PXIe-2315 Series

5-Slot PXIe Chassis

User Manual

User Manual Version: V1.3.2

Revision Date: July 8, 2021

Table of Contents

1. Introduction

1.1 Overview

PXIe-2315 series is a high performance cost-effective 5-slot all hybrid PXI/PXIe chassis. It complements JYTEK PXIe-62301 6-slot sturdy all hybrid chassis with the new mechanical design that appeals to customers who wish to lower system cost but retain the high performance.

Depanding on PCIe link speed capability, PXIe-2315 series provide two models as shown in Table 1.

Model Name	PCIe Link Speed Capability	System Bandwidth	Slot Bandwidth
PXIe-2315G3	Gen3	16 GB/s	4 GB/s
PXIe-2315G2	Gen2	8 GB/s	2 GB/s

Table 1 PXIe-2315 series model name

Note:

- system bandwidth defined as data rate between controller and chassis backplane.
- slot bandwidth defined as data rate between peripheral module and chassis backplane.

1.2 Main Features

- High data throughput 5-slot PCIe Gen2 or Gen3 PXIe chassis
- High clock accuracy and low phase jitter
- Low power ripple noise
- Specially designed for cost effective PXI/PXIe applications
- Ideal for OEM vendors

2. Hardware

2.1 Backplane Overview

2.1.1 Backplane Architectture

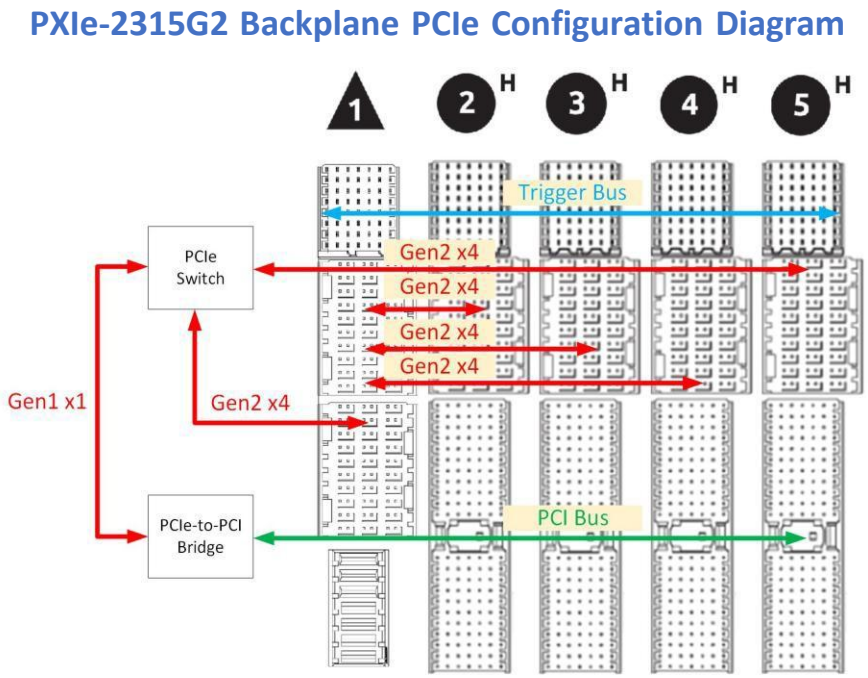


Figure 1 PXIe-2315G2 backplane configuration Diagram

PXIe-2315G3 Backplane PCIe Configuration Diagram

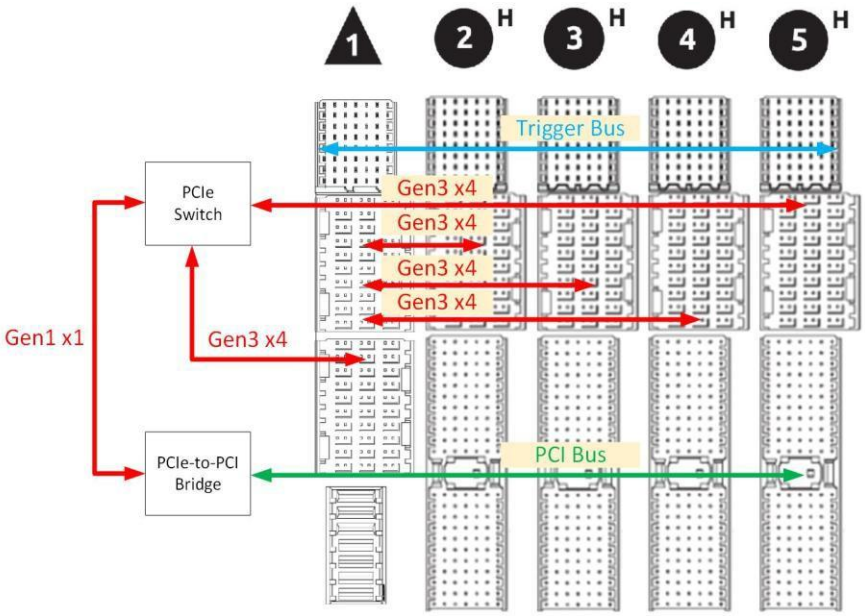


Figure 2 PXIe-2315G3 backplane configuration Diagram

2.1.2 System Controller Slot

The System Controller slot is a fixed PCIe 4-Link configuration. Link 1, 2 and 3 are routed to slot2, slot3 and slot4 repectively. Link 4 is routed to PCIe switch and downstream to slot5 and PCI bus. The chassis can accommodate a maximum 4-slot width PXIe controller.

2.1.3 Peripheral Slot

PXIe-2315 provides four hybrid peripheral slots. It can accept the following peripheral modules:

- PXI Express Peripheral Module
- CompactPCI Express Type-2 Peripheral Module
- Hybrid slot compatible PXI-1 Peripheral Module
- CompactPCI 32-bit Peripheral Module

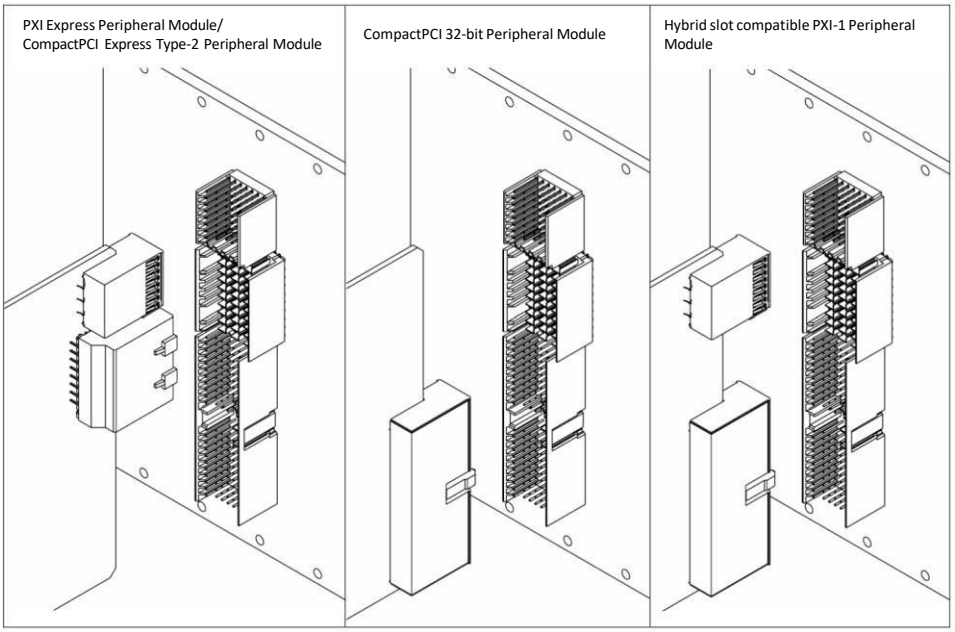


Figure 3 PXIe-2315 Peripheral Slot Compatible Modules

Each peripheral slot PCIe link can support Gen3 x4 (PXIe-2315G3) or Gen2 x4 (PXIe-2315G2), providing maximum single-direction bandwidth of 4GB/s or 2GB/s. And each peripheral slot can also support 32bit PCB bus, providing maximum single-direction bandwidth of 132MB/s.

2.1.4 PXI Trigger Bus

All slots on PXIe-2315 share eight trigger lines, peripheral module can deliver trigger or clock via the trigger bus to synchronize the data acquisition operation.

2.1.5 PXI Local Bus

The local bus on PXIe-2315 is a daisy-chained bus that connects each peripheral slot with adjacent peripheral slots to the left and right, which by routing PXI Local Bus 6 signal between adjacent peripheral slots.

2.1.6 System Reference Clock and Synchronization Signal

The PXIe-2315 supplies 10MHz reference clock (PXI_CLK10), 100MHz reference clock (PXIe_CLK100) and synchronization signal (PXIe_SYNC100) to each peripheral slot for inter-module synchronization.

The PXIe-2315 has the default timing relationship of PXI_CLK10, PXIe_CLK100 and PXIe_SYNC100 as show in Figure 4 which comply with PXI-5 specification.

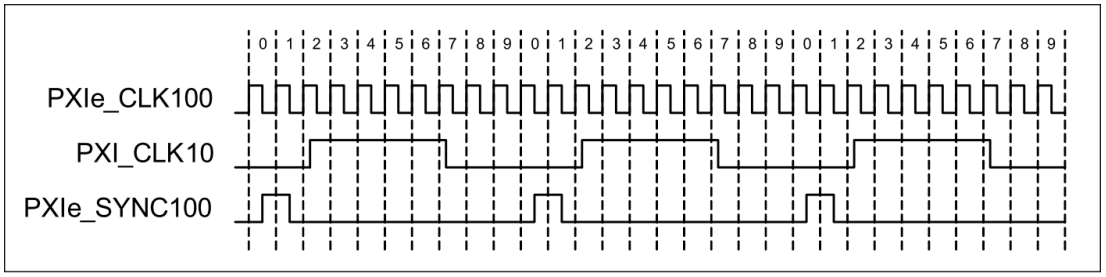


Figure 4 PXIe-2315 System Reference Clock Default Behavior

2.2 Specifications

2.2.1 Basic

Description	PXIe-2315G3	PXIe-2315G2
PXI Chassis Type	PXI Express	PXI Express
Slot Count	5	5
Maximum system bandwidth	16 GB/s (PCIe Gen3 x 16)	8 GB/s (PCIe Gen2 x 16)
Maximum slot bandwidth	4 GB/s (PCIe Gen3 x 4)	2 GB/s (PCIe Gen2 x 4)
Chassis Power Supply Type	AC	AC
Slot Cooling Capacity	58 W (0°C ~ 40°C) 38 W (0°C ~ 50°C)	58 W (0°C ~ 40°C) 38 W (0°C ~ 50°C)
Onboard Clock Type	VCXO	VCXO
Number of hybrid slots	4	4

Table 1 Basic Specification

2.2.2 Electrical

AC Input

Total Chassis Power	472 W
Input voltage range	90 to 264 VAC
Input frequency	47~63 Hz
Input current rating	6-3 A
12V Line regulation	±50 mV
5V Line regulation	±50 mV
3.3V Line regulation	±50 mV
-12V Line regulation	±50 mV
Efficiency	80% ~ 85%

