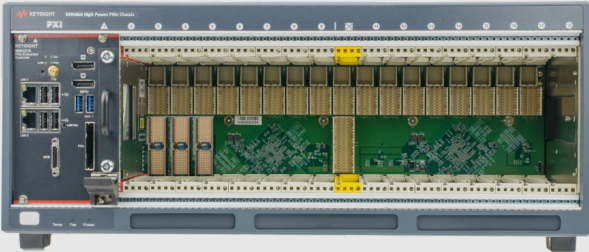

Keysight PXIe Chassis Family

M9010A, M9018B, M9019A, M9046A



M9046A



M9010A



M9019A



M9018B

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www.keysight.com/find/M9018B

www.keysight.com/find/M9019A

www.keysight.com/find/M9046A

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M9010A, M9018B, M9019A, M9046A PXIe Chassis Specification Guide

How to Use this Document

This document contains technical specifications and characteristics for all versions, to the publication date of this Specification Guide, of the M9010A, M9018B, M9019A and M9046A PXIe chassis.

NOTE

The specification, characteristics, and typical data in this version of the Specification Guide supersedes the information in all previous versions.

Some specifications in this document may apply only to a specific manufacturing version of the chassis. When a specification applies only to a specific version, the version number is listed next to that specification in the table.

Technical Specification and Characteristics

Terminology definitions

Term	Definition
Specification (Spec.)	<p>Warranted performance. Specifications include guard bands 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” sections of this specification Guide. In addition, the following conditions must be met:</p> <ul style="list-style-type: none"> • Instrument is within its calibration cycle if calibration is required. • Instrument has been stored for a minimum of one hour within the operating temperature range prior to turn-on and after a 30 minute warm-up period.
Characteristic (Char.)	<p>Characteristics describe product performance that is useful in the application of the product, but that is not covered by the warranty. Characteristics are often referred to as Typical or Nominal values.</p>
Typical (Typ.)	<p>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.</p>
Nominal (Nom.)	<p>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.</p>

Requirements for Temperature Control

For optimal cooling and proper operating temperatures,

- Any empty module slot in the chassis should be fitted with a slot blocker and EMC filler panel.
- If a PCIe Cable Interface module is used in place of a controller, the open area to the left of the interface module should be filled with the filler panel and bracket.
- All vents should remain unobstructed.
- The chassis fan speed should be set to HIGH.

Additional Information

- All data are measured from multiple units at room temperature and are representative of product performance within the controlled temperature range unless otherwise noted.
- The specifications contained in this document are subject to change.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

M9010A Technical Specifications

Chassis characteristics		
Standards compliance		
		PXI-5 PXI Express hardware specification PXI-1 hardware specification rev 2.2 PICMG EXP.0 R2.0 specification
Backplane		
	Module size	3U
	Total slots	10
	Hybrid compatible slots	8
	PXIe system slot	1 (with three system expansion slots)
	PXIe timing slot	1 (also accepts PXIe module)
	Module compatibility	PXIe, PXI-Hybrid, PXI-1 (J1 only), and cPCI (J1 only)
	System slot link configuration (fixed)	2-Link configuration: x8, x16
	Backplane speed	PCIe revision 3.0 (Gen 3)
Mechanical		
	Size	322.5 mm W x 194.8 mm H x 552.5 mm D (with feet installed) 322.5 mm W x 177.8 mm H x 552.5 mm D (with feet removed)
	Weight (without modules)	14.02 kg (30.91 lbs)

Power supply characteristics		
AC input		
	Operating voltage/power (low-line) ¹	100-120 V, 734 W Maximum
	Operating voltage/power (high-line) ¹	220-240 V, 1100 W Maximum
	Input frequency range	50/60 Hz
	Mains supply voltage fluctuations are not to exceed $\pm 10\%$ of the nominal voltage.	
	Transient over-voltages typically present on the Mains supply (installation CAT II).	
	Over current protection	Internal fuse in line
Available DC output power (for module slots)		
	Total DC power ²	
	220-240 V input:	830 W
	100-120 V input:	470 W

