# Keysight Technologies

# M9005A PXIe Chassis

## Integrated System Module, 5-slots, 3U

Data Sheet


KEYSIGHT TECHNOLOGIES

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# Introduction

The Keysight Technologies, Inc. M9005A PXIe 5-slot chassis is the smallest footprint family member of Keysight's PXIe chassis product line. It has been designed as a low cost, bench friendly solution while still enabling PXIe compatibility and performance. The integrated system module enables a solution that is fast and easy to setup. The combination of footprint, cost, and performance make it a perfect entry-level chassis for many applications.

## Key Features

- Small footprint, bench friendly, 4U PXIe chassis
- 5 peripheral slots: 3 PXIe hybrid slots, 2 PXIe-only slots
- Integrated PXIe Gen1 x1 system module for use with desktop host adapter
- Up to 250 MB/s total system bandwidth
- Up to 250 MB/s per-slot data bandwidth
- Specified up to 50 °C and 2000 m operating conditions

# Hardware Overview

## Backplane configuration

The M9005 PXIe chassis provides 5 peripheral slots: 3 hybrid-compatible slots and 2 PXI Express for a combination of measurement flexibility and performance. Each slot has a PCIe® x1 Gen 1 link to the upstream PC. Each hybrid peripheral slot can accept a PXI Express peripheral module, a CompactPCI Express Type-2 peripheral, or a PXI-1 module which has the J2 connector replaced with the XJ4 connector. The hybrid slots provide full PXI Express and 32-bit PXI functionality.

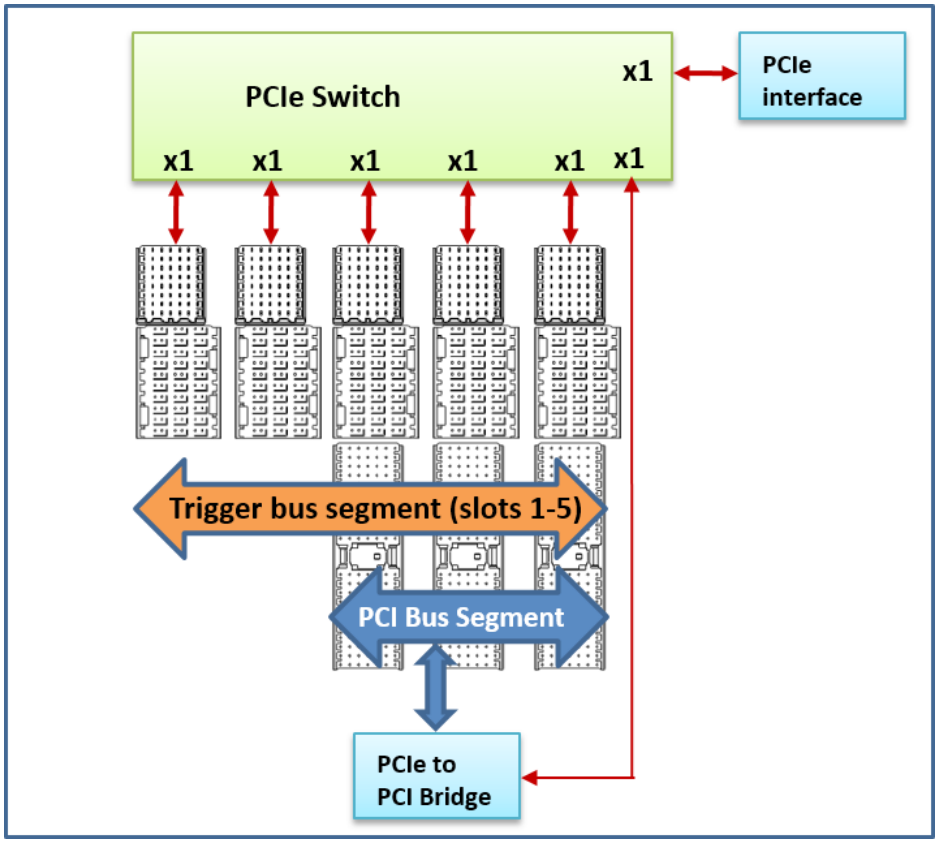


Figure 1. Backplane configuration diagram of the M9005A PXIe 5-slot chassis.

## Software Overview

The M9005A provides a simple use model. The only necessary software is low level chassis driver which allows the system PXI resource manager to enumerate the M9005A chassis and the installed modules.

## Keysight Standard Warranty

With Keysight's standard warranty, your investment is protected by Keysight's global reach in more than 100 countries (either directly or through distributors). The warranty gives you convenient standard coverage for the country in which the product is used, eliminating the need to ship equipment back to the country of purchase. Keysight's warranty service provides:

- All parts and labor necessary to return your investment to full specified performance
- Recalibration for products supplied originally with a calibration certificate
- Return shipment

## Definitions

**Specifications**

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:

- 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.

**Characteristic**

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**

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**

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.

**Module specifications and configuration**

Some module specifications may be affected by chassis characteristics. Refer to module datasheet to determine the configuration used when specifications were set and to ensure module power and cooling requirements are met.

