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**PXIe-1086**

# PXle-1086DC

PXle, 18-Slot (16 Hybrid Slots, 1 PXI Express Slot), Up to 12 GB/s  
PXI Chassis

The manual includes instructions for installing and configuring your PXIe-1086DC chassis and PXI Express system.

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## Getting Started

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### Unpacking

Carefully inspect the shipping container and the chassis for damage. Check for visible damage to the metal work. Check to make sure all handles, hardware, and switches are undamaged. Inspect the inner chassis for any possible damage, debris, or detached components. If damage appears to have been caused during shipment, file a claim with the carrier. Retain the packing material for possible inspection and/or reshipment.

### What You Need to Get Started

The PXIe-1086DC chassis kit contains the following items:

- PXIe-1086DC chassis
- Filler panels
- Power cable
- *PXIe-1086DC Safety, Environmental, and Regulatory Information*
- Software media with *PXI Platform Services 14.0* or newer
- Chassis number labels
- Inhibit fault cable connector
- Ferrite bead for use with redundant power supplies

### Key Features

The PXIe-1086DC chassis combines a high-performance 18-slot PXI Express backplane with a high-output power supply and a structural design that has been optimized for maximum

usability in a wide range of applications. The chassis' modular design ensures a high level of maintainability, resulting in a very low mean time to repair (MTTR). The chassis also features redundant power supplies and fans designed to maximize system availability. The PXIe-1086DC chassis fully complies with the *PXI-5 PXI Express Hardware Specification*, offering advanced timing and synchronization features.

The key features of the PXIe-1086DC chassis include the following:

## High Performance for Instrumentation Requirements

- Up to 4 GB/s (single direction) per PXI Express slot dedicated bandwidth (Gen-2 x8 PCI Express).
- 38.25 W per slot cooling meets increased PXI Express cooling requirements
- Low-jitter internal 10 MHz reference clock for PXI slots with  $\pm 25$  ppm stability
- Low-jitter internal 100 MHz reference clock for PXI Express slots with  $\pm 25$  ppm stability
- Variable speed fan controller optimizes cooling and acoustic emissions
- Remote power-inhibit control
- Complies with PXI and CompactPCI Specifications

## High Reliability

- 0 to 50 °C operating temperature range
- Power supply, temperature, and fan monitoring
- Ethernet interface for remote monitoring

## High Availability

- Dual redundant, hot-swappable power supplies
- Redundant, hot-swappable chassis fans

## Multi-Chassis Support

- PXI Express System Timing Slot for tight synchronization across chassis
- Front CLK10 I/O connectors
- Switchless CLK10 routing

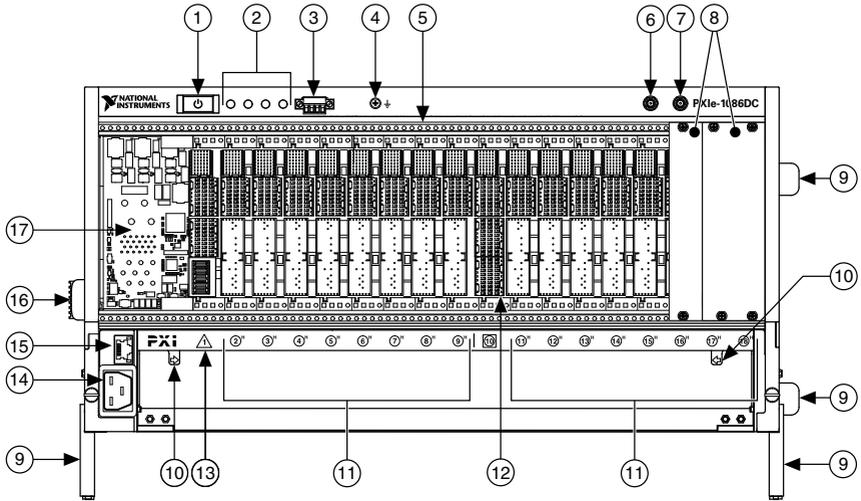
## Optional Features

- Front and rear rack-mount kits
- Replacement power supply
- EMC filler panels
- Slot blockers for improved cooling performance
- Factory installation services
- Replacement fan modules

## Chassis Description

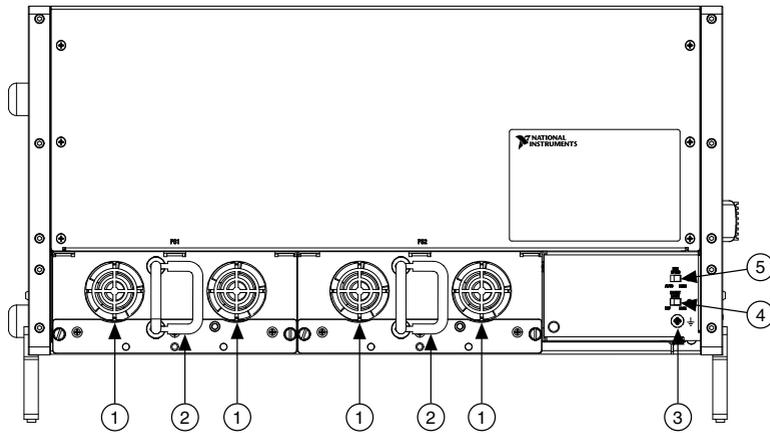
The following figures show key features of the PXIe-1086DC chassis front and back panels.

**Figure 1. Front View of the PXIe-1086DC**



- |                                 |  |
|---------------------------------|--|
| 1. Power Inhibit Switch         | 10. Fan Door Latch                             |
| 2. Status LEDs                  | 11. PXI Express Hybrid Peripheral Slots (16x)  |
| 3. Inhibit/Fault Connector      | 12. PXI Express PXI Express System Timing Slot |
| 4. Ground Terminal              | 13. PXI Express System Controller Slot         |
| 5. Backplane Connectors         | 14. Chassis Power Connector                    |
| 6. Clk10 Output                 | 15. Ethernet Port                              |
| 7. Clk10 Input                  | 16. Chassis Carry Handle                       |
| 8. PXI Filler Panels (Optional) | 17. System Controller Expansion Slots          |
| 9. Removable Feet               |  |

**Figure 2.** Rear View of the PXIe-1086DC



- |                               |                                 |
|-------------------------------|---------------------------------|
| 1. Power Supply Cooling Fan   | 4. Inhibit Mode Selector Switch |
| 2. Power Supply Handle        | 5. Fan Speed Selector Switch    |
| 3. Earth Ground Terminal (PE) |                                 |

## Optional Equipment

Contact National Instruments to order the following options for the PXIe-1086DC chassis.

### EMC Filler Panels

EMC filler panel kits are available from National Instruments.

### Power Supply Filler Panels

Optional power supply filler panels are available from National Instruments. Use a power supply filler panel if you operate the PXIe-1086DC chassis with a single power supply.

### Rack Mount Kits

There are two optional kits for mounting the PXIe-1086DC chassis into a rack. The first option is a pair of mounting brackets for use on the front of the chassis. The second option is a rear rack mount kit. The rear rack mount kit differs from the front kit to allow for easier installation into the rack. Refer to [NI Chassis Rack Mount Kit Components](#) for more information.

### Slot Blockers

PXI Slot Blocker kits are available from National Instruments. Slot Blockers improve cooling in a chassis by re-routing airflow from empty slots to slots containing PXI modules.

### Replacement Power Supply

Replacement power supply kits are available from National Instruments.

## Replacement Fan Modules

Replacement fan modules are available from National Instruments.

# PXIe-1086DC Chassis Backplane Overview

## Interoperability with CompactPCI

The design of the PXIe-1086DC provides you the flexibility to use the following devices in a single PXI Express chassis:

- PXI Express compatible products
- CompactPCI Express compatible 2-Link system controller products
- CompactPCI Express compatible Type-2 peripheral products
- PXI peripheral products modified to fit in a hybrid slot
- Standard CompactPCI peripheral products modified to fit in a hybrid slot

## System Controller Slot

The system controller slot is Slot 1 of the chassis and is a 2-Link configuration system slot as defined by the CompactPCI Express and PXI Express specifications. It has three expansion slots for system controller modules that are wider than one slot. These slots allow the system controller to expand to the left to prevent it from using peripheral slots.

The backplane connects the system slot to two PCI Express switches using a Gen-2 x8 and a Gen-2 x16 PCI Express link. These switches distribute PCI Express connections to the peripheral slots and to two PCI Express-to-PCI bridges to provide PCI buses to the hybrid peripheral slots. Refer to *PXIe-1086DC PCI Express Backplane Diagram*.

System slot link 1 is a Gen-2 x8 PCI Express link to PCI Express switch 1, providing a nominal bandwidth of 4 GB/s (single direction) between the system controller and PCI Express switch 1. PXI Express peripheral slots 2-10 are connected to PCI Express switch 1 with Gen-2 x8 PCI Express links and are downstream of system slot link 1. PCI Express-to-PCI bridge 1 is connected to PCI Express switch 1 and provides a 32-bit, 33 MHz PCI bus for hybrid peripheral slots 2-9. PCI Express switch 1 also is connected to PCI Express switch 2 with a Gen-2 x8 PCI Express link for advanced backplane configurations.

System slot link 2 is a Gen-2 x16 PCI Express link to PCI Express switch 2, providing a nominal bandwidth of 8 GB/s (single direction) between the system controller slot and PCI Express switch 2. PXI Express peripheral slots 11-18 are connected to PCI Express switch 2 with Gen-2 x8 PCI Express links and are downstream of system slot link 2. PCI Express-to-PCI bridge 2 is connected to PCI Express switch 2 and provides a 32-bit, 33 MHz PCI bus for hybrid peripheral slots 11-18. PCI Express switch 2 also is connected to PCI Express switch 1 with a Gen-2 x8 PCI Express link for advanced backplane configurations.

The system controller slot also has connectivity to some PXI features such as: PXI\_CLK10, PXI Star, PXI Trigger Bus and PXI Local Bus 6.

By default, the system controller will control the power supply with the PS\_ON# signal. A logic low on this line will turn the power supply on.



**Note** The Inhibit Mode switch on the rear of the chassis must be in the Default position for the system controller to have control of the power supply. Refer to the Inhibit Mode Switch section for details about the Inhibit Mode switch.

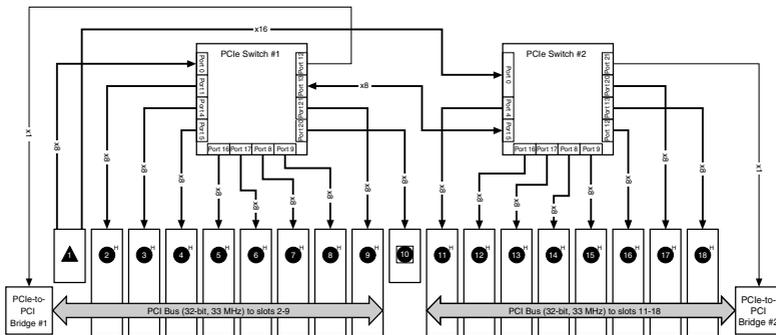
## Hybrid Peripheral Slots

The chassis provides 16 hybrid peripheral slots as defined by the *PXI-5 PXI Express Hardware Specification*: slots 2 to 9 and slots 11 to 18. A hybrid peripheral slot can accept the following peripheral modules:

- A PXI Express peripheral with x8, x4, or x1 PCI Express link through a switch to the system slot. Each PXI Express peripheral slot can link up to a Gen-2 x8 PCI Express, providing a maximum nominal single-direction bandwidth of 4 GB/s.
- A CompactPCI Express Type-2 Peripheral with x8, x4, or x1 PCI Express link through a PCI Express switch to the system slot.
- A hybrid-compatible PXI Peripheral module modified by replacing the J2 connector with an XJ4 connector installed in the upper eight rows of J2. Refer to the *PXI Express Specification* for details. The PXI peripheral communicates through the backplane's 32-bit PCI bus.
- A CompactPCI 32-bit peripheral on the backplane's 32-bit PCI bus.