DC Output

Total Available Power	400 W
+3.3 V maximum current	20 A
+5 V maximum current	20 A
+12 V maximum current	30 A
–12 V maximum current	0.8 A
5 Vaux maximum current	3.5 A

Table 2 Electrical Specification

2.2.3 System Synchronization Clock

PXI_CLK10

Maximum slot-to-slot skew	66 ps
Accuracy	±25 ppm max
Maximum jitter	3.7 ps RMS phase-jitter (10 Hz–1 MHz range)
Duty-factor	45%–55%
Unloaded signal swing	3.3 V ±0.3 V

PXIe_CLK100

Maximum slot-to-slot skew	80 ps
Accuracy	±25 ppm max
Maximum jitter	3.7 ps RMS phase-jitter (10 Hz–12 kHz range) 95 fs RMS phase-jitter (12 kHz–20 MHz range)
Duty-factor	45%–55%
Absolute differential voltage	400–1000 mV

PXIe_SYNC100

Duty-factor	10%
Absolute differential voltage	400–1000 mV

Table 3 System Synchronization Clock

2.2.4 Continuous Current Capability

(at 50°C ambient temperature)

System Controller Slot XJ1 Connector

+3.3 V	15 A
+5 V	15 A
+12 V	30 A
5 Vaux	1 A

Hybrid Peripheral Slot XP4 Connector

+3.3 V	9A
+12 V	6 A
5 Vaux	1 A

Hybrid Peripheral Slot P1 Connector

+3.3 V	6 A
+5 V	6 A
+12 V	1 A
–12 V	1 A
V (I/O)	11 A

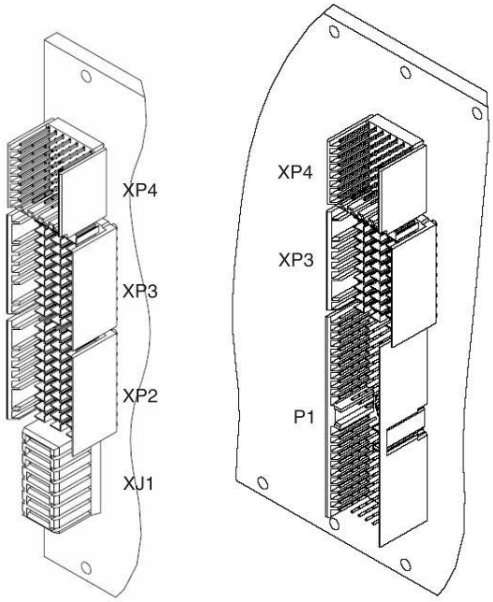


Table 4 Continuous Current Capability

2.2.5 Physical and Enviornment

Operating Environment

Maximum altitude	5000 m
Ambient temperature range	0 to 50 °C
Relative humidity range	20 to 80%, noncondensing

Storage Environment

Ambient temperature range	-20 °C to 80 °C
Relative humidity range	10% to 90%, noncondensing

Shock and Vibration

Operational shock	30 g peak, half-sine, 11 ms pulse duration
Random Vibration (Operating)	5 to 500 Hz, 0.21 Grms, 3 axes
Random Vibration (Nonoperating)	5 to 500 Hz, 2.46 Grms, 3 axes

Sound Pressure Level

Auto fan (up to ~30 °C ambient)	35.3 dBA
High fan	60.8 dBA

Sound Power

Auto fan (up to ~30 °C ambient)	50.0 dBA
High fan	71.4 dBA

Backplane

Size	3 U

Chassis Size and Weight

Width	213.4 mm
Depth	306.7 mm
Height	175.4 mm
Weight	5.8 kg

Table 5 Physical and Environment

2.3 Mechanical Dimensions

All dimensions are shown in mm (millimeters)

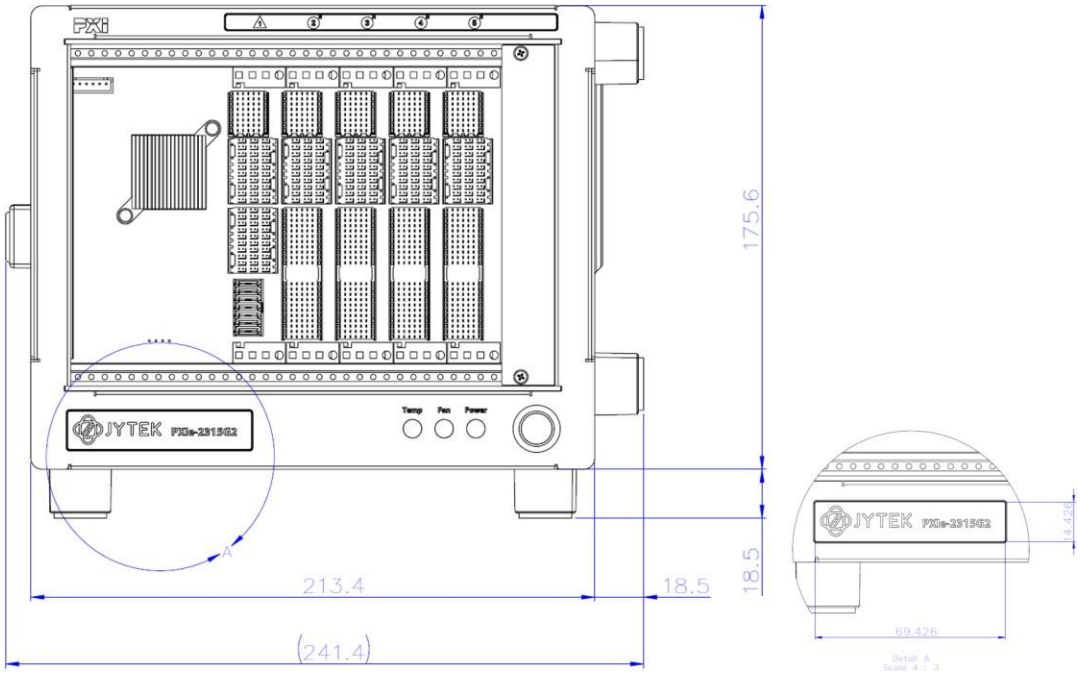


Figure 3Front View (PXIe-2315 Gen 2)

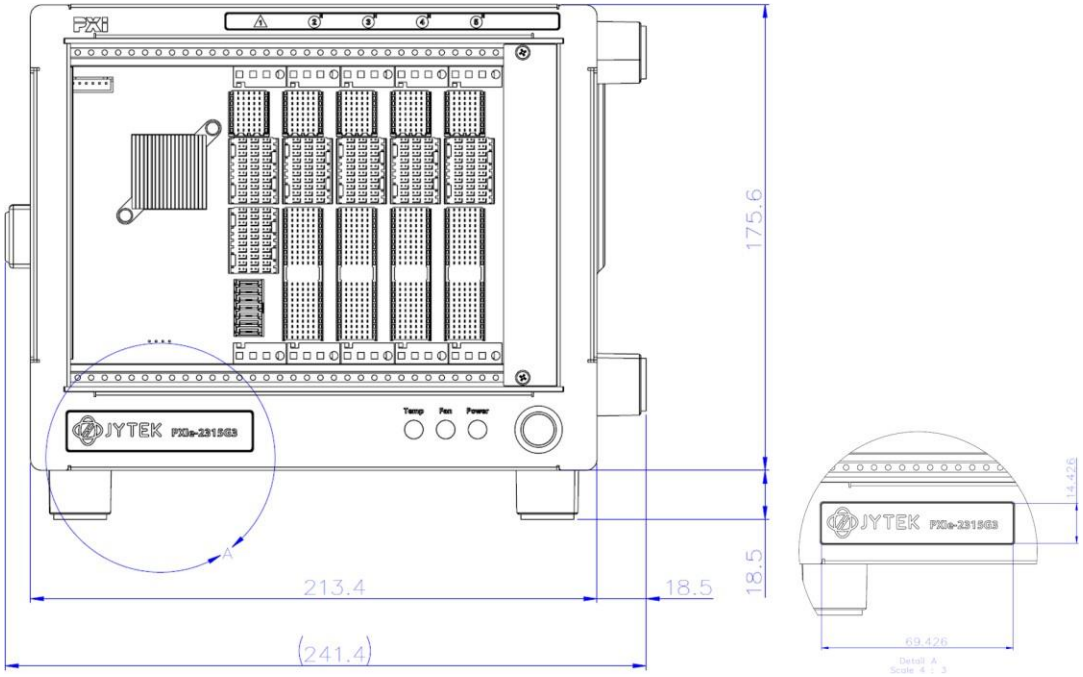


Figure 4 Front View (PXIe-2315 Gen 3)

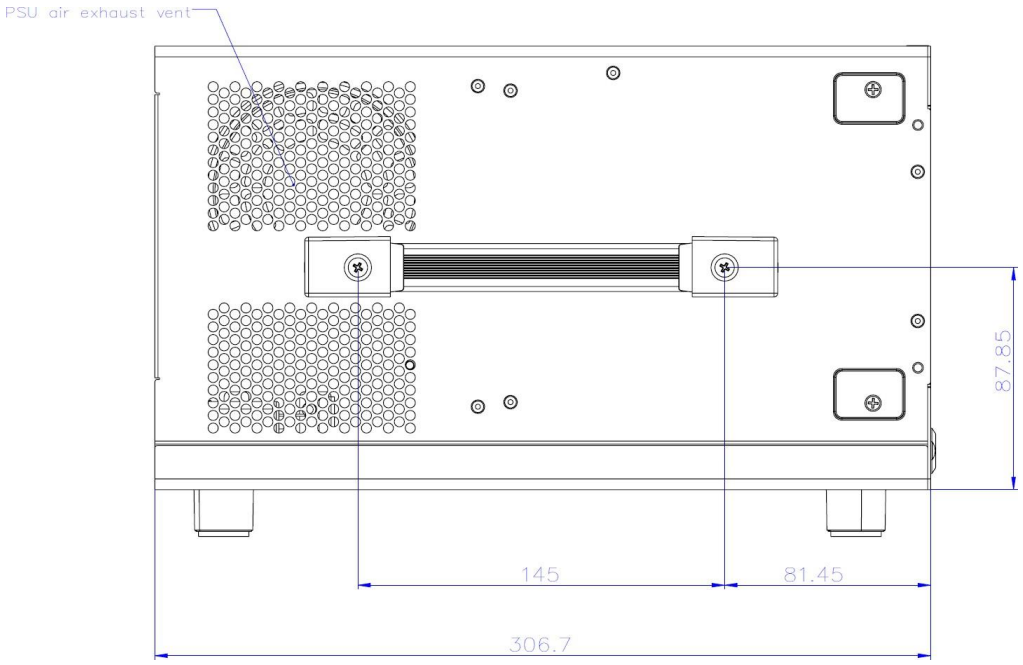


Figure 5 Left Side View (PXIe-2315 Gen 3/Gen 2)

