



PTX10001 Packet Transport Router Hardware Guide



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PTX10001 Packet Transport Router Hardware Guide
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- Documentation Feedback on page xvii
- Requesting Technical Support on page xvii

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <https://www.juniper.net/documentation/>.

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Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xsl;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {
  file ex-script-snippet.xsl; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see [CLI Explorer](#).

Documentation Conventions

Table 1 on page xv defines notice icons used in this guide.

Table 1: Notice Icons







Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page xvi defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS CLI User Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Encloses optional keywords or variables.	stub <default-metric metric>;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast <i>(string1 string2 string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Encloses a variable for which you can substitute one or more values.	community name members [community-ids]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	}

GUI Conventions

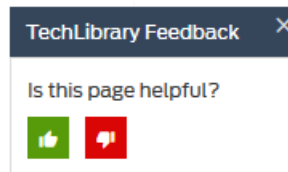
Table 2: Text and Syntax Conventions (continued)

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback so that we can improve our documentation. You can use either of the following methods:

- Online feedback system—Click TechLibrary Feedback, on the lower right of any page on the [Juniper Networks TechLibrary](#) site, and do one of the following:



- Click the thumbs-up icon if the information on the page was helpful to you.
- Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide feedback.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active Juniper Care or Partner Support Services support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <https://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <https://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://entitlementsearch.juniper.net/entitlementsearch/>

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <https://support.juniper.net/support/requesting-support/>.

CHAPTER 1

Overview

- [PTX10001 System Overview on page 19](#)
- [PTX10001 Port Panel on page 23](#)
- [PTX10001 Management Panel on page 28](#)
- [PTX10001 Cooling System on page 29](#)
- [PTX10001 Power System on page 32](#)
- [Expansion Module for the PTX10001 on page 40](#)

PTX10001 System Overview

- [PTX10001 Packet Transport Router Description on page 19](#)
- [PTX10001 Hardware Component Overview on page 22](#)
- [PTX10001 Component Redundancy on page 22](#)
- [PTX10001 Field-Replaceable Units on page 22](#)

PTX10001 Packet Transport Router Description

Juniper Networks PTX10001 Packet Transport Router is a fixed-configuration MacSec enabled LSR core router. It features a compact 1U form factor that is easily deployed in space-constrained Internet exchange locations, remote central offices, and embedded peering points throughout the network.

- [Benefits of the PTX10001 Router on page 19](#)
- [System Overview on page 20](#)
- [Port Panel on page 20](#)
- [Management Panel on page 21](#)

Benefits of the PTX10001 Router

- **Scalability**—The PTX10001 scales to 3.6 Tbps in a single chassis, supporting up to 144 10-Gigabit Ethernet interfaces, 36 40-Gigabit Ethernet interfaces, and 36 100-Gigabit Ethernet interfaces, giving cloud and service providers the performance and scalability needed as networks grow.
- **Performance**—The PTX10001's exceptional packet processing capabilities help alleviate the challenge of scaling the network as traffic levels increase while optimizing IP/MPLS

transit functionality around superior performance. PTX10001 is tailored for LSR core router with support for 128K LSPs.

- High availability hardware—The PTX10001 is engineered with hardware redundancy for cooling, power supplies, and forwarding. With the PTX1001's high availability, service providers can maintain an always-on infrastructure base and to meet stringent SLAs across the core.
- Space efficiency—The PTX10001's ultra-compact 1U form factor efficiency is a critical requirement for peering internet exchange points, peering collocations, central offices, and regional networks. The PTX10001 is the first 1RU LSR router with MacSec support built in.

System Overview

The PTX10001 is a fixed-configuration router that supports 10-Gbps, 40-Gbps, and 100-Gbps port speeds in a single 1U stackable platform.

- Control operations are performed by the Routing Engine, which runs the Juniper Networks Junos operating system (Junos OS). The Routing Engine handles routing protocols, traffic engineering, policy, policing, monitoring, and configuration management. Junos OS is installed on the PTX10001 router's internal 2 x 50-gigabyte (GB) M.2 SATA solid-state drives (SSDs). The Routing Engine is enhanced by a 1.6-GHz 4 core Intel CPU and 24 GB of SDRAM.
- Forwarding operations are performed by the Packet Forwarding Engine, which uses Juniper Networks Express-based silicon. The custom ASICs enable the PTX10001 to provide up to 3.6 Tbps of throughput and 2 Bpps of forwarding capacity.

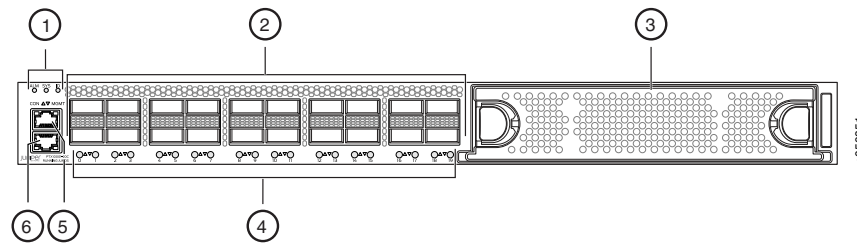


TIP: For information about features supported on PTX Series routers, see [Feature Explorer](#).

Port Panel

The port panel of the PTX10001 contains 20 network ports, port LEDs, one bay for an optional expansion module, console and management ports, and system status LEDs. [Figure 1 on page 21](#) shows the PTX10001 port panel.

Figure 1: PTX10001 Port Panel and Management Panel



1— System status LEDs	4—Network port LEDs
2—Network port	5—Console port
3—Expansion bay	6—Management port

The 20 network ports on the port panel are QSFP28 ports. [Table 3 on page 21](#) describes the maximum number of ports for each interface type supported by the PTX10001 with the optional JNPI0001-16C-PIC expansion module installed.

Table 3: Maximum Supported Ports at Each Interface Speed

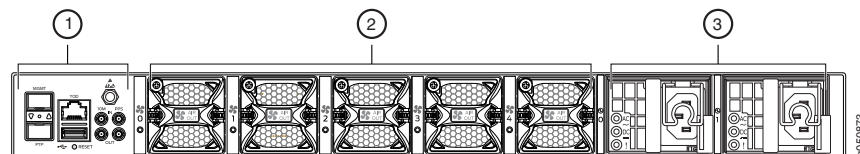
Interface Type	Maximum Supported Ports
10-Gigabit Ethernet	144
40-Gigabit Ethernet	36
100-Gigabit Ethernet	36

You manage the PTX10001 by using the Junos OS CLI, which is accessible through the console and out-of-band management ports on the management panel. In addition, the management panel has system status LEDs that alert you to minor or major alarms or other issues with the router, external clock synchronization ports, and a USB port to support software installation and recovery.

Management Panel

The management panel of the PTX10001 is located on the FRU side of the device. It contains management ports, the fan modules, and power supplies for the PTX10001. [Figure 2 on page 21](#) shows the PTX10001 management panel.

Figure 2: PTX10001 Management Panel



1— Management ports.	3—Power supplies (2)
2—Fan modules (5)	

PTX10001 Hardware Component Overview

The PTX10001 supports the components in [Table 4 on page 22](#) listed in alphabetic order. See [“PTX10001 Physical Specifications” on page 47](#) the dimensions and weight of the PTX10001.

Table 4: PTX10001 Hardware Components

Component	Spare Juniper Model Number	CLI Output	Description
Chassis	PTX10001-CHAS	JNP10001-20c [PTX10001]	“PTX10001 Packet Transport Router Description” on page 19
Fan module	JNP-FAN-1RU	PTX10001-M20C Fan Controller	“PTX10001 Cooling System” on page 29
Power supplies	JPSU-850W-AC-AFO	JPSU-850W-AC-AFO	“PTX10001 Power System” on page 32
	JPSU-850W-DC-AFO	JPSU-850W-DC-AFO	

PTX10001 Component Redundancy

The following hardware components provide redundancy on a PTX10001:

- Power supplies—The PTX10001 has two power supplies. Each power supply provides power to all components in the device. The two power supplies provide full power redundancy to the device. If one power supply fails or is removed, the second power supply balances the electrical load without interruption. To provide power redundancy to the system both power supplies must be installed. Connect power source feed A to one power supply and power source feed B to the second power supply.



CAUTION: Do not connect feed A and feed B to the same power supply input terminal.

- Cooling system—The PTX10001 has five fan modules. If a fan module fails and the remaining fan modules are unable to keep the PTX10001 within the desired temperature thresholds, chassis alarms occur and the PTX10001 can shut down.

PTX10001 Field-Replaceable Units

Field-replaceable units (FRUs) are components that you can replace at your site.



CAUTION: Replace a failed fan module with a new fan module within 30 seconds of removal to prevent chassis overheating.

[Table 5 on page 23](#) lists the FRUs for the PTX10001 and actions to take before removing them.

Table 5: Required Actions Before Removing a FRU from the PTX10001

FRU	Required Actions Before Removal
Power supplies (2)	Remove the power cord or cable for the power supply unit. See "Maintaining the PTX10001 Power Supplies" on page 88.
Fan modules (5)	See "Maintaining the PTX10001 Fan Modules" on page 85.
Expansion modules	See "Maintaining a PTX10001 Expansion Module" on page 90.
Optical transceivers	See "Removing a Transceiver" on page 94.



NOTE: If you have a Juniper Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/support/tools/updateinstallbase/>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

See Also

- Related Documentation**
- [PTX10001 Port Panel on page 23](#)
 - [PTX10001 Management Panel on page 28](#)
 - [PTX10001 Cooling System on page 29](#)
 - [PTX10001 Power System on page 32](#)

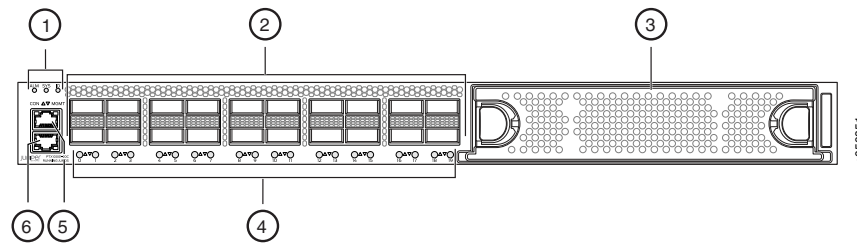
PTX10001 Port Panel

- [PTX10001 Port Panel on page 23](#)
- [PTX10001 Chassis Status LEDs on page 25](#)
- [PTX10001 Management Port LEDs on page 26](#)
- [PTX10001 Network Port LEDs on page 27](#)

PTX10001 Port Panel

The PTX10001 supports 10-Gbps, 40-Gbps, and 100-Gbps port speeds. [Figure 3 on page 24](#) shows the PTX10001 port panel.

Figure 3: PTX10001 Port Panel



1—Status LEDs—Alarm (ALM), system (SYS), identification (ID).	4—Network port LEDs
2—Network ports	5—RJ-45 console port (CON) to support RS-232 serial ports.
3—Expansion module bay	6—RJ-45 (1000BASE-T) management Ethernet port (labeled MGMT). In the Junos OS CLI, this port is identified as emo .

- [Network Ports on page 24](#)
- [Expansion Module Bay on page 25](#)

Network Ports

The PTX10001 uses 28-Gbps quad small-form factor pluggable plus (QSFP28) sockets that are configured as 100 Gigabit Ethernet ports by default.

The PTX10001 network ports (**0** to **19**) support:

- 100 Gbps QSFP28 transceivers
- 40 Gbps QSFP+ transceivers
- 100 Gbps active optical cables (AOC)
- 40 Gbps AOC
- QSFP28 direct attach copper (DAC) cables
- QSFP+ DAC cables
- QSFP+ direct attach copper break out (DACBO) cables
- QSFP28 DACBO cables



NOTE: Port speeds are configured using the `set chassis fpc 0 pic 0 port port-number speed speed` command. You configure ports to operate at a particular speed by using the appropriate speed option. If you configure a port to operate at a certain speed, and you want to return the port to the default configuration, delete the `speed` statement from the configuration at the `[chassis fpc 0 pic 0 port port-number]` hierarchy level and commit the configuration. The network port is reset to the default Ethernet interface.

Expansion Module Bay

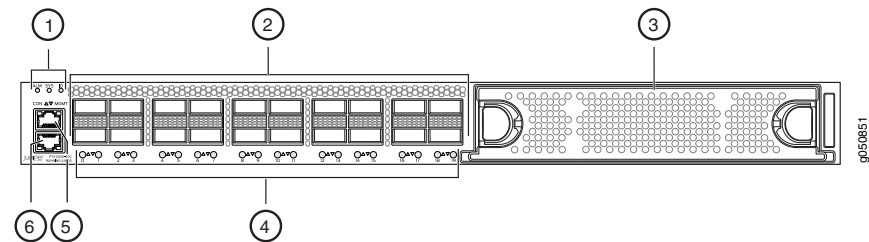
The PTX10001 has one bay on the port panel for an optional expansion module. The expansion module is an addition to the PTX10001 chassis and must be ordered separately.

The PTX10001 supports the JNP10001-16C-PIC expansion module. For more information, see “Expansion Module for the PTX10001” on page 40.

PTX10001 Chassis Status LEDs

The PTX10001 has three status LEDs on the port panel of the chassis, next to the network ports (see Figure 4 on page 25).

Figure 4: PTX10001 Port Panel



1— Status LEDs	4— Network port LEDs
2— Network ports	5— RJ-45 console port
3— Expansion module bay	6— RJ-45 management Ethernet port

Table 6 on page 26 describes the chassis status LEDs on a PTX10001, their colors and states, and the status they indicate.

Table 6: Chassis Status LEDs on a PTX10001 Device

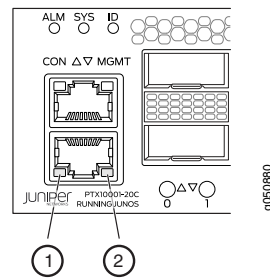
Name	Color	State	Description
ALM–Alarm	Unlit	Off	The device is halted or there is no alarm.
	Red	On steadily	A major hardware fault has occurred, such as a temperature alarm or power failure, and the device has halted. Power off the device by setting the AC power source outlet to the OFF (O) position, or unplugging the AC power cords. Correct any voltage or site temperature issues, and allow the device to cool down. Power on the device and monitor the power supply and fan LEDs to help determine where the error is occurring.
	Amber	On steadily	A minor alarm has occurred, such as a software error. Power off the device by setting the AC power source outlet to the OFF (O) position, or unplugging the AC power cords. Power on the device and monitor the status LEDs to ensure that Junos OS boots properly.
SYS–System	Unlit	Off	The device is powered off or halted.
	Green	On steadily	Junos OS is loaded on the device.
ID–Identification	Unlit	Off	The beacon feature is not enabled on the device. This feature is enabled using the request chassis beacon command.
	Blue	Blinking	The beacon feature is enabled on the device. This feature is enabled using the request chassis beacon command.

PTX10001 Management Port LEDs

There are two management ports on the PTX10001, Both ports are labeled **MGMT**. The RJ-45 management port is for 10/100/1000BASE-T connections and is located on the port panel. The small form-factor pluggable (SFP) management port is for 10/100/1000BASE-T and 1000BASE-X connections and is located on the FRU end of the device.

The RJ-45 port has separate LEDs for status and activity. The SFP port has a LED to indicate both link and activity. [Figure 5 on page 27](#) shows the location of the LEDs.

Figure 5: Management Port LEDs on a PTX10001



1— Status LED (RJ-45)

2— Link activity LED (RJ-45)

Table 7 on page 27 describes the RJ-45 management port LEDs.

Table 7: PTX10001 RJ-45 Management Port LEDs

LED	Color	State	Description
Link activity	Unlit	Off	No link is established, there is a fault, or the link is down.
	Amber	Blinking or flickering	A link is established, and there is link activity.
Status	Unlit	Off	Either the port speed is 10 Mbps or the link is down.
	Green	On steadily	The port speed is 1000 Mbps.

Table 8 on page 27 describes the SFP management port LED.

Table 8: PTX10001 SFP Management Port LED

LED	Color	State	Description
Link activity	Unlit	Off	No link is established, there is a fault, or the link is down.
	Green	On steadily	A link is established, but there is no link activity.
		Blinking or flickering	A link is established, and there is link activity.