The hybrid peripheral slots provide full PXI Express functionality and 32-bit PXI functionality except for PXI Local Bus. The hybrid peripheral slot only connects to PXI Local Bus 6 left and right.

**Figure 3. PXIe-1086DC PCI Express Backplane Diagram**



# System Timing Slot

The system timing slot is slot 10. The system timing slot accepts the following peripheral modules:

- A PXI Express System Timing Module with x8, x4, or x1 PCI Express link to the system slot through a PCI Express switch. Each PXI Express peripheral slot can link up to a Gen-2 x8 PCI Express, providing a maximum nominal single-direction bandwidth of 4 GB/s.
- A PXI Express Peripheral with x8, x4, or x1 PCI Express link to the system slot through a PCI Express switch.
- A CompactPCI Express Type-2 Peripheral with x8, x4, or x1 PCI Express link to the system slot through a PCI Express switch.

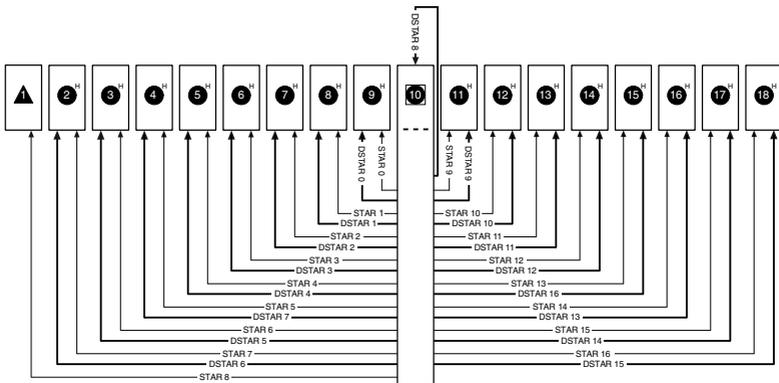
The system timing slot has three (3) dedicated differential pairs (PXIe\_DSTAR) connected from the TP1 and TP2 connectors to the XP3 connector for each PXI Express hybrid peripheral slot, as well as routed back to the XP3 connector of the system timing slot, as shown in the following figure. You can use the PXIe\_DSTAR pairs for high-speed triggering, synchronization, and clocking. Refer to the *PXI Express Specification* for details.

The system timing slot also has a single-ended (PXI Star) trigger connected to every slot. Refer to the following figure for more details.

The system timing slot has a pin (PXI\_CLK10\_IN) through which a system timing module may source a 10 MHz clock to which the backplane phase-locks. Refer to the System Reference Clock section for details.

The system timing slot has a pin (PXIe\_SYNC\_CTRL) through which a system timing module can control the PXIe\_SYNC100 timing. Refer to the PXI Express Specification and the PXIe SYNC CTRL section of this chapter for details.

**Figure 4. PXIe\_DSTAR and PXI Star Connectivity Diagram**



## PXI Local Bus

The PXI backplane local bus is a daisy-chained bus that connects each peripheral slot with adjacent peripheral slots to the left and right.

The backplane routes PXI Local Bus 6 between all slots. The left local bus 6 from slot 1 is not routed anywhere, and the right local bus 6 from slot 18 is not routed anywhere.

Local bus signals may range from high-speed TTL signals to analog signals as high as 42 V.

Initialization software uses the configuration information specific to each adjacent peripheral module to evaluate local bus compatibility.

## PXI Trigger Bus

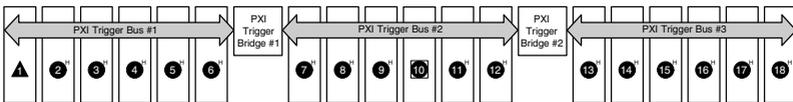
All slots on the same PXI bus segment share eight PXI trigger lines. You can use these trigger lines in a variety of ways. For example, you can use triggers to synchronize the operation of several different PXI peripheral modules. In other applications, one module located in the system timing slot can control carefully timed sequences of operations performed on other modules in the system. Modules can pass triggers to one another on the lines, allowing precisely timed responses to asynchronous external events the system is monitoring or controlling.

The PXI trigger lines from adjacent PXI trigger bus segments can be routed in either direction across the PXI trigger bridges through buffers. This allows you to send trigger signals to, and receive trigger signals from, every slot in the chassis. Static trigger routing (user-specified line and directional assignments) can be configured through Measurement & Automation Explorer (MAX). Dynamic routing of triggers (automatic line assignments) is supported through certain National Instruments drivers like NI-DAQmx.



**Note** Although any trigger line may be routed in either direction, it cannot be routed in more than one direction at a time.

**Figure 5. PXI Trigger Bus Connectivity Diagram**



## System Reference Clock

The PXIe-1086DC chassis supplies PXI\_CLK10, PXIe\_CLK100 and PXIe\_SYNC100 to every peripheral slot with an independent driver for each signal.

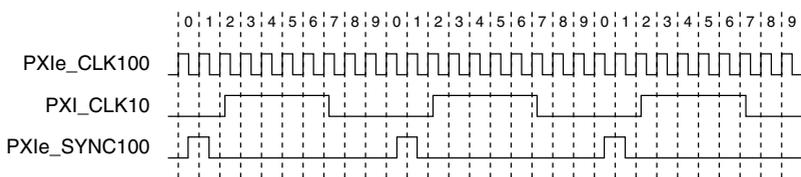
An independent buffer (having a source impedance matched to the backplane and a skew of less than 1 ns between slots) drives PXI\_CLK10 to each peripheral slot. You can use this common reference clock signal to synchronize multiple modules in a measurement or control system.

An independent buffer drives PXIe\_CLK100 to each peripheral slot. These clocks are matched in skew to less than 100 ps. The differential pair must be terminated on the peripheral with LVPECL termination for the buffer to drive PXIe\_CLK100 so that when there is no peripheral or a peripheral that does not connect to PXIe\_CLK100, there is no clock being driven on the pair to that slot.

An independent buffer drives PXIe\_SYNC100 to each peripheral slot. The differential pair must be terminated on the peripheral with LVPECL termination for the buffer to drive PXIe\_SYNC100 so that when there is no peripheral or a peripheral that does not connect to PXIe\_SYNC100, there is no SYNC100 signal being driven on the pair to that slot.

PXI\_CLK10, PXIe\_CLK100 and PXIe\_SYNC100 have the default timing relationship described in the following figure.

**Figure 6. System Reference Clock Default Behavior**



To synchronize the system to an external clock, you can drive PXI\_CLK10 from an external source through the PXI\_CLK10\_IN pin on the System Timing Slot. Refer to the System Timing Slot XP4 Connector Pinout section for the pinout. When a 10MHz clock is detected on this pin, the backplane automatically phase-locks the PXI\_CLK10, PXIe\_CLK100, and PXIe\_SYNC100 signals to this external clock and distributes these signals to the slots. Refer to the Specifications for the specification information for an external clock provided on the PXI\_CLK10\_IN pin of the system timing slot.

You also can drive a 10 MHz clock on the 10 MHz REF IN connector on the front of the chassis. When a 10 MHz clock is detected on this connector, the backplane automatically phase-locks the PXI\_CLK10, PXIe\_CLK100, and PXIe\_SYNC100 signals to this external clock and distributes these signals to the slots. Refer to the *Specifications* section for the specification information for an external clock provided on the 10 MHz REF IN connector on the front panel of the chassis.

If the 10 MHz clock is present on both the PXI\_CLK10\_IN pin of the System Timing Slot and the 10 MHz REF IN connector on the front of the chassis, the signal on the System Timing Slot is selected. Refer to the following table which explains how the 10 MHz clocks are selected by the backplane.

**Table 1. Backplane External Clock Input Configuration**

System Timing Slot PXI_CLK10_IN	Front Chassis Panel 10 MHz REF IN	Backplane PXI_CLK10, PXIe_CLK100 and PXIe_SYNC100
No clock present	No clock present	Backplane generates its own clocks
No clock present	10 MHz clock present	PXI_CLK10, PXIe_CLK100 and PXIe_SYNC100 all phase-locked to front Chassis Panel—10 MHz REF IN
10 MHz clock present	No clock present	PXI_CLK10, PXIe_CLK100 and PXIe_SYNC100 all phase-locked to System Timing Slot— PXI_CLK10_IN
10 MHz clock present	10 MHz clock present	PXI_CLK10, PXIe_CLK100 and PXIe_SYNC100 all phase-locked to System Timing Slot— PXI_CLK10_IN

A copy of the backplane's PXI\_CLK10 is exported to the 10 MHz REF OUT connector on the front of the chassis. This clock is driven by an independent buffer.

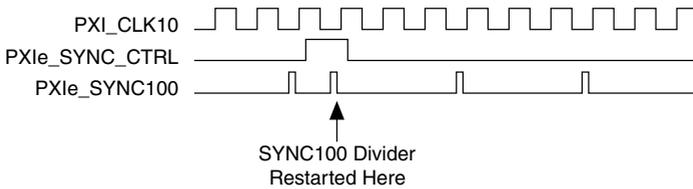
## PXIe\_SYNC\_CTRL

PXIe\_SYNC100 is by default a 10 ns pulse synchronous to PXI\_CLK10. The frequency of PXIe\_SYNC100 is  $10/n$  MHz, where  $n$  is a positive integer. The default for  $n$  is 1, giving PXIe\_SYNC100 a 100 ns period. However, the backplane allows  $n$  to be programmed to other integers. For example, setting  $n = 3$  gives a PXIe\_SYNC100 with a 300 ns period while still maintaining its phase relationship to PXI\_CLK10. The value for  $n$  can be any positive integer from 1 to 255.

The system timing slot has a control pin for PXIe\_SYNC100 called PXIe\_SYNC\_CTRL for use when  $n > 1$ . Refer to [System Timing Slot XP3 Connector Pinout](#) for the pinout. Refer to the [Specifications](#) for the PXIe\_SYNC\_CTRL input specifications.

By default, a high-level detected by the backplane on the PXIe\_SYNC\_CTRL pin causes a synchronous restart for the PXIe\_SYNC100 signal. On the next PXI\_CLK10 edge the PXIe\_SYNC100 signal restarts. This allows several chassis to have their PXIe\_SYNC100 in phase with each other. Refer to the following figure for timing details with this method.

**Figure 7. PXIe\_SYNC100 at 3.33 MHz Using PXIe\_SYNC\_CTRL as Restart**



## Installation and Configuration

### Safety Information



**Caution** Before undertaking any troubleshooting, maintenance, or exploratory procedure, carefully read the following caution notices.



**Caution** Protection may be impaired if equipment is not used in the manner specified.

This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.