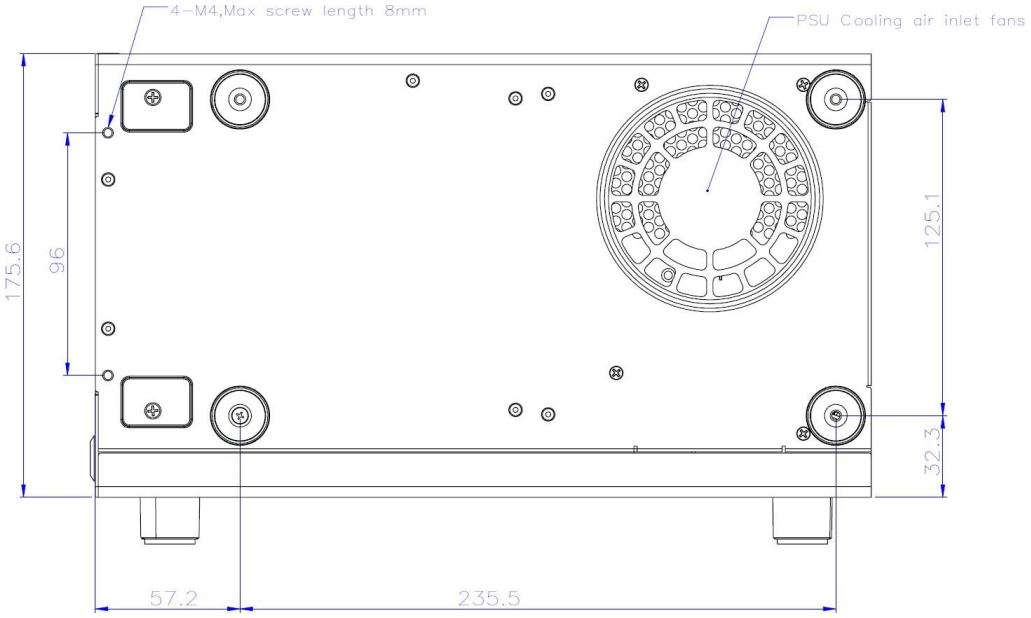


Figure 6 Right Side View (PXIe-2315 Gen 3/Gen 2)

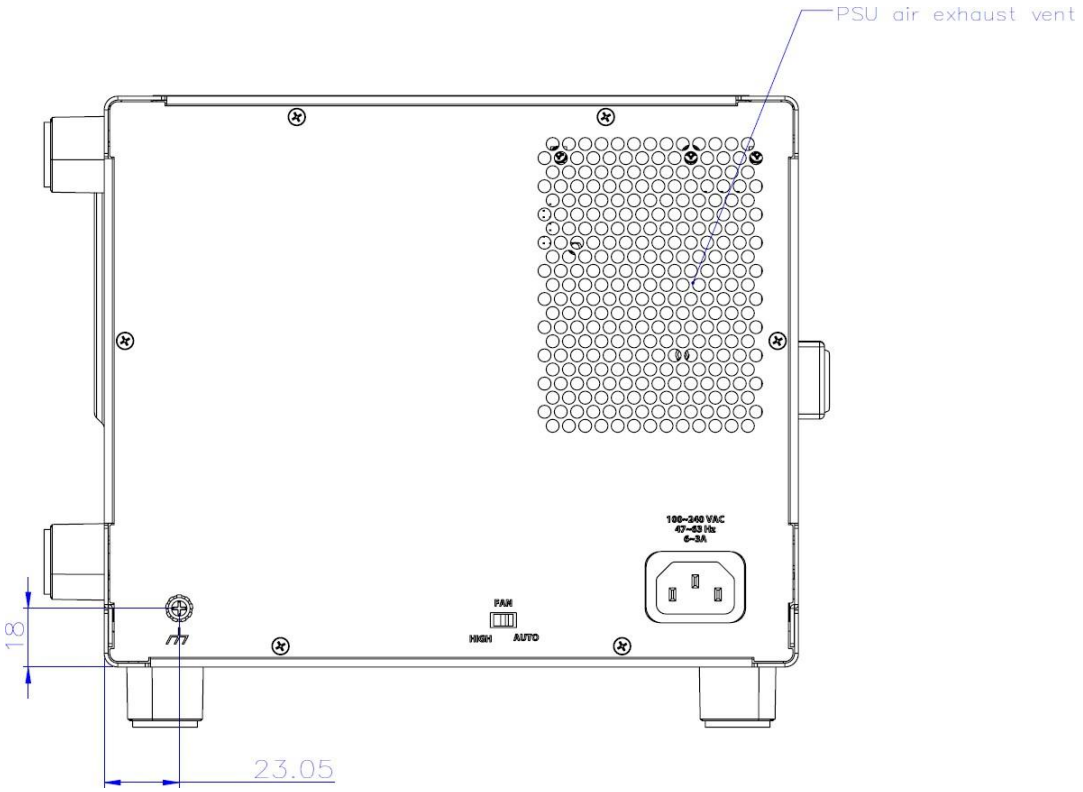


Figure 7 Rear View (PXIe-2315 Gen 3/Gen 2)

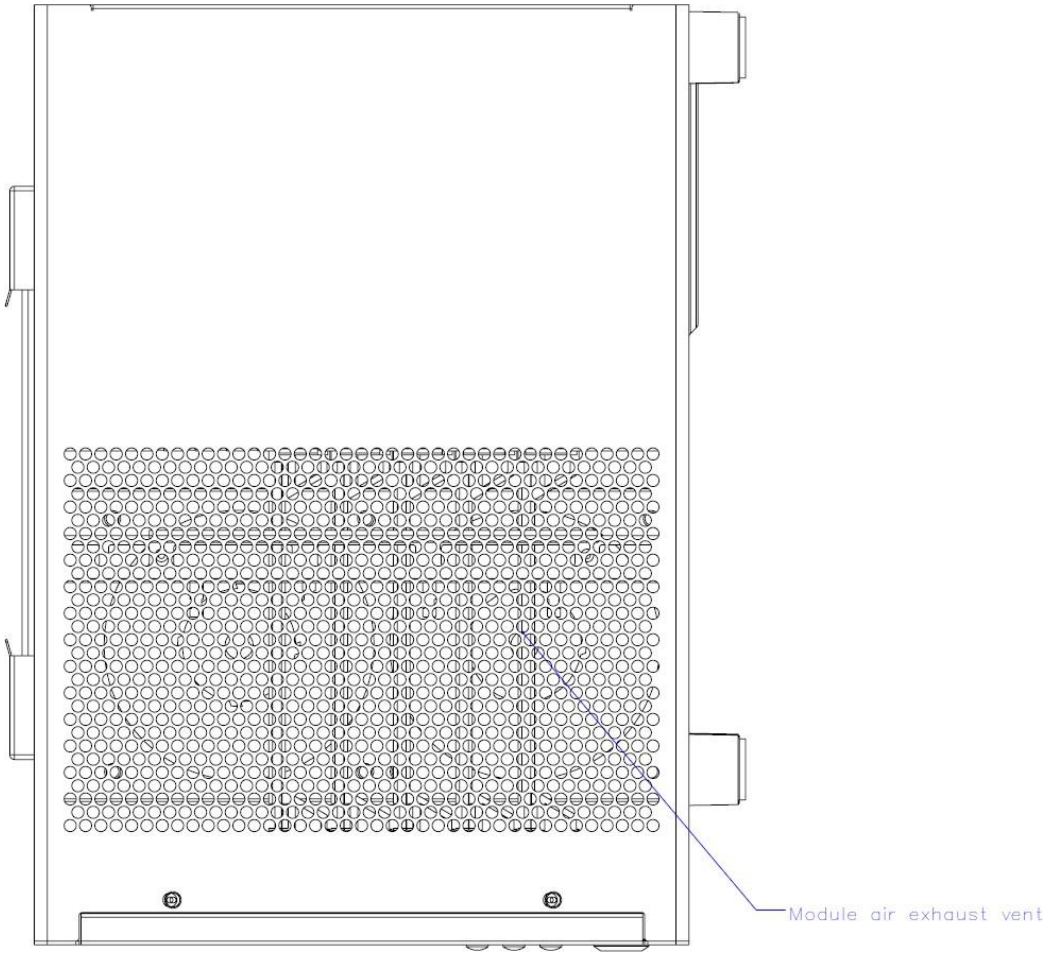


Figure 8 Top View (PXIe-2315 Gen 3/Gen 2)

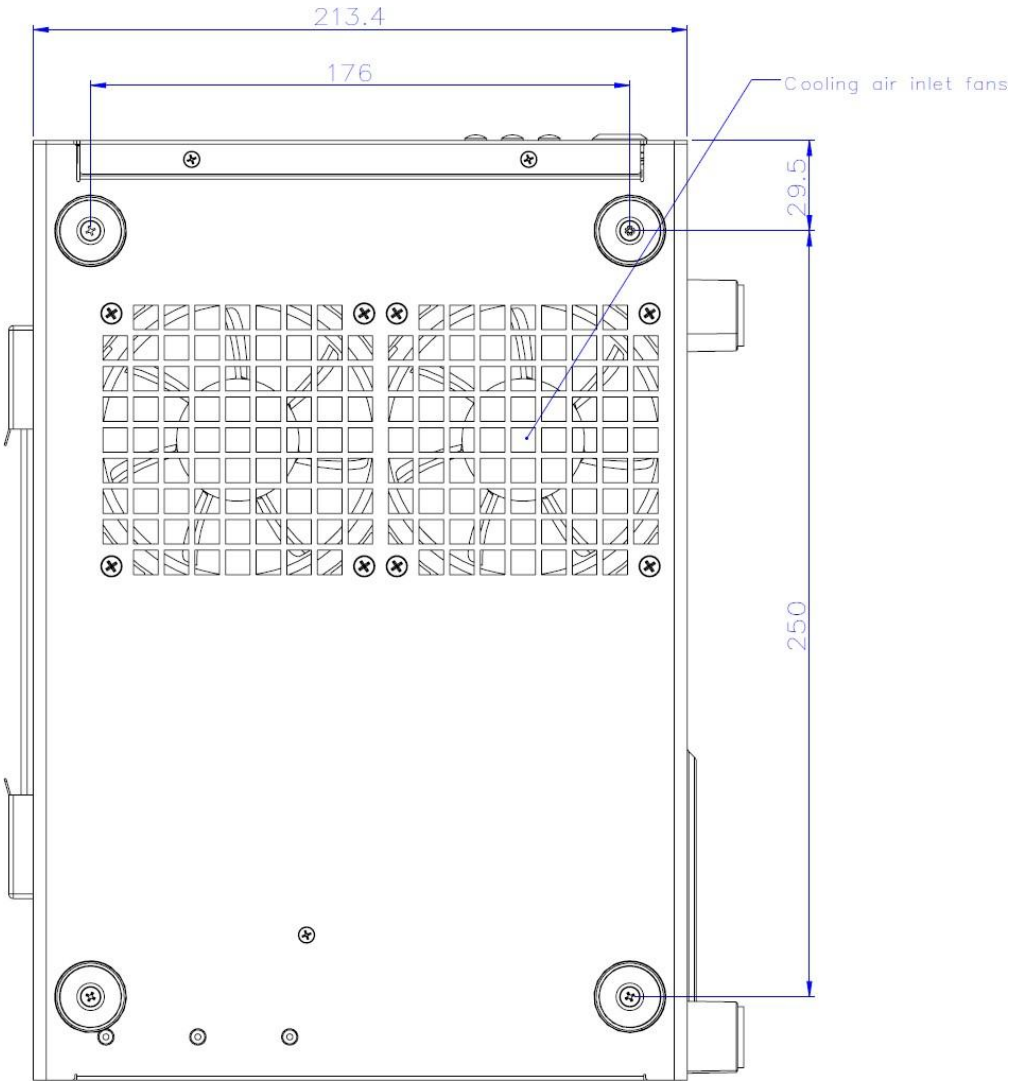


Figure 9 Bottom View (PXIe-2315 Gen 3/Gen 2)