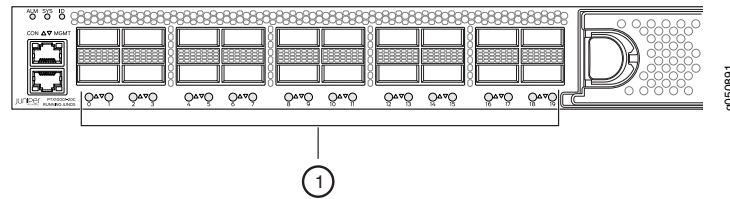
PTX10001 Network Port LEDs

Each PTX10001 network port uses a single bicolored LED to indicate link status and activity. The circular LEDs are located underneath the ports. The triangular arrow next to the LED points either up or down indicating whether the LED is associated with the top or bottom port. Figure 6 on page 28 shows the location of the LEDs.



NOTE: All 36 network port LEDs behave the same. Including the 16 network port LEDs located on the JNP10001-16C-PIC expansion module.

Figure 6: Network Port LEDs on a PTX10001



1— Network port LEDs

The number next to the LED indicates the port number that the LED belongs to and the arrow next to the LED indicates if it is the top or bottom port.



NOTE: The same bicolored LED also indicates status when the port is configured to operate as four 10-Gigabit Ethernet interfaces.

Table 9 on page 28 describes the network port LEDs.

Table 9: PTX10001 Network Port LEDs

Color	State	Description
Unlit	Off	The port is administratively disabled, there is no power, the link is down, or a transceiver is not present.
Green	On steadily	A link is established.
	Blinking	The beacon function was enabled on the port.
Amber	On steadily	When the port is configured to operate as four 10-Gigabit Ethernet interfaces, indicates that one or more interfaces (but not all four) are up.
	Blinking	There are one or more errors on the connections.

- Related Documentation**
- [PTX10001 System Overview on page 19](#)
 - [PTX10001 Management Panel on page 28](#)
 - `show chassis alarms`
 - `request chassis beacon`

PTX10001 Management Panel

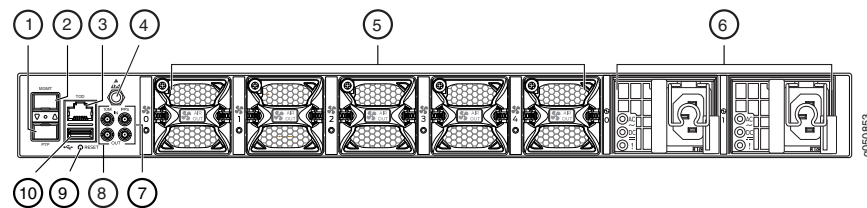
- [PTX10001 Management Panel on page 29](#)

PTX10001 Management Panel

The PTX10001 management panel is found on the Field Replaceable Unit (FRU) end of the device.

You manage the PTX10001 by using the Junos OS CLI, which is accessible through the console and out-of-band management ports on the management panel. In addition, the management panel has system status LEDs that alert you to minor or major alarms or other issues with the router, external clock synchronization ports, and a USB port to support software installation and recovery. See [Figure 7 on page 29](#) for management panel details.

Figure 7: PTX10001 Management Panel



1—SFP PTP Ethernet (1000BASE-T) port (labeled PTP). The PTP port is not currently supported. It is reserved for future use.	6—Power supplies
2—SFP management Ethernet port (labeled MGMT). In the Junos OS CLI, this port is identified as em2 .	7—Pulses-per-second SMB connector (labeled PPS) input and output. The PPS port is not currently supported. It is reserved for future use.
3—RS-232 Time-of-day port (labeled TOD). The TOD port is not currently supported. It is reserved for future use.	8—10 MHz SubMiniature B (SMB) connector (labeled 10M) input and output. The 10M port is not currently supported. It is reserved for future use.
4—Electrostatic discharge (ESD) terminal	9—Reset button. Press and hold for 5 seconds to reset the hardware.
5—Fan modules	10—USB port.

- Related Documentation**
- [PTX10001 System Overview on page 19](#)
 - [PTX10001 Port Panel on page 23](#)

PTX10001 Cooling System

- [PTX10001 Cooling System Description on page 29](#)
- [PTX10001 Fan Module LEDs on page 31](#)

PTX10001 Cooling System Description

- [Fan Modules on page 30](#)
- [Airflow Through the Chassis on page 31](#)

Fan Modules

The cooling system in a PTX10001 device consists of fan modules and a single fan in each power supply. There are five fan modules in the PTX10001. The airflow direction on the PTX10001 is airflow out, air comes into the device through the vents in the port panel.

The fan modules in the PTX10001 are hot-insertable and hot-removable field-replaceable units (FRUs). These fan modules are designed for the airflow out direction. The fan modules are installed in the fan module slots on the management panel of the device next to the power supplies. The PTX10001 has 5 fan modules numbered 0 through 4 from left to right. Each fan module slot has a fan icon next to it.

Figure 8 on page 30 shows the location of the fan modules on the device. Figure 9 on page 30 shows an example of the fan module.

Figure 8: PTX10001 FRU Panel

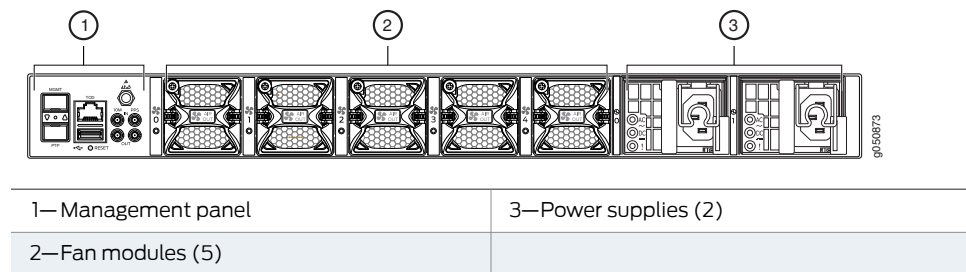
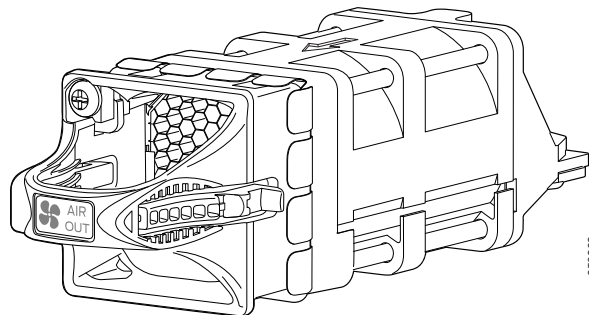


Figure 9 on page 30 shows the fan module for the PTX10001.

Figure 9: PTX10001 Fan Module



You remove and replace a fan module from the FRU end of the chassis. During replacement, the device continues to operate if a fan module is removed. If all fan modules are removed, the device will operate for 30 seconds before the device shuts down.



NOTE: All fan modules must be installed for optimal operation of the device.

Table 10 on page 31 lists the fan module product SKU.

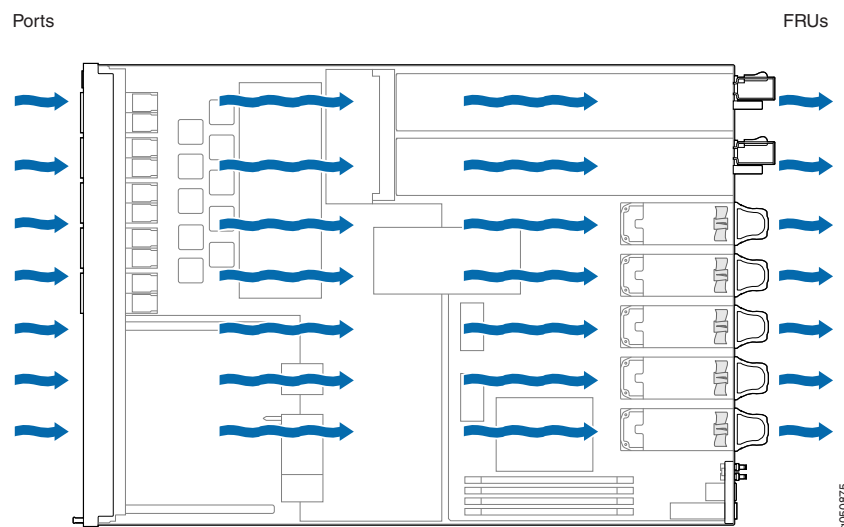
Table 10: PTX10001 Fan Modules

Fan Module	Label on the Fan Module	Direction of Airflow in the Fan Module	Power Supplies
JNP-FAN-1RU	AIR OUT	Port-to-FRU, that is, air comes in through vents on the end with ports; air exhausts out the end with the fans (also known as front-to-back airflow).	You must install only power supplies that have AIR OUT labels in devices in which the fan modules have AIR OUT labels.

Airflow Through the Chassis

In the PTX10001 cooling system, cool air enters through the vents in the port panel and hot air exhausts through the FRU panel. This type of airflow is known as *airflow out* or *port-to-FRU* airflow. When the chassis is installed, it must be positioned so that the FRUs are next to the *hot aisle*. Figure 10 on page 31 shows the airflow through the chassis.

Figure 10: Airflow Through the PTX10001 Chassis (Port-to-FRU)



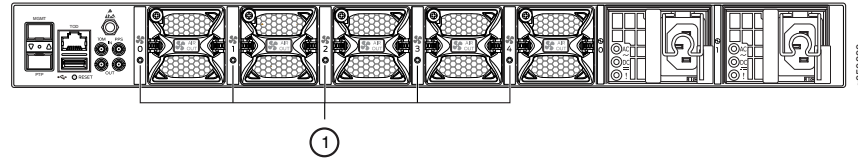
NOTE: Under normal operating conditions, the fan modules operate at a moderate speed. Temperature sensors in the chassis monitor the temperature within the chassis. The system raises an alarm if a fan module fails or if the ambient temperature inside the chassis rises above the acceptable range. If the temperature inside the chassis rises above the threshold temperature, the system shuts down automatically.

PTX10001 Fan Module LEDs

You can check the status of fan modules through the `show system alarms` command or by looking at the LEDs next to each fan module.

Figure 11 on page 32 shows the location of the LED next to the fan module.

Figure 11: Fan Module LEDs on a PTX10001



1— Fan LED

Use Table 11 on page 32 describes the function of the fan module LED.

Table 11: PTX10001 Fan Module LED

LED Color	LED State	Description
Green	On steadily	The fan module is operating normally. The system has verified that the module is engaged, that the airflow is in the correct direction, and that the fan is operating correctly.
Amber	Blinking	An error has been detected in the fan module. Replace the fan module as soon as possible. Either the fan has failed or it is seated incorrectly. To maintain proper airflow through the chassis, leave the fan module installed in the chassis until you are ready to replace it.

- Related Documentation**
- [PTX10001 System Overview on page 19](#)
 - [PTX10001 Power System on page 32](#)

PTX10001 Power System

- [PTX10001 AC Power Supply Description on page 32](#)
- [PTX10001 AC Power Supply LEDs on page 33](#)
- [PTX10001 DC Power Supply Description on page 34](#)
- [PTX10001 DC Power Supply LEDs on page 36](#)
- [PTX10001 AC Power Specifications on page 36](#)
- [PTX10001 AC Power Cord Specifications on page 37](#)
- [PTX10001 DC Power Specifications on page 38](#)
- [PTX10001 DC Power Cable Specifications on page 39](#)

PTX10001 AC Power Supply Description

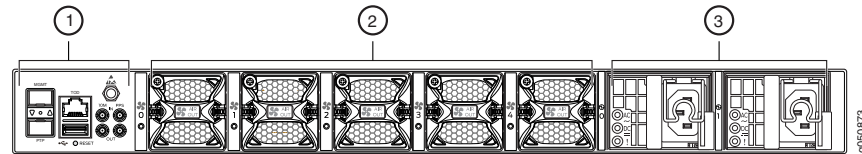
The two power supplies in a PTX10001 are hot-removable and hot-insertable field-replaceable units (FRUs). The power supplies are installed in the device at the factory. You can install replacement power supplies from the management panel without powering off the device or disrupting the devices functions.

The AC power supply is 850 W. [Figure 12 on page 33](#) shows the location of the power supplies on the FRU end of the device. [Figure 13 on page 33](#) shows an example of the AC power supply. The PTX10001 has two power supplies.



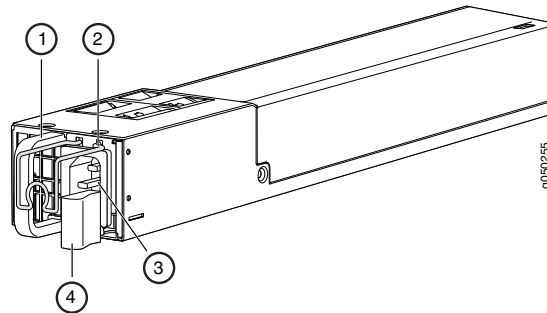
CAUTION: Do not mix AC and DC power supplies in the same chassis.

Figure 12: PTX10001 FRU Panel



1—Management panel	3—Power supplies (2)
2—Fan modules (5)	

Figure 13: AC Power Supply in a PTX10001



1—Handle	3—AC application inlet
2—Cord retainer	4—Latch lever

When the PTX10001 has both power supplies installed and connected to power, the device has full power redundancy. If a power supply fails or is removed, another power supply balances the electrical load without interruption.



CAUTION: To avoid electrical injury, carefully follow instructions in [“Connecting the PTX10001 to Power” on page 69](#), [“Maintaining the PTX10001 Power Supplies” on page 88](#).

PTX10001 AC Power Supply LEDs

[Figure 14 on page 34](#) shows the location of the LED on the power supply.

Figure 14: AC Power Supply LED on a PTX10001

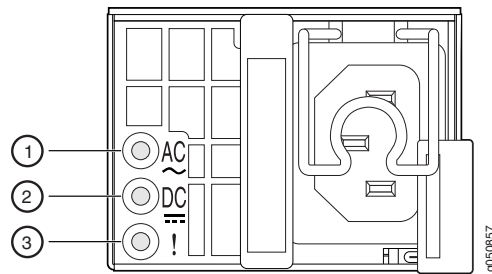


Table 12 on page 34 describes the LEDs on the AC power supplies.

Table 12: PTX10001 AC Power Supply LEDs

LED	Color	State	Description
AC	Unlit	Off	The power supply is disconnected from power, or power is not coming into the power supply.
	Green	On steadily	Power is coming into the power correctly.
DC	Unlit	Off	The power supply is disconnected from power, or the power supply is not sending out power correctly.
	Green	On steadily	The power supply is sending out power correctly.
! (Fault)	Amber	On steadily	An error has been detected in the power supply. Replace the power supply as soon as possible. To maintain proper airflow through the chassis, leave the power supply installed in the chassis until you are ready to replace it.



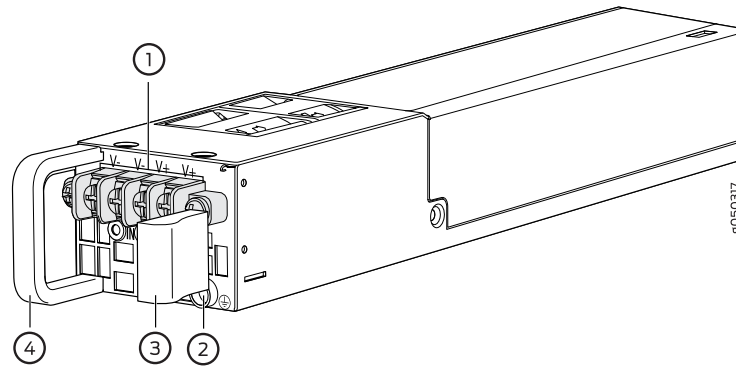
NOTE: If the AC LED and the DC LED are unlit, either the AC power cord is not installed properly or the power supply fuse has failed. If the AC LED is lit and the DC LED is unlit, the AC power supply is installed properly, but the power supply has an internal failure.

PTX10001 DC Power Supply Description

The power supplies in PTX10001 devices (see Figure 15 on page 35) are hot-removable and hot-insertable field-replaceable units (FRUs) that you can install in a PTX10001 device without powering off the device or disrupting the routing functions.

The DC power supply is 850 W with dual feeds for power resiliency.

Figure 15: PTX10001 DC Power Supply

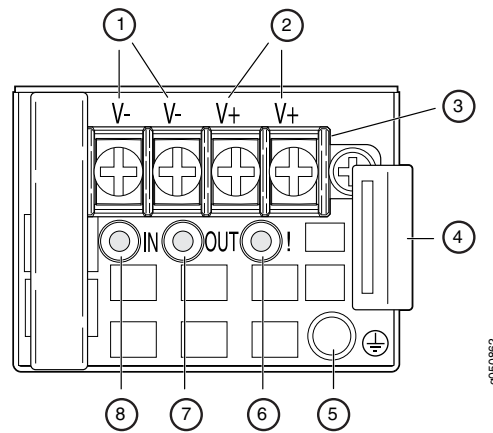


1— Terminal block	3— Latch lever
2— ESD grounding point	4— Handle



NOTE: The DC power supply has four terminals labeled V-, V-, V+, and V+ (see Figure 16 on page 35 for connecting DC power source cables labeled positive (+) and negative (-)).