- **Chassis Grounding**—The chassis requires a connection from the premise wire safety ground to the chassis ground. The earth safety ground must be connected during use of this equipment to minimize shock hazards. Refer to the *Connecting Safety Ground* section for instructions on connecting safety ground.
- **Live Circuits**—Operating personnel and service personnel must not remove protective covers when operating or servicing the chassis. Adjustments and service to internal components must be undertaken by qualified service technicians. During service of this product, the mains connector to the premise wiring must be disconnected. Dangerous voltages may be present under certain conditions; use extreme caution.
- **Explosive Atmosphere**—Do *not* operate the chassis in conditions where flammable gases are present. Under such conditions, this equipment is unsafe and may ignite the gases or gas fumes.
- **Part Replacement**—Only service this equipment with parts that are exact replacements, both electrically and mechanically. Contact National Instruments for replacement part information. Installation of parts with those that are not direct replacements may cause harm to personnel operating the chassis. Furthermore, damage or fire may occur if replacement parts are unsuitable.

- **Modification**—Do not modify any part of the chassis from its original condition. Unsuitable modifications may result in safety hazards.
- **Location**—The chassis is for use in stationary (non-moveable), restricted access locations such as a desk or bench, or for installation in a rack only. Installation and maintenance are to be performed by skilled/trained service persons.

## Chassis Cooling Considerations

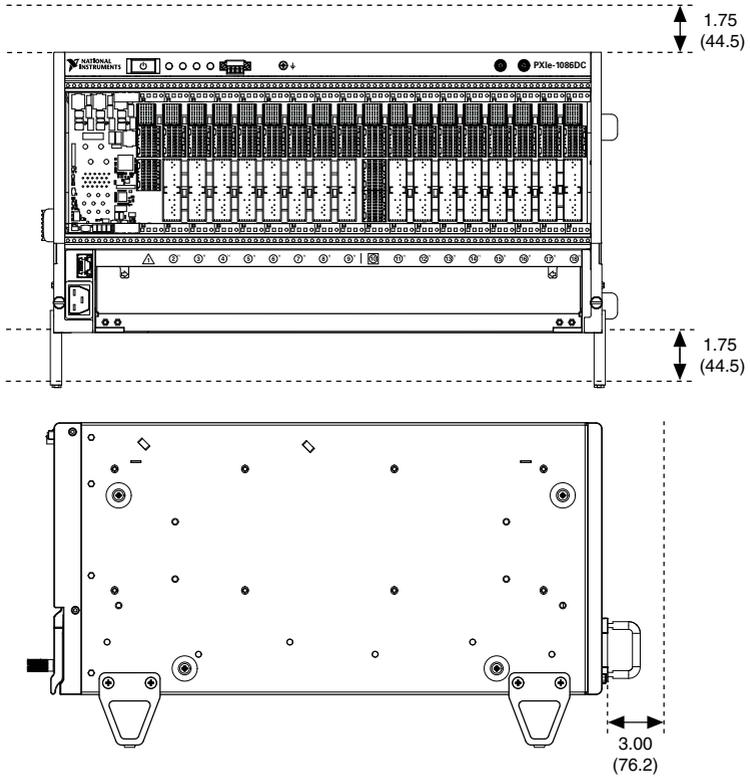
The PXIe-1086DC chassis is designed to operate on a bench or in an instrument rack. The chassis must be oriented horizontally with the primary exhaust vent at top. Vertical orientation with the chassis handle up is not a supported configuration. Regardless of the configuration, you must provide the cooling clearances as outlined in the following sections.

### Providing Adequate Clearance

The primary cooling exhaust vent for the PXIe-1086DC is on the top of the chassis. The primary intake vent is on the bottom of the chassis. The secondary intake vents are located along on the rear of the chassis. Adequate clearance between the chassis and surrounding equipment or blockages must be maintained to ensure proper cooling of the chassis power supply as well as the modules plugged into the chassis. These clearances are outlined in the following figures. Failure to provide these clearances may result in thermal-related failures in the chassis or modules.

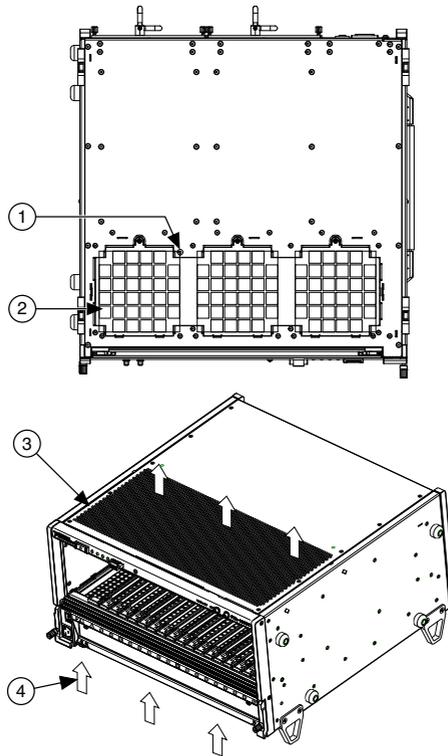
**Figure 8. PXIe-1086DC Cooling Clearances**

Dimensions are in inches (millimeters)



The vent locations are shown in the following figure.

**Figure 9. PXIe-1086DC Vents**



- 
- |                               |                                |
|-------------------------------|--------------------------------|
| 1. Ambient Temperature Sensor | 3. PXI Module Air Exhaust Vent |
| 2. PXI Module Air Intake (3x) | 4. Airflow                     |
- 

## Chassis Ambient Temperature Definition

The chassis fan control system uses ambient intake air temperatures for controlling fan speeds when in Auto Fan Speed mode. Because of this, the chassis ambient temperature is defined as the temperature of the air just outside of the fan intake vents on the bottom of the chassis. Note that this temperature may be higher than ambient room temperature depending on the surrounding equipment and/or blockages present. Ensure ambient intake temperatures do not exceed the ratings in the *Operating Environment* section of the [PXIe-1086DC Specifications](#). If the temperature exceeds the stated spec, the front-panel temperature LED blinks red.

## Setting Fan Speed

The fan-speed selector switch is on the chassis rear panel. Refer to [Rear View of the PXIe-1086DC](#) to locate the fan-speed selector switch. Select **High** for maximum cooling performance or **Auto** for improved acoustic performance. When set to **Auto**, the chassis intake air temperature determines the fan speed.

## Installing Filler Panels

To maintain proper module cooling performance, install filler panels (provided with the chassis) in unused or empty slots. Secure with the captive mounting screws provided.

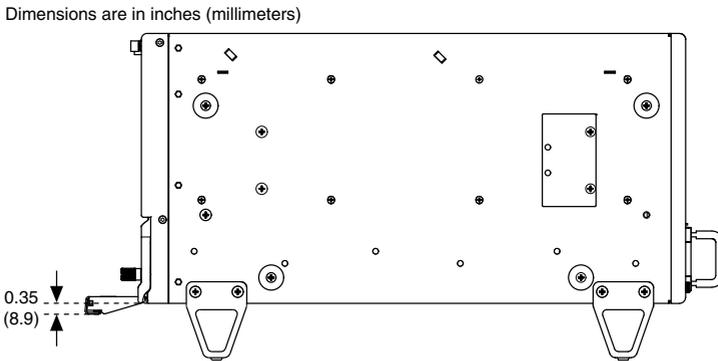
## Installing Slot Blockers

The cooling performance of the chassis can be improved by installing optional slot blockers. Refer to the National Instruments website at [ni.com/info](http://ni.com/info) and enter the Info Code `slotblocker` for more information about slot blockers.

## Fan Access Door Clearance

When installing the PXIe-1086DC chassis, you also must provide the proper clearance for the fan access door to open fully, as shown in the following figure.

**Figure 10.** Fan Access Door Clearance



## Rack Mounting

Rack mount applications require optional rack mount kits available from National Instruments. Refer to the instructions supplied with the rack mount kits to install your PXIe-1086DC chassis in an instrument rack. Refer to [NI Chassis Rack Mount Kit Components](#) for more information.



**Note** You may want to remove the feet from the PXIe-1086DC chassis when rack mounting. To do so, remove the screw holding the feet and handle in place.

## Connecting to Safety Ground and Power Source

The PXIe-1086DC chassis has a single power connector that supplies input power to both chassis power supplies. The power connector is on the front panel.

The PXIe-1086DC ships with a power cord that has an appliance coupler and leads for connection to the source. The cord requires custom termination. The following figure shows the cord connector pinout.

You can order an additional or replacement cord from National Instruments. Part number 782108-01 is a US/CAN approved 3 m, three-conductor, 18 AWG cord with leads and suitable for use in North America. Part number 785863-01 is an international harmonized power cord, 3 m, three-conductor, 1.0mm<sup>2</sup> cord with leads and suitable for use in the EU and internationally. Installation must be done in accordance with local electric codes.



**Caution** The PXIe-1086DC chassis must have a safety ground (protective earth), which is connected by the installer to the premise safety ground system for safe operation. The supplied power cord has a green ground wire for this purpose. The safety ground method shall be reliable and meet applicable safety codes.

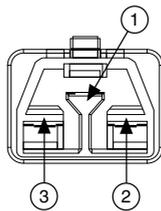


**Attention** Pour un fonctionnement en toute sécurité, le châssis PXIe-1086DC doit disposer d'un fil de protection (mise à la terre) relié par l'installateur au système de mise à la terre du site. Le cordon d'alimentation fourni dispose d'un fil de protection vert prévu à cet effet. La méthode de mise à la terre doit être fiable et respecter les codes de sécurité applicables.

The Earth Ground Terminal on the rear of the chassis must be used where the power cord is terminated via a standard power plug (for example, IEC 60320, NEMA 5-15). This provides a supplemental protective earthing connection to prevent shock hazards if the ground in the plug were to be interrupted. Complete the following steps to connect a protective conductor to this terminal:

1. Connect a 18 AWG wire to the Earth Ground Terminal using a grounding lug. The wire must have green insulation with a yellow stripe or must be noninsulated (bare). The lug must be sized for the M4 x 6 screw.
2. Attach the opposite end of the wire to permanent earth ground using toothed washers or a toothed lug.

**Figure 11.** Power Connector



1. Protective Earth (Ground)
2. Power (-, Neutral)
3. Power (+, Hot)



### Notice

To ensure the specified EMC performance with a second chassis power supply, install a snap-on ferrite bead (NI part number 711849-01) onto the power cord as close to the input connector as possible. You can order this ferrite bead directly from NI using the Order By Part Number link on the home page at [ni.com](http://ni.com). Order the following part number: 781233-02 EMI suppression ferrite, 10.2 mm (includes NI part number 711849-01 (Fair-Rite 0443167251, type 43, round cable, 10.2 mm/0.402 in. ID, 225  $\Omega$  @ 100 MHz)).

## Power-On Test



**Caution** Do not install modules prior to performing the following power-on test.



**Caution** To completely remove power, you must disconnect all power cables.

The PXIe-1086DC chassis has two slots for inserting power supplies on the rear of the chassis. A power supply must be installed in one or both of these slots to power on the chassis.

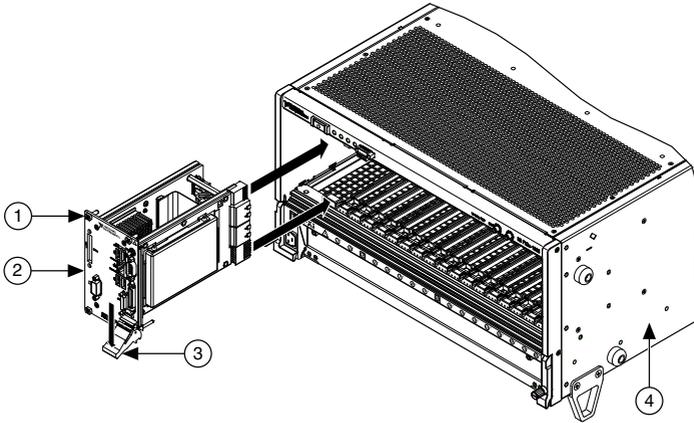
Use the Inhibit Mode switch to power on the chassis or place it in standby mode. Set the Inhibit Mode switch on the back of the chassis to the Manual position. Observe that all fans become operational and that all chassis LEDs are steady green. Set the Inhibit Mode switch back to the Default position to allow the system controller to control the power supply.