2.4 Front and Rear Panels

2.4.1 Front Panel

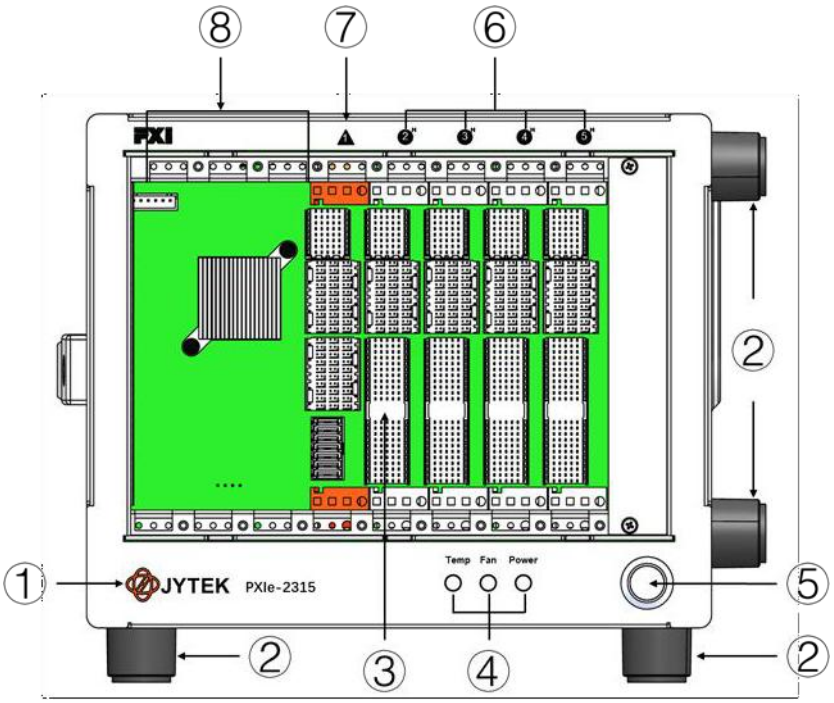


Figure 10 Front Panel

	Feature
①	Chassis Model Name
②	Removable Feet
③	Backplane Connectors
④	Chassis Status LED
⑤	Power Switch
⑥	PXI Express Hybrid Peripheral Slots
⑦	PXI Express System Controller Slot
⑧	System Controller Expansion Slots

Table 1 Front Panel

2.4.2 Rear Panel

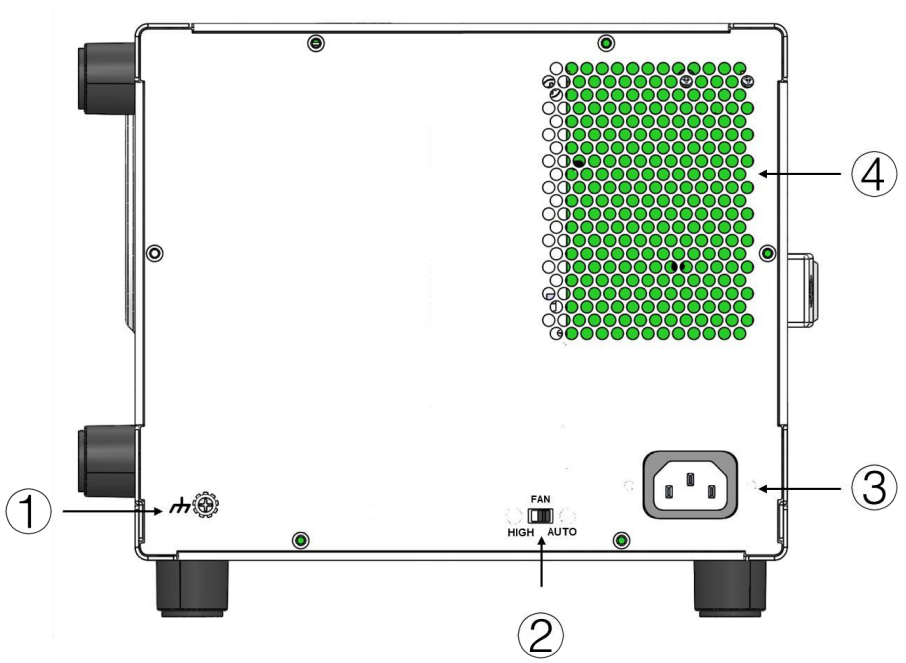


Figure 11 Rear Panel

	Feature
①	Chassis Ground Screw
②	FAN Switch
③	AC Input
④	Rear Output Vents

Table 6 Rear Panel

2.4.3 Chassis Status LED

Chassis Status LED	Temp LED (Amber)	Fan LED (Green)	Power LED (Blue)
On	Chassis MCU is abnormal	Fan is normal	Power is normal
Off	Temperature is normal	Chassis is powered down	Chassis is powered down
Blinking	Temperature sensors exceeds threshold temperature (default is 70℃)	Fan falls below threshold speed (default is 800RPM)	Power rail exceeds threshold setting (default is ±5%)

Table 3 Chassis Status LED

2.4.4 Fan Mode

PXIe-2315 provides the smart fan control mechanism as blow curve. It provides two fan modes.

Fan Mode	Fan's duty cycle	Fan's speed	Note
AUTO	40% ~ 100%	1100 rpm ±10%	Based on temperature
HIGH	100%	4800 rpm ±10%	

Table 4 Fan Mode

When the **Fan Switch** is set to **AUTO** mode, the fan speed is controlled based on the measured temperature of sensor.

Fans run at 40% duty cycle if the measured temperature less than 40°C, and begin ramping up when any temperature reading exceeds 40°C.

Fans run at 100% duty cycle (full speed) if any temperature reading exceeds 65°C.

When the **Fan Switch** is set to **HIGH** mode, fans run at 100% duty cycle immdiately.

The factory default fan control curve shows as following Figure.

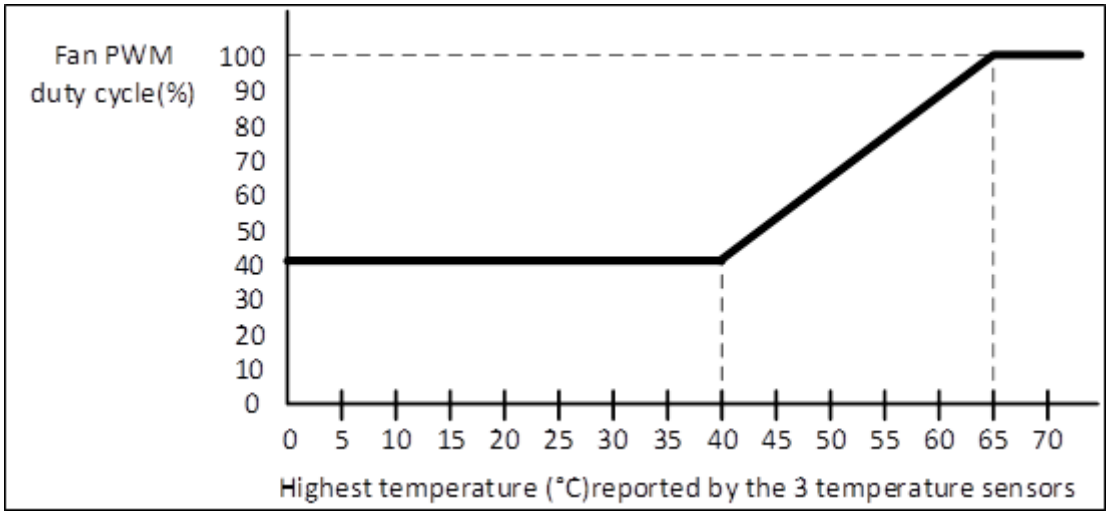


Figure 8 Fan Control Curve

2.5 Chassis Cooling Considerations

2.5.1 PXI/PXIe Modules Cooling

For PXI/PXIe modules cooling, there are two fans on the underside of the chassis draw cool air from the bottom side of chassis to be exhausted to the top sides of the chassis.

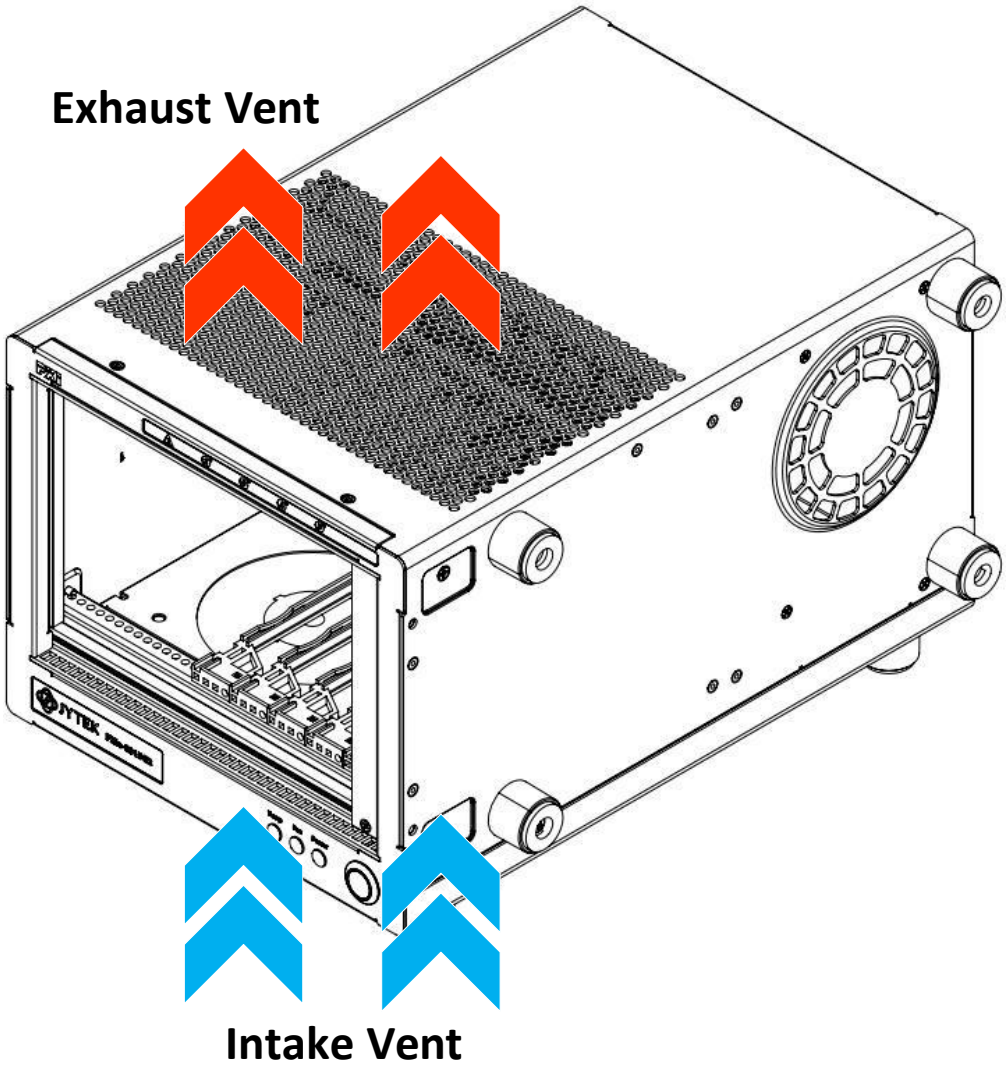


Figure 9 PXI/PXIe Modules Cooling

2.5.2 Power Supply Cooling

For power supply cooling, power supply's fan draws cool air from the right side, to be exhausted through the left side and rear side of the chassis.