1. Auto switching between high line and low line.

2. No derating required for temperature or altitude.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Power supply characteristics (continued)					
DC Supplies					
Voltage	Maximum Current ¹		Load Regulation	Maximum ripple and noise (20 MHz BW)	
	45 °C, <10kft	50 °C, 10kft			
+3.3 V	58.8 A	48.8 A	5%	1.5% (pk-pk)	
+5 V	36 A	31.5 A	5%	1% (pk-pk)	
+12 V	40 A	35 A	5%	1% (pk-pk)	
-12 V	4 A	3.5 A	5%	1% (pk-pk)	
5 Vaux	2 A	2 A	5%	50mV (pk-pk)	
Backplane pin current capacity					
Slot	+3.3 V	+5 V	+12 V	-12V	5 Vaux
System controller slot	9 A	9 A	11 A	0 A	1 A
System timing/PXle slot	6 A	0 A	4 A	0 A	1 A
PXle hybrid slot	6 A	6 A	4 A	1 A	1 A
Chassis cooling and power dissipation characteristics					
Slot airflow direction			Bottom of module to top of module		
Chassis cooling intake			Rear of chassis		
Chassis cooling exhaust			Front top of chassis		
Chassis cooling fans			Two 120 cfm fans on rear panel with HIGH/AUTO speed selector		
Power dissipation, system slot			140 W max		
Power dissipation, user slot			42 W max ²		
Power dissipation, timing slot			42 W max ²		

1. The total power supplied for all rails must not exceed 470 W (100-120 V) or 830 W (220-240 V).

2. Maximum per slot power dissipation at 55 °C with 15 °C temperature rise; requires: a) that the chassis bottom is not blocked (1U rack space below or sitting on bench with feet extended) OR b) two air inlet modules in slots 9, 10, or 11, and a slot blocker in empty controller slots. Module cooling can be impacted by each module's resistance to air flow.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Clocks and Triggers	
10 MHz system clock (PXI_CLK10)	
Maximum slot-to-slot skew	200 ps
Accuracy	30 ppm
Output amplitude (10 MHz REF Out BNC)	1 V pk-pk $\pm 20\%$ square-wave into 50Ω
	2 V pk-pk unloaded
Output impedance (10 MHz REF Out BNC)	$50\Omega \pm 5\Omega$
100 MHz system clock (PXIe_CLK100)	
Maximum slot-to-slot skew	125 ps
Accuracy	30 ppm
External 10 MHz clock source input requirements	
Frequency input	10 MHz ± 100 ppm
Input signal (10 MHz REF In BNC)	100 mVPP to 5 Vpp (square or sine wave)
Input signal (PXI timing slot PXI_CLK10_IN)	5V or 3.3 V TTL signal
PXI star trigger	
Maximum slot-to-slot skew	250 ps
PXI differential star triggers	
Maximum slot-to-slot skew	150 ps
Maximum differential skew	25 ps
Front panel triggers (trig 1 and trig 2 SMBs)	
Direction control	Input or Output (configurable)
Output level	3.3 V CMOS (TTL Compatible, 5 V tolerant)
Output impedance	50Ω (typ)
Output trigger source	PXI_Trig0 - PXI_Trig7 (Segment 1)
Input level	3.3 V CMOS (TTL Compatible, 5 V tolerant)
Input impedance	$3\text{ k}\Omega$ (typ)
Input trigger destination	PXI_Trig0 - PXI_Trig7 (Segment 1)
Input threshold	1.65 V (typ)
Minimum swing	250 mV
Minimum pulse width	100 ns (typ)

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Environmental Characteristics ^{1,2}		
Operating and storage conditions		
	Operating	Storage
Temperature	0 °C to 55 °C	-40 °C to 70 °C
Altitude	Up to 10,000 ft (3048 m)	Up to 15,000 ft (4572 m)
Humidity	Type-tested at 95% RH up to 40 °C, decreases linearly to 45% RH at 55 °C (non-condensing) ³	
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	
Acoustical emissions (referenced to 20 µPa)		
	Auto fan (25 °C ambient)	High Fan
Sound pressure level ⁴	45 dB	58 dB
Sound Power	50 dB	66 dB
Regulatory Characteristics		
Safety	Complies with the essential requirements of the European LVD Directive of the following standards (dates and editions are cited in the Declaration of Conformity):	
	<ul style="list-style-type: none"> - IEC/EN 61010-1 - Canada: CSA C22.2 No. 61010-1 - USA: UL std no. 61010-1 	
Acoustic statement (European Machinery Directive)	Acoustic noise emission LpA < 70 dB Operator position Normal operation mode per ISO 7779	
EMC	Complies with European EMC Directive of the following standards (dates and editions are cited in the Declaration of Conformity):	
	<ul style="list-style-type: none"> - 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 a la norme NMB-001 du Canada	

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. From 40 °C to 55 °C, the maximum % Relative Humidity follows the line of constant dew point.