## Installing a PXI Express System Controller

This section contains general installation instructions for installing a PXI Express system controller in a PXIe-1086DC chassis. Refer to your PXI Express system controller user manual for specific instructions and warnings. To install a system controller, complete the following steps:

1. Ensure that the chassis is properly grounded to protect it from electrical damage while you install the system controller.
2. Install the system controller into the system controller slot (slot 1, indicated by the red card guides) by first placing the system controller PCB into the front of the card guides (top and bottom). Slide the system controller to the rear of the chassis, making sure that the injector/ejector handle is pushed down as shown in the following figure.

**Figure 12.** Installing a PXI Express System Controller

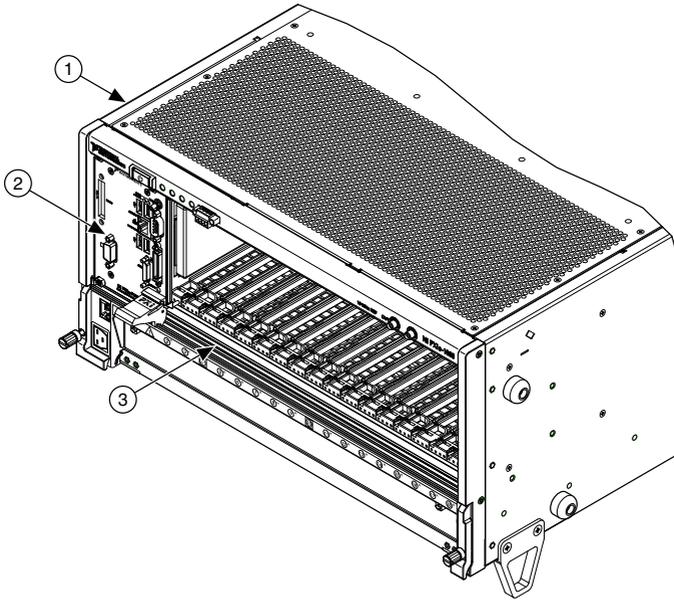


- |  |                            |
|--|----------------------------|
| 1. Controller Front Panel Mounting Screws (4x) | 3. Injector/Ejector Handle |
| 2. NI PXI Express System Controller            | 4. PXIe-1086DC Chassis     |

3. When you begin to feel resistance, pull up on the injector/ejector handle to seat the system controller fully into the chassis frame. Secure the system controller front panel to the chassis using the system controller front panel mounting screws.
4. Connect the keyboard, mouse, and monitor to the appropriate connectors. Connect devices to ports as required by your system configuration.
5. Power on the chassis. Verify that the system controller boots. If the system controller does not boot, refer to your system controller user manual.

The following figure shows a PXI Express system controller installed in the system controller slot of a PXIe-1086DC chassis. You can place CompactPCI, CompactPCI Express, PXI, or PXI Express modules in other slots depending on the slot type.

**Figure 13.** PXI Express System Controller Installed in an PXIe-1086DC Chassis



1. PXIe-1086DC chassis
2. PXI Express System Controller
3. Injector/Ejector Rail

## Installing Peripheral Modules

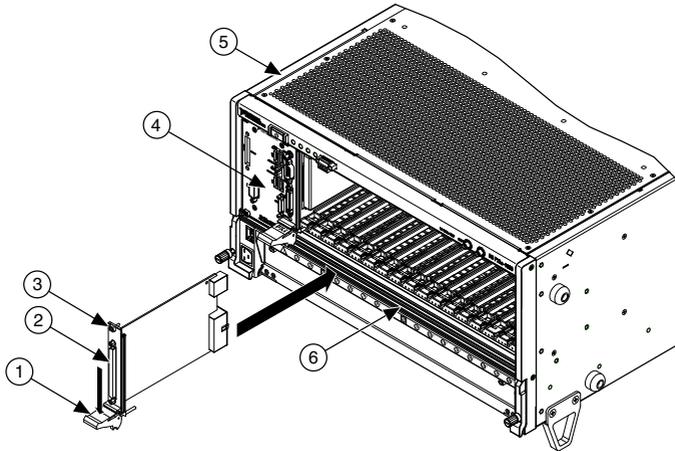


**Caution** The PXIe-1086DC chassis has been designed to accept a variety of peripheral module types in different slots. To prevent damage to the chassis, ensure that the peripheral module is being installed into a slot designed to accept it. Refer to the Getting Started section for a description of the various slot types.

This section contains general installation instructions for installing a peripheral module in a PXIe-1086DC chassis. Refer to your peripheral module user manual for specific instructions and warnings. To install a module, complete the following steps:

1. Ensure that the chassis is properly grounded to protect it from electrical damage while you install the module.
2. Ensure that the chassis is powered off.
3. Install a module into a chassis slot by first placing the module card PCB into the front of the card guides (top and bottom), as shown in the following figure. Slide the module to the rear of the chassis, making sure that the injector/ejector handle is pushed down as shown in the following figure.
4. When you begin to feel resistance, push up on the injector/ejector handle to fully seat the module into the chassis frame. Secure the module front panel to the chassis using the module front-panel mounting screws.

**Figure 14.** Installing PXI, PXI Express, or CompactPCI Peripheral Modules



- |   |                                  |
|---|----------------------------------|
| 1. Injector/Ejector Handle                            | 4. PXI Express System Controller |
| 2. PXI Peripheral Module                              | 5. PXIe-1086DC Chassis           |
| 3. Peripheral Module Front Panel Mounting Screws (2x) | 6. Injector/Ejector Rail         |

## Remote System Monitoring

The PXIe-1086DC chassis provides an Ethernet port on the front panel of the chassis. You can use this Ethernet port to monitor the chassis operating parameters remotely over a network.

The Ethernet port on the chassis supports communication speeds of 10 Mbps and 100 Mbps. Contact your network administrator to determine whether your network supports DHCP. If your network uses DHCP, the network configuration is performed automatically. Refer to [Front View of the PXIe-1086DC](#) to locate the Ethernet port

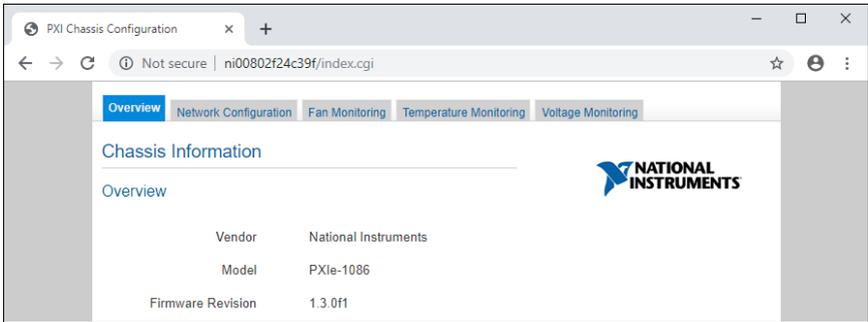
To use the remote monitoring interface, connect one end of an Ethernet cable to your PXIe-1086DC chassis. Connect the other end of the cable to your Ethernet network.



**Note** The Ethernet controller can perform automatic crossover, thus eliminating the need for crossover cables.

Through the remote monitoring Ethernet interface of the chassis, you can access a web page with information about the current chassis operating parameters. You can access this page in most browsers. Enter the IP address or hostname currently assigned to the chassis into the browser's address bar.

**Figure 15.** Chassis Configuration Web Page



The Ethernet connector has two LEDs that indicate the current status of the Ethernet link.

**Table 2.** Ethernet LED Behavior

LED	State	Description
ACT/Link	Off	Link is not established.
	Steady green	Link is established.
	Blinking green	Chassis is communicating with another device on the network.
10/100	Off	10 Mbps data rate is selected.
	Steady green	100 Mbps data rate is selected.

## Default Configuration Settings

The chassis ships from the factory with the following default configuration settings:

- DHCP with Auto IP fallback
- Default hostname as printed on the product label

## LED Indicators

The PXIe-1086DC chassis has four main LEDs on the front panel next to the Power Inhibit switch. Refer to *Front View of the PXIe-1086DC* to locate these LEDs. You can use the four main LEDs to determine the chassis operating status quickly.

**Table 3. Main Chassis LED Behavior**

<b>LED</b>	<b>State</b>	<b>Description</b>
Temperature Status	Off	Chassis is powered off.
	Steady green	Air intake temperature is within chassis operating range.
	Blinking red	Air intake temperature is outside of chassis operating range.
	Steady red	Air intake or exhaust temperature has reached critical limits.
Fan Status	Off	Chassis is powered off.
	Steady green	All chassis fans are enabled and operating normally.
	Blinking red	One or more chassis fans have failed, but chassis can continue to operate.
	Steady red	One or more chassis fans have failed, and chassis must shut itself down.
Power Supply 1 Status	Off	Power supply is not installed or is in standby.
	Steady green	Power supply is active, and all voltages are within normal operating ranges.
	Blinking red	Power supply is active, and at least one voltage is out of range.
	Steady red	Power supply has failed.
Power Supply 2 Status	Off	Power supply is not installed or is in standby.
	Steady green	Power supply is active, and all voltages are within normal operating ranges.
	Blinking red	Power supply is active, and at least one voltage is out of range.
	Steady red	Power supply has failed.

Each chassis fan assembly has an LED that shows the current health of that fan.

**Table 4. Chassis Fan LED Behavior**

LED	State	Description
Individual Fan Status	Off	Fan is not enabled.
	Steady green	Fan is operating normally.
	Steady red	Fan has failed.

Each power supply also has an LED that shows the power supply's current health.

**Table 5. Power Supply LED Behavior**

LED	State	Description
Individual Power Supply Status	Off	Power supply is in standby.
	Steady green	Power supply is operating normally.
	Steady red	Power supply has failed.

## Remote Inhibit and Fault Monitoring

The PX1e-1086DC chassis supports remote inhibit and fault monitoring through a 4-pin terminal block on the chassis front panel. Refer to [Front View of the PX1e-1086DC](#) to locate this connector.

**Table 6. Remote Inhibit and Fault Connector Pinout**

Pin	Signal
1	Remote Inhibit (active low)
2	Ground
3	Remove Fault (active high)
4	Ground

When the chassis Inhibit Mode switch is in the Manual position, you can use the Remote Inhibit signal to control the chassis power supplies. Refer to the [Inhibit Mode Switch](#) section for details.

The Remote Fault signal is an output signal that is asserted high when any chassis fault is detected. You can use this signal to monitor the overall chassis health.

## Inhibit Mode Switch

On the rear panel of the chassis there is an Inhibit Mode switch. Refer to [Rear View of the PX1e-1086DC](#) to locate this switch.

The Inhibit Mode switch should be in the Default position when normal power inhibit switch functionality is desired. If the user needs to power on a chassis without a system controller installed the switch should be in the Manual position.

When the Inhibit Mode switch is set to the Manual position, the power supplies are enabled, and you can use the Inhibit signal (active low) on pin 1 of the Remote Inhibit and Fault connector to power off the chassis. To power off the chassis remotely, connect the Inhibit pin (pin 1) to a Logic Ground pin (pin 2). As long as this connection exists, the chassis will remain off (standby); when you remove this connection, the chassis turns on.