Figure 16: PTX10001 DC Power Supply Faceplate



1— Shunt negative input terminals (-48V)	5— ESD grounding point
2— Shunt positive input terminals (+RTN)	6— Fault LED
3— Terminal block	7— Output LED
4— Latch lever	8— Input LED



CAUTION: To avoid electrical injury, carefully follow instructions in “Connecting the PTX10001 to Power” on page 69, “Maintaining the PTX10001 Power Supplies” on page 88.

See Also

PTX10001 DC Power Supply LEDs

Figure 16 on page 35 shows the location of the LED on the DC power supply.



CAUTION: The V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources.

Table 13 on page 36 describes the LEDs on the DC power supplies.

Table 13: PTX10001 DC Power Supply LEDs

Name	Color	State	Description
IN	Unlit	Off	The power supply is disconnected from power or power is not coming into the power supply.
	Green	On steadily	Power is coming into the power supply.
OUT	Unlit	Off	The power supply is disconnected from power or the power supply is not sending out power correctly.
	Green	On steadily	Power is sending out power correctly.
! (Fault)	Amber	On steadily	An error has been detected in the power supply. Replace the power supply as soon as possible. To maintain proper airflow through the chassis, leave the power supply installed in the chassis until you are ready to replace it.

PTX10001 AC Power Specifications

Table 14 on page 36 describes the AC power specifications for PTX10001 AC power supplies.

Table 14: AC Power Specifications for a PTX10001 Device

Item	Specification
AC input voltage	Operating range: <ul style="list-style-type: none"> 100 / 240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> 4.5 A at 100–120 VAC 2.0 A at 200–240 VAC
Typical power consumption	632 W

Table 14: AC Power Specifications for a PTX10001 Device (continued)

Item	Specification
Maximum power consumption	663 W

PTX10001 AC Power Cord Specifications










Detachable AC power cords are shipped with the chassis, if you include them as part of your order. The coupler is type C13 as described by International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source outlet that is standard for your geographical location.



NOTE: In North America, AC power cords must not exceed 14.75 feet (approximately 4.5 meters) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52, and Canadian Electrical Code (CEC) Section 4-010(3).

Table 15 on page 38 lists AC power cord specifications provided for each country or region.

Table 15: AC Power Cord Specifications

Country/Region	Electrical Specifications	Plug Standards	Shipped Juniper Model Number	Spare Juniper Model Number	Graphic
Australia	250 VAC, 10 A, 50 Hz	AS/NZ 3109-1996	CG_CBL-C13-06-AU	CBL-EX-PWR-C13-AU	
China	250 VAC, 10 A, 50 Hz	GB 1002-1996	CG_CBL-C13-06-CH	CBL-EX-PWR-C13-CH	
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII	CG_CBL-C13-06-EU	CBL-EX-PWR-C13-EU	
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16/VII	CG_CBL-C13-06-IT	CBL-EX-PWR-C13-IT	
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	JIS C8303	CG_CBL-C13-06-JP	CBL-EX-PWR-C13-JP	
North America	250 VAC, 13 A, 60 Hz 250 VAC, 13 A, 60 Hz	CAN/CSA No. 49-92 NEMA L6-15 NEMA 6-15	CG_CBL-C13-06-US	CBL-EX-PWR-C13-US CBL-PW-C13-250-US CBL-PWR-C13-250-US	
South Korea	250 VAC, 10 A, 60 Hz 250 VAC, 13 A, 60 Hz	KSC 8305; K60884-1	CG_CBL-C13-06-KR	CBL-EX-PWR-C13-KR	
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011 SEV 1991; EN 60320 C13	CG_CBL-C13-06-SZ	CBL-EX-PWR-C13-SZ	
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A	CG_CBL-C13-06-UK	CBL-EX-PWR-C13-UK	

PTX10001 DC Power Specifications

Table 16 on page 38 describes the DC power specifications for PTX10001 DC power supplies.

Table 16: DC Power Specifications for a PTX10001

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> Rated operating voltage: -48 VDC to -60 VDC Operating voltage range: -40 VDC through -72 VDC <hr/> <ul style="list-style-type: none"> Rated operating voltage: VDC -48 VDC to -60 VDC Operating voltage range: -40 VDC through -72 VDC
DC input current rating	10 A maximum

Table 16: DC Power Specifications for a PTX10001 (continued)

Item	Specifications
Typical power consumption	646 W
Maximum power consumption	676 W

PTX10001 DC Power Cable Specifications

PTX10001 DC power supplies require a D-Sub 3W3- type connector. The three pins on the connector provide –48 VDC input (–), return (+), and ground connections to the power supply.



NOTE: The optional right-angle DC power cables, CBL-JNP-PWR-DSUB2 and CBL-JNP-PWR-DSUB3, do not include a ground connection wire.

Regardless which DC power cable you use, you must connect the PTX10001 to earth ground before you connect it to power, using the procedure described in “[Connecting the PTX10001 to Ground](#)” on page 70.

DC power cables, each approximately 13.1 ft (4 m) long, are supplied with the PTX10001. The provided cables include the three-pin connector on one end and insulated wires at the opposite end, for connection to the site’s DC power distribution system.

Table 17 on page 39 lists the specifications for the PTX10001 DC power cables.

Table 17: PTX10001 DC Power Cable Specifications

Juniper Model Number	Wire Function	Insulation Color	Wire Size
CBL-JNP-PWR-DSUB (straight cable)	–48 VDC input (–)	Blue	8 AWG (8.4 mm ²), 90° C
	Return (+)	Black	8 AWG (8.4 mm ²), 90° C
	Ground	Green and yellow	8 AWG (8.4 mm ²), 90° C
CBL-JNP-PWR-DSUB2 (right-angle cable)	–48 VDC input (–)	Blue	8 AWG (8.4 mm ²), 90° C
	Return (+)	Black	8 AWG (8.4 mm ²), 90° C
CBL-JNP-PWR-DSUB3 (FT4 vertical-flame rated, right-angle cable)	–48 VDC input (–)	Gray	8 AWG (8.4 mm ²), 90° C
	Return (+)	Gray	8 AWG (8.4 mm ²), 90° C



WARNING: For field-wiring connections, use copper conductors only.



WARNING: Power cables must not block access to PTX10001 components or drape where people could trip over them.



CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site might be different from the color coding for the leads on the DC power cable provided with the chassis.

See Also

- Related Documentation**
- [PTX10001 System Overview on page 19](#)
 - [Maintaining the PTX10001 Power Supplies on page 88](#)

Expansion Module for the PTX10001

The PTX10001 has one bay on the port panel for an optional expansion module. For instructions on replacing an expansion module, see [“Maintaining a PTX10001 Expansion Module” on page 90](#).

The PTX10001 supports the JNP10001-16C-PIC expansion module.

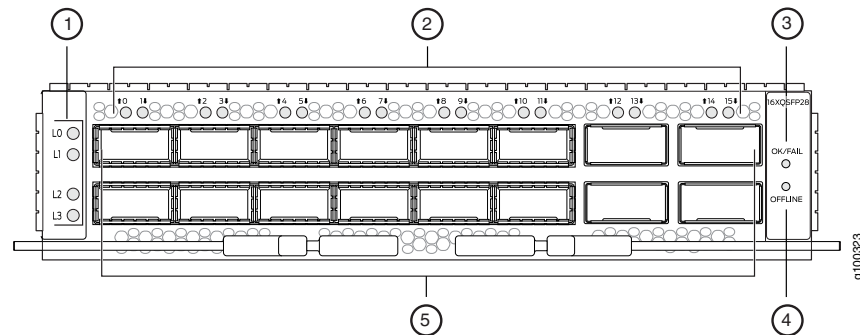
- [JNP10001-16C-PIC on page 40](#)

JNP10001-16C-PIC

The JNP10001-16C-PIC expansion module provides 16 additional QSFP28 ports. The QSFP28 ports support 10-Gbps, 40-Gbps, and 100-Gbps port speeds.

[Figure 17 on page 41](#) shows the JNP10001-16C-PIC ports and LEDs.

Figure 17: JNP10001-16C-PIC Faceplate and LEDs



1—Lane LEDs (L0 to L3)	4—Offline button (OFFLINE)
2—Network port LEDs (0 to 15)	5—QSFP28 network ports
3—Expansion module status LEDs (OK/Fail)	

The JNP10001-16C-PIC network ports support:

- 100 Gbps QSFP28 transceivers
- 40 Gbps QSFP+ transceivers
- 100 Gbps active optical cables (AOC)
- 40 Gbps AOC
- QSFP28 direct attach copper (DAC) cables
- QSFP+ DAC cables
- QSFP+ direct attach copper break out (DACBO) cables
- QSFP28 DACBO cables

Description	<ul style="list-style-type: none"> • Weight: 3.2 lb (1.45 kg) • Power requirement: 200 W • Name in the CLI: 16xQSFP28 Macsec TIC
Hardware features	<ul style="list-style-type: none"> • Sixteen 100-Gigabit Ethernet ports that support quad small form-factor pluggable (QSFP28) transceivers • The ports are numbered 0 through 15. • Each port can be configured as a 100-Gigabit Ethernet port, 40-Gigabit Ethernet port, or as four 10-Gigabit Ethernet ports (by using a breakout cable).
Software features	<ul style="list-style-type: none"> • Supports rate selectability at the port level. • By default, the ports are configured as 100-Gigabit Ethernet ports. • Supports remote port identification. • Supports Media Access Control Security (MACsec)
Cables and connectors	<p>TIP: You can use the Hardware Compatibility Tool to find information about the pluggable transceivers supported on your Juniper Networks device.</p>

LEDs

- **OK/FAIL LED**, one bicolor:
 - OFF—The expansion module is offline.
 - Green—The expansion module is online.
 - Red—The expansion module is in a power failure state.
- **Port LED**:
 - Off—Link is not plugged in.
 - Green—Link is up.
 - Amber—Link is down due to loss of signal or it is configured down.
 - Red—Link is down.
- **Lane LEDs**:
 - Off—No demand for diagnosis or the lane number does not apply to the selected port.
 - Green—Lane is up.
 - Amber—Link is down due to loss of signal or it is configured down.
 - Red—Link is down.

Related Documentation

- [PTX10001 System Overview on page 19](#)
- [PTX10001 Management Panel on page 28](#)
- *show chassis alarms*
- *request chassis beacon*

CHAPTER 2

Site Planning, Preparation, and Specifications

- PTX10001 Site Preparation Checklist on page 43
- PTX10001 Site Guidelines and Requirements on page 44
- PTX10001 Network Cable and Transceiver Planning on page 50
- PTX10001 Management Cable Specifications and Pinouts on page 60

PTX10001 Site Preparation Checklist

The checklist in [Table 18 on page 43](#) summarizes the tasks you need to perform when preparing a site for a PTX10001 installation.

Table 18: Site Preparation Checklist

Item or Task	For More Information	Performed by	Date
Environment			
Verify that environmental factors such as temperature and humidity do not exceed router tolerances.	"PTX10001 Environmental Requirements and Specifications" on page 44		
Power			
Measure the distance between external power sources and the router installation site.			
Calculate the power consumption and requirements.	<ul style="list-style-type: none">• PTX10001 AC Power Specifications on page 36• PTX10001 AC Power Cord Specifications on page 37		
Rack or Cabinet			
Verify that your rack or cabinet meets the minimum requirements for the installation of the router.	"PTX10001 Rack Requirements" on page 48		
Plan rack or cabinet location, including required space clearances.	"PTX10001 Clearance Requirements for Airflow and Hardware Maintenance" on page 46		

Table 18: Site Preparation Checklist (continued)

Item or Task	For More Information	Performed by	Date
Secure the rack or cabinet to the floor and building structure.			
Cables			
Acquire cables and connectors:	<ul style="list-style-type: none"> Determining Transceiver Support for the PTX10001 on page 50 Cable and Connector Specifications for MX Series and PTX Series Devices on page 51 		
<ul style="list-style-type: none"> Determine the number of cables needed based on your planned configuration. Review the maximum distance allowed for each cable. Choose the length of cable based on the distance between the hardware components being connected. 			
Plan the cable routing and management.			

- Related Documentation**
- PTX10001 Installation Safety Guidelines on page 64
 - Installation Instructions Warning on page 126
 - Chassis and Component Lifting Guidelines on page 127
 - Restricted Access Warning on page 127
 - Ramp Warning on page 128
 - Rack-Mounting and Cabinet-Mounting Warnings on page 129
 - Grounded Equipment Warning on page 133

PTX10001 Site Guidelines and Requirements

- PTX10001 Environmental Requirements and Specifications on page 44
- General Site Guidelines on page 45
- PTX10001 Chassis Grounding Cable and Lug Specifications on page 46
- PTX10001 Clearance Requirements for Airflow and Hardware Maintenance on page 46
- PTX10001 Physical Specifications on page 47
- QFX5120 Site Electrical Wiring Guidelines on page 47
- PTX10001 Rack Requirements on page 48
- PTX10001 Cabinet Requirements on page 49

PTX10001 Environmental Requirements and Specifications

The PTX10001 must be installed in a rack or cabinet. It must be housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the PTX10001 cooling system.
- Maintain ambient airflow for normal PTX10001 operation. If the airflow is blocked or restricted, or if the intake air is too warm, the chassis might overheat, leading to the PTX10001 temperature monitor shutting down the router to protect the hardware components.

Table 19 on page 45 provides the required environmental conditions for normal PTX10001 operation.

Table 19: PTX10001 Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation up to 6,562 feet (2000 meters).
Relative humidity	<ul style="list-style-type: none"> • Normal operation ensured in relative humidity range of 5% through 90%, noncondensing. • Short-term operation ensured in relative humidity range of 5% through 93%, noncondensing. <p>NOTE: As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year.</p>
Temperature	<ul style="list-style-type: none"> • Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C). • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C).
Seismic	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.



NOTE: Install the PTX10001 only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

General Site Guidelines

Efficient device operation requires proper site planning and maintenance and proper layout of the equipment, rack or cabinet (if used), and wiring closet.

To plan and create an acceptable operating environment for your device and prevent environmentally caused equipment failures:

- Keep the area around the chassis free from dust and conductive material, such as metal flakes.
- Follow prescribed airflow guidelines to ensure that the cooling system functions properly and that exhaust from other equipment does not blow into the intake vents of the device.

- Follow the prescribed electrostatic discharge (ESD) prevention procedures to prevent damaging the equipment. Static discharge can cause components to fail completely or intermittently over time.
- Install the device in a secure area, so that only authorized personnel can access the device.

PTX10001 Chassis Grounding Cable and Lug Specifications

For installations that require a separate grounding conductor to the chassis, the PTX10001 must be adequately grounded before power is connected to ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements. To ground a PTX10001, connect a grounding cable to earth ground and then attach it to the chassis grounding points.



WARNING: The device is a pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth ground for installations that require a separate grounding conductor to the chassis.



WARNING: To comply with GR-1089 requirements, all intrabuilding copper cabling used for SFP+, QSFP+, and QSFP28 ports must be shielded and grounded at both ends.



CAUTION: Before device installation begins, a licensed electrician must attach a cable lug to the grounding cables that you supply. See [“Connecting the PTX10001 to Ground” on page 70](#). A cable with an incorrectly attached lug can damage the PTX10001.

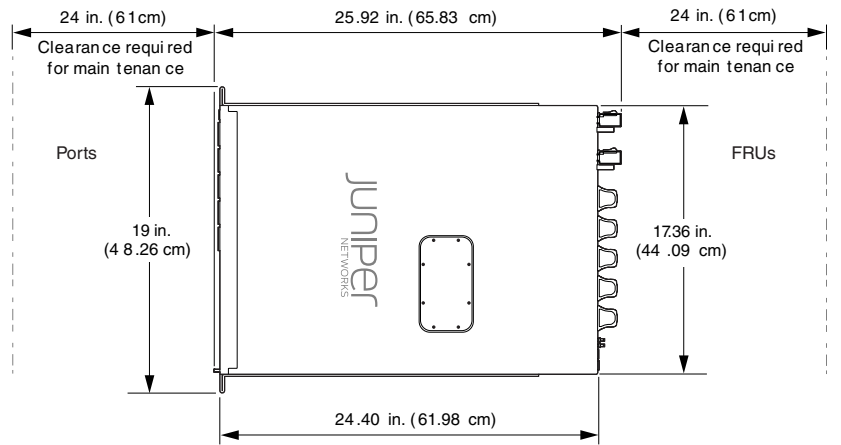
Before connecting the PTX10001 to earth ground, review the following information:

- The grounding lug required is a Panduit LCD10-10A-L or equivalent (not provided). The grounding lug accommodates 14–10 AWG (2–5.3 mm²) stranded wire.
- The grounding cable that you provide for a PTX10001 must be the same size or heavier than the input wire of each power supply. Minimum recommendations are 14 AWG (2 mm²) stranded wire, 60° C wire, or as permitted by local code.