4. At operator position

Recommended Configuration

Configure the Keysight M9010A PXIe chassis as follows:

- Select a PXIe system module (the Keysight M9022A, M9023A or M9024A System Interface Modules are recommended) or embedded controller (M9037A).
- If an external computer is being used, select an appropriate PC interface card (the Keysight M9048B or M9049A Host Adapter Interface modules are recommended).
- If an external computer is being used, make sure to use a supported computer from www.keysight.com/find/PXIAXIeTestedPC.
- Select an appropriate cable to connect the computer interface board to the chassis interface (the Y1202A is recommended to connect the M9048B and M9022A).
- Select accessories as required.

Multi-chassis Configuration

The M9010A can be used in multi-chassis configurations with other PXIe chassis (including the M9010A, M9018B, M9019A, M9046A, and the AXIe chassis (M9502A, M9505A, and M9506A). In general, up to four chassis can be connected together depending on the controller and operating system used. Different topologies include cascade and star.

M9018B Technical Specifications

Chassis characteristics	
Standards compliance	
	PXI-5 PXI Express hardware specification PXI-1 hardware specification rev 2.2 PICMG EXP.0 R2.0 specification
Backplane	
Module size	3U
Total slots	18
Hybrid compatible slots	16
PXIe system slot	1 (with three system expansion slots)
PXIe timing slot	1 (also accepts PXIe module)
Module compatibility	PXIe, PXI-Hybrid, PXI-1 (J1 only), and cPCI (J1 only)
System slot link configuration (configurable)	2-Link (2x8) and 4-Link (4x4) plus M9021A configuration (1x8)
Backplane speed	PCIe revision 2.0 (Gen 2)
Mechanical	
Size	444.4 mm W x 194.8 mm H x 466 mm D (with feet installed) 444.4 mm W x 177.8 mm H x 466 mm D (with feet removed) 4U x 1 rack width
Weight (without modules)	13.5 kg (29.8 lbs)
Power supply characteristics	
AC input	
Operating voltage/power (low-line) ¹	100-120 V, 1200 W Maximum
Operating voltage/power (high-line) ¹	200-240 V, 1300 W Maximum
Input frequency range	50/60 Hz
Mains supply voltage fluctuations are not to exceed $\pm 10\%$ of the nominal voltage.	
Transient over-voltages typically present on the Mains supply (installation CAT II).	
Over current protection	Internal fuse in line
Available DC output power (for module slots)	
Total DC power ²	
200-240 V input:	858 W
100-120 V input:	708 W

Power supply characteristics

1. Auto switching between high line and low line.
2. No derating required for temperature or altitude.

DC Supplies					
Voltage	Maximum Current ¹		Load Regulation	Maximum ripple and noise (<20 MHz BW)	
	45 °C, <10kft	50 °C, 10kft			
+3.3 V	70 A	67 A	5%	1.5% (pk-pk)	
+5 V	60 A ²	52.5 A ²	5%	1% (pk-pk)	
+12 V	57.4 A ²	49.9 A ²	5%	1% (pk-pk)	
-12 V	4 A	4 A	5%	1% (pk-pk)	
5 Vaux	2 A	2 A	5%	50mV (pk-pk)	
Backplane pin current capacity					
Slot	+3.3 V	+5 V	+12 V	-12V	5 Vaux
System controller slot	9 A	9 A	11 A	0 A	1 A
System timing/PXle slot	6 A	0 A	4 A	0 A	1 A
PXle hybrid slot	6 A	6 A	4 A	1 A	1 A
Chassis cooling and power dissipation characteristics					
Slot airflow direction			Bottom of module to top of module		
Chassis cooling intake			Bottom of front bezel, side panels, and bottom panel of chassis		
Chassis cooling exhaust			Rear of chassis		
Chassis cooling fans			Three 186 cfm fans on rear panel with HIGH/AUTO speed selector		
Power dissipation, system slot			140 W max		
Power dissipation, user slot			42 W max ³		
Power dissipation, timing slot			42 W max ³		

1. The total power supplied for all rails must not exceed 708 W (100-120 V) or 858 W (200-240 V).
2. The total power supplied for 5 V and 12 V rails must not exceed 689 W at 45 °C, <10k ft, or 599 W at 50 °C, 10k ft.
3. Maximum per slot power dissipation at 55 °C with 15 °C temperature rise; requires: a) that the chassis bottom is not blocked (1U rack space below or sitting on bench with feet extended) OR b) two air inlet modules in slots 9, 10, or 11, and a slot blocker in empty controller slots. Module cooling can be impacted by each module's resistance to air flow.