**Note** For the Remote Inhibit signal to control the On/Off (standby) state of the chassis, the Inhibit Mode switch must be in the Manual position.

## PXI\_CLK10 Front Panel Connectors

There are two SMA connectors on the front of the PXIe-1086DC chassis for PXI\_CLK10. The connectors are labeled IN and OUT. You can use them for supplying the backplane with PXI\_CLK10 or routing the backplane's PXI\_CLK10 to another chassis. Refer to the [System Reference Clock](#) section for details about these signals.

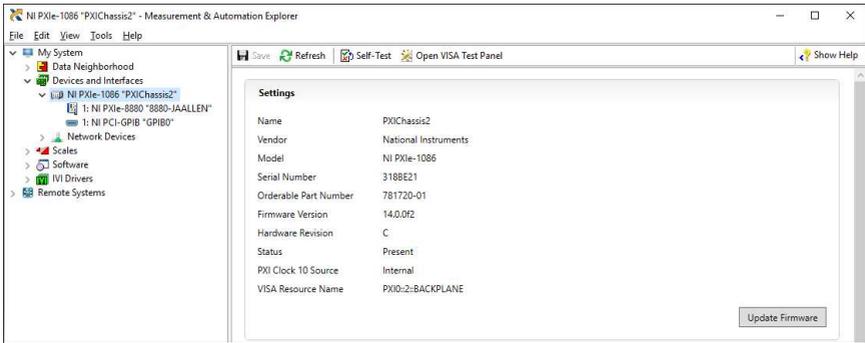
## PXI Express System Configuration with MAX

The PXI Platform Services software included with your chassis automatically identifies your PXI Express system components to generate a `pxiesys.ini` file. You can configure your entire PXI system and identify your chassis through Measurement & Automation Explorer (MAX), included with your system controller. PXI Platform Services creates the `pxiesys.ini` and `pxisys.ini` file, which define your PXI system parameters.

MAX provides the following chassis information:

- Asset information, such as serial number or part number
- Chassis number
- Voltages, temperatures, and fan speeds
- Ethernet monitoring port configuration
- Slot details
- Chassis self-test
- Firmware Update

**Figure 16. MAX Interface**



## Trigger Configuration in MAX

PXI Platform Services provides an interface to route and reserve triggers so dynamic routing, through drivers such as NI-DAQmx, avoids double-driving and potentially damaging trigger lines. For more information about routing and reserving PXI triggers, refer to Info Code wfl7sp at [ni.com/support](http://ni.com/support).

Each chassis has one or more trigger buses, each with eight lines numbered 0 through 7 that can be reserved and routed statically or dynamically. Static reservation *pre-allocates* a trigger line to prevent its configuration by a user program. Dynamic reservation/routing/deallocation is *on the fly* within a user program based on National Instruments APIs such as NI-DAQmx. NI recommends dynamic reservations and routing are used whenever possible. If static reservations are required, static reservation of trigger lines can be implemented by the user in MAX through the **Triggers** tab. PXI modules dynamically configured by programs such as NI-DAQmx will not use reserved trigger lines. This prevents the instruments from double-driving the trigger lines, possibly damaging devices in the chassis. In the default configuration, trigger lines on each bus are independent. For example, if trigger line 3 is asserted on trigger bus 0, by default it is not asserted automatically on any other trigger bus.

Complete the following steps to reserve these trigger lines in MAX.

1. In the Configuration tree, click the PXI chassis branch to configure.
2. In the lower right pane, click the **Triggers** tab.
3. Select the trigger lines to statically reserve.
4. Click the **Save** button.

# PXI Trigger Bus Routing

Some National Instruments chassis, such as the PXIe-1086DC, have the capability to route triggers from one bus to others within the same chassis using the **Trigger Routing** tab in MAX.

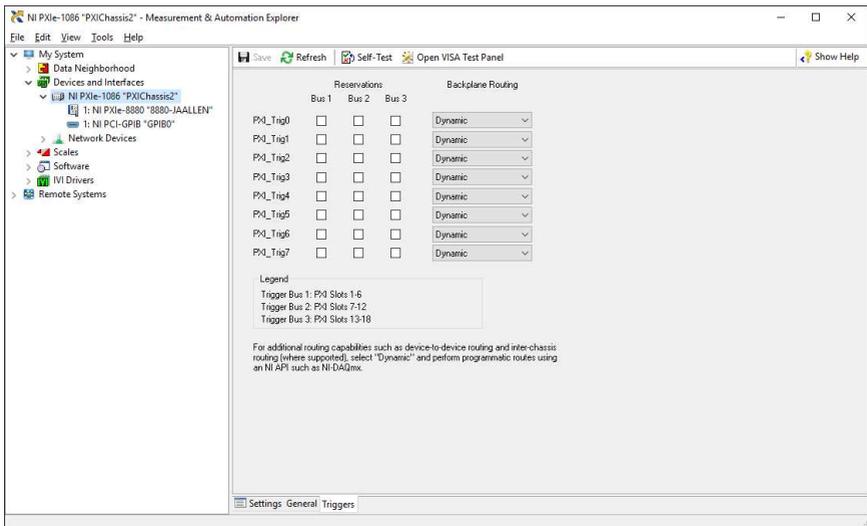


**Note** Selecting any non-disabled routing automatically reserves the line in all trigger buses being routed to. If you are using NI-DAQmx, it will reserve and route trigger lines for you, so you won't have to route trigger lines manually.

Complete the following steps to configure trigger routings in MAX.

1. In the **Configuration** tree, select the chassis in which you want to route trigger lines.
2. In the right-hand pane, select the **Triggers** tab near the bottom.
3. For each trigger line, select Route Right, Route Outward From Middle, or Route Left to route triggers on that line in the described direction, or select Disabled for the default behavior with no manual routing.
4. Click the **Save** button.

**Figure 17.** Trigger Configuration



## Using System Configuration and Initialization Files

The PXI Express specification allows many combinations of PXI Express chassis and system modules. To assist system integrators, the manufacturers of PXI Express chassis and system modules must document the capabilities of their products. The minimum documentation requirements are contained in .ini files, which consist of ASCII text. System integrators, configuration utilities, and device drivers can use these .ini files.

The capability documentation for the PXIe-1086DC chassis is contained in the `chassis.ini` file on the software media that comes with the chassis. The information in this file is combined with information about the system controller to create a single system initialization file called `pxisys.ini` (PXI System Initialization). The system controller manufacturer either provides a `pxisys.ini` file for the particular chassis model that contains the system controller or provides a utility that can read an arbitrary `chassis.ini` file and generate the corresponding `pxisys.ini` file. System controllers from NI provide the `pxisys.ini` file for the PXIe-1086DC chassis, so you should not need to use the `chassis.ini` file. Refer to the documentation provided with the system controller or to [ni.com/support](http://ni.com/support) for more information on `pxisys.ini` and `chassis.ini` files.

Device drivers and other utility software read the `pxisys.ini` file to obtain system information. The device drivers should have no need to directly read the `chassis.ini` file. For detailed information regarding initialization files, refer to the PXI Express specification at [www.pxisa.org](http://www.pxisa.org).

## Maintenance

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This section describes basic maintenance procedures you can perform on the PXIe-1086DC chassis.



**Caution** Disconnect the power cable prior to servicing your PXIe-1086DC chassis.

## Service Interval

Clean dust from the chassis exterior (and interior) as needed, based on the operating environment. Periodic cleaning increases reliability.

## Preparation

The information in this section is designed for use by qualified service personnel. Read the *PXIe-1086DC Safety, Environmental, and Regulatory Information* document included with your kit before attempting any procedures in this section.



**Caution** Many components within the chassis are susceptible to static discharge damage. Service the chassis only in a static-free environment. Observe standard handling precautions for static-sensitive devices while servicing the chassis. *Always* wear a grounded wrist strap or equivalent while servicing the chassis.

## Cleaning

Cleaning procedures consist of exterior and interior cleaning of the chassis. Refer to your module's user documentation for information about cleaning individual CompactPCI or PXI Express modules.



**Caution** Always disconnect the power cable prior to servicing the chassis.

## Interior Cleaning

Use a dry, low-velocity stream of air to clean the interior of the chassis. Use a soft-bristle brush for cleaning around components.

## Exterior Cleaning

Clean the exterior surfaces of the chassis with a dry, lint-free cloth or a soft-bristle brush. If any dirt remains, wipe with a cloth moistened in a mild soap solution. Remove any soap residue by wiping with a cloth moistened with clear water. Do not use abrasive compounds on any part of the chassis.



**Caution** Avoid getting moisture inside the chassis during exterior cleaning, especially through the top vents. Use just enough moisture to dampen the cloth. Do not wash the front- or rear-panel connectors or switches. Cover these components while cleaning the chassis.

Do not use harsh chemical cleaning agents; they may damage the chassis. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

## Replacing a Modular Power Supply

This section describes how to remove and install a modular power supply for the PXIe-1086DC chassis.



**Caution** Disconnect the power cable prior to replacing the power supply.



**Attention** Débranchez le câble d'alimentation avant de remplacer le bloc d'alimentation.



**Caution** Do not use a power supply from another chassis. Doing so may damage your chassis and the power supply. You must ensure the chassis is properly grounded after any maintenance.



**Attention** N'essayez pas d'utiliser un bloc d'alimentation provenant d'un modèle de châssis différent du vôtre. Cela pourrait endommager votre châssis et le bloc d'alimentation.

Refer to [Connecting to Safety Ground and Power Source](#) for instructions on connecting safety ground.

## Removal of Power Supply

The PXIe-1086DC power supply (part number 782106-01) is a replacement part for the PXIe-1086DC chassis. Before attempting to replace a power supply, verify that there is adequate clearance behind the chassis.

The power supplies for this chassis are redundant and hot swappable. If both power supplies are installed and functional, you can remove either without disconnecting main AC power

from the system. If both power supplies are installed, and one has failed, you can remove the failed supply without disconnecting main AC power from the system.

Complete the following steps to remove a power supply from the rear of the chassis:



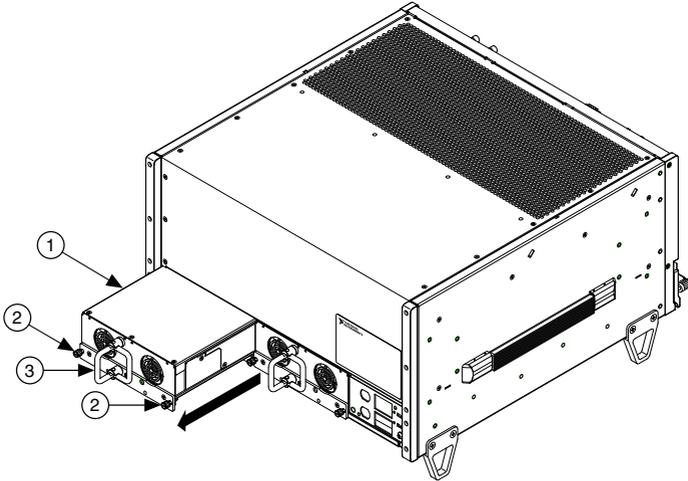
**Caution** Before handling the power supply, allow the fan to stop spinning.

1. Disengage the two screws on the rear of the power supply with a flat-blade screwdriver.
2. Extend the collapsible handle and pull the power supply out of the chassis.