PTX10001 Clearance Requirements for Airflow and Hardware Maintenance

When planning the site for a PTX10001 installation, you must allow sufficient clearance around the installed chassis (see [Figure 18 on page 47](#)).

Figure 18: Clearance Requirements for Airflow and Hardware Maintenance for a PTX10001



Follow these guidelines:

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. See “PTX10001 Cooling System” on page 29 for more information about the airflow through the chassis.
- If you are mounting a PTX10001 in a rack with other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.
- You must leave at least 24 in. (61 cm) both in front of and behind the PTX10001 for service personnel to remove and install hardware components, you must leave adequate space at the front and back of the PTX10001. NEBS GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the rack or cabinet and 24 in. (61 cm) behind the rack.

PTX10001 Physical Specifications

Table 20 on page 47 lists the physical specifications for the PTX10001 chassis.

Table 20: Physical Specifications for the PTX10001

Product SKU	Weight	Height	Width	Depth
PTX10001-20C	With all power supplies and fans installed: 26.8 lbs (12.2 kg)	1.72 in. (4.3 cm)	17.36 in. (44.09 cm)	25.92 in. (65.83 cm)

QFX5120 Site Electrical Wiring Guidelines

Table 21 on page 48 describes the factors you must consider while planning the electrical wiring at your site.



WARNING: You must provide a properly grounded and shielded environment and to use electrical surge-suppression devices.

Table 21: Site Electrical Wiring Guidelines

Site Wiring Factor	Guidelines
Signaling limitations	<p>If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding:</p> <ul style="list-style-type: none"> Improperly installed wires cause radio frequency interference (RFI). Damage from lightning strikes occurs when wires exceed recommended distances or pass between buildings. Electromagnetic pulses (EMPs) caused by lightning damage unshielded conductors and electronic devices.
Radio frequency interference	<p>To reduce or eliminate RFI from your site wiring, do the following:</p> <ul style="list-style-type: none"> Use a twisted-pair cable with a good distribution of grounding conductors. If you must exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.
Electromagnetic compatibility	<p>If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice.</p> <p>Some of the problems caused by strong sources of electromagnetic interference (EMI) are:</p> <ul style="list-style-type: none"> Destruction of the signal drivers and receivers in the device Electrical hazards as a result of power surges conducted over the lines into the equipment

PTX10001 Rack Requirements

The PTX10001 chassis is designed to be installed in four-post racks.

Rack requirements consist of:

- Rack type
- Mounting bracket hole spacing
- Rack size and strength

Table 22 on page 48 provides the rack requirements and specifications for the PTX10001.

Table 22: Rack Requirements for the PTX10001

Rack Requirement	Guidelines
Rack type: four-post	<p>Use a four-post rack that provides bracket holes or hole patterns spaced at 1-U (1.75 in. or 4.45 cm) increments and that meets the size and strength requirements to support the weight.</p> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Components Industry Association (http://www.ecianow.org/).</p>
Mounting bracket hole spacing	<p>The holes in the mounting brackets are spaced at 1 U (1.75 in. or 4.45 cm), so that the PTX10001 can be mounted in any rack that provides holes spaced at that distance.</p>

Table 22: Rack Requirements for the PTX10001 (continued)

Rack Requirement	Guidelines
Rack size and strength	<ul style="list-style-type: none"> Ensure that the rack complies with the standards for a 19-in. rack as defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Components Industry Association (http://www.ecianow.org/). Use a 600-mm rack as defined in the four-part <i>Equipment Engineering (EE); European telecommunications standard for equipment practice</i> (document numbers ETS 300 119-1 through 119-4) published by the European Telecommunications Standards Institute (http://www.etsi.org). The horizontal spacing between the rails in a rack that complies with this standard is usually wider than the router's mounting brackets, which measure 19 in. (48.26 cm) from outer edge to outer edge. Use approved wing devices to narrow the opening between the rails as required. Ensure that the rack rails are spaced widely enough to accommodate the PTX10001 chassis' external dimensions. The outer edges of the front-mounting rails extend the width to 19 in. (48.26 cm). Ensure that the front and rear rack rails are spaced between 23.6 in. (60 cm) and 36 in. (91.4 cm) front-to-back. Ensure that the rack is strong enough to support the weight of the device. Ensure that the spacing of rails and adjacent racks allows for proper clearance around the PTX10001 and rack.
Rack connection to building structure	<ul style="list-style-type: none"> Secure the rack to the building structure. If earthquakes are a possibility in your geographical area, secure the rack to the floor. Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.

PTX10001 Cabinet Requirements

You can mount the PTX10001 in an enclosure or cabinet that contains a four-post 19-in. open rack as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Industry Association.

Cabinet requirements consist of:

- Cabinet size and clearance
- Cabinet airflow requirements

Table 23 on page 49 provides the cabinet requirements and specifications for the PTX10001.

Table 23: Cabinet Requirements for the PTX10001

Cabinet Requirement	Guidelines
Cabinet size and clearance	The minimum cabinet size for accommodating a PTX10001 device is 36 in. (91.4 cm) deep. Large cabinets improve airflow and reduce the chance of overheating.

Table 23: Cabinet Requirements for the PTX10001 (continued)

Cabinet Requirement	Guidelines
Cabinet airflow requirements	<p>When you mount the device in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating.</p> <ul style="list-style-type: none"> • Ensure that the cool air supply you provide through the cabinet adequately dissipates the thermal output of the device. • Ensure that the cabinet allows the chassis hot exhaust air to exit the cabinet without recirculating into the device. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top allows the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust. • The PTX10001 fans exhaust hot air through the vents on the fans and power supplies. Install the device in the cabinet in a way that maximizes the open space on the FRU side of the chassis. This maximizes the clearance for critical airflow. • Route and dress all cables to minimize the blockage of airflow to and from the chassis. • Ensure that the spacing of rails and adjacent cabinets allows for the proper clearance around the device and cabinet.

Related Documentation

- [PTX10001 Site Preparation Checklist on page 43](#)
- [General Safety Guidelines and Warnings on page 122](#)
- [General Electrical Safety Guidelines and Warnings on page 141](#)
- [Prevention of Electrostatic Discharge Damage on page 143](#)

PTX10001 Network Cable and Transceiver Planning

- [Determining Transceiver Support for the PTX10001 on page 50](#)
- [Cable and Connector Specifications for MX Series and PTX Series Devices on page 51](#)
- [Understanding Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion on page 56](#)
- [Calculating Power Budget and Power Margin for Fiber-Optic Cables on page 57](#)

Determining Transceiver Support for the PTX10001

The PTX10001 has 20 network ports. Each of the 20 network ports on the port panel support QSFP+ and QSFP28 transceivers, direct-attach copper (DAC) cables, active optical cables (AOC), and DAC breakout cables (DACBO).

You can configure each of the 20 ports as 10-Gigabit Ethernet ports, 40-Gigabit Ethernet ports, or 100-Gigabit Ethernet ports. See [“PTX10001 Port Panel” on page 23](#) for more information about the network ports.

You can find information about the pluggable transceivers supported on your Juniper Networks device by using the Hardware Compatibility Tool. In addition to transceiver and connector type, the optical and cable characteristics—where applicable—are documented for each transceiver. The Hardware Compatibility Tool enables you to search by product, displaying all the transceivers supported on that device, or category, by

interface speed or type. The list of supported transceivers for the PTX10001 is located at <https://pathfinder.juniper.net/hct/product/#prd=PTX10001>.



CAUTION: If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Cable and Connector Specifications for MX Series and PTX Series Devices

The transceivers that are supported on MX Series and PTX Series devices use fiber-optic cables and connectors. The type of connector and the type of fiber depends on the transceiver type.

You can determine the type of cable and connector required for your specific transceiver by using the [Hardware Compatibility Tool](#).



CAUTION: To maintain agency approvals, use only a properly constructed, shielded cable.



NOTE: The terms multifiber push-on (MPO) and multifiber termination push-on (MTP) describe the same connector type. The rest of this topic uses MPO to mean MPO or MTP.

- [12-Fiber MPO Connectors on page 51](#)
- [24-Fiber MPO Connectors on page 55](#)
- [LC Duplex Connectors on page 56](#)

12-Fiber MPO Connectors

There are two types of cables used with 12-fiber MPO connectors on Juniper Networks devices—patch cables with MPO connectors on both ends, and breakout cables with an MPO connector on one end and four LC duplex connectors on the opposite end. Depending on the application, the cables might use single-mode fiber (SMF) or multimode fiber (MMF). Juniper Networks sells cables that meet the supported transceiver requirements, but it is not required to purchase cables from Juniper Networks.

Ensure that you order cables with the correct polarity. Vendors refer to these crossover cables as *key up to key up*, *latch up to latch up*, *Type B*, or *Method B*. If you are using patch panels between two transceivers, ensure that the proper polarity is maintained through the cable plant.

Also, ensure that the fiber end in the connector is finished correctly. Physical contact (PC) refers to fiber that has been polished flat. Angled physical contact (APC) refers to

fiber that has been polished at an angle. Ultra physical contact (UPC) refers to fiber that has been polished flat, to a finer finish. The required fiber end is listed with the connector type in the [Hardware Compatibility Tool](#).

12-Fiber Ribbon Patch Cables with MPO Connectors

You can use 12-fiber ribbon patch cables with female MPO connectors to connect two transceivers of the same type—for example, 40GBASE-SR4-to-40GBASESR4 or 100GBASE-SR4-to-100GBASE-SR4. You can also connect 4x10GBASE-LR or 4x10GBASE-SR transceivers by using patch cables—for example, 4x10GBASE-LR-to-4x10GBASE-LR or 4x10GBASE-SR-to-4x10GBASE-SR—instead of breaking the signal out into four separate signals.

[Table 24 on page 52](#) describes the signals on each fiber. [Table 25 on page 52](#) shows the pin-to-pin connections for proper polarity.

Table 24: Cable Signals for 12-Fiber Ribbon Patch Cables

Fiber	Signal
1	Tx0 (Transmit)
2	Tx1 (Transmit)
3	Tx2 (Transmit)
4	Tx3 (Transmit)
5	Unused
6	Unused
7	Unused
8	Unused
9	Rx3 (Receive)
10	Rx2 (Receive)
11	Rx1 (Receive)
12	Rx0 (Receive)

Table 25: Cable Pinouts for 12-Fiber Ribbon Patch Cables

MPO Pin	MPO Pin
1	12

Table 25: Cable Pinouts for 12-Fiber Ribbon Patch Cables (continued)

MPO Pin	MPO Pin
2	11
3	10
4	9
5	8
6	7
7	6
8	5
9	4
10	3
11	2
12	1

12-Fiber Ribbon Breakout Cables with MPO-to-LC Duplex Connectors

You can use 12-ribbon breakout cables with MPO-to-LC duplex connectors to connect a QSFP+ transceiver to four separate SFP+ transceivers—for example, 4x10GBASE-LR-to-10GBASE-LR or 4x10GBASE-SR-to-10GBASE-SR SFP+ transceivers. The breakout cable is constructed out of a 12-fiber ribbon fiber-optic cable. The ribbon cable splits from a single cable with a female MPO connector on one end, into four cable pairs with four LC duplex connectors on the opposite end.

[Table 26 on page 53](#) describes the way the fibers are connected between the MPO and LC duplex connectors. The cable signals are the same as those described in [Table 24 on page 52](#).

Table 26: Cable Pinouts for 12-Fiber Ribbon Breakout Cables

MPO Connector Pin	LC Duplex Connector Pin
1	Tx on LC Duplex 1
2	Tx on LC Duplex 2
3	Tx on LC Duplex 3
4	Tx on LC Duplex 4
5	Unused

Table 26: Cable Pinouts for 12-Fiber Ribbon Breakout Cables (continued)

MPO Connector Pin	LC Duplex Connector Pin
6	Unused
7	Unused
8	Unused
9	Rx on LC Duplex 4
10	Rx on LC Duplex 3
11	Rx on LC Duplex 2
12	Rx on LC Duplex 1

12-Ribbon Patch and Breakout Cables Available from Juniper Networks

Juniper Networks sells 12-ribbon patch and breakout cables with MPO connectors that meet the requirements described above. It is not required to purchase cables from Juniper Networks. [Table 27 on page 54](#) describes the available cables.

Table 27: 12-Ribbon Patch and Breakout Cables Available from Juniper Networks

Cable Type	Connector Type	Fiber Type	Cable Length	Juniper Model Number
12-ribbon patch	Female MPO/PC to female MPO/PC, key up to key up	MMF (OM3)	1 m	MTP12-FF-M1M
			3 m	MTP12-FF-M3M
			5 m	MTP12-FF-M5M
			10 m	MTP12-FF-M10M
	Female MPO/APC to female MPO/APC, key up to key up	SMF	1 m	MTP12-FF-S1M
			3 m	MTP12-FF-S3M
			5 m	MTP12-FF-S5M
			10 m	MTP12-FF-S10M

Table 27: 12-Ribbon Patch and Breakout Cables Available from Juniper Networks (continued)

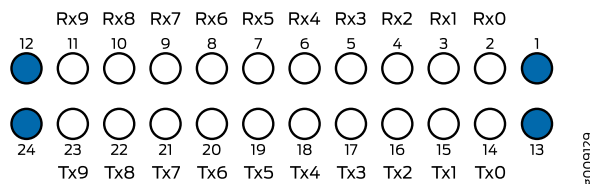
Cable Type	Connector Type	Fiber Type	Cable Length	Juniper Model Number
12-ribbon breakout	Female MPO/PC, key up, to four LC/UPC duplex	MMF (OM3)	1 m	MTP-4LC-M1M
			3 m	MTP-4LC-M3M
			5 m	MTP-4LC-M5M
			10 m	MTP-4LC-M10M
	Female MPO/APC, key up, to four LC/UPC duplex	SMF	1 m	MTP-4LC-S1M
			3 m	MTP-4LC-S3M
			5 m	MTP-4LC-S5M
			10 m	MTP-4LC-S10M

24-Fiber MPO Connectors

You can use patch cables with 24-fiber MPO connectors to connect two supported transceivers of the same type—for example, 100GBASE-SR10-to-100GBASE-SR10.

Figure 19 on page 55 shows the 24-fiber MPO optical lane assignments.

Figure 19: 24-Fiber MPO Optical Lane Assignments



NOTE: Ensure that you order cables with the correct polarity. Vendors refer to these crossover cables as *key up to key up*, *latch up to latch up*, *Type B*, or *Method B*. If you are using patch panels between two transceivers, ensure that the proper polarity is maintained through the cable plant.

The MPO optical connector for the CFP2-100G-SR10-D3 is defined in *Section 5.6 of the CFP2 Hardware Specification and Section 88.10.3 of IEEE STD 802.3-2012*. These specifications include the following requirements:

- Recommended Option A in IEEE STD 802.3-2012.
- The transceiver receptacle is male. A patch cable with female connector is required to mate with the module.

- Ferrule finish shall be flat polished interface that is compliant with IEC 61754-7.
- Alignment key is key up.

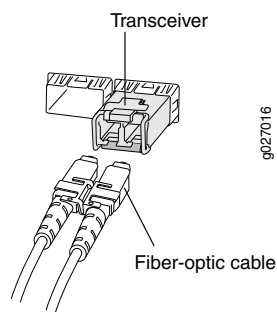
The optical interface must meet the requirement FT-1435-CORE in *Generic Requirements for Multi-Fiber Optical Connectors*. The module must pass the wiggle test defined by IEC 62150-3.

LC Duplex Connectors

You can use patch cables with LC duplex connectors to connect two supported transceivers of the same type—for example, 40GBASE-LR4-to-40GBASE-LR4 or 100GBASE-LR4-to-100GBASE-LR4. The patch cable is one fiber pair with two LC duplex connectors at opposite ends. LC duplex connectors are also used with 12-fiber ribbon breakout cables, as described in “12-Fiber Ribbon Breakout Cables with MPO-to-LC Duplex Connectors” on page 53.

Figure 20 on page 56 shows an LC duplex connector being installed in a transceiver.

Figure 20: LC Duplex Connector



Understanding Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion

This topic describes signal loss, attenuation, and dispersion in fiber-optic cable.