Clocks and Triggers	
10 MHz system clock (PXI_CLK10)	
Maximum slot-to-slot skew	155 ps
Accuracy	30 ppm
Output amplitude (10 MHz REF Out BNC)	1 V pk-pk 20% square-wave into 50Ω
	2 V pk-pk unloaded
Output impedance (10 MHz REF Out BNC)	50Ω ±5Ω
100 MHz system clock (PXIe_CLK100)	
Maximum slot-to-slot skew	125 ps
Accuracy	30 ppm
External 10 MHz clock source input requirements	
Frequency input	10 MHz ±100 ppm
Input signal (10 MHz REF In BNC)	100 mVPP to 5 Vpp (square or sine wave)
Input signal (PXI timing slot PXI_CLK10_IN)	5V or 3.3 V TTL signal
PXI star trigger	
Maximum slot-to-slot skew	250 ps
PXI differential star triggers	
Maximum slot-to-slot skew	150 ps
Maximum differential skew	25 ps
Front panel triggers (trig 1 and trig 2 SMBs)	
Direction control	Input or Output (configurable)
Output level	3.3 V CMOS (TTL Compatible, 5 V tolerant)
Output impedance	PXI_Trig0 – PXI_Trig7 (Segment 2)
Output trigger source	316 Ω pulled up to 3.3 V
Input level	3.3 V CMOS (TTL Compatible, 5 V tolerant)
Input impedance	3 kΩ (typ)
Input trigger destination	PXI_Trig0 – PXI_Trig7 (Segment 2)
Input threshold	1.65 V (typ)
Minimum swing	250 mV
Minimum pulse width	100 ns (typ)

Environmental Characteristics ^{1,2}		
Operating and storage conditions		
	Operating	Storage
Temperature	0 °C to 55 °C	-40 °C to 70 °C
Altitude	Up to 10,000 ft (3048 m)	Up to 15,000 ft (4572 m)
Humidity	Type-tested at 95% RH up to 40 °C, decreases linearly to 45% RH at 55 °C (non-condensing) ³	
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	
Acoustical emissions (referenced to 20 µPa)		
	Auto fan (25°C ambient)	High Fan
Sound pressure level ⁴	53 dB	69 dB
Sound Power	59 dB	77 dB
Regulatory Characteristics		
Safety	Complies with the essential requirements of the European EMC Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):	
	<ul style="list-style-type: none"> - IEC/EN 61010-1 - Canada: CSA C22.2 No. 61010-1 - USA: UL std no. 61010-1 	
Acoustic statement (European Machinery Directive)	Acoustic noise emission LpA < 70 dB Operator position Normal operation mode per ISO 7779	
EMC	Complies with European EMC Directive of the following standards (dates and editions are cited in the Declaration of Conformity):	
	<ul style="list-style-type: none"> - 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 a la norme NMB-001 du Canada	

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. From 40 °C to 55 °C, the maximum % Relative Humidity follows the line of constant dew point.

4. At operator position

Recommended Configuration

Configure the Keysight M9018B PXIe chassis as follows:

- Select a PXIe system module (the Keysight M9022A, M9023A, or M9024A System Interface Modules are recommended) or embedded controller (M9037A).
- If an external computer is being used, select an appropriate PC interface card (the Keysight M9048B or M9049A Host Adapter Interface modules are recommended).
- If an external computer is being used, make sure to use a supported computer from www.keysight.com/find/PXIAXIeTestedPC.
- Select an appropriate cable to connect the computer interface board to the chassis interface (the Y1202A is recommended to connect the M9048B and M9022A).
- Select accessories as required.

Multi-chassis Configuration

The M9018B can be used in multi-chassis configurations with other PXIe chassis (including the M9010A, M9018B, M9019A, M9046A, and the AXIe chassis (M9502A, M9505A and M9506A). In general, up to four chassis can be connected together depending on the controller and operating system used. Different topologies include cascade and star.

