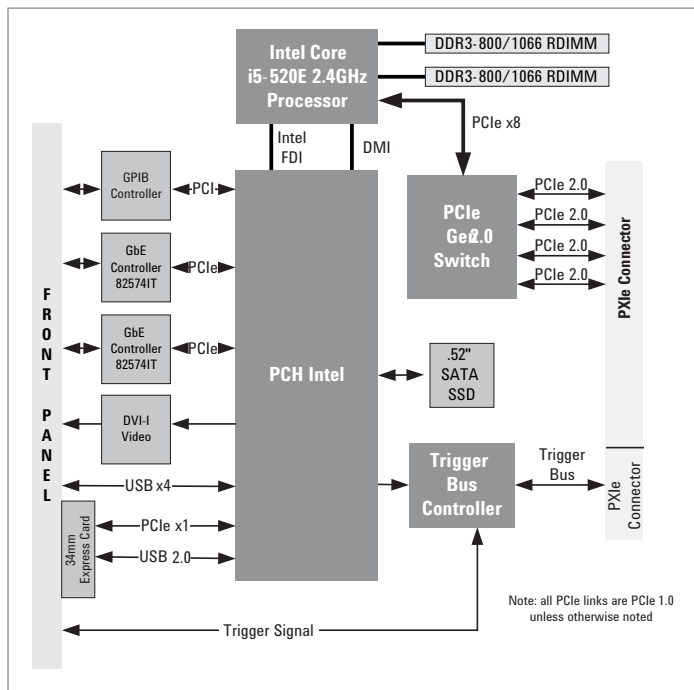


Figure 1. Keysight M9036A block diagram

### Dual-core processor

The M9036A architecture is built on the Intel i5-520E dual-core processor. This processor utilizes the Intel Hyper-Threading Technology with a total of four simultaneous threads. Use a multi-tasking operating system, such as Microsoft Windows 7 and 10, to take full advantage of capabilities of this processor. The processor also utilizes the direct media interface (DMI) with 1 GB/s data bandwidth in each direction.

### Memory

The M9036A has two 204-pin SODIMM memory sockets which support DDR3-800/1066 RAM. Each socket can support memory modules up to 4 GB for a total memory capacity of 8 GB. The standard configuration utilizes a single 4 GB memory module with an option to add a second 4 GB module.

### Solid-state drive

A 160 GB solid state drive is included standard with the M9036A. This drive provides superior mechanical reliability compared to a conventional rotating hard drive.

### Video

The DVI-I connector on the front panel supports both digital (DVI) and analog (VGA) monitors. When using an analog monitor, a DVI-to-VGA adapter is required (provided with the computer).

### Peripheral I/O

The M9036A front panel contains connectors for USB 2.0, DVI-I video, Gigabit Ethernet, and GPIB. The computer also includes an ExpressCard/34 interface which provides I/O flexibility. This can be used to connect the embedded controller to a second Keysight M9018A chassis using the Keysight M9045A for example.

### PXI trigger

The front panel contains a bi-directional trigger connector which can be used to route an external trigger signal to/from the PXI backplane.

### PXIe backplane configuration

The embedded controller utilizes a Gen 2 PCIe switch to provide a flexible backplane connection that can operate in either a 2- or 4-link configuration. When installed in the Keysight M9018B PXIe chassis and operating in a 2-link (2x8) configuration, it will enable x8 slots in the chassis to communicate peer-to-peer at Gen 2 speeds without involving the CPU itself. This PCIe backplane switch is also connected to the CPU via a Gen 1, x8 PCIe link. Therefore, data transfers to/from memory will operate at Gen 1 speeds.

### Easy maintenance and support

The M9036A is easy to maintain or upgrade. The SSD and memory can be removed without removing the covers. The SSD also contains a recovery partition that can be used to restore the drive to the factory default conditions.

### Software platform

The embedded controller supports Microsoft Windows operating systems and comes with the selected operating system installed. Keysight I/O libraries, including VISA, Keysight Connection Expert, and I/O monitor, are also pre-installed.

The external trigger is controlled with a driver or soft front panel which are also pre-installed on the computer.