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**Figure 18.** Removing Power Supply from the PXIe-1086DC Chassis

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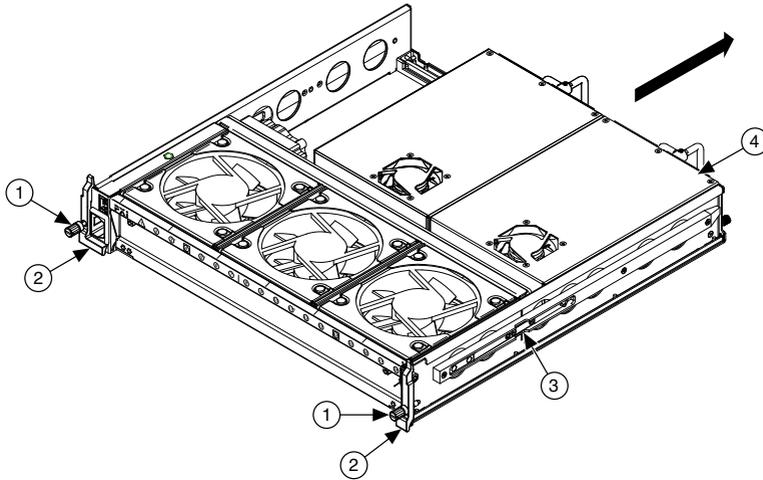


- 
1. Power Supply
  2. Captive Screw
  3. Collapsible Handle
- 

## Removal of Power Drawer

If access to the rear of the chassis is not available, you still can remove the power supplies by removing the entire power drawer from the chassis.

**Figure 19. PXIe-1086DC Power Drawer**



- |                       |                 |
|-----------------------|-----------------|
| 1. Captive Screw      | 3. Side Latch   |
| 2. Power Drawer Lever | 4. Power Supply |



**Caution** If you are using the PXIe-1086DC and SC Express modules with front mounting terminal blocks together, you must remove the SC Express module front mount terminal blocks to access the power drawer. Refer to your module documentation for more information about removing the terminal blocks.

Complete the following steps to remove the power drawer:



**Caution** You must disconnect AC or DC power before removing the power drawer.

1. Disconnect AC or DC power by pressing the release button on the power cord.
2. Loosen the drawer lever captive screws with a flat-blade screwdriver until the threads disengage from the chassis frame.
3. Rotate the drawer levers to eject the drawer from the chassis frame.
4. Pull the drawer about halfway out until the side latches engage.
5. Press in the side latches on both sides to release the drawer and continue to pull out the drawer.



**Caution** Before handling the power supply, allow the fan to stop spinning.

6. Place the drawer on a table surface to remove the power supply.
7. Disengage the two screws on the rear of the power supply with a flat-blade screwdriver. Refer to [Rear View of the PXIe-1086DC](#) for the location of the screws.
8. Extend the collapsible handle and pull the power supply out of the chassis. Refer to [Rear View of the PXIe-1086DC](#) for the location of the handle.

## Installation of Power Supply

Ensure there is no visible damage to the new power supply before installing it. Verify that there is no foreign material inside the connector on the new power supply.

The power supplies for this chassis are redundant and hot swappable. If one power supply already is installed and functional, you can install the second power supply without first disconnecting main AC power from the system. If no power supplies are installed or functional in the system, you must remove main power from the system by disconnecting the power cable from the AC power connector on the chassis front panel.

Complete the following steps to install a power supply from the rear of the chassis:

1. Slide the power supply into an empty slot with the connector facing toward the chassis until it engages.
2. Fold down the collapsible handle on the power supply.
3. Tighten the two captive screws on the rear of the power supply to 11.5 lb · in. torque with a flat-blade screwdriver.

## Installation of Power Drawer

If access to the rear of the chassis is not available, you still can install power supplies by removing the entire power drawer from the chassis. The power drawer is shown in [PXIe-1086DC Power Drawer](#).



**Caution** If you are using the PXIe-1086DC and SC Express modules with front mounting terminal blocks together, you must remove the SC Express module front mount terminal blocks to access the power drawer. Refer to your module documentation for more information about removing the terminal blocks.

Complete the following steps to remove the power drawer:



**Caution** You must disconnect AC or DC power before removing the power drawer.

1. Disconnect AC or DC power by pressing the release button on the power cord.
2. Loosen the drawer lever captive screws with a flat-blade screwdriver until the threads disengage from the chassis frame.
3. Rotate the drawer levers to eject the drawer from the chassis frame.
4. Pull the drawer about halfway out until the side latches engage.
5. Press in the side latches on both sides to release the drawer and continue to pull out the drawer.



**Caution** Before handling the power supply, allow the fan to stop spinning.

6. Place the drawer on a table surface to install the power supply.
7. Slide the power supply into an empty slot with the connector facing toward inside of drawer until it engages.

8. Fold down the collapsible handle on the power supply.
9. Tighten the two captive screws on the rear of the power supply to 11.5 lb · in. torque with a flat-blade screwdriver.
10. Reinstall the power drawer. When reinstalling the drawer, tighten the drawer lever captive screws to 11.5 lb · in. torque.

## Replacing a Modular Fan Assembly

This section describes how to remove and install a modular fan assembly for the chassis.



**Caution** Do not use a fan assembly from another chassis. Doing so may damage your chassis and the fan assembly.

### Removal

The fan assembly (part number 782107-01) is a replacement part for the chassis. Before attempting to replace a fan assembly, verify that there is adequate clearance in front of the chassis.

The fans for this chassis are redundant and hot swappable. You can remove the fans with main power connected to the system.



**Caution** Use care when selecting which fans to remove, as an undesired system shut down can occur. Do not remove both fans from the same column, as this triggers a system shutdown.



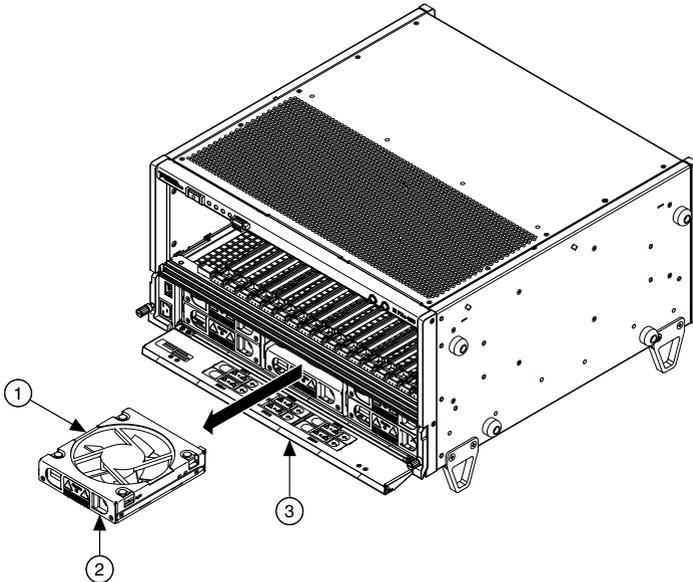
**Caution** Likewise, do not remove the working fan from the same column as a failed fan, as this also triggers a chassis shutdown.



**Caution** If all fans are installed and operating normally, you can remove any fan without causing the system to shut down.

The following figure shows the PXIe-1086DC chassis with a fan assembly removed.

**Figure 20. PXIe-1086DC Chassis with Fan Assembly Removed**



1. Modular Fan Assembly
2. Fan Latch
3. Fan Door

Complete the following steps to remove a fan assembly:

1. Open the fan door by sliding the door latches inward and rotating the door down.
2. Locate the fan to be removed. A red LED indicates a failed fan.



**Caution** If the fan is still spinning, allow the fan to stop before handling. (The fan will not stop as long as it is in the airflow path.)

3. Slide the fan latch until it disengages and allows removal by pulling the fan module forward.

## Installation

Ensure there is no visible damage to the new fan assembly before installing it. Verify that there is no foreign material inside the connector on the new fan assembly.

The fans for this chassis are redundant and hot swappable. You can install any fan with main AC power connected to the system.

Complete the following steps to install a fan assembly:

1. Open the fan door by sliding the door latches inward and rotating the door down.
2. Slide the fan module into an empty fan slot with the connector facing the chassis until it latches.

3. Verify that the fan is properly installed by pulling it forward with a light force without pressing the latch. If the fan does not slide out without pressing in the latch, it is installed correctly.
4. Close the fan door.

## Specifications

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This document contains specifications for the PXIe-1086DC chassis.

### Electrical

#### AC Input

Input rating	210 to 300 VDC, 3.5 to 6 A 100 to 240 VAC, 12 to 6 A
Operating voltage range <sup>1</sup>	210 to 300 VDC 90 to 264 VAC
Nominal AC input frequency	50/60 Hz
Operating AC frequency range <sup>1</sup>	47 to 63 Hz
Efficiency	70% typical
Power disconnect	The AC/DC power cable provides main power disconnect. Do not position the equipment so that it is difficult to disconnect the power cord. The front-panel power switch causes the internal chassis power supply to provide DC power to the CompactPCI/PXI Express backplane. You also can use the front panel terminal block 4-pin connector and power mode switch to control the internal chassis power supply.

#### DC Output

**Table 7. DC Current Capacity ( $I_{mp}$ )**

Voltage	Maximum Current Single Power Supply	Maximum Current Dual Power Supplies
+3.3 V	50 A	60 A
+5 V	40 A	49 A

<sup>1</sup> The operating range is guaranteed by design.

**Table 7. DC Current Capacity ( $I_{mp}$ ) (Continued)**

Voltage	Maximum Current Single Power Supply	Maximum Current Dual Power Supplies
+12 V	50 A	62 A
-12 V	4 A	4 A
5 V <sub>AUX</sub>	1.5 A	1.5 A



**Note** Maximum total usable power is 855 W.



**Note** Maximum combined +12 V and -12 V power of a single power supply is 588 W.

**Table 8. Backplane Slot Current Capacity**

Slot	+5 V	V (I/O)	+3.3 V	+12 V	-12 V	5 V <sub>AUX</sub>
System Controller Slot	15 A	—	15 A	30 A	—	1 A
System Timing Slot	—	—	6 A	4 A	—	1 A
Hybrid Peripheral Slot with PXI-1 Peripheral	6 A	5 A	6 A	1 A	1 A	—
Hybrid Peripheral Slot with PXI-5 Peripheral	—	—	6 A	4 A	—	1 A
PXI-1 Peripheral Slot	6 A	11 A	6 A	1 A	1 A	—



**Note** Total system slot current should not exceed 45 A.



**Note** PCI V(I/O) pins in PXI-1 peripheral slots and hybrid peripheral slots are connected to +5 V.



**Note** The maximum power dissipated in the system slot should not exceed 140 W.



**Note** The maximum power dissipated in a peripheral slot should not exceed 38.25 W.

**Table 9. Load Regulation**

Voltage	Load Regulation
+3.3 V	<5%
+12 V	<5%
+5 V	<5%
-12 V	<5%

**Table 10. Maximum Ripple and Noise (20 MHz Bandwidth)**

Voltage	Maximum Ripple and Noise
+3.3 V	50 mV <sub>pp</sub>
+12 V	120 mV <sub>pp</sub>
+5 V	50 mV <sub>pp</sub>
-12 V	120 mV <sub>pp</sub>

Over-current protection	All outputs protected from short circuit and overload with automatic recovery
Over-voltage protection, 3.3 V and 5 V	Clamped at 25 to 40% above nominal output voltage
Power supply shuttle MTTR	Replacement in under 1 minute

## Chassis Cooling

Module cooling system	Forced air circulation (positive pressurization) through six 150 cfm fans (three sets of dual stacked fans) with High/Auto speed selector
Slot airflow direction	Bottom of module to top of module
Module cooling intake	Bottom of chassis
Module cooling exhaust	Along top of chassis
Power supply cooling system	Forced air circulation through integrated fan
Power supply cooling intake	Rear of chassis
Power supply cooling exhaust	Top of chassis

## Minimum chassis cooling clearances

Above	44.45 mm (1.75 in)
Rear	76.20 mm (3.00 in)
Sides	44.45 mm (1.75 in)

## Environmental

Maximum altitude 4,600 m (570 mbar) (at 25 °C ambient)



**Note** Fan speed selector must be set to High to meet the maximum altitude specification.

Pollution Degree 2

Indoor use only.