M9019A Technical Specifications

Chassis characteristics	
Standards compliance	
	PXI-5 PXI Express hardware specification PXI-1 hardware specification rev 2.2 PICMG EXP0 R2.0 specification
Backplane	
Module size	3U
Total slots	18
Hybrid compatible slots	16
PXIe system slot	1 (with three system expansion slots)
PXIe timing slot	1 (also accepts PXIe module)
Module compatibility	PXIe, PXI-Hybrid, PXI-1 (J1 only), and cPCI (J1 only)
System slot link configuration (fixed)	2-link configuration (x8, x16)
Backplane speed	PCIe revision 3.0 (Gen 3)
Mechanical	
Size	444.4 mm W x 194.8 mm H x 466 mm D (with feet installed) 444.4 mm W x 177.8 mm H x 466 mm D (with feet removed) 4U x 1 rack width
Weight (without modules)	13.3 kg (29.3 lbs)
Power supply characteristics	
AC input	
Operating voltage/power (low-line) ¹	100-120 V, 1200 W Maximum
Operating voltage/power (high-line) ¹	200-240 V, 1300 W Maximum
Input frequency range	50/60 Hz
Mains supply voltage fluctuations are not to exceed $\pm 10\%$ of the nominal voltage.	
Transient over-voltages typically present on the Mans supply (installation CAT II).	
Over current protection	Internal fuse in line
Available DC output power (for module slots)	
Total DC power ²	
200-240 V input:	800 W
100-120 V input:	650 W

Power supply characteristics

1. Auto switching between high line and low line.
2. No derating required for temperature or altitude.

DC Supplies					
Voltage	Maximum Current ¹		Load Regulation	Maximum ripple and noise (<20 MHz BW)	
	45 °C, <10kft	50 °C, 10kft			
+3.3 V	70 A	67 A	5%	1.5% (pk-pk)	
+5 V	60 A ²	52.5 A ²	5%	1% (pk-pk)	
+12 V	52.5 A ²	45 A ²	5%	1% (pk-pk)	
-12 V	4 A	4 A	5%	1% (pk-pk)	
5 Vaux	2 A	2 A	5%	50mV (pk-pk)	
Backplane pin current capacity					
Slot	+3.3 V	+5 V	+12 V	-12V	5 Vaux
System controller slot	9 A	9 A	11 A	0 A	1 A
System timing/PXle slot	6 A	0 A	4 A	0 A	1 A
PXle hybrid slot	6 A	6 A	4 A	1 A	1 A
Chassis cooling and power dissipation characteristics					
Slot airflow direction			Bottom of module to top of module		
Chassis cooling intake			Bottom of front bezel, side panels, and bottom panel of chassis		
Chassis cooling exhaust			Rear of chassis		
Chassis cooling fans			Three 186 cfm fans on rear panel with HIGH/AUTO speed selector		
Power dissipation, system slot			140 W max		
Power dissipation, user slot			42 W max ³		
Power dissipation, timing slot			42 W max ³		

1. The total power supplied for all rails must not exceed 708 W (100-120 V) or 858 W (200-240 V).
2. The total power supplied for 5 V and 12 V rails must not exceed 689 W at 45 °C, <10k ft, or 599 W at 50 °C, 10k ft.
3. Maximum per slot power dissipation at 55 °C with 15 °C temperature rise; requires: a) that the chassis bottom is not blocked (1U rack space below or sitting on bench with feet extended) OR b) two air inlet modules in slots 9, 10, or 11, and a slot blocker in empty controller slots. Module cooling can be impacted by each module's resistance to air flow.

Clocks and Triggers	
10 MHz system clock (PXI_CLK10)	
Maximum slot-to-slot skew	155 ps
Accuracy	30 ppm
Output amplitude (10 MHz REF Out BNC)	1 V pk-pk 20% square-wave into 50 Ω 2 V pk-pk unloaded
Output impedance (10 MHz REF Out BNC)	50 Ω \pm 5 Ω
100 MHz system clock (PXIe_CLK100)	
Maximum slot-to-slot skew	125 ps
Accuracy	30 ppm
External 10 MHz clock source input requirements	
Frequency input	10 MHz \pm 100 ppm
Input signal (10 MHz REF In BNC)	100 mVPP to 5 Vpp (square or sine wave)
Input signal (PXI timing slot PXI_CLK10_IN)	5V or 3.3 V TTL signal
PXI star trigger	
Maximum slot-to-slot skew	250 ps
PXI differential star triggers	
Maximum slot-to-slot skew	150 ps
Maximum differential skew	25 ps
Front panel triggers (trig 1 and trig 2 SMBs)	
Direction control	Input or Output (configurable)
Output level	3.3 V CMOS (TTL Compatible, 5 V tolerant)
Output impedance	50 Ω (typ)
Output trigger source	PXI_Trig0 – PXI_Trig7 (Segment 2)
Input level	3.3 V CMOS (TTL Compatible, 5 V tolerant)
Input impedance	3 k Ω (typ)
Input trigger destination	PXI_Trig0 – PXI_Trig7 (Segment 2)
Input threshold	1.65 V (typ)
Minimum swing	250 mV
Minimum pulse width	100 ns (typ)