- [Signal Loss in Multimode and Single-Mode Fiber-Optic Cable on page 56](#)
- [Attenuation and Dispersion in Fiber-Optic Cable on page 57](#)

Signal Loss in Multimode and Single-Mode Fiber-Optic Cable

Multimode fiber is large enough in diameter to allow rays of light to reflect internally (bounce off the walls of the fiber). Interfaces with multimode optics typically use LEDs as light sources. However, LEDs are not coherent sources. They spray varying wavelengths of light into the multimode fiber, which reflects the light at different angles. Light rays travel in jagged lines through a multimode fiber, causing signal dispersion. When light traveling in the fiber core radiates into the fiber cladding, higher-order mode loss results. Together these factors limit the transmission distance of multimode fiber compared with single-mode fiber.

Single-mode fiber is so small in diameter that rays of light can reflect internally through one layer only. Interfaces with single-mode optics use lasers as light sources. Lasers generate a single wavelength of light, which travels in a straight line through the

single-mode fiber. Compared with multimode fiber, single-mode fiber has higher bandwidth and can carry signals for longer distances.

Exceeding the maximum transmission distances can result in significant signal loss, which causes unreliable transmission.

Attenuation and Dispersion in Fiber-Optic Cable

Correct functioning of an optical data link depends on modulated light reaching the receiver with enough power to be demodulated correctly. *Attenuation* is the reduction in power of the light signal as it is transmitted. Attenuation is caused by passive media components, such as cables, cable splices, and connectors. Although attenuation is significantly lower for optical fiber than for other media, it still occurs in both multimode and single-mode transmission. An efficient optical data link must have enough light available to overcome attenuation.

Dispersion is the spreading of the signal over time. The following two types of dispersion can affect an optical data link:

- Chromatic dispersion—Spreading of the signal over time resulting from the different speeds of light rays.
- Modal dispersion—Spreading of the signal over time resulting from the different propagation modes in the fiber.

For multimode transmission, modal dispersion, rather than chromatic dispersion or attenuation, usually limits the maximum bit rate and link length. For single-mode transmission, modal dispersion is not a factor. However, at higher bit rates and over longer distances, chromatic dispersion rather than modal dispersion limits maximum link length.

An efficient optical data link must have enough light to exceed the minimum power that the receiver requires to operate within its specifications. In addition, the total dispersion must be less than the limits specified for the type of link in Telcordia Technologies document GR-253-CORE (Section 4.3) and International Telecommunications Union (ITU) document G.957.

When chromatic dispersion is at the maximum allowed, its effect can be considered as a power penalty in the power budget. The optical power budget must allow for the sum of component attenuation, power penalties (including those from dispersion), and a safety margin for unexpected losses.

Calculating Power Budget and Power Margin for Fiber-Optic Cables

Use the information in this topic and the specifications for your optical interface to calculate the power budget and power margin for fiber-optic cables.



TIP: You can use the [Hardware Compatibility Tool](#) to find information about the pluggable transceivers supported on your Juniper Networks device.

To calculate the power budget and power margin, perform the following tasks:

1. [Calculating Power Budget for Fiber-Optic Cable on page 58](#)
2. [Calculating Power Margin for Fiber-Optic Cable on page 58](#)

Calculating Power Budget for Fiber-Optic Cable

To ensure that fiber-optic connections have sufficient power for correct operation, you need to calculate the link's power budget, which is the maximum amount of power it can transmit. When you calculate the power budget, you use a worst-case analysis to provide a margin of error, even though all the parts of an actual system do not operate at the worst-case levels. To calculate the worst-case estimate of power budget (P_B), you assume minimum transmitter power (P_T) and minimum receiver sensitivity (P_R):

$$P_B = P_T - P_R$$

The following hypothetical power budget equation uses values measured in decibels (dB) and decibels referred to one milliwatt (dBm):

$$P_B = P_T - P_R$$

$$P_B = -15 \text{ dBm} - (-28 \text{ dBm})$$

$$P_B = 13 \text{ dB}$$

Calculating Power Margin for Fiber-Optic Cable

After calculating a link's power budget, you can calculate the power margin (P_M), which represents the amount of power available after subtracting attenuation or link loss (LL) from the power budget (P_B). A worst-case estimate of P_M assumes maximum LL:

$$P_M = P_B - LL$$

P_M greater than zero indicates that the power budget is sufficient to operate the receiver.

Factors that can cause link loss include higher-order mode losses, modal and chromatic dispersion, connectors, splices, and fiber attenuation. [Table 28 on page 58](#) lists an estimated amount of loss for the factors used in the following sample calculations. For information about the actual amount of signal loss caused by equipment and other factors, refer to vendor documentation.

Table 28: Estimated Values for Factors Causing Link Loss

Link-Loss Factor	Estimated Link-Loss Value
Higher-order mode losses	Single-mode—None
	Multimode—0.5 dB
Modal and chromatic dispersion	Single-mode—None
	Multimode—None, if product of bandwidth and distance is less than 500 MHz-km

Table 28: Estimated Values for Factors Causing Link Loss (continued)

Link-Loss Factor	Estimated Link-Loss Value
Connector	0.5 dB
Splice	0.5 dB
Fiber attenuation	Single-mode—0.5 dB/km Multimode—1 dB/km

The following sample calculation for a 2-km-long multimode link with a power budget (P_B) of 13 dB uses the estimated values from [Table 28 on page 58](#) to calculate link loss (LL) as the sum of fiber attenuation (2 km @ 1 dB/km, or 2 dB) and loss for five connectors (0.5 dB per connector, or 2.5 dB) and two splices (0.5 dB per splice, or 1 dB) as well as higher-order mode losses (0.5 dB). The power margin (P_M) is calculated as follows:

$$P_M = P_B - LL$$

$$P_M = 13 \text{ dB} - 2 \text{ km (1 dB/km)} - 5 (0.5 \text{ dB}) - 2 (0.5 \text{ dB}) - 0.5 \text{ dB}$$

$$P_M = 13 \text{ dB} - 2 \text{ dB} - 2.5 \text{ dB} - 1 \text{ dB} - 0.5 \text{ dB}$$

$$P_M = 7 \text{ dB}$$

The following sample calculation for an 8-km-long single-mode link with a power budget (P_B) of 13 dB uses the estimated values from [Table 28 on page 58](#) to calculate link loss (LL) as the sum of fiber attenuation (8 km @ 0.5 dB/km, or 4 dB) and loss for seven connectors (0.5 dB per connector, or 3.5 dB). The power margin (P_M) is calculated as follows:

$$P_M = P_B - LL$$

$$P_M = 13 \text{ dB} - 8 \text{ km (0.5 dB/km)} - 7(0.5 \text{ dB})$$

$$P_M = 13 \text{ dB} - 4 \text{ dB} - 3.5 \text{ dB}$$

$$P_M = 5.5 \text{ dB}$$

In both examples, the calculated power margin is greater than zero, indicating that the link has sufficient power for transmission and does not exceed the maximum receiver input power.

Related Documentation

- [Determining Transceiver Support and Specifications](#)
- [PTX10001 Port Panel on page 23](#)
- [PTX10001 System Overview on page 19](#)

PTX10001 Management Cable Specifications and Pinouts

- Cable Specifications for Console and Management Connections for the PTX10001 on page 60
- Management Port Connector Pinouts for the PTX10001 on page 60
- Console Port Connector Pinouts for the PTX10001 on page 61
- USB Port Specifications for the PTX10001 on page 61

Cable Specifications for Console and Management Connections for the PTX10001

Table 29 on page 60 lists the specifications for the cables that connect the PTX10001 to a management device.



NOTE: All RJ-45 connectors must conform to the rules and regulations as described in the FCC specification 47 CFR Part 68.

Table 29: Cable Specifications for Console and Management Connections for the PTX10001

Port on PTX10001	Cable Specification	Cable Supplied	Maximum Length	Device Receptacle
Console (CON) port	RS-232 (EIA-232) serial cable	One 7-foot (2.13-meter)-long RJ-45 patch cable and RJ-45 to DB-9 adapter	7 feet (2.13 meters)	RJ-45
Management (MGMT) port	Category 5 cable or equivalent suitable for 1000BASE-T operation	One 7-foot (2.13-meter)-long RJ-45 patch cable	328 feet (100 meters)	RJ-45

Management Port Connector Pinouts for the PTX10001

The 10/100/1000BASE-T RJ-45 management port (labeled **MGMT**) uses an RJ-45 connector to connect to a management device for out-of-band management.

Table 30 on page 60 provides the pinout information of the RJ-45 management port connector. An RJ-45 cable is supplied with the PTX10001.

Table 30: RJ-45 Management Port Connector Pinouts for the PTX10001

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1
2	TRP1-	Transmit/receive data pair 1
3	TRP2+	Transmit/receive data pair 2
4	TRP3+	Transmit/receive data pair 3

Table 30: RJ-45 Management Port Connector Pinouts for the PTX10001 (continued)

Pin	Signal	Description
5	TRP3-	Transmit/receive data pair 3
6	TRP2-	Transmit/receive data pair 2
7	TRP4+	Transmit/receive data pair 4
8	TRP4-	Transmit/receive data pair 4

Console Port Connector Pinouts for the PTX10001

The console port (labeled **CON**) is an RS-232 serial interface that uses an RJ-45 connector to connect to a console management device. The default baud rate for the console port is 9600 baud.

[Table 31 on page 61](#) provides the pinout information for the RJ-45 console connector. An RJ-45 cable and an RJ-45 to DB-9 adapter are supplied with the PTX10001.



NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to a PTX10001, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the router and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

Table 31: Console Port Connector Pinouts for the PTX10001

Pin	Signal	Description
1	RTS Output	Request to send
2	DTR Output	Data terminal ready
3	TxD Output	Transmit data
4	Signal Ground	Signal ground
5	Signal Ground	Signal ground
6	RxD Input	Receive data
7	DCD Input	Data carrier detect
8	CTS Input	Clear to send

USB Port Specifications for the PTX10001

USB flash drives used with the PTX10001 must support USB 2.0 or later.



.....

CAUTION: Remove the USB flash drive before upgrading Junos OS or rebooting a PTX10001. Failure to do so could expose your router to unpredictable behavior.

.....

**Related
Documentation**

- [PTX10001 Management Panel on page 28](#)

CHAPTER 3

Initial Installation and Configuration

- [PTX10001 Installation Overview on page 63](#)
- [Unpacking and Mounting the PTX10001 on page 65](#)
- [Connecting the PTX10001 to Power on page 69](#)
- [Connecting the PTX10001 to External Devices on page 78](#)
- [Performing the Initial Software Configuration for the PTX10001 on page 80](#)
- [Powering Off the PTX10001 on page 82](#)

PTX10001 Installation Overview

- [Overview of Installing the PTX10001 on page 63](#)
- [PTX10001 Installation Safety Guidelines on page 64](#)

Overview of Installing the PTX10001

You can mount a PTX10001 flush with the front of a 19-in. four-post rack. Use the standard mounting brackets provided with the PTX10001 for this configuration.

Before you begin to install and connect a PTX10001, ensure that you have reviewed the information in [“PTX10001 Installation Safety Guidelines” on page 64](#).

To install and connect a PTX10001:

1. [Unpack the PTX10001 and verify the components received. See “Unpacking the PTX10001” on page 65.](#)
2. Determine how the device is to be mounted.
[Mount the PTX10001 in a rack or cabinet. See “Mounting the PTX10001” on page 68.](#)
3. For installations that require a separate grounding conductor to the chassis, follow the instructions in [“Connecting the PTX10001 to Ground” on page 70](#).
4. Connect the PTX10001 to a management console for initial configuration. See [“Connecting the PTX10001 to a Management Console” on page 79](#).

5. Connect the PTX10001 to power. Depending on your configuration, follow the instructions in [“Connecting AC Power to the PTX10001” on page 71](#) or [“Connecting DC Power to the PTX10001” on page 74](#).
6. Initially configure Junos OS following the instructions in [“Performing the Initial Software Configuration for the PTX10001” on page 80](#).

PTX10001 Installation Safety Guidelines

Observe the following guidelines before and during PTX10001 installation:

- [General Installation Safety Guidelines on page 64](#)
- [PTX10001 Chassis Lifting Guidelines on page 64](#)

General Installation Safety Guidelines

Before installing or moving the PTX10001, verify that the intended site meets the specified power, environmental, and clearance requirements. See the following documentation:

- [PTX10001 Site Preparation Checklist on page 43](#)
- [PTX10001 Clearance Requirements for Airflow and Hardware Maintenance on page 46](#)
- [PTX10001 Rack Requirements on page 48](#)
- [PTX10001 Cabinet Requirements on page 49](#)
- [PTX10001 Environmental Requirements and Specifications on page 44](#)
- [“PTX10001 AC Power Specifications” on page 36](#) or [PTX10001 DC Power Specifications on page 38](#)

PTX10001 Chassis Lifting Guidelines

The weight of a fully-loaded PTX10001 is approximately 26.8 lb (12.16 kg). Observe the following guidelines for lifting and moving a PTX10001:



CAUTION: If you are installing the PTX10001 above 60 in. (152.4 cm) from the floor, remove the power supplies, fan modules, and any expansion modules before attempting to install the device, or ask someone to assist you during the installation.

- Before installing the PTX10001, read the guidelines in [“PTX10001 Site Preparation Checklist” on page 43](#) to verify that the intended site meets the specified power, environmental, and clearance requirements.
- Before lifting or moving the PTX10001, disconnect all external cables.
- As when lifting any heavy object, lift most of the weight with your legs rather than your back. Keep your knees bent and your back relatively straight and avoid twisting your body as you lift. Balance the load evenly and be sure that your footing is solid.

- Related Documentation**
- [Unpacking and Mounting the PTX10001 on page 65](#)
 - [Connecting the PTX10001 to Ground on page 70](#)

Unpacking and Mounting the PTX10001

- [Unpacking the PTX10001 on page 65](#)
- [Mounting the PTX10001 in a Rack or Cabinet on page 66](#)

Unpacking the PTX10001

The PTX10001 chassis is a rigid sheet-metal structure that houses the hardware components. The PTX10001 is shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory kit and a pointer card with links to the quick start instructions.



CAUTION: PTX10001 routers are maximally protected inside the shipping carton. Do not unpack the PTX10001 until you are ready to begin installation.

To unpack a PTX10001:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.
2. Position the carton so that the arrows point up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory kit and verify the contents against the inventory of components listed in [Table 32 on page 65](#).
5. Pull out the packing material holding the device in place.
6. Verify the chassis components received:
 - Two power supplies
 - Five fan modules
7. Save the shipping carton and packing materials in case you need to move or ship the chassis later.

Table 32: Inventory of Components Supplied with a PTX10001

Component	Quantity
Chassis with five fan modules and two power supplies	1

Table 32: Inventory of Components Supplied with a PTX10001 (continued)

Component	Quantity
Rear mounting blades	2
Front mounting brackets	2
Flathead screws for mounting brackets (Phillips, M4 x 6 mm)	12
RJ-45 cable and RJ-45 to DB-9 adapter	1
Power cords with plugs appropriate to your geographical location	2

Mounting the PTX10001 in a Rack or Cabinet

You can mount a PTX10001 in a four post 19-in. rack or cabinet by using the included mounting brackets. (The remainder of this topic uses *rack* to mean *rack or cabinet*.)

For four-post rack installation, the shipping carton contains two front-mounting rails with two matching rear-mounting blades. This configuration allows either end of the device to be mounted flush with the rack and still be adjustable for racks with different depths. The minimum distance the front and rear rack rails can be spaced apart is 28 in. (71.1 cm) front to back. The maximum distance the front and rear rack rails can be spaced apart is 36 in. (91.4 cm) front to back.

- [Before You Begin Rack Installation on page 66](#)
- [Mounting the PTX10001 on page 68](#)

Before You Begin Rack Installation

Before you begin mounting a PTX10001 in the rack:

1. Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 143](#).
2. Verify that the site meets the requirements described in [“PTX10001 Site Preparation Checklist” on page 43](#).
3. Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
4. Read [“General Safety Guidelines and Warnings” on page 122](#) and [“PTX10001 Installation Safety Guidelines” on page 64](#).

5. Remove the PTX10001 from the shipping carton (see [“Unpacking the PTX10001” on page 65](#)).
6. Ensure that you have the following parts and tools available to mount the PTX10001 in a rack:
 - ESD grounding strap (not provided).
 - A pair of front mounting rails (provided).
 - A pair of rear mounting blades (provided). These mounting blades support the rear of the chassis and must be installed.
 - Screws to secure the mounting rail to the chassis (12 screws are provided).
 - Eight screws to secure the chassis and mounting blades to the rack (not provided).
 - Screwdriver appropriate for the rack-mounting screws (not provided).
 - Two power cords with plugs appropriate to your geographical location (provided).
 - RJ-45 cable and RJ-45 to DB-9 serial port adapter (provided).
 - Management host, such as a PC laptop, with a serial port (not provided).