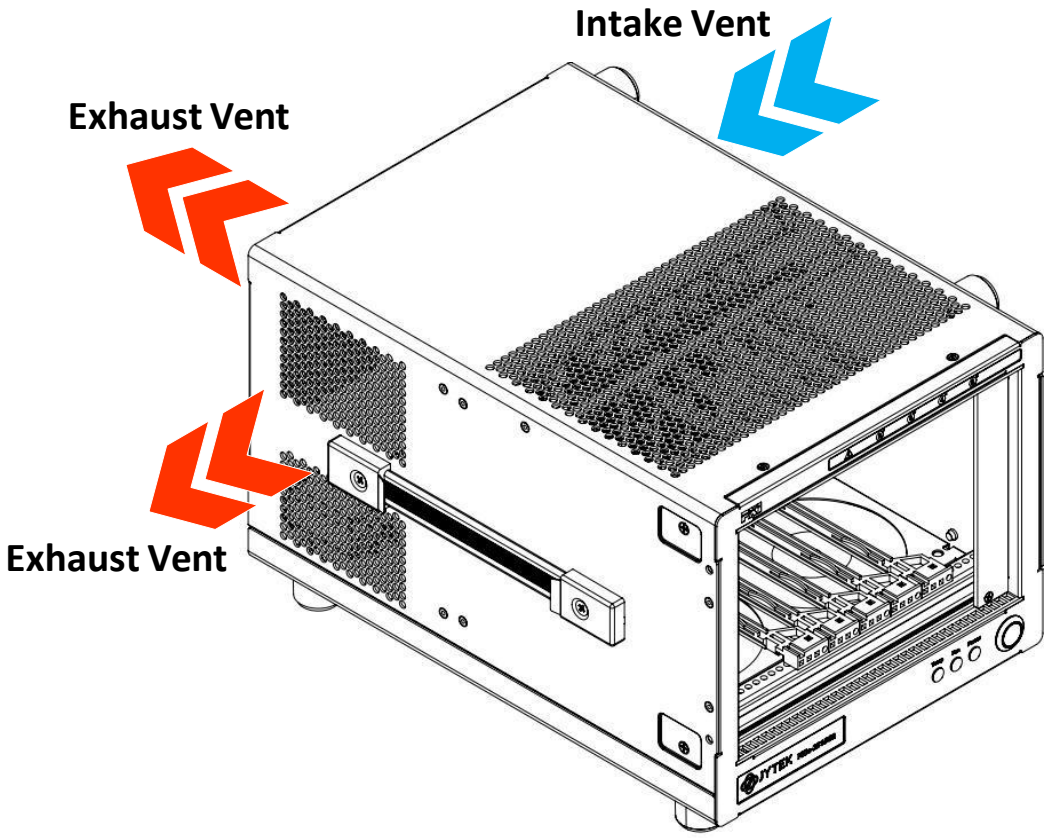


Figure 10 Power Supply Cooling

3. Performance Test

3.1 PCI Bus Throughput

PXIe-2315G3/G2 provides excellent throughput of PCI Bus as shown in below.

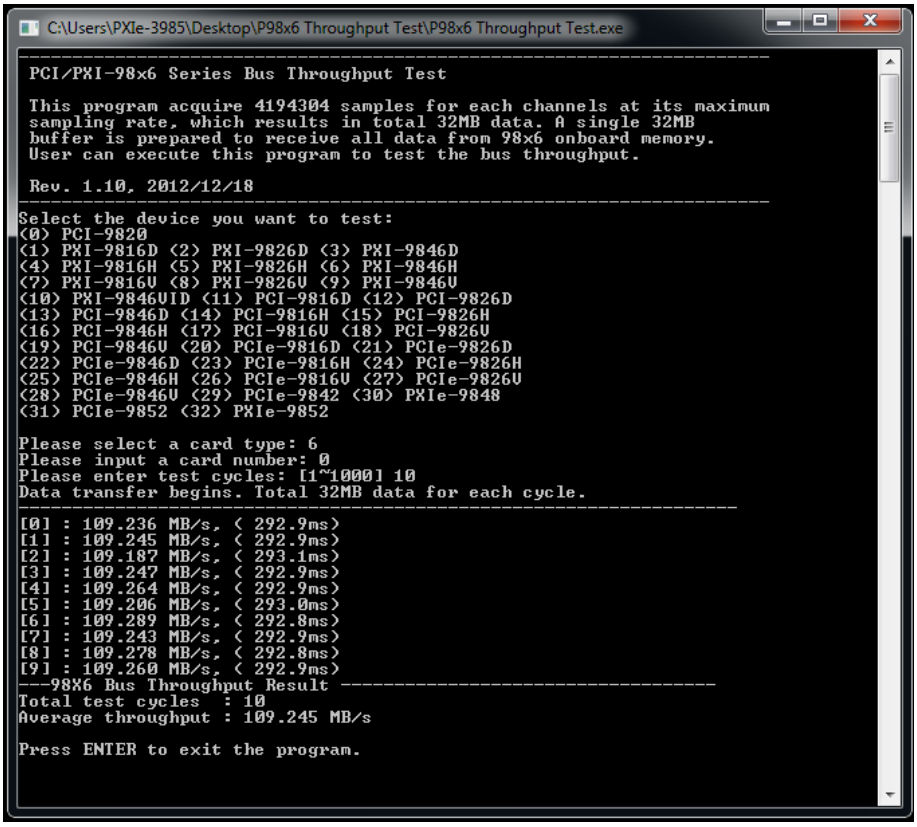


Figure 12 PCI Bus Throughput

Slot	Test Module	Test Result
2	PXI-69846H	109 MB/s
3	PXI-69846H	109 MB/s
4	PXI-69846H	109 MB/s
5	PXI-69846H	109 MB/s

Table 7 PCI Bus Throughput

Note:

- PCI Bus theoretical maximum bandwidth is 132 MB/s.
- PXI-69846H is 4-ch 40 MS/s 16-bit digitizer, its bandwidth is 320 MB/s.

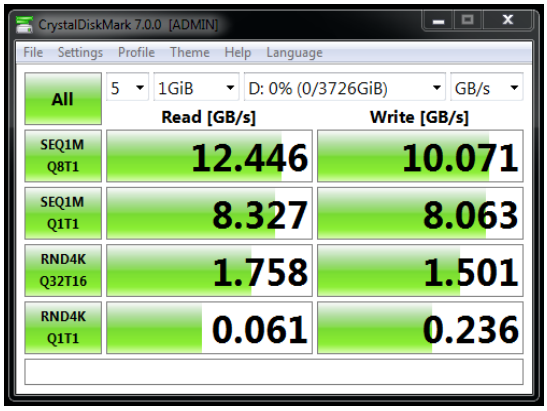
3.2 PCIe Bus Throughput

PXIe-2315G3 provides excellent throughput of PCIe Bus as shown in below.

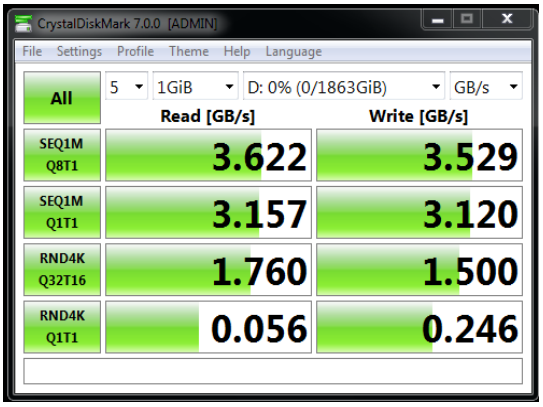
Slot	Fixture	Test Result
1	PXIe-63987 + PXIe RAID Card*4 + Samsung 970 EVO SSD 1TB *4	Upstream: 12.4 GB/s
		Downstream:10.0 GB/s
2	PXIe-63987 + PXIe RAID Card + Samsung 970 EVO SSD 1TB *2	Upstream: 3.6 GB/s
		Downstream: 3.5 GB/s
3	PXIe-63987 + PXIe RAID Card + Samsung 970 EVO SSD 1TB *2	Upstream: 3.6 GB/s
		Downstream: 3.5G B/s
4	PXIe-63987 + PXIe RAID Card + Samsung 970 EVO SSD 1TB *2	Upstream: 3.6 GB/s
		Downstream: 3.5 GB/s
5	PXIe-63987 + PXIe RAID Card + Samsung 970 EVO SSD 1TB *2	Upstream: 3.6 GB/s
		Downstream: 3.5 GB/s

Table 8 PCIe Bus Throughput

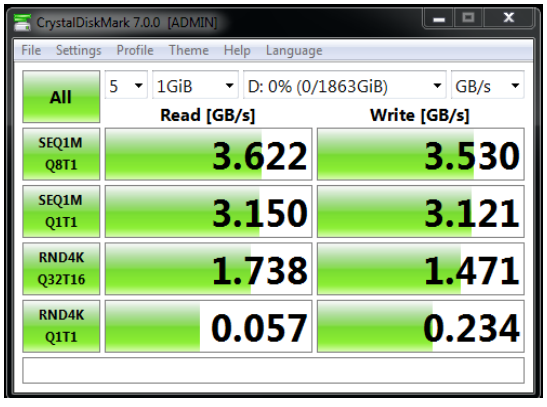
Slot1:



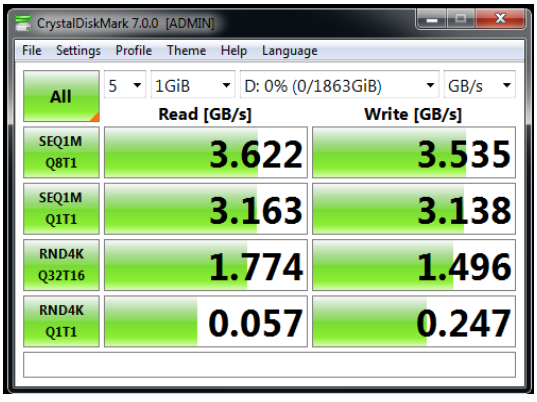
Slot2:



Slot3:



Slot4:



Slot5:

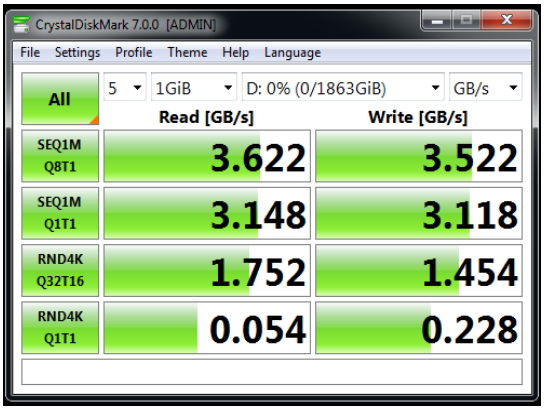


Figure 13 PCIe Bus Throughput

Note:

- Slot 1 is the system bandwidth test; its theoretical maximum bandwidth is 16 GB/s (PCIe Gen3 x16).
- Slot 2 to 5 are the slot bandwidth test; its theoretical maximum bandwidth is 4 GB/s (PCIe Gen3 x4).

3.3 Cooling Capability

The definition of chassis cooling capability:

The maximum sensor temperature at the top side of peripheral module should be lower than 70 °C at ambient temperature 55 °C condition. (It means temperature rise should be lower than 15 °C)

- Test Software: Burn-in test program V6.0
- Test Method:
  - Installing 38W PXIe load board in every slot.
  - PXIe-63987 controller is running Burn-in test software and 100% CPU loading.
- Test Result: Pass

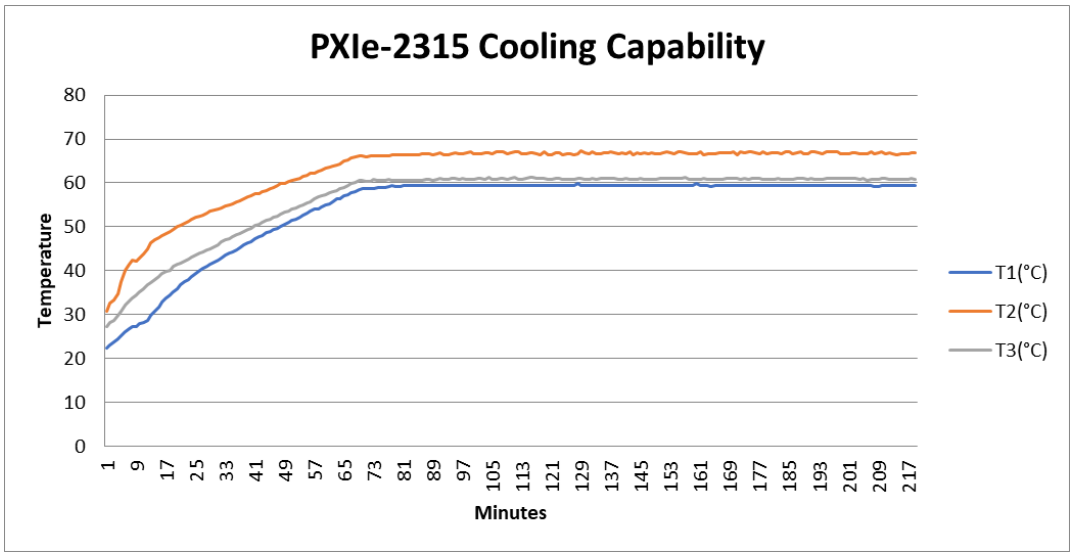


Figure 14 PXIe-2315 Cooling Capability

Note:

T1 sensor location: the top side of slot1.

T2 sensor location: the top side of slot3.

T3 sensor location: the top side of slot5.

3.4 System Reference Clock Accuracy

PXIe-2315 can provide high accuracy system reference clocks. The measurement result for different ambient temperature as following table

3.4.1 PXI_CLK10 accuracy

Ambient Temperature	PXI_CLK10 frequency	Accuracy
-5°C	9.999996 MHz	-0.4 ppm
25°C	9.999954 MHz	-4.6 ppm
55°C	9.999926 MHz	-7.4 ppm

Table 9 PXI_CLK10 Accuracy

3.4.2 PXIe_CLK100 accuracy

Ambient Temperature	PXIe_CLK100 frequency	Accuracy
-5°C	99.999997 MHz	-0.03 ppm
25°C	99.999524 MHz	-4.76 ppm
55°C	99.999309 MHz	-6.9 ppm

Table 10 PXIe_CLK100 Accuracy

4. Software

4.1 Introduction to JYDM

JYDM (**JY**TEK **D**evice **M**anagement) is the latest equipment management software of JYTEK. Its main functions are as follows:

- Support GUI information display and management of PXI-2/6 standard equipment.
- Support trigger configuration of PXI-9 standard chassis.
- JYTEK self-developed chassis information management.
- JYTEK self-developed card: alias management, driver and firmware online upgrade, online driver version management, board test panel.
- JYTEK SeeSharp card: driver information view, test panel.

4.2 Installation and use of JYDM

JYDM support operating system: Windows 7 32/64 bit, Windows 10 32/64 bit.

1. Install **.Net framework** (version 4.0 or above).
2. Download and install **FirmDrive** (version 1.3.3 or above) from the official website of JYTEK.
3. Download and Install the JYTEK **peripheral module driver** from the official website of JYTEK.
4. Download and install the **JYDM** installation package from the official website of JYTEK.

Figure 15 Install the JYDM

After the software installation complete, open JYDM and you will see the chassis, controller and peripheral module in the overall system as shown in the figure below.

Note:

- JYDM usually requires a few seconds to scan device.

The left side of the JYDM interface is the hardware device column, and the right side is the device details column. You can view and configure the current device information, and upgrade the driver and firmware.

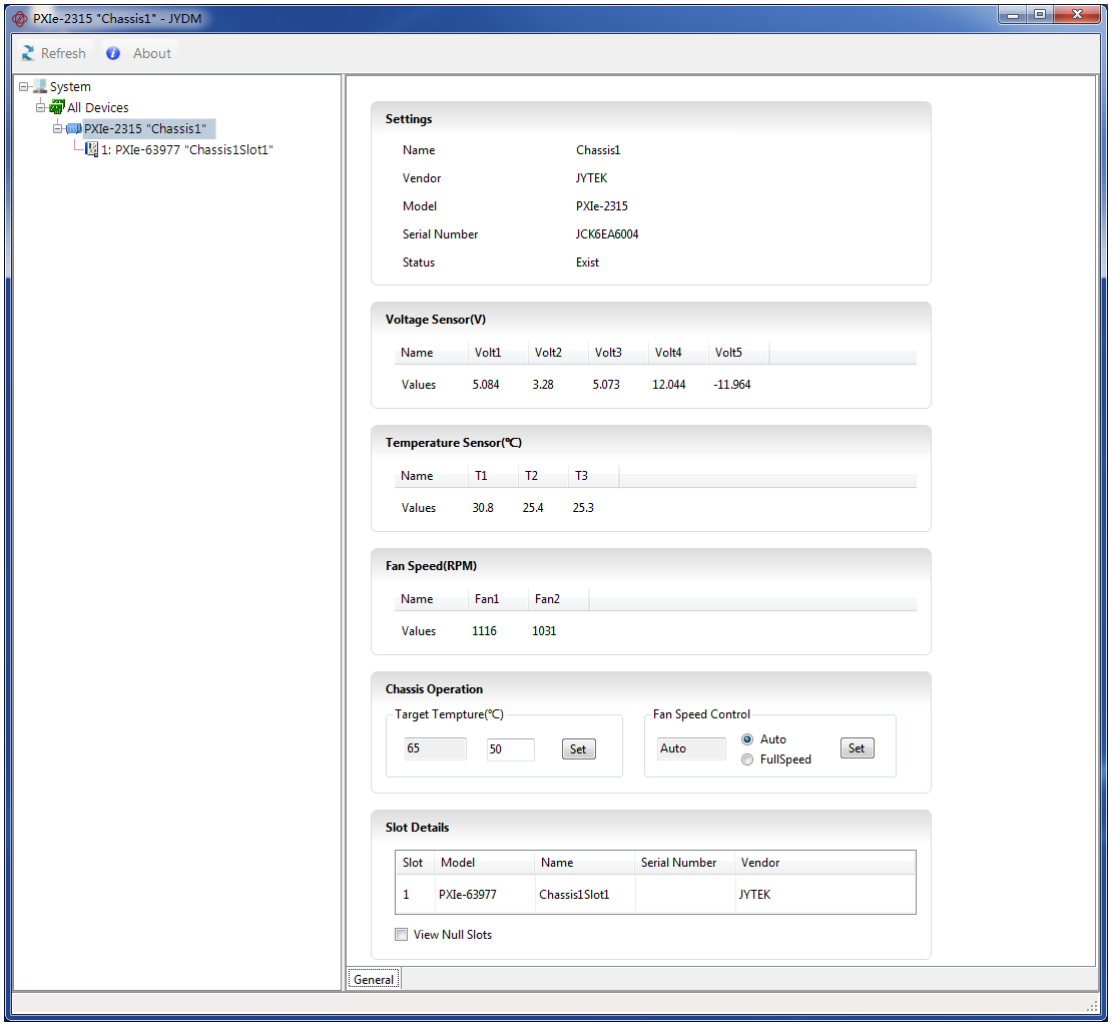


Figure 15 JYDM GUI application program

Note:

- JYTEK peripheral module driver has two parts: the shared common driver kernel software (FirmDrive) and the specific peripheral module driver.
- After firmware update of peripheral module, you need to **cold restart** your device.
- After driver update of peripheral module, you need to **warm restart** your device.

4.3 Chassis environment monitoring in JYDM

The JYDM provides the following chassis environment monitoring capabilities:

- Monitoring the chassis power rails: 5Vsb (standby power), 3.3V, 5V, 12V and -12V DC power.

Figure 16 Monitoring the Chassis Power Rails

- Monitoring the chassis temperature sensors.

  (T1 sensor is located on the top side of slot1.)

Figure 17 Monitoring the Chassis Temperature Sensors

- Monitoring the chassis fan speed.

  (Fan1 module ia located on the bottom side of slot1.)