Environmental Characteristics ^{1,2}		
Operating and storage conditions		
	Operating	Storage
Temperature	0 °C to 55 °C	-40 °C to 70 °C
Altitude	Up to 10,000 ft (3048 m)	Up to 15,000 ft (4572 m)
Humidity	Type-tested at 95% RH up to 40 °C, decreases linearly to 45% RH at 55 °C (non-condensing) ³	
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	
Acoustical emissions (referenced to 20 µPa)		
	Auto fan (25°C ambient)	High Fan
Sound pressure level ⁴	53 dB	69 dB
Sound Power	59 dB	77 dB
Regulatory Characteristics		
Safety	Complies with the essential requirements of the European LVD Directive of the following standards (dates and editions are cited in the Declaration of Conformity):	
	<ul style="list-style-type: none"> - IEC/EN 61010-1 - Canada: CSA C22.2 No. 61010-1 - USA: UL std no. 61010-1 	
Acoustic statement (European Machinery Directive)	Acoustic noise emission LpA < 70 dB Operator position Normal operation mode per ISO 7779	
EMC	Complies with European EMC Directive of the following standards (dates and editions are cited in the Declaration of Conformity):	
	<ul style="list-style-type: none"> - 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 a la norme NMB-001 du Canada	

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. From 40 °C to 55 °C, the maximum % Relative Humidity follows the line of constant dew point.

4. At operator position

Recommended Configuration

Configure the Keysight M9019A PXIe chassis as follows:

- Select a PXIe system module (the Keysight M9022A, M9023A, or M9024A System Interface Modules are recommended) or embedded controller (M9037A).
- If an external computer is being used, select an appropriate PC interface card (the Keysight M9048B or M9049A Host Adapter Interface modules are recommended).
- If an external computer is being used, make sure to use a supported computer from www.keysight.com/find/PXIAXIeTestedPC.
- Select an appropriate cable to connect the computer interface board to the chassis interface (the Y1202A is recommended to connect the M9048B and M9022A).
- Select accessories as required.

Multi-chassis Configuration

The M9019A can be used in multi-chassis configurations with other PXIe chassis (including the M9010A, M9018B, M9019A, M9046A, and the AXIe chassis (M9502A, M9505A and M9506A). In general, up to four chassis can be connected together depending on the controller and operating system used. Different topologies include cascade and star.

M9010A, M9018B, M9019A, M9046A PXIe Chassis
Specification Guide

M9046A Technical Specifications

Chassis characteristics	
Standards compliance	
PXI-5 PXI Express hardware specification PXI-1 hardware specification rev 2.2 PICMG EXP0 R2.0 specification	
Backplane	
Module size	3U
Total slots	18
Hybrid compatible slots	3
PXIe system slot	1 (with three system expansion slots)
PXIe timing slot	1 (also accepts PXIe module)
Module compatibility	PXIe, PXI-Hybrid, PXI-1 (J1 only), and cPCI (J1 only)
System slot link configuration (fixed)	2-Link configuration: x8, x16
Backplane speed	PCIe revision 3.0 (Gen 3)
Mechanical	
Size	445 mm W x 193 mm H x 515 mm D (with feet installed) 445 mm W x 178 mm H x 515 mm D (with feet removed) 4U x 1 rack width
Weight (without modules)	18.66 kg (41.14 lbs)
Power supply characteristics	
AC input ¹	
Operating voltage/power (low-line) ²	100-120 V, 1350 W (maximum)
Operating voltage/power (high-line) ²	200-240 V, 2000 W (maximum)
Input frequency range (100 to 120 V)	50/60/400 Hz ³
Input frequency range (220 to 240 V)	50/60 Hz ³
Mains supply voltage fluctuations are not to exceed $\pm 10\%$ of the nominal voltage.	
Transient over-voltages typically present on the Mains supply (installation CAT II).	
Over current protection	Internal fuse in line
Available DC output power (for module slots) ⁴	
Total DC power	
200 to 240 V input:	1675 W
100 to 120 V input:	887.5 W ⁵