Optional equipment: Grounding cable kit with bracket, lug, and three nuts with integrated washers.



WARNING: PTX10001 routers must be supported at all four corners. Mounting the chassis by using only the front brackets will damage the chassis and can result in serious bodily injury.



CAUTION: PTX10001 routers require two people for installation, one person to lift the device into place and another person to attach the device to the rack. If you are installing the PTX10001 above 60 in. (152.4 cm) from the floor, you can remove the power supplies and fan modules to minimize the weight before attempting to install the PTX10001.



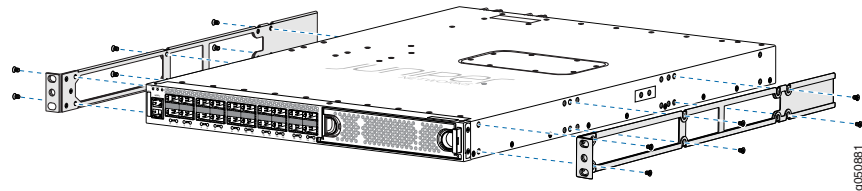
CAUTION: If you are mounting multiple devices in a rack, mount the device in the lowest position of the rack first. Proceed to mount the rest of the devices from the bottom to the top of the rack to minimize the risk of the rack toppling.

Mounting the PTX10001

To mount the PTX10001 on four posts in a rack by using the provided mounting kit:

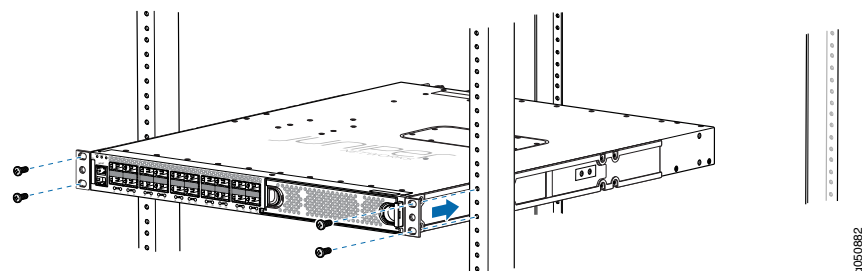
1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. Decide whether the field-replaceable unit (FRU) end or the port end of the PTX10001 must be placed at the front of the rack. Position the PTX10001 in such a manner that the **AIR OUT** labels on components are next to the hot aisle.
3. Align the holes in the mounting rail with the screw holes on the side of the chassis. See [Figure 21 on page 68](#) to see the proper alignment for the PTX10001.

Figure 21: Attaching the Front Mounting Rails to the PTX10001



4. Attach the mounting rail to the device using the mounting screws. Tighten the screws.
5. Repeat Step 3 and Step 4 on the opposite side of the device.
6. Have one person grasp both sides of the device, lift it, and position it in the rack so that the front bracket is aligned with the rack holes.
7. Have a second person secure the front of the device to the rack by using 4 mounting screws (and cage nuts and washers if your rack requires them). Tighten the screws. See [Figure 22 on page 68](#).

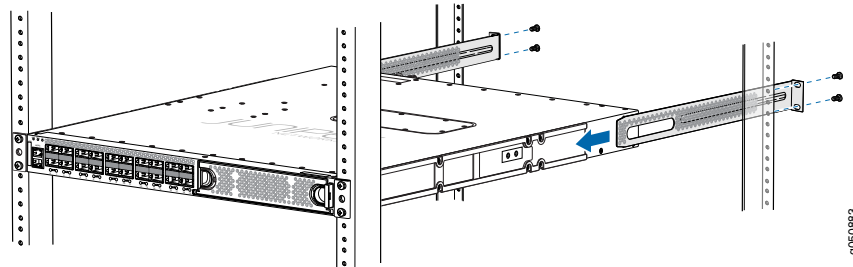
Figure 22: Attaching the PTX10001 to the Rack



8. Continue to support the PTX10001 while sliding the rear-mounting blades into the channel of the side mounting-rails and securing the blades to the rack. Use four

mounting screws (and cage nuts and washers if your rack requires them) to attach the blade to the rack. Tighten the screws. See [Figure 23 on page 69](#)

Figure 23: Slide Mounting Blades into Mounting Rail



9. Ensure that the PTX10001 chassis is level by verifying that all the screws on the front of the rack are aligned with the screws at the back of the rack.

Related Documentation

- [PTX10001 Installation Overview on page 63](#)
- [Connecting the PTX10001 to Ground on page 70](#)

Connecting the PTX10001 to Power

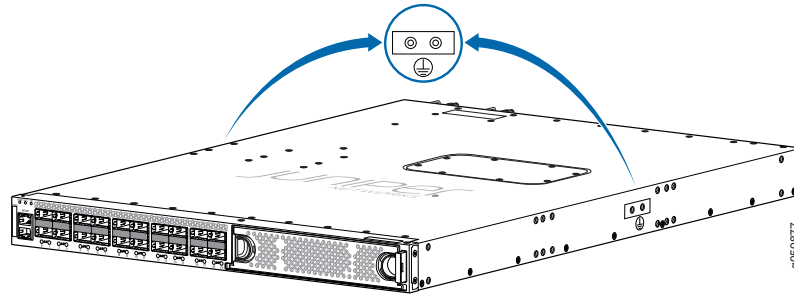
- [Connecting the PTX10001 to Ground on page 70](#)
- [Connecting AC Power to the PTX10001 on page 71](#)
- [Connecting DC Power to the PTX10001 on page 74](#)

Connecting the PTX10001 to Ground

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the PTX10001 device to earth ground before you connect it to power.

Figure 24 on page 70 shows the location of the PTX10001 grounding points.

Figure 24: PTX10001 Grounding Points



Before you connect earth ground to the protective earthing terminal of a PTX10001 device, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable.



CAUTION: Using a grounding cable with an incorrectly attached lug can damage the switch.



NOTE: Mount your device in the rack before attaching the grounding lug to the switch. See “[Unpacking and Mounting the PTX10001](#)” on page 65.

Ensure that you have the following parts and tools available:

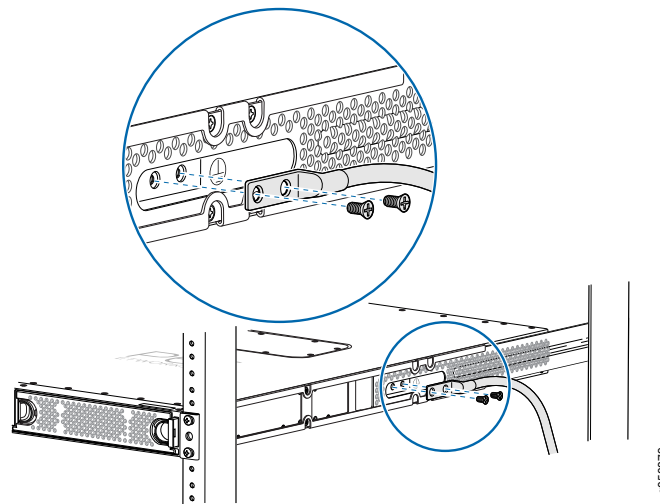
- Grounding cable for your PTX10001 device—The grounding cable must be 14 AWG (2 mm²), minimum 90° C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent.
- Two SAE #10-32 washers and screws—To attach the grounding lug to the protective earthing terminal.
- Screwdriver to attach the screws.

An AC-powered PTX10001 chassis gains additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See “[PTX10001 AC Power Cord Specifications](#)” on page 37.

To connect a grounding cable to a PTX10001 device:

1. Attach one end of the grounding cable to an appropriate earth ground site, such as the mounting rack.
2. Position the grounding lug over the protective earthing terminal on the side of the chassis, which is visible through the mounting bracket.
3. Secure the grounding lug to the protective earthing terminal with the washers and screws. See [Figure 25 on page 71](#).

Figure 25: Connecting a Grounding Cable to a PTX10001 Device



4. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people could trip over it.

See Also

Connecting AC Power to the PTX10001

The PTX10001 is shipped from the factory with two power supplies. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running. You can install replacement power supplies in the two slots next to the fan modules without powering off the device or disrupting the routing functions.

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Power cord or cords appropriate for your geographical location available to connect AC power to the PTX10001 (see [“PTX10001 AC Power Cord Specifications” on page 37](#)).

Before you begin connecting AC power to the device:

- Read [“General Electrical Safety Guidelines and Warnings”](#) on page 141 and [“Action to Take After an Electrical Accident”](#) on page 142.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage”](#) on page 143).
- Ensure that you have connected the PTX10001 chassis to earth ground.



CAUTION: Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit). To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the switch chassis to connect to the earth ground. For instructions on connecting earth ground, see [“Connecting the PTX10001 to Ground”](#) on page 70. The switch gains additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using the AC power cord appropriate for your geographical location (see [“PTX10001 AC Power Supply Description”](#) on page 32).

- Install the power supply in the chassis following the instructions in [“Installing a Power Supply in a PTX10001”](#) on page 89.



CAUTION: Do not mix AC and DC power supplies in the same chassis.



NOTE: Each power supply must be connected to a dedicated power source outlet.

To connect AC power to a PTX10001:

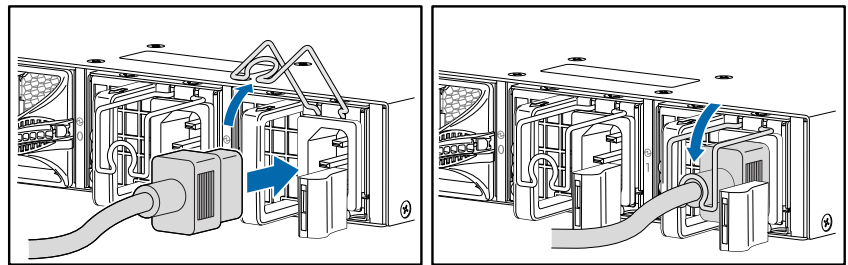
1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to an approved site ESD grounding point.
2. Ensure that the power supplies are fully inserted in the chassis and the latches are secure. If only one power supply is installed, ensure that a blank cover panel is installed over the second power supply slot.
3. Locate the power cord or cords shipped with the PTX10001; the cords have plugs appropriate for your geographical location. See [“PTX10001 AC Power Cord Specifications”](#) on page 37.



WARNING: Ensure that the power cord does not block access to router components or drape where people could trip on it.

4. Connect each power supply to the power sources. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate.
5. Push the power cord retainer onto the power cord (see [Figure 26 on page 73](#)).

Figure 26: Connecting an AC Power Cord to an AC Power Supply in a PTX10001



6. If the AC power source outlet has a power switch, set it to the off (O) position.



NOTE: The device powers on as soon as power is provided to the power supply. There is no power switch on the device.

7. Insert the power cord plug into an AC power source outlet.
8. If the AC power source outlet has a power switch, set it to the on (I) position.
9. Verify that the AC and DC LEDs on each power supply are lit green.

If the amber fault LED is lit, remove power from the power supply, and replace the power supply (see [“Removing a Power Supply from the PTX10001” on page 88](#)). Do not remove the power supply until you have a replacement power supply ready: the power supplies or a blank cover panel must be installed in the PTX10001 to ensure proper airflow.



CAUTION: Replace a failed power supply with a blank panel or new power supply within 1 minute of removal to prevent the chassis from overheating.

Connecting DC Power to the PTX10001

The PTX10001 is shipped from the factory with two power supplies. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running. You can install replacement power supplies in the two slots next to the fan modules without powering off the device or disrupting the routing functions.



WARNING: DC-powered PTX10001 models are intended for installation only in a restricted-access location.



NOTE: The battery returns of the DC power supply must be connected as an isolated DC return (DC-I).

Ensure that you have the following parts and tools available:

- ESD grounding strap
- DC power source cables (14–16 AWG) with ring lug (Molex 190700069 or equivalent) (not provided)
- Phillips (+) screwdriver, number 2 (not provided)
- Multimeter (not provided)

Before you begin connecting DC power to the PTX10001:

- Read [“General Electrical Safety Guidelines and Warnings” on page 141](#), [“DC Power Electrical Safety Guidelines” on page 145](#), and the following warnings:
 - [DC Power Copper Conductors Warning on page 146](#)
 - [DC Power Disconnection Warning on page 146](#)
 - [DC Power Grounding Requirements and Warning on page 148](#)
 - [DC Power Wiring Sequence Warning on page 149](#)
 - [DC Power Wiring Terminations Warning on page 150](#)
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 143](#)).
- Ensure that you have connected the PTX10001 chassis to earth ground.



CAUTION: Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit). To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must

connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the switch chassis to connect to the earth ground. For instructions on connecting earth ground, see [“Connecting the PTX10001 to Ground” on page 70.](#)

- Install the power supply in the chassis following the instructions in [“Installing a Power Supply in a PTX10001” on page 89.](#)



CAUTION: Do not mix AC and DC power supplies in the same chassis.



NOTE: Each power supply must be connected to a dedicated power source outlet.

To connect DC power to a PTX10001:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to an approved site ESD grounding point.
2. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the –48V and RTN DC cables to chassis ground:
 - The cable with very low resistance (indicating a closed circuit) to chassis ground is positive (+) and will be installed on the V+ (return) DC power input terminal.
 - The cable with very high resistance (indicating an open circuit) to chassis ground is negative (–) and will be installed on the V– (input) DC power input terminal.



CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the DC power input terminals on each power supply.

3. Ensure that the input circuit breaker is open so that the voltage across the DC power source cable leads is 0 V and that the cable leads do not become active while you are connecting DC power.



NOTE: The V+ terminals are referred to as +RTN, and V- terminals are referred to as -48 V in “DC Power Wiring Sequence Warning” on page 149 and “DC Power Electrical Safety Guidelines” on page 145.

4. Ensure that the power supplies are fully inserted in the chassis.
5. Remove the terminal block cover. The terminal block cover is a piece of clear plastic that snaps into place over the terminal block (see [Figure 27 on page 77](#)).
6. Remove the screws on the terminals using the screwdriver. Save the screws.



WARNING: Ensure that the power cables do not block access to device components or drape where people can trip on them.

7. Connect each power supply to the power sources. Secure power source cables to the power supplies by screwing the ring lugs attached to the cables to the appropriate terminals by using the screw from the terminals (see [Figure 27 on page 77](#) and [Figure 28 on page 77](#)). The PTX10001 is designed to operate with a DC power supply that has a single, non-redundant, feed input. For source redundancy, two DC power supplies must be installed; connect source (A) to one power supply and connect source (B) to the second power supply. This configuration provides the commonly deployed A/B feed redundancy for the system.

The terminal block of the power supply has four terminals labeled V+, V+, V-, and V- for connecting DC power source cables labeled positive (+) and negative (-). The V+ terminals are shunted internally together, as are the V- terminals.

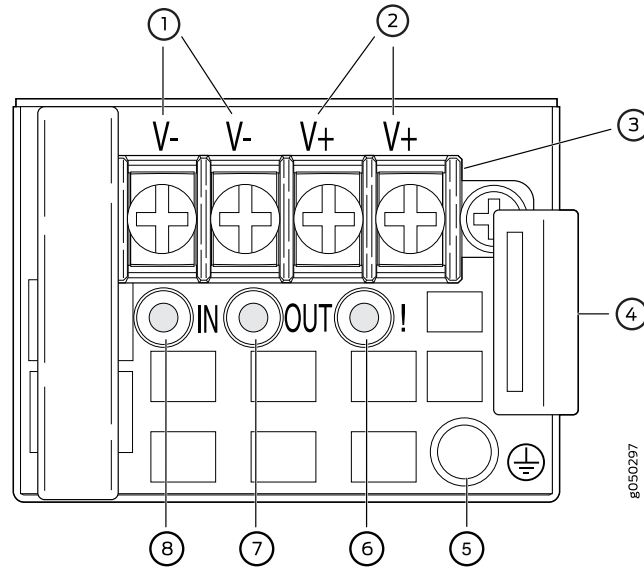


CAUTION: The connection between each power source and power supply must include a circuit breaker.

Do not connect two sources to a single power supply because doing so can potentially cause circulating current in feed wires whenever there is any difference in the voltage of the two sources.