## Technical Specifications and Characteristics

<b>General characteristics</b>					
<b>Controller characteristics</b>					
CPU	Intel i5-520E dual-core				
CPU threads	4				
CPU clock frequency	2.4 GHz				
Chipset	Mobile Intel QM57Express				
Video	Integrated Intel graphics				
Type	DVI:1920x1200 (60Hz) or VGA: 2048 x 1536 (75Hz)				
Maximum resolution					
Memory	3 MB				
Cache	Two DDR3-800/1066 204-pin SODIMM sockets				
RAM type	4 GB standard, 8 GB optional, 8 GB maximum*				
RAM capacity					
Storage	2.5" SATA II SSD				
Type	160 GB				
Size					
Operating system support	Windows 7 (32- and 64-bit) and Windows 10 (64-bit)				
Pre-loaded software	Operating system, trigger driver, and Keysight I/O libraries				
<b>Mechanical characteristics</b>					
Dimensions	3U/3-slot PXI/CompactPCI standard				
Chassis slot compatibility	PXIe system module slot (with two or more controller expansion slots)				
Weight	1 kg (2.2 lbs)				
<b>DC power requirements</b>					
DC supply	+3.3 V	+5 V	+12 V	-12 V	+5 V <sub>AUX</sub>
DC current requirements ( <i>typ</i> )	0.72 A	0.54 A	0.9 A	0	0.11 A
DC current requirements (max)	0.75 A	0.76 A	2.81 A	0	0.12 A
Power dissipation (max)	40.6 W				
<b>I/O characteristics</b>					
<b>Front panel connections</b>					
USB	Four USB 2.0 (type A)				
Ethernet	Two 10/100/1000BASE-T (RJ45)				
Video	DVI-I (VGA with DVI/VGA adapter)				
GPIB	Micro-D 25-pin				
ExpressCard	ExpressCard 34 mm slot				
PXI trigger	SMB (programmable direction)				
<b>PXIe backplane I/O</b>					
PCIe link	2x8 or 4x4 (automatically configured based on chassis configuration)				
Configuration					
Data bandwidth	2 GB/s max to/from the processor				
	4 GB/s max between PCIe backplane links (2-link mode)				
PXI trigger bus	Selectable routing to/from all 8 PXI_TRIG lines				

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

## Technical Specifications and Characteristics (continued)

### Environmental characteristics <sup>1,2</sup>

#### Operating and storage conditions

	Operating	Storage
Temperature	0°C to 55°C	-20°C to 70°C
Humidity	Type-tested at 95%, +40°C (non-condensing)	
Altitude	Up to 4600 m (15000 ft)	

#### 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

1. 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.
2. Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.

### Regulatory characteristics

#### Safety

Complies with European Low Voltage Directive 2006/95/EC

IEC/EN 61010-1, 2nd Edition

Canada: CSA C22.2 No. 61010-1-04

USA: UL std no. 61010-1, 2nd Edition

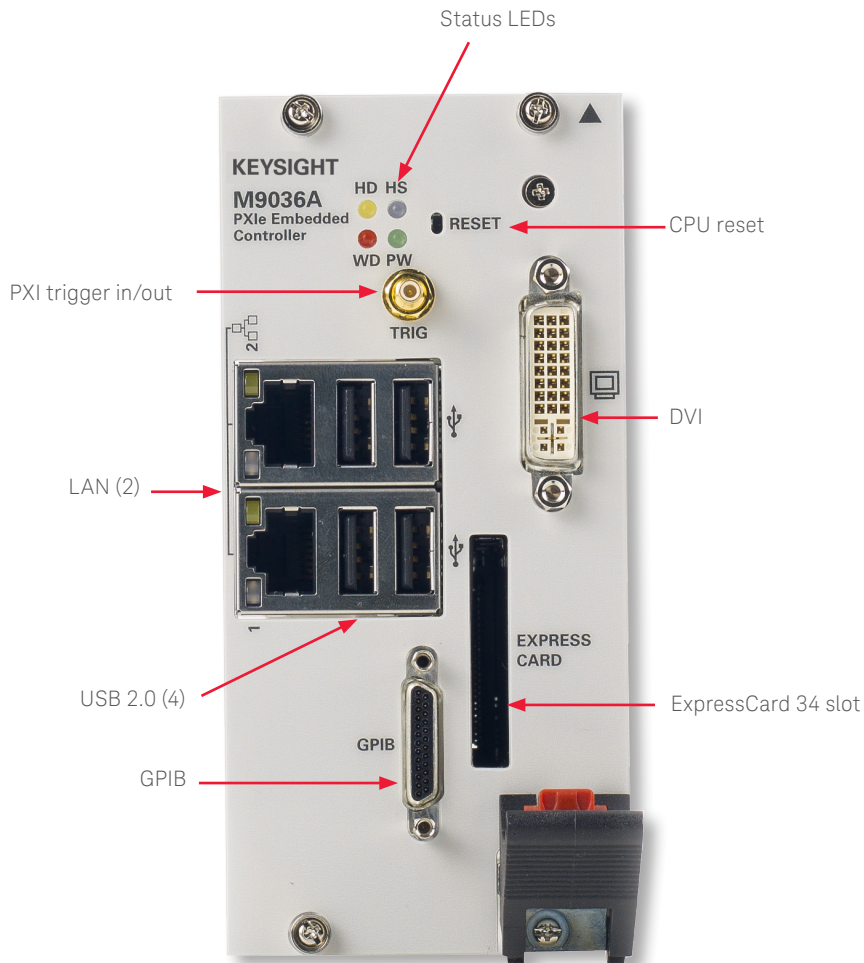
#### EMC

Complies with European EMC Directive 2014/30/EU and conforms with the following product standards:

Standard	Limit
IEC 61326-1:2005 / EN 61326-1:2006	
<i>Reference Standards</i>	
CISPR 11:2003 / EN 55011:2007	Class A, Group 1
IEC 61000-4-2:2001 / EN 61000-4-2	4 kV/4 kV contact/air
IEC 61000-4-3:2002 / EN 61000-4-3	3 V/m, 80-2000 MHz, 1 V/m, 2-2.7 GHz
IEC 61000-4-4:2004 / EN 61000-4-4	0.5 kV signal lines, 1 kV power lines
IEC 61000-4-5:2001 / EN 61000-4-5	0.5 kV line-line, 1 kV line-ground
IEC 61000-4-6:2003 / EN 61000-4-6	3 V, 0.15-80 MHz
IEC 61000-4-11:2004 / EN 61000-4-11	100% dip, 1/2 cycle; 100% dip, 1 cycle ; 30% dip, 25 cycles; 100% interruption, 250 cycles
Canada: ICES/NMB-001:2006	
Australia/New Zealand: AS/NZS CISPR 11:2011	

## Technical Specifications and Characteristics (continued)

### Front panel connections



## Multi-Chassis Configuration

The M9036A with either a Windows 7 or 10 operating system can be used to control two M9018B chassis in a cascade configuration. The M9021A is used for cascading the PCIe fabric from the first to the second chassis. Multi-chassis operations is not supported in other chassis.

It is recommended that the controller is configured with a 64-bit operating system and 8 GB of RAM. Multi-chassis operation requires Keysight I/O Libraries Suite 17.1 Update 1 or later (18.0 is recommended). An M9036A with the Windows 7 or 10 operating system (options WE6 or W16) is pre-loaded with the required software.

For more detailed information about multi-chassis configuration, go to [www.keysight.com/find/pxie-multichassis](http://www.keysight.com/find/pxie-multichassis).

## Configurations and Ordering Information

### Software information

Model	Description
Supported operating systems	Microsoft Windows 7 (32/64-bit) Microsoft Windows 10 (64-bit)
Standard compliant drivers	IVI-COM, IVI-C, LabView
Supported application development environments	VisualStudio (VB.NET, C#, C/C++), LabVIEW, LabWindows/CVI, MATLAB (ADE)
Keysight IO Libraries	Includes: VISA Libraries, Keysight Connection Expert, IO Monitor

### Definitions for specifications

Specifications describe the warranted performance of calibrated instruments that have been stored for a minimum of two hours within the operating temperature range of 0 °C to 50 °C, unless otherwise stated, and after a 45 minute warm-up period. Data represented in this document are specifications unless otherwise noted.

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 describes characteristic performance, which 80% of instruments will meet when operated over a 20 °C to 30 °C temperature range. Typical performance is not warranted.
- Nominal describes representative performance that is useful in the application of the product when operated over a 20 °C to 30 °C temperature range. Nominal performance is not warranted.

Note: All graphs contain measured data from several units at room temperature unless otherwise noted.

### Ordering information

Model	Description
M9036A	PXIe embedded PC controller
M9036A-M08	Memory upgrade from 4 GB RAM to 8 GB RAM
M9036A-WE3	Microsoft Windows Embedded Standard 7 Operating System (32-bit)
M9036A-WE6	Microsoft Windows Embedded Standard 7 Operating System (64-bit)
M9036A-W16	Microsoft Windows 10 IoT Core Operating System (64-bit)
M9036-31301	GP-IB cable for the M9036A Embedded Controller
M9036-34101	DVI-to-VGA Adapter
M9036-55501	4 GB RAM module for the M9036A Embedded Controller

### Related products

Model	Description
M9018B	18-slot PXIe chassis

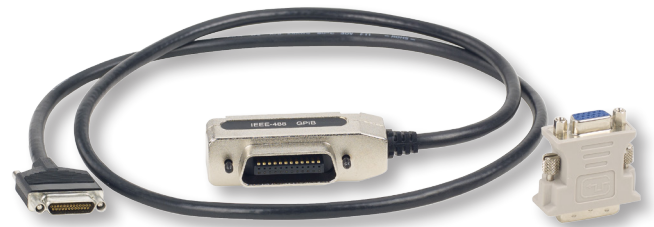


Figure 2. Accessories included with the M9036A