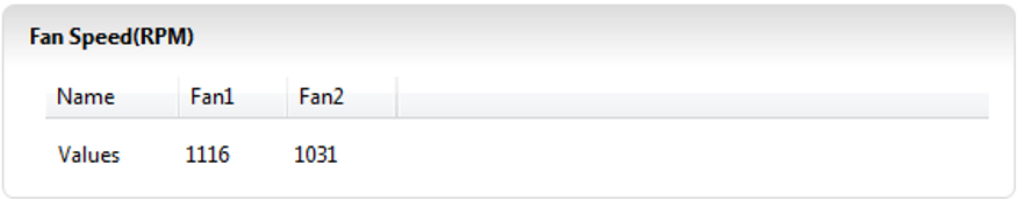


Figure 18 Monitoring the Chassis Fan Speed

4.4 Chassis cooling control in JYDM

PXIe-2315 chassis allow user to control the cooling capability via JYDM.

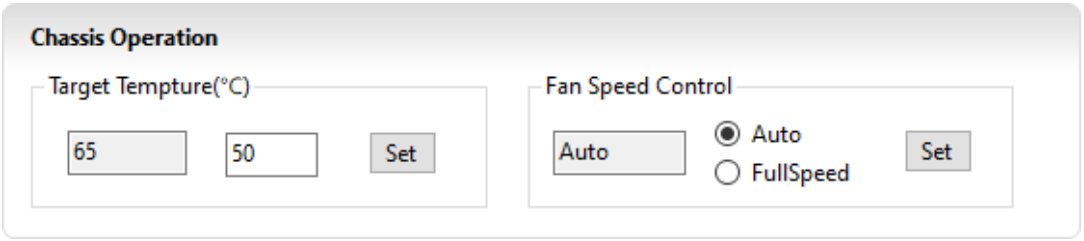


Figure 19 Chassis Cooling Control in JYDM

Target Temperature specifies the chassis temperature at which the maximum fan speed (100% duty cycle) is achieved as shown in below figure.

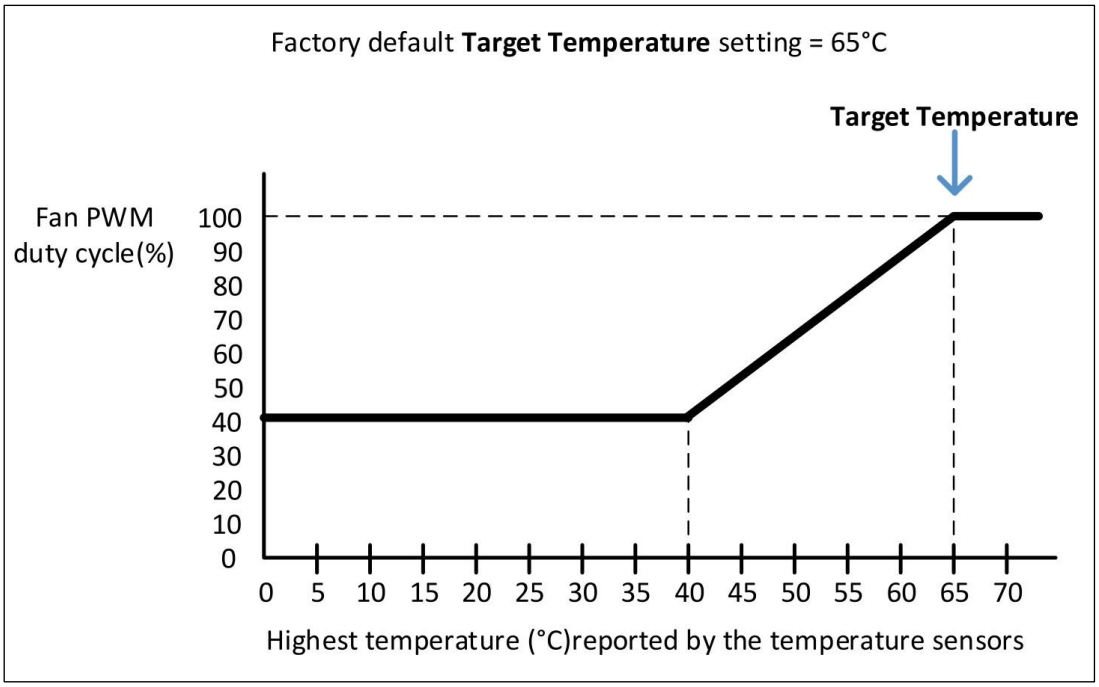


Figure 16 Factory default Target Temperature setting

The factory default target temperature setting is 65 °C. User can change target temperature to lower value (ex. 45 °C), it will increase fan speed if the factory default setting could not fulfill the peripheral modules cooling requirement.

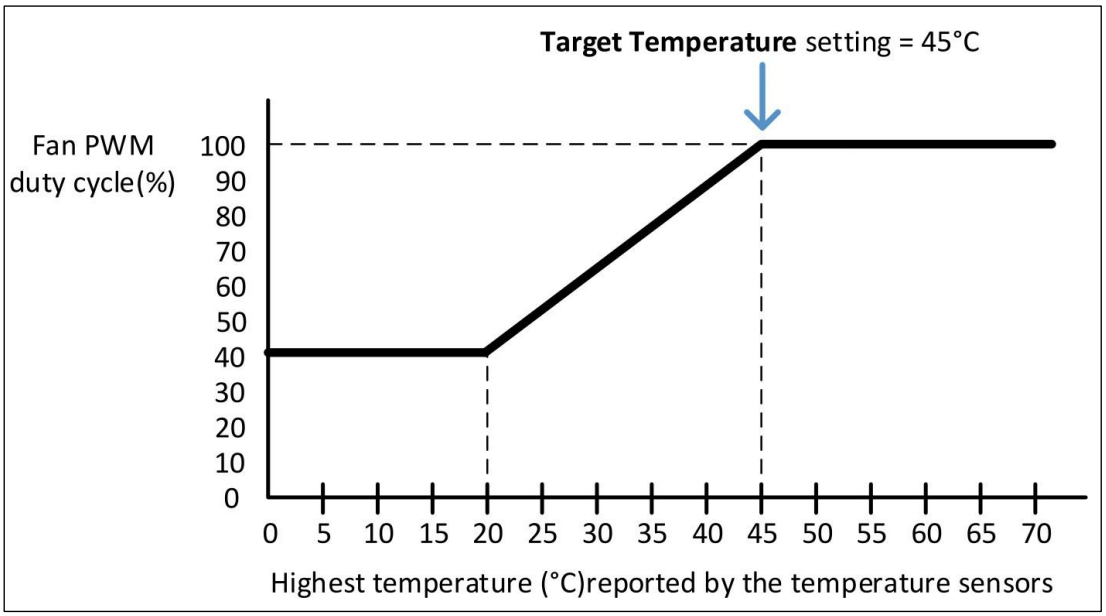


Figure 17 Change Target Temperature to 45 °C

4.5 Chassis identification in NI MAX

Download and install NI PXI platform services 20.0 or higher from NI website:

Figure 20 Install NI MAX

Open **JYDM**, set **Valid PXI Resource Manager** and **Default PXI Trigger Manger** to National Instruments, and then click **Save** to save the settings.

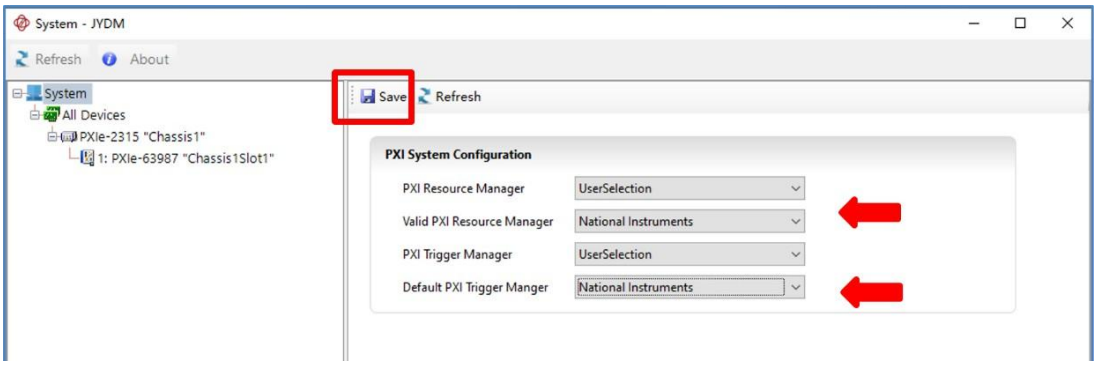


Figure 21 Change PXI Trigger Manager Setting

Open NI MAX after software installation and the devices can be identified:

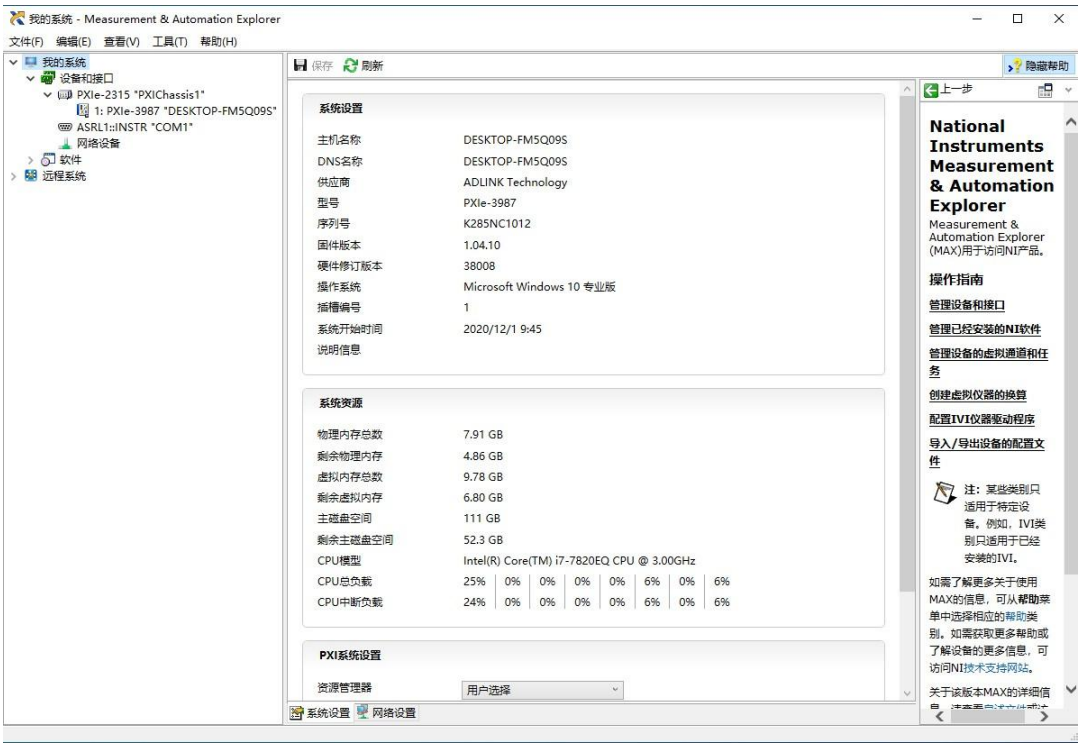


Figure 18 NI MAX GUI display JYTEK chassis and modules

5. Using PXIe-2315 Chassis

This chapter provides the operation guides for PXIe-2315.