- a. Secure the ring lug of the positive (+) DC power source cable to the V+ terminal on the DC power supply.
- b. Secure the ring lug of the negative (-) DC power source cable to the V- terminal on the DC power supply.
- c. Tighten the screws on the power supply terminals until snug using the screwdriver. Do not overtighten—apply between 5 in-lb (0.56 Nm) and 6 in-lb (0.68 Nm) of torque to the screws.

Figure 27: DC Power Supply Faceplate for a PTX10001

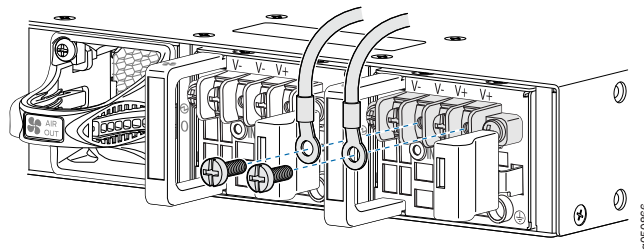


1—Shunt negative input terminals (+RTN)	5—ESD grounding point
2—Shunt positive input terminals (-48V)	6—Fault LED
3—Terminal block	7—Output LED
4—Latch lever	8—Input LED



CAUTION: The V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources.

Figure 28: Securing Ring Lugs to the Terminals on the PTX10001 DC Power Supply



8. Replace the terminal block cover.
9. Close the input circuit breaker.



NOTE: The device powers on as soon as power is provided to the power supply. There is no power switch on the device.

10. Verify that the **IN** and **OUT** LEDs on the power supply are lit green and are on steadily.

**Related
Documentation**

- [PTX10001 Power System on page 32](#)
- [PTX10001 Chassis Grounding Cable and Lug Specifications on page 46](#)

Connecting the PTX10001 to External Devices

- [Connecting the PTX10001 to a Management Ethernet Device on page 78](#)
- [Connecting the PTX10001 to a Management Console on page 79](#)

Connecting the PTX10001 to a Management Ethernet Device

You can monitor and manage the PTX10001 by using a dedicated management channel. The device has two management ports—a 10/100/1000BASE-T RJ-45 port for copper connections and a Gigabit Ethernet SFP port for fiber-optic connections. Use the management ports to connect the device to a network for out-of-band management.



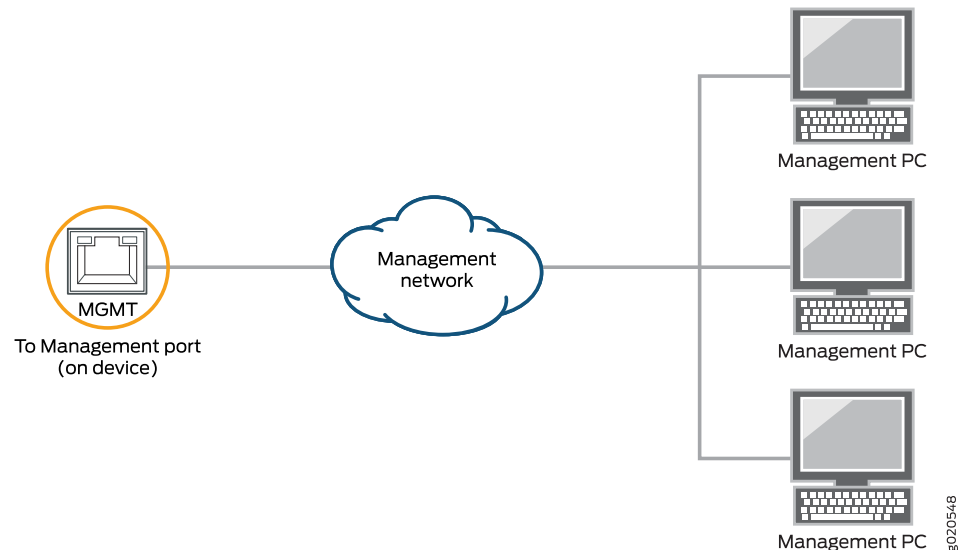
NOTE: You cannot use the management ports to perform the initial configuration of the PTX10001. You must configure the management ports through the console connection before you can successfully connect to the PTX10001 by using these ports. See [“Performing the Initial Software Configuration for the PTX10001” on page 80](#).

Ensure that you have an appropriate cable available. See [“Cable Specifications for Console and Management Connections for the PTX10001” on page 60](#).

To connect a PTX10001 to a network for out-of-band management (see [Figure 29 on page 79](#)):

1. Connect one end of the cable to one of the two management ports—labeled **MGMT**—on the PTX10001.
2. Connect the other end of the cable to the management network device.

Figure 29: Connecting a PTX10001 to a Network for Out-of-Band Management



Connecting the PTX10001 to a Management Console

The PTX10001 has a console port with an RJ-45 connector. Use the console port to connect the router directly to a management console, such as a laptop, or to a console server.

Ensure that you have an RJ-45 to DB-9 rollover cable available. An RJ-45 cable with an RJ-45 to DB-9 adapter is provided with the PTX10001.



NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to the PTX10001, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the router and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

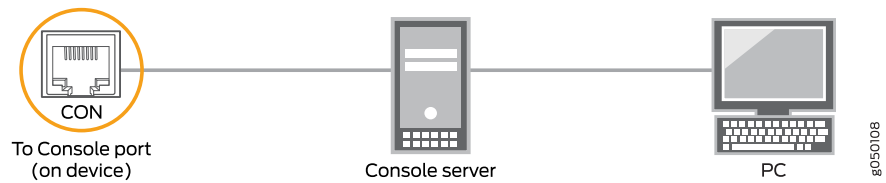
To connect the PTX10001 to a management console (see [Figure 30 on page 79](#) or [Figure 31 on page 80](#)):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**).
2. Connect the other end of the Ethernet cable directly to a management console or console server.

Figure 30: Connecting the PTX10001 Directly to a Management Console



Figure 31: Connecting the PTX10001 to a Management Console Through a Console Server



See Also

- Related Documentation**
- [PTX10001 Port Panel on page 23](#)
 - [PTX10001 Management Panel on page 28](#)

Performing the Initial Software Configuration for the PTX10001

You must perform the initial configuration of the PTX10001 through the console port by using the Junos OS command-line interface (CLI).

Before you begin connecting and configuring a PTX10001, set the following parameter values on the management console or console server:

- Baud Rate—9600
- Flow Control—None
- Data—8
- Parity—None
- Stop Bits—1
- DCD State—Disregard

To connect and configure the PTX10001 from the console:

1. Connect the console port to a laptop or PC by using the supplied RJ-45 cable and RJ-45 to DB-9 adapter. The console port (labeled **CON**) is located on the management panel of the PTX10001 (see [“Connecting the PTX10001 to a Management Console” on page 79](#) for more information).
2. Log in as **root**. There is no password. If the software boots before you connected to the console port, you might need to press the **Enter** key for the prompt to appear.

```
Login: root
```

3. Start the CLI.

```
root@% cli
```

4. Enter configuration mode.

```
root> configure
```


5. Add a password to the root administration user account.

```
[edit]
root@# set system root-authentication plain-text-password
New password: password
Retype new password: password
```

6. (Optional) Configure the name of the PTX10001. If the name includes spaces, enclose the name in quotation marks (" ").

```
[edit]
root@# set system host-name host-name
```

7. Configure the default gateway.

```
[edit]
root@# set routing-options static route default next-hop address
```

8. Configure the IP address and prefix length for the management interface.

```
[edit]
root@# set interfaces em0 unit 0 family inet address address/prefix-length
```



CAUTION: Although the CLI permits you to configure two management Ethernet interfaces within the same subnet, only one interface is usable and supported at a time.



NOTE: The management port em0 is on the port panel and the management port em2 is on the FRU end of the PTX10001 router.

9. (Optional) Configure the static routes to remote prefixes with access to the management port.

```
[edit]
root@# set routing-options static route remote-prefix next-hop destination-ip retain
no-readvertise
```

10. Enable the Telnet service.

```
[edit]
root@# set system services telnet
```



NOTE: When Telnet is enabled, you cannot log in to a PTX10001 through Telnet by using root credentials. Root login is allowed only for SSH access.

11. Enable SSH service for root login.

```
[edit]
root@# set system services SSH
```

12. Commit the configuration to activate it on the device.

```
[edit]
root@# commit
```

Related Documentation • [PTX10001 Management Cable Specifications and Pinouts on page 60](#)

Powering Off the PTX10001

Before you power off a PTX10001:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 143](#).
- Ensure that you do not need to route traffic through the PTX10001.
- Ensure that you have the following parts and tools available to power off the PTX10001:
 - An ESD grounding strap
 - An external management device such as a PC
 - An RJ-45 to DB-9 rollover cable to connect the external management device to the console port

To power off a PTX10001:

1. Connect to the router by using one of the following methods:
 - Connect a management device to the console (**CON**) port on a PTX10001 by following the instructions in [“Connecting the PTX10001 to a Management Console” on page 79](#).
 - Connect a management device to one of the two management (**MGMT**) ports by following the instructions in [“Connecting the PTX10001 to a Management Ethernet Device” on page 78](#).
2. Shut down Junos OS from the external management device by issuing the **request vmhost halt** operational mode CLI command. This command shuts down Junos OS gracefully and preserves system state information. A message appears on the console, confirming that the operating system has halted.

```
user@host> request vmhost halt
Halt the system ? [yes,no] (no) yes
```

You see the following output (or something similar) after entering the command:

```
Initiating vmhost halt... ok
Initiating Junos shutdown... shutdown: [pid 14318]
Shutdown NOW!
```

```

ok
Junos shutdown is in progress...
*** FINAL System shutdown message ***

System going down IMMEDIATELY

...
...
Operating system halted.
Please press any key to reboot.

```



CAUTION: The final output of any version of the request system halt command is the “The operating system has halted.” Wait at least 60 seconds after first seeing this message before following the instructions in Step 4 and Step 5 to power off the PTX10001.

3. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
4. Disconnect power to the PTX10001:
 - AC power supply—If the AC power source outlet has a power switch, set it to the OFF (O) position. If the AC power source outlet does not have a power switch, gently pull out the male end of the power cord connected to the power source outlet.
 - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the OFF position.
5. Remove the power source cable from the power supply faceplate:
 - AC power supply—Remove the power cord from the power supply faceplate by detaching the power cord retainer and gently pulling out the female end of the power cord connected to the power supply faceplate.
 - DC power supply—Remove the screws securing the ring lugs attached to the power source cables to the power supply using the screwdriver and remove the power source cables from the power supply. Replace the screws on the terminals and tighten them.
 - Uncable the device before removing it from the rack or cabinet.

Related Documentation

CHAPTER 4

Removing, Installing, and Maintaining Components

- Maintaining the PTX10001 Fan Modules on page 85
- Maintaining the PTX10001 Power Supplies on page 88
- Maintaining a PTX10001 Expansion Module on page 90
- Maintaining the PTX10001 Transceivers and Fiber-Optic Cables on page 94
- Maintaining the SATA Solid State Drive in a PTX10001 on page 104
- Uninstalling the PTX10001 on page 107

Maintaining the PTX10001 Fan Modules

- Removing a Fan Module from the PTX10001 on page 85
- Installing a Fan Module in the PTX10001 on page 86

Removing a Fan Module from the PTX10001

The fan modules in a PTX10001 are hot-removable and hot-insertable field-replaceable units (FRUs)—you can remove and replace them without powering off the PTX10001 or disrupting routing functions.



CAUTION: Replace the fan module within 1 minute of removal to prevent chassis overheating. Before removing the fan module, ensure you have a replacement fan module available.

Before you remove a fan module from a PTX10001, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage”](#) on page 143).

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Antistatic bag or an antistatic mat
- Phillips (+) screwdriver, number 1

To remove a fan module from a PTX10001 (see [Figure 32 on page 86](#)):

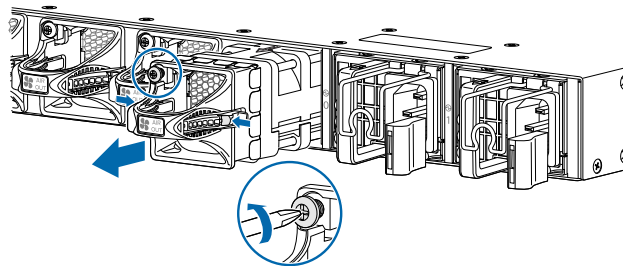
1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
3. Using the Phillips screwdriver, loosen the locking screw (3 or 4 turns).
4. Grasp the handle on the fan module and squeeze the outside of the handle to release the module.



WARNING: To avoid injury, do not touch the fan with your hands or any tools as you slide the fan module out of the chassis—the fan might still be running.

5. Pull firmly to slide the fan module halfway out of the chassis.
6. When the fan stops spinning, slide the fan module completely out of the chassis.
7. Place the fan module in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

Figure 32: Removing a Fan Module from a PTX10001



NOTE: When a fan module is removed, the CLI message `Fan/Blower is Absent` is logged in the system log, and the system raises a minor alarm.

Installing a Fan Module in the PTX10001

The fan modules in a PTX10001 are hot-removable and hot-insertable field-replaceable units (FRUs)—you can remove and replace them without powering off the PTX10001 or disrupting routing functions.



CAUTION: Replace the fan module within 1 minute of removal to prevent chassis overheating. Before removing the fan module, ensure you have a replacement fan module available.



NOTE: The fan module provides airflow out, which is also known as *port-to-FRU* airflow.

Before you install a fan module in a PTX10001, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see “[Prevention of Electrostatic Discharge Damage](#)” on page 143).

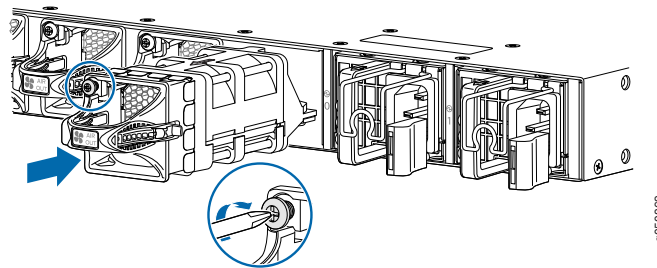
Ensure that you have the following parts and tools available:

- ESD grounding strap
- Phillips (+) screwdriver, number 1

To install a fan module in a PTX10001 (see [Figure 33 on page 87](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Taking care not to touch the connectors, remove the fan module from its bag.
3. Align the module with the open slot on the FRU end of the PTX10001 and slide it in until it is fully seated.
4. Using the Phillips screwdriver, tighten the locking screw (3 or 4 turns).

Figure 33: Installing a Fan Module in a PTX10001



Related Documentation

- [Maintaining the PTX10001 Power Supplies on page 88](#)
- [Maintaining the PTX10001 Transceivers and Fiber-Optic Cables on page 94](#)

Maintaining the PTX10001 Power Supplies

- [Removing a Power Supply from the PTX10001 on page 88](#)
- [Installing a Power Supply in a PTX10001 on page 89](#)

Removing a Power Supply from the PTX10001

The power supplies in a PTX10001 are hot-removable and hot-insertable field-replaceable units (FRUs) when the second power supply is installed and running. You can install replacement power supplies in the two slots next to the fan modules without powering off the device or disrupting the routing functions.

Before you remove a power supply from a PTX10001, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 143](#)).

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Antistatic bag or an antistatic mat
- Phillips (+) screwdriver, number 2 (DC power supply)



CAUTION: Replace the power supply with a new power supply within 1 minute of removal to prevent chassis overheating. Before removing the power supply, ensure you have a replacement power supply available.

To remove a power supply from a PTX10001 (see [Figure 34 on page 89](#)):

1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
 2. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
-

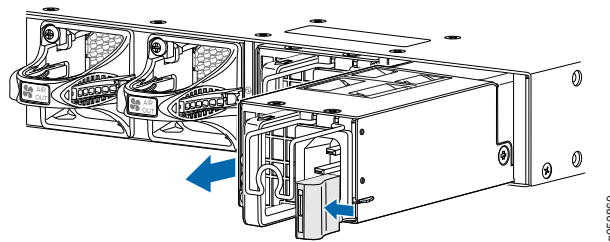


NOTE: If you need to remove all the power supplies installed in your PTX10001, you must power off the PTX10001 before removing the power supplies. See *Powering Off the PTX10001*.

3. Disconnect power to the PTX10001:
 - AC power supply—If the AC power source outlet has a power switch, set it to the OFF (O) position. If the AC power source outlet does not have a power switch, gently pull out the male end of the power cord connected to the power source outlet.
 - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the OFF position.