## Operating Environment

Ambient temperature range 0 °C to 50 °C

Relative humidity range 10% to 90%, noncondensing

## Storage Environment

Ambient temperature range -40 °C to 71 °C

Relative humidity range 5% to 95%, noncondensing

## Shock and Vibration

Operational shock 30 g peak, half-sine, 11 ms pulse

Random Vibration Operating 5 to 500 Hz, 0.3 g<sub>rms</sub>



**Caution** When using a single power supply unit, you must use a power supply filler panel (NI part number 784057-01) in the empty slot to meet operational shock and vibration specifications.

## Acoustic Emissions

### Sound Pressure Level (at Operator Position)

Auto fan (up to ~30 °C ambient) 57.0 dBA

High fan 69.0 dBA

## Sound Power

Auto fan (up to ~30 °C ambient)	63.3 dBA
High fan	79.3 dBA



**Caution** The protection provided by the PXIe-1086DC can be impaired if it is used in a manner not described in this document.

## Backplane

Size	3U-sized; one system slot (with three system expansion slots) and 17 peripheral slots. Compliant with IEEE 1101.10 mechanical packaging. PXI Express Specification compliant. Accepts both PXI Express and CompactPCI (PICMG 2.0 R 3.0) 3U modules.
Backplane bare-board material	UL 94 V-0 Recognized
Backplane connectors	Conforms to IEC 917 and IEC 1076-4-101, UL 94 V-0 rated

## 10 MHz System Reference Clock: PXI\_CLK10

Maximum slot-to-slot skew	250 ps
Accuracy	±25 ppm max (guaranteed over the operating temperature range)
Maximum jitter	5 ps RMS phase-jitter (10 Hz–1 MHz range)
Duty-factor	45% to 55%
Unloaded signal swing	3.3 V ±0.3 V



**Note** For other specifications, refer to the *PXI-1 Hardware Specification*.

## 100 MHz System Reference Clock: PXIe\_CLK100 and PXIe\_SYNC100

Maximum slot-to-slot skew	100 ps
Accuracy	±25 ppm max (guaranteed over the operating temperature range)
Maximum jitter	3 ps RMS phase-jitter (10 Hz to 12 kHz range), 2 ps RMS phase-jitter (12 kHz to 20 MHz range)

Duty-factor for PXIe_CLK100	45% to 55%
Absolute differential voltage (When terminated with a 50 $\Omega$ load to 1.30 V or Thévenin equivalent)	400 to 1000 mV



**Note** For other specifications, refer to the *PXI-5 PXI Express Hardware Specification*

## External 10 MHz Reference Out

(SMA on front panel of chassis)

Accuracy	$\pm 25$ ppm max (guaranteed over the operating temperature range)
Maximum jitter	5 ps RMS phase-jitter (10 Hz to 1 MHz range)
Output amplitude	1 $V_{PP} \pm 20\%$ square-wave into 50 $\Omega$ , 2 $V_{PP}$ unloaded
Output impedance	50 $\Omega \pm 5 \Omega$

## External Clock Source

Frequency	10 MHz $\pm 100$ ppm
Input amplitude	
Front panel SMA	200 mV <sub>PP</sub> to 5 V <sub>PP</sub> square-wave or sine-wave
System timing slot PXI_CLK10_IN	5 V or 3.3 V TTL signal
Front-panel SMA input impedance	50 $\Omega \pm 5 \Omega$
Maximum jitter introduced by backplane	1 ps RMS phase-jitter (10 Hz to 1 MHz range)

## PXIe\_SYNC\_CTRL

$V_{IH}$	2.0 to 5.5 V
$V_{IL}$	0 to 0.8 V

## PXI Star Trigger

Maximum slot-to-slot skew	250 ps
Backplane characteristic impedance	65 $\Omega \pm 10\%$

For PXI slot to PXI Star mapping, refer to [System Timing Slot](#).

For other specifications, refer to the *PXI-1 Hardware Specification*.

## PXI Differential Star Triggers

(PXIe-DSTARA, PXIe-DSTARB, PXIe-DSTARC)

Maximum slot-to-slot skew	150 ps
Maximum differential skew	25 ps
Backplane differential impedance	100 $\Omega \pm 10\%$

For PXI Express slot to PXI DStar mapping, refer to [System Timing Slot](#).

For other specifications, the PXIe-1086DC complies with the *PXI-5 PXI Express Hardware Specification*.

## Mechanical

### Standard chassis dimensions

Height	10.59 in. (268.7 mm)
Width	18.39 in. (467.1 mm)
Depth	18.76 in. (476.5 mm)

### Weight

With two power supplies	37.6 lb. (17.1 kg)
With single power supply	31.5 lb. (14.3 kg)

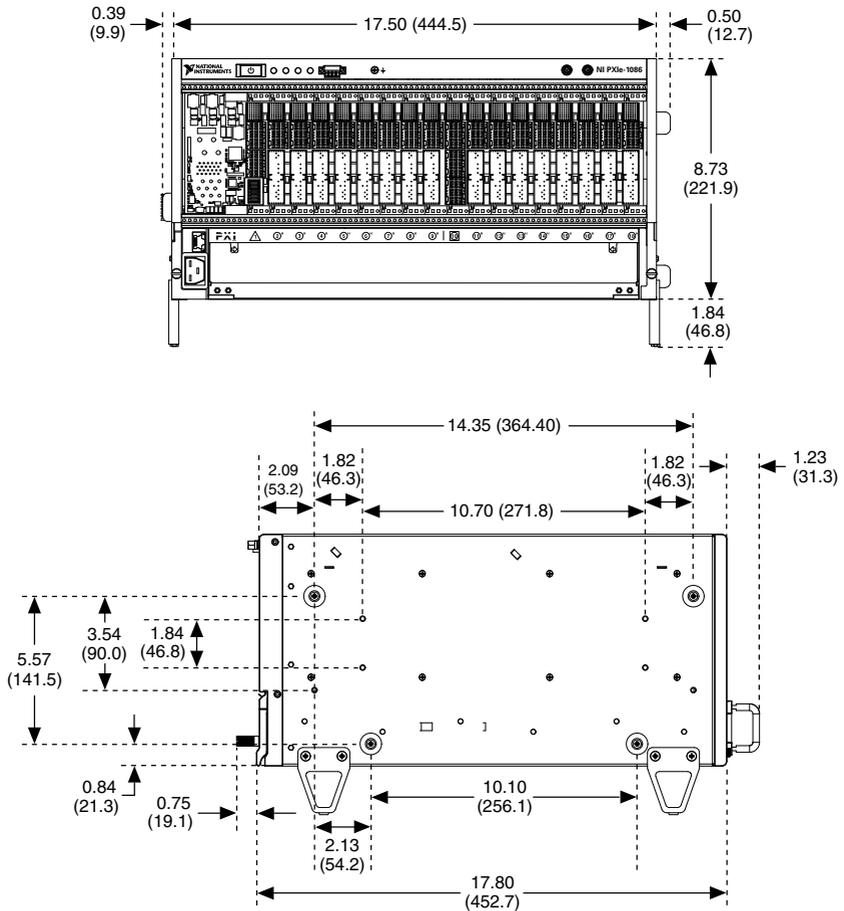
Chassis materials	Sheet Aluminum (5052-H32, 3003-H14, and 6061-T6), Extruded Aluminum (6060-T6), and Cold Rolled Steel, PC-ABS, Santoprene, Nylon
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Finish	Conductive Clear Iridite on Aluminum, Electroplated Nickel on Cold Rolled Steel, Polyurethane Enamel
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The following figures show the PXIe-1086DC chassis dimensions. The holes shown are for the installation of the optional rack mount kits. You can install those kits on the front or rear of the chassis, depending on which end of the chassis you want to face toward the front of the instrument cabinet. Notice that the front and rear chassis mounting holes (size M4) are symmetrical.

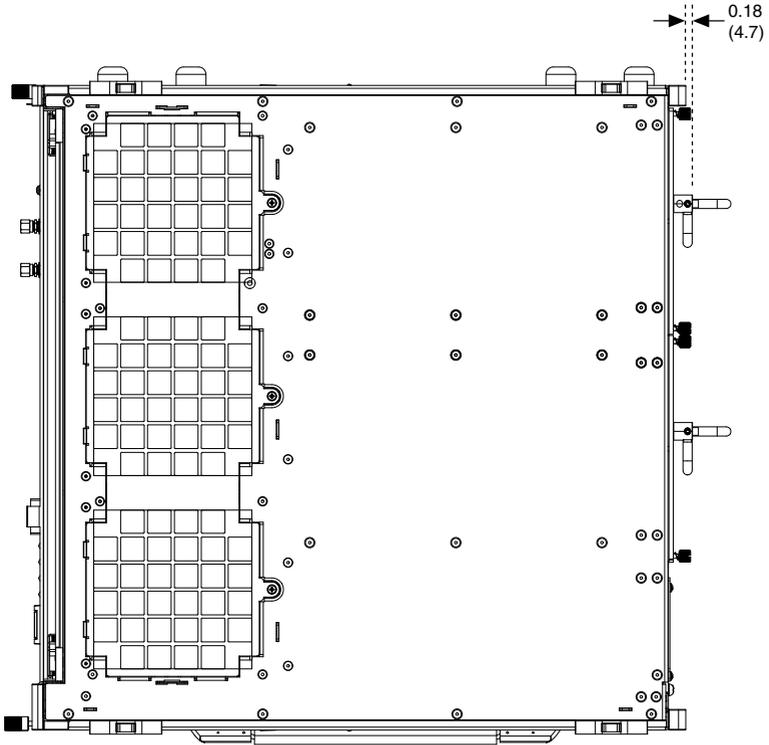
**Figure 21. PXIe-1086DC Chassis Dimensions (Front and Side)**

Dimensions are in inches (millimeters)

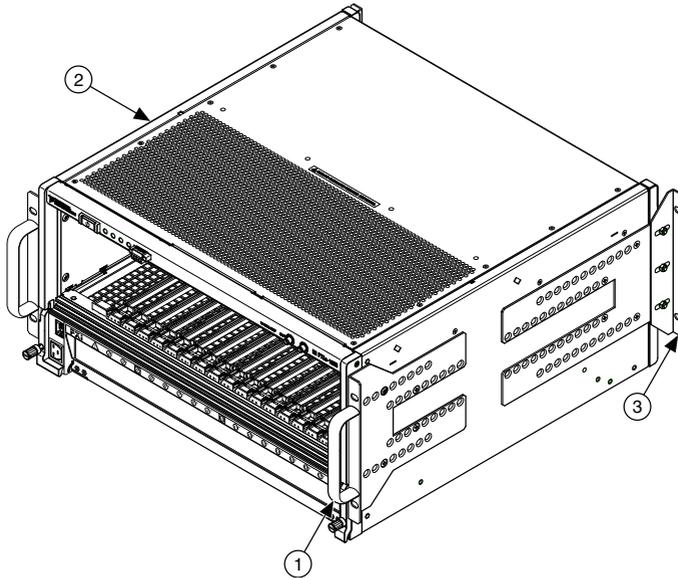


**Figure 22. PXIe-1086DC Chassis Dimensions (Bottom)**

Dimensions are in inches (millimeters)



**Figure 23. NI Chassis Rack Mount Kit Components**



1. Front Rack Mount Kit
2. PXIe-1086DC Chassis
3. Rear Rack Mount Kit

## Safety Compliance Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1



**Note** For UL and other safety certifications, refer to the product label or the [Product Certifications and Declarations](#) section.

## Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions

- FCC 47 CFR Part 15B: Class A emissions
- ICES-003: Class A emissions



**Note** In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light industrial, and heavy industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11), Class A equipment is intended for use only in heavy industrial locations.



**Note** Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.



**Note** For EMC declarations and certifications and additional information, refer to the [Product Certifications and Declarations](#) section

## CE Compliance

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EC; Low-Voltage Directive (safety)
- 2014/13/EC; Electromagnetic Compatibility Directive (EMC)

## Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit [ni.com/product-certifications](http://ni.com/product-certifications), search by model number, and click the appropriate link.

## Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Commitment to the Environment* web page at [ni.com/environment](http://ni.com/environment). This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

## 电子信息产品污染控制管理办法（中国 RoHS）



**中国客户** National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 [ni.com/environment/rohs\\_china](http://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](http://ni.com/environment/rohs_china).)

## Waste Electrical and Electronic Equipment (WEEE)



**EU Customers** At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit [ni.com/environment/weee](http://ni.com/environment/weee).

# Pinouts

## System Controller Slot XP1 Connector Pinout

Pins	Signals
A	GND
B	12V
C	12V
D	GND
E	5V
F	3.3V
G	GND

## System Controller Slot XP2 Connector Pinout

Pin	A	B	ab	C	D	cd	E	F	ef
1	2PETp1	2PETn1	GND	2PERp1	2PERn1	GND	2PETp2	2PETn2	GND
2	2PETp3	2PETn3	GND	2PERp3	2PERn3	GND	2PERp2	2PERn2	GND
3	2PETp4	2PETn4	GND	2PERp4	2PERn4	GND	2PETp5	2PETn5	GND
4	2PETp6	2PETn6	GND	2PERp6	2PERn6	GND	2PERp5	2PERn5	GND
5	2PETp7	2PETn7	GND	2PERp7	2PERn7	GND	2PETp8	2PETn8	GND
6	2PETp9	2PETn9	GND	2PERp9	2PERn9	GND	2PERp8	2PERn8	GND
7	2PETp10	2PETn10	GND	2PERp10	2PERn10	GND	2PETp11	2PETn11	GND
8	2PETp12	2PETn12	GND	2PERp12	2PERn12	GND	2PERp11	2PERn11	GND
9	2PETp13	2PETn13	GND	2PERp13	2PERn13	GND	2PETp14	2PETn14	GND
10	2PETp15	2PETn15	GND	2PERp15	2PERn15	GND	2PERp14	2PERn14	GND

## System Controller Slot XP3 Connector Pinout

Pin	A	B	ab	C	D	cd	E	F	ef
1	RSV	RSV	GND	RSV	RSV	GND	RSV	RSV	GND
2	RSV	RSV	GND	PWR_OK	PS_ON#	GND	LINKCAP	PWRBTN#	GND
3	SMBDAT	SMBCLK	GND	RSVD	RSVD	GND	RSVD	RSVD	GND
4	RSV	PERST#	GND	2RefClk+	2RefClk-	GND	1RefClk+	1RefClk-	GND
5	1PETp0	1PETn0	GND	1PERp0	1PERn0	GND	1PETp1	1PETn1	GND
6	1PETp2	1PETn2	GND	1PERp2	1PERn2	GND	1PERp1	1PERn1	GND
7	1PETp3	1PETn3	GND	1PERp3	1PERn3	GND	1PETp4	1PETn4	GND
8	1PETp5	1PETn5	GND	1PERp5	1PERn5	GND	1PERp4	1PERn4	GND
9	1PETp6	1PETn6	GND	1PERp6	1PERn6	GND	1PETp7	1PETn7	GND
10	2PETp0	2PETn0	GND	2PERp0	2PERn0	GND	1PERp7	1PERn7	GND

## System Controller Slot XP4 Connector Pinout

Pin	Z	A	B	C	D	E	F
1	GND	GA4	GA3	GA2	GA1	GA0	GND
2	GND	5Vaux	GND	SYSEN#	WAKE#	ALERT#	GND
3	GND	RSV	RSV	RSV	RSV	RSV	GND
4	GND	RSV	RSV	RSV	RSV	RSV	GND
5	GND	PXI_TRIG3	PXI_TRIG4	PXI_TRIG5	GND	PXI_TRIG6	GND
6	GND	PXI_TRIG2	GND	RSV	PXI_STAR	PXI_CLK10	GND
7	GND	PXI_TRIG1	PXI_TRIG0	RSV	GND	PXI_TRIG7	GND
8	GND	RSV	GND	RSV	RSV	PXI_LBR6	GND

## System Timing Slot TP1 Connector Pinout

Pin	A	B	ab	C	D	cd	E	F	ef
1	*A3+	*A3-	GND	*C7+	*C7-	GND	*C12+	*C12-	GND
2	*C4+	*C4-	GND	PXI_STAR12	PXI_STAR13	GND	*A12+	*A12-	GND
3	*B4+	*B4-	GND	*A16+	*A16-	GND	*B12+	*B12-	GND
4	*4A+	*A4-	GND	*B7+	*B7-	GND	*C13+	*C13-	GND
5	*C5+	*C5-	GND	PXI_STAR14	PXI_STAR15	GND	*A13+	*A13-	GND
6	*B5+	*B5-	GND	*B16+	*B16-	GND	*B13+	*B13-	GND
7	*A5+	*A5-	GND	*A7+	*A7-	GND	*C14+	*C14-	GND
8	*C6+	*C6-	GND	PXI_STAR16	RSV	GND	*A14+	*A14-	GND
9	*B6+	*B6-	GND	*C15+	*C15-	GND	*B14+	*B14-	GND
10	*A6+	*A6-	GND	*B15+	*B15-	GND	*A15+	*A15-	GND
*PXIe_DSTAR									

## System Timing Slot TP2 Connector Pinout

Pin	A	B	ab	C	D	cd	E	F	ef
1	*C0+	*C0-	GND	*C8+	*C8-	GND	*B8+	*B8-	GND
2	*A0+	*A0-	GND	*C9+	*C9-	GND	*A8+	*A8-	GND
3	*B0+	*B0-	GND	*C1+	*C1-	GND	*A9+	*A9-	GND
4	*B1+	*B1-	GND	PXI_STAR0	PXI_STAR1	GND	*B9+	*B9-	GND
5	*A1+	*A1-	GND	PXI_STAR2	PXI_STAR3	GND	*C10+	*C10-	GND
6	*C2+	*C2-	GND	PXI_STAR4	PXI_STAR5	GND	*A10+	*A10-	GND
7	*B2+	*B2-	GND	PXI_STAR6	PXI_STAR7	GND	*B10+	*B10-	GND
8	*A2+	*A2-	GND	PXI_STAR8	PXI_STAR9	GND	*C11+	*C11-	GND
9	*C3+	*C3-	GND	PXI_STAR10	PXI_STAR11	GND	*A11+	*A11-	GND
10	*B3+	*B3-	GND	*D16+	*D16-	GND	*B11+	*B11-	GND
*PXIe_DSTAR									

## System Timing Slot XP3 Connector Pinout

Pin	A	B	ab	C	D	cd	E	F	ef
1	*CLK100+	*CLK100-	GND	*SYNC100+	*SYNC100-	GND	**C+	**C-	GND
2	PRSNT#	PWREN#	GND	*DSTARB+	*DSTARB-	GND	**A+	**A-	GND
3	SMBDAT	SMBCLK	GND	RSV	RSV	GND	RSV	RSV	GND
4	MPWRGD*	PERST#	GND	RSV	RSV	GND	1RefClk+	1RefClk-	GND
5	1PETp0	1PETn0	GND	1PERp0	1PERn0	GND	1PETp1	1PETn1	GND
6	1PETp2	1PETn2	GND	1PERp2	1PERn2	GND	1PERp1	1PERn1	GND
7	1PETp3	1PETn3	GND	1PERp3	1PERn3	GND	1PETp4	1PETn4	GND
8	1PETp5	1PETn5	GND	1PERp5	1PERn5	GND	1PERp4	1PERn4	GND
9	1PETp6	1PETn6	GND	1PERp6	1PERn6	GND	1PETp7	1PETn7	GND
10	RSV	RSV	GND	RSV	RSV	GND	1PERp7	1PERn7	GND
*PXIe_ **PXIe_DSTAR									

## System Timing Slot XP4 Connector Pinout

Pin	Z	A	B	C	D	E	F
1	GND	GA4	GA3	GA2	GA1	GA0	GND
2	GND	5Vaux	GND	SYSEN#	WAKE#	ALERT#	GND
3	GND	12V	12V	GND	GND	GND	GND
4	GND	GND	GND	3.3V	3.3V	3.3V	GND
5	GND	PXI_TRIG3	PXI_TRIG4	PXI_TRIG5	GND	PXI_TRIG6	GND
6	GND	PXI_TRIG2	GND	ATNLED	PXI_CLK10_IN	PXI_CLK10	GND
7	GND	PXI_TRIG1	PXI_TRIG0	ATNSW#	GND	PXI_TRIG7	GND
8	GND	PXIe_SYNC_CTRL	GND	RSV	PXI_LBL6	PXI_LBR6	GND

## Hybrid Slot P1 Connector Pinout

Pin	Z	A	B	C	D	E	F
25	GND	5V	REQ64#	ENUM#	3.3V	5V	GND
24	GND	AD[1]	5V	V(I/O)	AD[0]	ACK64#	GND
23	GND	3.3V	AD[4]	AD[3]	5V	AD[2]	GND
22	GND	AD[7]	GND	3.3V	AD[6]	AD[5]	GND
21	GND	3.3V	AD[9]	AD[8]	M66EN	C/BE[0]#	GND
20	GND	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
19	GND	3.3V	AD[15]	AD[14]	GND	AD[13]	GND
18	GND	SERR#	GND	3.3V	PAR	C/BE[1]#	GND
17	GND	3.3V	IPMB_SCL	IPMB_SDA	GND	PERR#	GND
16	GND	DEVSEL#	GND	V(I/O)	STOP#	LOCK#	GND
15	GND	3.3V	FRAME#	IRDY#	BD_SEL#	TRDY#	GND
12 to 14	Key Area						
11	GND	AD[18]	AD[17]	AD[16]	GND	C/BE[2]#	GND
10	GND	AD[21]	GND	3.3V	AD[20]	AD[19]	GND
9	GND	C/BE[3]#	IDSEL	AD[23]	GND	AD[22]	GND
8	GND	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND
7	GND	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND
6	GND	REQ#	GND	3.3V	CLK	AD[31]	GND
5	GND	BRSVP1A5	BRSVP1B5	RST#	GND	GNT#	GND
4	GND	IPMB_PWR	HEALTHY#	# V(I/O)	INTP	INTS	GND
3	GND	INTA#	INTB#	INTC#	5V	INTD#	GND
2	GND	TCK	5V	TMS	TDO	TDI	GND
1	GND	5V	-12	TRST#	+12	5V	GND

# Where to Go for Support

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The National Instruments Web site is your complete resource for technical support. At [ni.com/support](https://ni.com/support) you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

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