5.1 Using PXIe-2315 with JYTEK PXI/PXIe Peripheral Modules

Using PXIe-2315 with JYTEK PXI/PXIe peripheral modules is straightforward.

5.2 Using PXIe-2315 with National Instruments PXI/PXIe Peripheral Modules

5.2.1 Use National Instruments PXI/PXIe Peripheral Modules without synchronization:

You can use the modules as usual without any additional setting.

5.2.2 Use National Instruments PXI/PXIe Peripheral Modules with synchronization:

A few vi like" Get Full Terminal Name.vi" cannot use on the third-party chassis:

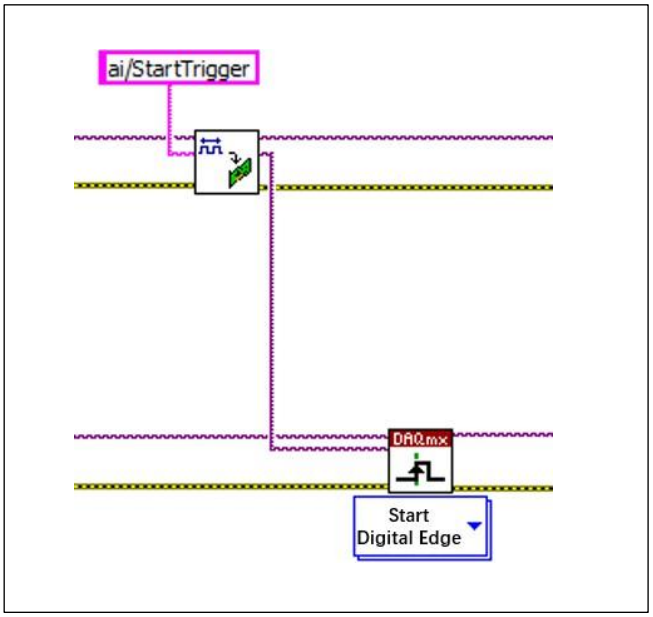


Figure 22 Trigger Routing

But you can use "DAQmx Export Signal" to set appointed clock/trigger routing:

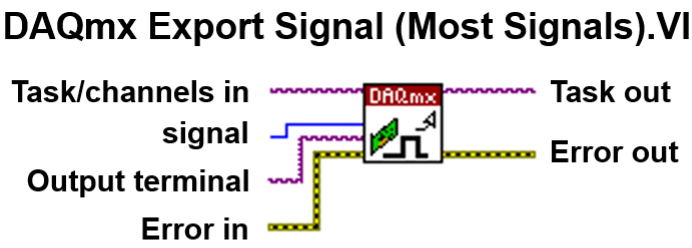


Figure 23 DAQmx Export Signal

DAQ synchronization reference code:

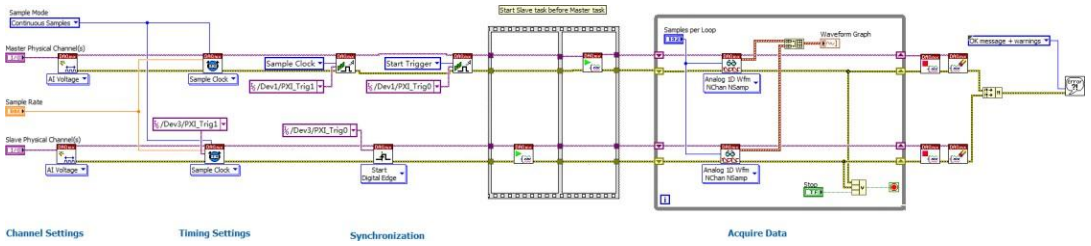


Figure 24 DAQ Synchronization Reference Code

6. Optional Equipment

6.1 Rack Mount Kits

JYTEK provides optional hardware for installation of PXIe-2315 chassis into a server or rack. The rack mounting kits dimension as following figure.

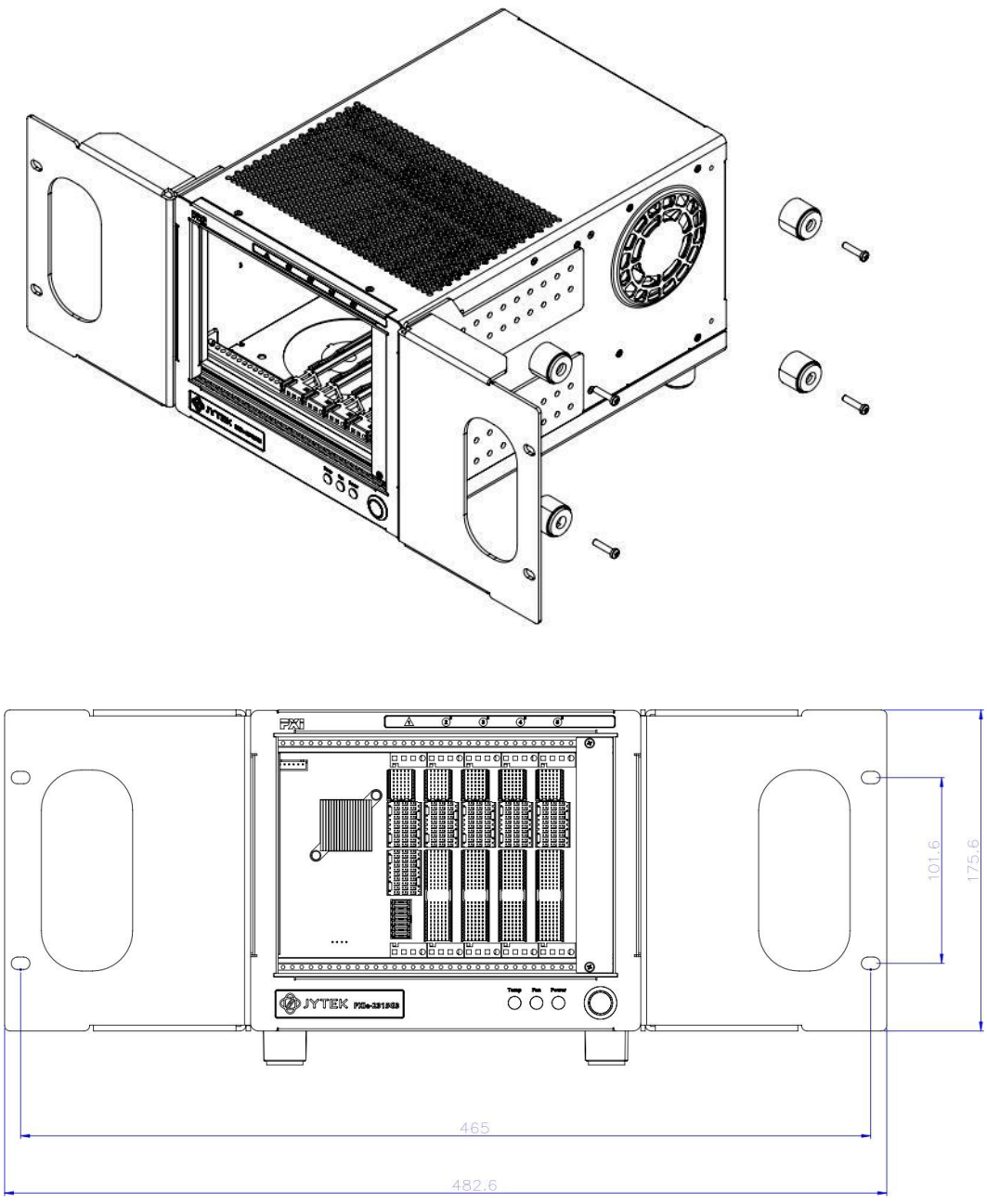


Figure 25 PXIe-2315 rack mount kits dimension

7. About JYTEK

7.1 JYTEK China

Founded in June, 2016, JYTEK China is a leading Chinese test & measurement company, providing complete software and hardware products for the test and measurement industry. The company is a joint venture between Adlink Technologies and a group of experienced professionals form the industry. JYTEK independenly develop the software and hardware products and is entirely focused on the Chinese market. Our Shanghai headquarters and production service center have regular stocks to ensure timely supply; we have R&D centers in Xi'an and Chongqing to develop new products; we also have highly trained direct technical sales representatives in Shanghai, Beijing, Tianjin, Xi'an, Chengdu, Nanjing, Wuhan, Haerbin, and Changchun. We also have many patners who provide system level support in various cities.

7.2 JYTEK Korea and JYTEK In Other Countries

JYTEK Korea was the first JYTEK enterprise outside China to promote JYTEK products. Together with Adlink Technologies and JYTEK China, JYTEK is expanding to more countries. Each JYTEK location is an independently owned and operated franchise. It shares JYTEK's philosophy and business approach. Together JYTEK entities promote the JYTEK brand, technology, and products.

7.3 JYTEK Hardware Products

According to JYTEK's agreement with our equity partner Adlink Technologies, JYTEK's hardware is manufactured by the state-of-art manufacturing facility located in Shanghai Zhangjiang Hi-Tech Park. Adlink has over 20 years of the world-class low-volumn and high-mix manufacturing expertise with ISO9001-2008, China 3C, UL, ROHS, TL9000, ISO-14001, ISO-13485 certifications. Its 30,000 square meters facilities and three high-speed Panasonic SMT production lines can produce 60,000 pieces boards/month; it also has full supply chain management - planning, sweeping, purchasing, warehousing and distribution. Adlink's manufacturing excellence ensures JYTEK's hardware has word-class manufacturing quality.

One core technical advantage is JYTEK's pursue for the basic and fundamental technology excellence. JYTEK China has developed a unique PCIe, PXIe, USB hardware driver architecture, FirmDrive, upon which many our future hardware will be based.

In addition to our own developed hardware, JYTEK also rebrands Adlink's PXI product lines. In addition, JYTEK has other rebranding agreements to increase our hardware coverage. It is our goal to provide the complete product coverage in PXI and PCI modular instrumentation and data acquisition.

7.4 JYTEK Software Platform

JYTEK has developed a complete software platform, SeeSharp Platform, for the test and measurement applications. We leverage the open sources communities to provide the software tools. Our platform software is also open sourced and is free, thus lowering the cost of tests for our customers. We are the only domestic vendor to offer complete commercial software and hardware tools.

7.5 JYTEK Warranty and Support Services

With our complete software and hardware products, JYTEK is able to provide technical and sales services to wide range of applications and customers. In most cases, our products are backed by a 1-year warranty. For technical consultation, pre-sale and after-sales support, please contact JYTEK of your country.

8. Statement

The hardware and software products described in this manual are provided by JYTEK China, or JYTEK in short.

This manual provides the product review, quick start, some explaination for JYTEK PXIe-2315 chassis. The manual is copyrighted by JYTEK.

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While we try to keep this manual up to date, there are factors beyond our control that may affect the accuracy of the manual. Please check the latest manual and product information from our website.

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