Power supply characteristics (continued)

1. The instrument can operate safely with voltage fluctuations up to $\pm 10\%$.
2. Auto switching between high line and low line.
3. 100-120VAC 400 Hz and 200-240VAC 60 Hz operation requires redundant earth ground. See installation manual for details.
- 4 2% derating per degree above 50°C and 2% derating per 100m (328.1ft) above 2000m (6561.7ft).
5. With option 003: 820W

DC Supplies						
Voltage	Maximum System Slot	Current PXIe Slot	Hybrid Slot	Load Regulation	Maximum ripple and noise (20 MHz BW)	
+3.3 V	15 A	9 A	9 A	5%	1.5% (pk-pk)	
+5 V ⁶	15 A	0 A	6 A	5%	1% (pk-pk)	
+12 V	30 A	6 A	6 A	5%	1% (pk-pk)	
-12 V ⁷	0 A	0 A	1 A	5%	1% (pk-pk)	
5 Vaux ⁸	1 A	1 A	1 A	5%	50mV (pk-pk)	

DC Supplies						
Voltage	Maximum System Slot	Power PXIe Slot	Hybrid Slot	Load Regulation	Maximum ripple and noise (20 MHz BW)	
+3.3 V	49.5 W	29.7 W	29.7 W	5%	1.5% (pk-pk)	
+5 V ⁶	75 W	0 W	30 W	5%	1% (pk-pk)	
+12 V	360 W	72 W	72 W	5%	1% (pk-pk)	
-12 V ⁷	0 W	0 W	12 W	5%	1% (pk-pk)	
5 Vaux ⁸	5 W	5 W	5 W	5%	50mV (pk-pk)	

Backplane pin current capacity (nom)						
Slot	+3.3 V	+5 V	+12 V	-12V	5 Vaux	
System controller slot	15 A	15 A	30 A	0 A	1 A	
System timing/PXIe slot	9 A	0 A	6 A	0 A	1 A	
PXIe hybrid slot	9 A	6 A	6 A	1 A	1 A	

Chassis cooling and power dissipation characteristics			
Slot airflow direction	Bottom of module to top of module		
Chassis cooling intake	Rear of chassis		
Chassis cooling exhaust	Top of chassis		
Power dissipation	Standard option		With option 003
System slot	300 W max		300 W max
Peripheral slot	85 W max ⁹		100 W max ⁹
Timing slot	85 W max ⁹		100 W max ⁹

Chassis cooling fans			
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Power supply characteristics (continued)		
	Standard	Three 210 cfm fans on rear panel with HIGH/AUTO speed selector
	Option 003	Four 129 cfm fans on top panel with HIGH/AUTO speed selector
DC Supply Protection		
	Over-current protection	Power supply is shut down when the output current is approximately 25% above maximum pin current per slot
	Over-voltage protection	Maximum output is 8% of nominal voltage of all rails

6. A single 25A@5V supply is shared across the 3 Hybrid slots and the System Slot.

7. A single 1A@-12V supply is shared across the 3 Hybrid slots.

8. A single 2A 5VAUX supply is shared across all slots.

9. Maximum per slot power dissipation at 55°C with 15°C temperature rise; requires a) that the chassis top is not blocked (1U rack space above or sitting on bench and b) a slot blocker is installed in each empty slot. Module cooling can be impacted by each module's resistance to air flow.

Clocks and Triggers	
10 MHz system clock (PXI_CLK10) (typ)	
Maximum slot-to-slot skew	155 ps
Accuracy	± 1 ppm
10 MHz system clock (PXI_CLK100) (typ)	
Maximum slot-to-slot skew	125 ps
Accuracy	± 1 ppm
100 MHz SYNC (PXIe_SYNC100) (typ)	
Maximum slot-to-slot skew	125 ps
Accuracy	± 1 ppm
External 10 MHz clock source input requirements (nom)	
Frequency input	10 MHz \pm 20 ppm
Input signal (10 MHz REF In BNC)	100 mVPP to 5 Vpp (square wave or sine wave)
Input signal (PXI timing slot PXI_CLK10_IN)	5V or 3.3 V TTL signal
External 10 MHz clock output (nom)	
Output amplitude (10 MHz REF Out BNC)	1 Vpp \pm 20% square-wave into 50 Ω 2 Vpp unloaded
Output impedance (10 MHz REF Out BNC)	50 Ω \pm 5 Ω
PXI star trigger (typ)	
Maximum slot-to-slot skew	250 ps
PXI differential star triggers (typ)	
Maximum slot-to-slot skew	150 ps
Maximum differential skew	25 ps
Option 001 Rear panel triggers (nom)	
Number of trigger ports	8
Connector type	SMB
Direction control	Input or Output (configurable)
Output level	3.3 V CMOS (TTL Compatible)
Output impedance	50 Ω (typ)
Output trigger source	PXI_Trig0 - PXI_Trig7 (Segment 1,2, or 3)
Input level	3.3 V CMOS (TTL Compatible, 5 V tolerant)
Input impedance	2 k Ω (typ)
Input trigger destination	PXI_Trig0 - PXI_Trig7 (Segment 1,2, or 3)
Input threshold	1.65 V (typ)
Minimum swing	250 mV (typ)
Minimum pulse width	100 ns (typ)