**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 specifications contained in this document are subject to change.

# Technical Characteristics

| | | | | |
|---|---|---|---|---|
| **Chassis characteristics** | | | | |
| **Standards compliance** | | | | |
| PXI-5 PXI Express hardware specification | | | | |
| PXI-1 hardware specification rev 2.2 | | | | |
| PICMG® EXP.0 R1.0 specification | | | | |
| **Backplane characteristics** | | | | |
| Module size | 3U | | | |
| Total number of slots | 5 | | | |
| Hybrid compatible slots | 3 | | | |
| PXIe only slots | 2 | | | |
| System slot | Integrated system module. PCIe Revision 1 x1 connection to external controller | | | |
| PXIe timing slot | Feature not available in M9005A. Consider M9010A, M9018B, M9019A chassis if required | | | |
| Module compatibility (depending on slot) | PXIe, PXI-hybrid, PXI-1 (J1-only), and cPCI (J1-only) | | | |
| Backplane speed | PCIe Revision 1.0 (Gen 1). x1 to each instrument slot | | | |
| **Mechanical characteristics** | | | | |
| Size | 257.1 mm W x 189.7 mm H x 212.8 mm D (with feet installed) | | | |
| | 257.1 mm W x 177 mm H x 212.8 mm D (with feet removed) | | | |
| | 6U x 1 rack width | | | |
| Weight (without modules) | 5 kg (11.0 lbs) | | | |
| **Power supply** | | | | |
| **AC input** | | | | |
| Input voltage range | 100-240 VAC, nominal | | | |
| Input frequency range | 50/60 Hz | | | |
| Input current rating | 4-2 A | | | |
| Over current protection | All outputs protected from short circuit | | | |
| **Available DC output power (for module slots)** | | | | |
| Total DC power | | | | |
| Maximum total power | 150 W | | | |
| Per slot power, for each of 5 slots | 30 W | | | |
| **DC supplies** | | | | |
| **Voltage** | **Maximum current** | | | |
| +3.3 V | 15 A | | | |
| +5 V | 7.5 A | | | |
| +12 V | 15 A | | | |
| -12 V | 0.75 A | | | |
| 5 $V_{AUX}$ | 1.0 A | | | |
| **Over-voltage protection** | | | | |
| | **Active range** | | | |
| **Over-voltage at** | **Minimum** | **Maximum** | | |
| +3.3 V | 3.76 V | 4.3 V | | |
| +5 V | 5.75 V | 7.0 V | | |
| +12 V | 13.4 V | 15.6 V | | |
| **Backplane pin current capacity** | | | | |
| **Slot** | **+3.3 V** | **+5 V** | **+ 12 V** | **-12 V** |
| PXIe slot | 6 A | 0 A | 4 A | 0 A |
| Hybrid slot | 6 A | 6 A | 4 A | 1 A |

# Technical Characteristics, continued

| **Chassis cooling and power dissipation** | |
|---|---|
| Slot airflow direction | Bottom of module to top of module |
| Chassis cooling intake | Bottom of chassis |
| Chassis cooling exhaust | Along rear, right side, and top of chassis |
| Chassis cooling fan | One 126 cfm fan on bottom of chassis with High/Auto speed selector |
| Power dissipation, peripheral slot | 38 W |
| Power supply cooling | Forced air circulation through integrated fan |
| Power supply cooling intake | Front side of chassis |
| Power supply cooling exhaust | Rear side of chassis |

When placed into an instrument rack or on a bench, maximum per slot power dissipation requires that the chassis bottom and top is not blocked. In an instrument rack, provide 1U rack space below and above the chassis. On the bench, the instrument feet provide the necessary bottom clearance. Slot blockers and EMC filler panels are recommended to be used in empty slots. Module cooling is affected by the module's resistance to air flow.

| **Clocks and triggers**<br>**10 MHz system clock (PXI_CLK10)** | |
|---|---|
| Maximum slot-to-slot skew | 250 ps |
| Accuracy | ±25 ppm max. (guaranteed over the operating temperature range) |
| Duty factor | 45%-55% |
| Unloaded signal swing | 3.3 V ±0.3 V |

External 10 MHz clock output feature is not available in M9005A. Consider M9010A, M9018B, M9019A chassis if required

| **100 MHz system clock (PXIe_CLK100)** | |
|---|---|
| Maximum slot-to-slot skew | 100 ps |
| Accuracy | ±25 ppm max. (guaranteed over the operating temperature range) |
| Duty factor | 45% - 55% |
| Absolute single-ended voltage swing (when each line in the differential pair has 50 Ω termination to 1.30 V or Thevenin equivalent) | 400 to 1000 mV |

**External 10 MHz clock source input requirements**

Feature not available in M9005A. Consider M9010A, M9018B, M9019A chassis if required for synchronization.

**PXI star trigger**

Feature not available in M9005A. Consider M9010A, M9018B, M9019A chassis if required for synchronization.