Environmental Characteristics ^{10,11,12}			
Operating and storage conditions			
Temperature	Operating 0 °C to 55 °C ^{13,14}	Storage -40 °C to 70 °C	
Altitude	Up to 10,000 ft (Approximately 3000 m) ¹³	Up to 15,000 ft (4572 m)	
Maximum Relative Humidity (non-condensing)	Type-tested at 95%RH up to 40°C, decreases linearly to 45%RH at 55°C ¹⁵		
Shock and 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}		
	Functional shock: type-tested at half-sine, 30g, 11 ms		
	Bench handling: type tested per MIL-PRF-28800F		
Acoustical emissions with rear fans only (referenced to 20 µPa)			
	Sound pressure level ^{16,17}	Auto fan (25°C ambient)	High Fan (55°C)
	42 W/Slot	52 dBA	72 dBA
	60 W/Slot	62 dBA	72 dBA
	85 W/Slot	69 dBA	72 dBA
	Sound power level ¹⁷	Auto fan (25°C ambient)	High Fan (55°C)
	42 W/Slot	60 dB	79 dB
	60 W/Slot	69 dB	79 dB
	85 W/Slot	77 dB	79 dB
Acoustical emissions with option 003 (referenced to 20 µPa)			
	Sound pressure level ^{16,17}	Auto fan (25°C ambient)	High Fan (55°C)
	90 W/Slot	74 dBA	80 dBA
	100 W/Slot	77 dBA	80 dBA
	Sound power level ¹⁷	Auto fan (25°C ambient)	High Fan (55°C)
	90 W/Slot	77 dB	83 dB
	100 W/Slot	80 dB	83 dB
Regulatory Characteristics			
Safety	Complies with the essential requirements of the European LVD Directive of the following standards (dates and editions are cited in the Declaration of Conformity):		
	<ul style="list-style-type: none"> - IEC/EN 61010-1 - Canada: CSA C22.2 No. 61010-1 - USA: UL std no. 61010-1 		
Acoustic statement (European Machinery Directive)	Acoustic noise emission LpA < 70 dB Operator position Normal operation mode per ISO 7779		

Environmental Characteristics^{10,11,12}

EMC

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

- 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 a la norme NMB-001 du Canada

10. 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.

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

12. Intended for indoor use only.

13. The amount of power available derates at 2% per degree above 50°C and 2% derating per 100m (328.1ft) above 2000m (6561.7ft)

14. For option QS1 and QS3: 0°C to 50°C.

15. From 40°C to 55°C, the maximum % Relative Humidity (non-condensing) follows the line of constant dew point.

16. At operator position.

17. At sea level.

Recommended Configuration

Configure the Keysight M9046A PXIe chassis as follows:

- Select a PXIe system module (the Keysight M9022A, M9023A or M9024A System Interface Modules are recommended) or embedded controller (M9037A).
- If an external computer is being used, select an appropriate PC interface card (the Keysight M9048B or M9049A Host Adapter Interface modules are recommended).
- If an external computer is being used, make sure to use a supported computer from www.keysight.com/find/PXIAXIeTestedPC.
- Select an appropriate cable to connect the computer interface board to the chassis interface (the Y1202A is recommended to connect the M9048B and M9022A).
- Install a slot-blocker into each empty slot (Y1212A) and cover them with blank panels.
- Select accessories as required.

Multi-chassis Configuration

The M9046A can be used in multi-chassis configurations with other PXIe chassis (including the M9010A, M9018B, M9019A, and the AXIe chassis (M9502A, M9505A and M9506A)). In general, up to four chassis can be connected together depending on the controller and operating system used. Different topologies include cascade and star.



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