**PXI differential star triggers**

Feature not available in M9005A. Consider M9010A, M9018B, M9019A chassis if required for synchronization.

| **Host adapter characteristics** | |
|---|---|
| Card format | Low profile |
| PCI bracket | Includes low and standard profile |
| Dimensions | 6.7 cm x 7.1 cm (2.6 in x 2.8 in) |
| Computer slot compatibility | PCIe x1, x8, or x16 |
| Maximum cable length | 3 m |
| Sustained data throughput | Up to 215 MB/s |
| Power consumption | 1.2 W (typ), 360 mA @ 3.3 V |

# Technical Characteristics, continued

| **Environmental characteristics** [1, 2] | | |
|---|---|---|
| | **Operating** | **Storage** |
| Temperature | 0 to 50 °C | –40 to 70 °C |
| Altitude | Up to 6,562 ft (2,000m) at 25 °C ambient | |
| Humidity | Type-tested 20 to 80%, non-condensing | Type-tested 10 to 95%, non-condensing |
| **Vibration** | | |
| Operating random vibration | 5 to 500 Hz, 0.3 g rms | |
| Survival random vibration | 5 to 500 Hz, 2.4 g rms | |
| **Acoustical emissions (referenced to 1pW)** | **Auto fan (25°C ambient)** | **High fan** |
| Sound pressure level [3] | 43 dBA | 58 dBA |
| Sound power | 51 dBA | 65 dBA |

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
3. At operator position

**Regulatory characteristics**

**Safety**

Complies with the essential requirements of the European LVD Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61010-1
- Canada: CSA C22.2 No. 61010-1
- USA: UL std no. 61010-1

**Acoustic statement (European Machinery Directive)**

- Acoustic noise emmission
- LpA <70 dB
- Operator position
- Normal position Per ISO 7779

**EMC**

Complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

Complies with European EMC Directive 2014/30/EU of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61326-1 Basic Immunity
- 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 a la norme NMB-001 du Canada

# Recommended Configuration

Configure the Keysight M9005A PXIe chassis as follows:

- Add the PC interface card
- The host adapter comes preconfigured with a 3 m PCIe cable.
- Use slot blockers and EMC filler panels in empty module slots to ensure proper module operating temperatures.
- Chassis fan may need to be set at high in order to provide required module cooling at targeted environment cooling.
- Module cooling can be impacted by each module's resistance to air flow, therefore, refer to each module data sheet for information regarding power and cooling to ensure proper configurations.
- Place modules which have high cooling requirements in the center slots of the M9005A. For high power modules, contact your local Keysight office regarding compatibility of the M9005A with your desired modular configuration.

# Software information

| | |
|---|---|
| Supported operating systems | Microsoft Windows 7 SP1 (32/64-bit)<br>Microsoft Windows 8.1 Update 1 (32/64-bit)<br>Microsoft Windows 10 (32/64-bit) |
| Standard compliant drivers | No IVI drivers required for this chassis |
| Supported application development environments (ADE) | LabVIEW, LabWindows/CVI, MATLAB, VEE, Visual Basic, VisualStudio.NET (C/C++, C#, VB.NET) |
| Keysight IO Libraries | Supported versions: 17.2 (or later). Use of latest version recommended. Includes: VISA Libraries, Keysight Connection Expert, IO Monitor |

# Hardware

| Model | Description |
|---|---|
| M9005A | 5-slot, PXIe chassis with integrated system module |
| M9005A-002 | PCIe Desktop adapter for M9005A + 3m cable |
| Includes | Standard PXI filler panels, getting started guide, drivers, and Keysight I/O libraries |

# Accessories

| Model | Description |
|---|---|
| Y1212A | Slot blocker kit: 5 single-slot |
| Y1213A | PXI EMC filler panel kit: 5 single-slot filler panels |
| Y1274A | Rack mount kit |

# Services

| Advantage Services: Calibration |
|---|
| Keysight Advantage Services is committed to your success throughout your equipment's lifetime. |

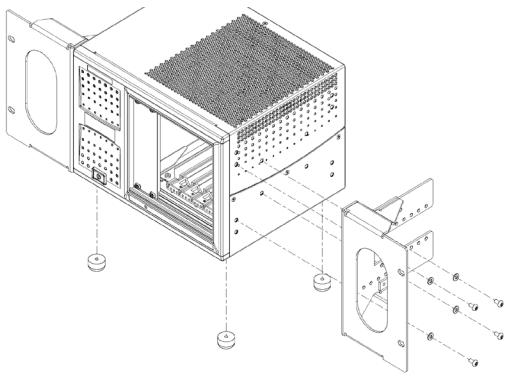

Figure 2. Y1274A M9005A Rack Mount Kit.

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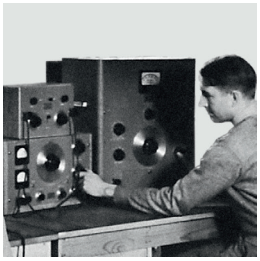

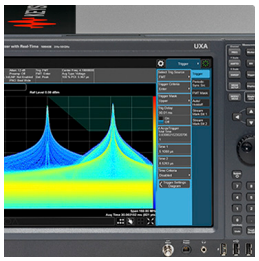

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