4. Remove the power source cable from the power supply faceplate:
 - AC power supply—Remove the power cord from the power supply faceplate by detaching the power cord retainer and gently pulling out the female end of the power cord connected to the power supply faceplate.
 - DC power supply—Remove the screws securing the ring lugs attached to the power source cables to the power supply using the screwdriver, and remove the power source cables from the power supply. Replace the screws on the terminals and tighten them.
5. Slide the locking lever toward the handle until it stops.
6. Grasp the power supply handle and pull firmly to slide the power supply halfway out of the chassis.
7. Place one hand under the power supply to support it and slide it completely out of the chassis. Take care not to touch power supply components, pins, leads, or solder connections.

Figure 34: Removing a Power Supply from a PTX10001



8. Place the power supply in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

Installing a Power Supply in a PTX10001

The power supplies in a PTX10001 are hot-removable and hot-insertable field-replaceable units (FRUs) when the second power supply is installed and running. You can install replacement power supplies in the two slots next to the fan modules without powering off the device or disrupting the routing functions.

Before you install a power supply in a PTX10001, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage”](#) on page 143).

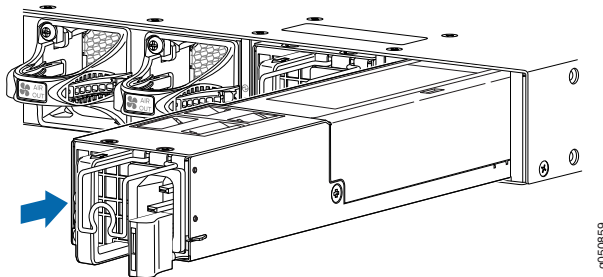
Ensure that you have the following parts and tools available:

- ESD grounding strap
- Antistatic bag or an antistatic mat
- Phillips (+) screwdriver, number 2 (DC power supply)

To install a power supply in a PTX10001 (see [Figure 35 on page 90](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
3. Using both hands, place the power supply in the power supply slot on the FRU panel of the PTX10001 and slide it in until it is fully seated and the locking lever slides into place.

Figure 35: Installing a Power Supply in a PTX10001



NOTE: Each power supply must be connected to a dedicated power source outlet.



NOTE: If you have a Juniper Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/support/tools/updateinstallbase/>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

See Also

- Related Documentation**
- [PTX10001 Power System on page 32](#)
 - [Connecting the PTX10001 to Power on page 69](#)

Maintaining a PTX10001 Expansion Module

- [Removing a PTX10001 Expansion Module on page 91](#)
- [Installing a PTX10001 Expansion Module on page 92](#)

Removing a PTX10001 Expansion Module

When you remove an expansion module, the router continues to function, although the expansion module interfaces being removed no longer function.

The expansion module is located at the front of the router. A typical expansion module weighs around 3.2 lb (1.45 kg).

To remove a expansion module (see [Figure 36 on page 92](#)):

1. Place an electrostatic bag or antistatic mat on a flat, stable surface to receive the expansion module. If the expansion module connects to fiber-optic cable, have ready a rubber safety cap for each transceiver and cable.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.

3. Take the expansion module offline.

- Issue the following CLI command:

```
user@host> request chassis pic fpc-slot 0 pic-slot 1 offline
```

For more information about the command, see the [Junos OS System Basics and Services Command Reference](#).

4. Label the cables connected to the expansion module so that you can later reconnect each cable to the correct port.
5. Disconnect the cables from the expansion module. If the expansion module uses fiber-optic cable, immediately cover each transceiver and the end of each cable with a rubber safety cap.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

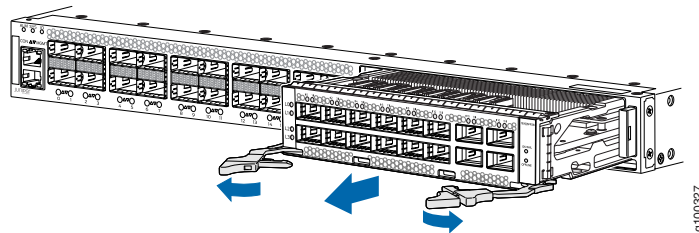
6. Arrange the cable to prevent it from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop.



CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

7. Pull both the ejector levers of the expansion module you are removing away from the chassis. Doing this disconnects the expansion module from the chassis.
8. Grasp the handles on the expansion module faceplate, and slide the expansion module out of the chassis. Place it in the electrostatic bag or on the antistatic mat.
9. If you are not reinstalling an expansion module into the emptied expansion module slot within a short time, install a blank expansion module panel over the slot to maintain proper airflow in the chassis.

Figure 36: Removing a expansion module



Installing a PTX10001 Expansion Module

To install an expansion module (see [Figure 37 on page 94](#)):

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. If the expansion module uses fiber-optic cable, verify that a rubber safety cap is over each transceiver on the faceplate. Install a cap if necessary.
3. Align the rear of the expansion module with the guides located at the corners of the expansion module slot.
4. Grasp and press both the expansion module ejector handles inward, and slide the expansion module until the ejectors latch into the chassis.



CAUTION: Slide the expansion module straight into the slot to avoid damaging the components on the expansion module.

5. Verify that the ejector lever is engaged properly by pushing it toward the expansion module faceplate.
6. If the expansion module uses fiber-optic cable, remove the rubber safety cap from each transceiver and the end of each cable.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

7. Insert the appropriate cables into the cable connectors on the expansion module.
8. Arrange each cable to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop.



CAUTION: Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.



CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

9. Bring the expansion module online.

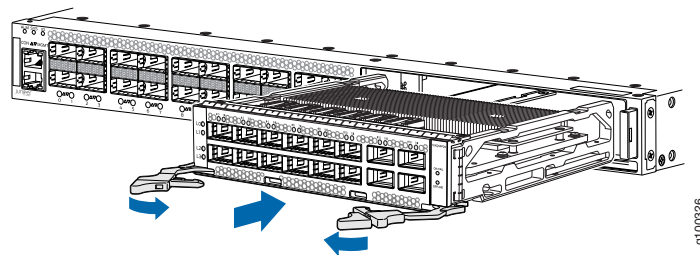
- Issue the following CLI command:

```
user@host> request chassis pic fpc-slot 0 pic-slot 1 online
```

For more information about the command, see the [Junos OS System Basics and Services Command Reference](#).

The normal functioning **OK/FAIL** LED confirms that the expansion module is online. You can also verify correct expansion module functioning by issuing the **show chassis fpc pic-status** command.

Figure 37: Installing an expansion module



Related Documentation

- [Maintaining the PTX10001 Transceivers and Fiber-Optic Cables on page 94](#)
- [Prevention of Electrostatic Discharge Damage on page 143](#)

Maintaining the PTX10001 Transceivers and Fiber-Optic Cables

- [Removing a Transceiver on page 94](#)
- [Installing a Transceiver on page 97](#)
- [Removing a QSFP28 Transceiver on page 99](#)
- [Installing a QSFP28 Transceiver on page 100](#)
- [Disconnecting a Fiber-Optic Cable from the PTX10001 on page 101](#)
- [Connecting a Fiber-Optic Cable to the PTX10001 on page 102](#)
- [Maintaining Fiber-Optic Cables in a PTX10001 on page 103](#)

Removing a Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace them without powering off the device or disrupting device functions.



NOTE: After you remove a transceiver or when you change the media-type configuration, wait for 6 seconds for the interface to display the operational commands.

Before you begin removing a transceiver from a device, ensure that you have taken the necessary precautions for the safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings” on page 133](#)).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- A dust cover to cover the port or a replacement transceiver

Figure 38 on page 96 shows how to remove a QSFP+ transceiver. The procedure is the same for all types of transceivers except the QSFP28 and CFP transceivers.

To remove a transceiver from a device:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
3. Label the cable connected to the transceiver so that you can reconnect it correctly.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



WARNING: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.



CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

4. Remove the cable connected to the transceiver. Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after disconnecting the fiber-optic cables.

5. To remove an SFP, SFP+, XFP, or a QSFP+ transceiver:

- a. By using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.



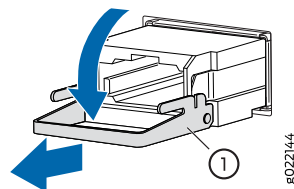
CAUTION: Before removing the transceiver, make sure that you open the ejector lever completely until you hear it click. This prevents damage to the transceiver.

- b. Grasp the transceiver ejector lever and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.



CAUTION: To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

Figure 38: Removing an SFP, SFP+, XFP, or a QSFP+ Transceiver



1—Ejector lever

To remove a CFP transceiver:

- a. Loosen the screws on the transceiver by using your fingers.
- b. Grasp the screws on the transceiver and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.



CAUTION: To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

6. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.

7. Place the transceiver in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
8. Place the dust cover over the empty port or install the replacement transceiver.

Installing a Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace them without powering off the device or disrupting the device functions.



NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.



NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



CAUTION: If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Before you begin to install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings”](#) on page 133).

Ensure that you have a rubber safety cap available to cover the transceiver.

[Figure 39 on page 99](#) shows how to install a QSFP+ transceiver. The procedure is the same for all types of transceivers except the QSFP28 and CFP transceivers.

To install a transceiver:



CAUTION: To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
2. Remove the transceiver from its bag.
3. Check to see whether the transceiver is covered with a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.



WARNING: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

4. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later. If you are hot-swapping a transceiver, wait for at least 10 seconds after removing the transceiver from the port before installing a new transceiver.
5. Using both hands, carefully place the transceiver in the empty port. The connectors must face the chassis.



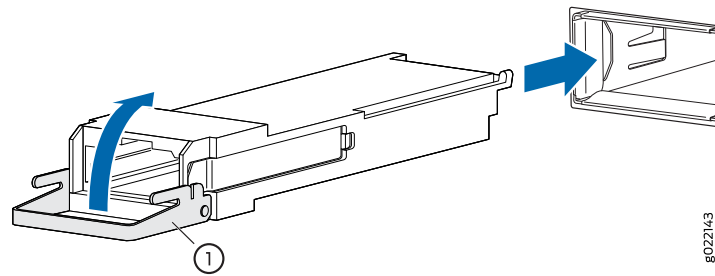
CAUTION: Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable.

6. Slide the transceiver in gently until it is fully seated. If you are installing a CFP transceiver, tighten the captive screws on the transceiver by using your fingers.
7. Remove the rubber safety cap when you are ready to connect the cable to the transceiver.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

Figure 39: Installing a Transceiver



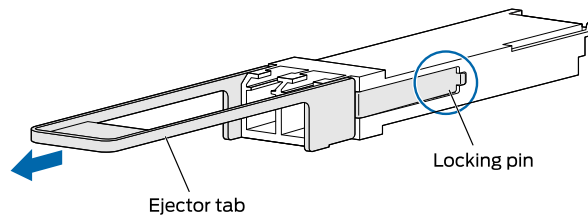
1— Ejector lever

g022143

Removing a QSFP28 Transceiver

28-Gbps quad small form-factor pluggable (QSFP28) are transceivers that can be removed from the device. QSFP28 transceivers are hot-insertable and hot-removable. Removing a QSFP28 transceiver does not interrupt the device functioning, but the removed QSFP28 transceiver no longer receives or transmits data.

Figure 40: 28-Gbps Quad Small Form-Factor Pluggable (QSFP28)



Ejector tab

Locking pin

g000099

To remove a QSFP28 transceiver (see [Figure 40 on page 99](#)):

1. Place an electrostatic bag or antistatic mat on a flat, stable surface to receive the QSFP28 transceiver. Have ready a rubber safety cap for the QSFP28 transceiver and the cable.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
3. Label the cable connected to the QSFP28 transceiver so that you can later reconnect it to the correct QSFP28 transceiver.
4. Disconnect the cable from the QSFP28 transceiver. Immediately cover the transceiver and the end of the cable with a rubber safety cap.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

5. Arrange the cable in the cable management system to prevent it from dislodging or developing stress points. Secure the cable so that it is not supporting its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

6. Pull the transceiver's rubber handle straight back. The locking pins on the transceiver automatically release. Place the transceiver on the antistatic mat or in the electrostatic bag.

Installing a QSFP28 Transceiver

To install a replacement QSFP28:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Verify that a rubber safety cap covers the QSFP28 transceiver, installing one if necessary.
3. Orient the QSFP28 over the port so that the QSFP28 connector faces the appropriate direction.
4. Slide the QSFP28 into the slot until the locking pins lock in place. If there is resistance, remove the QSFP28 and flip it so that the connector faces the other direction.
5. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

6. Arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it is not supporting its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.



CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

7. Verify that the status LEDs on the indicate that the QSFP28 is functioning correctly.

Disconnecting a Fiber-Optic Cable from the PTX10001

The PTX10001 has optical transceivers to which you can connect fiber-optic cables.

Before you disconnect a fiber-optic cable from a PTX10001, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Radiation from Open Port Apertures Warning”](#) on page 135 and [“Laser and LED Safety Guidelines and Warnings”](#) on page 133).

Ensure that you have the following parts and tools available:

- Rubber safety cap to cover the transceiver
- Rubber safety cap to cover the fiber-optic cable connector

To disconnect a fiber-optic cable from an optical transceiver installed in the PTX10001:

1. (Recommended) Disable the port in which the transceiver is installed by including the **disable** statement at the **[edit interfaces]** hierarchy level for the specific interface:

```
[edit interfaces]  
set interface-name disable
```



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



WARNING: Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

2. Carefully unplug the fiber-optic cable connector from the transceiver.
3. Cover the transceiver with a rubber safety cap.



WARNING: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

4. Cover the fiber-optic cable connector with the rubber safety cap.

Connecting a Fiber-Optic Cable to the PTX10001

The PTX10001 has optical transceivers to which you can connect fiber-optic cables.

Before you connect a fiber-optic cable to a PTX10001, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Radiation from Open Port Apertures Warning”](#) on page 135 and [“Laser and LED Safety Guidelines and Warnings”](#) on page 133).

To connect a fiber-optic cable to an optical transceiver installed in the PTX10001:



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



WARNING: Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. If the optical transceiver is covered by a rubber safety cap, remove the cap. Save the cap.
3. Insert the cable connector into the optical transceiver.
4. Secure the cable so that it does not support its own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.



CAUTION: Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Maintaining Fiber-Optic Cables in a PTX10001

To maintain fiber-optic cables in a PTX10001:

- When you unplug fiber-optic cables from transceivers, place rubber safety caps over the transceivers and on the end of the cables.
- Anchor fiber-optic cables to avoid stress on the connectors. When attaching a fiber-optic cable to a transceiver, be sure to secure the fiber-optic cable so that it does not support its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.

- Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.
- Frequent plugging and unplugging of fiber-optic cables in and out of optical instruments can damage the instruments, which are expensive to repair. Attach a short fiber extension to the optical equipment. Any wear and tear due to frequent plugging and unplugging is then absorbed by the short fiber extension, which is easier and less expensive to replace than the instruments.
- Keep fiber-optic cable connections clean. Microdeposits of oil and dust in the canal of the transceiver or cable connector can cause loss of light, reduction in signal power, and possibly intermittent problems with the optical connection.

To clean the transceiver canal, use an appropriate fiber-cleaning device such as RIFOCS Fiber Optic Adaptor Cleaning Wands (part number 946). Follow the directions in the cleaning kit you use.

After cleaning the transceiver, make sure that the connector tip of the fiber-optic cable is clean. Use only an approved alcohol-free fiber-optic cable cleaning kit such as the Cletop-S[®] Fiber Cleaner. Follow the directions in the cleaning kit you use.

Related Documentation

[Maintaining the SATA Solid State Drive in a PTX10001](#)

- [Removing a SATA Solid State Drive in a PTX10001 on page 105](#)
- [Installing a SATA Solid State Drive in a PTX10001 on page 106](#)

Removing a SATA Solid State Drive in a PTX10001

The PTX10001 allows for two 50 GB serial advanced technology attachment (SATA) solid state drives (SSD) as a secondary boot drive or for log storage. The SATA SSD is a hot-insertable and hot-removable field-replaceable unit (FRU).

Before you remove an SATA SSD from the device, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 143](#).

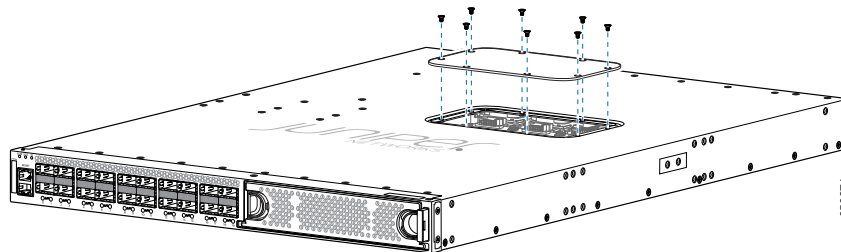
Ensure that you have the following parts and tools available to remove an SATA SSD from a PTX10001:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- An electrostatic bag or antistatic mat

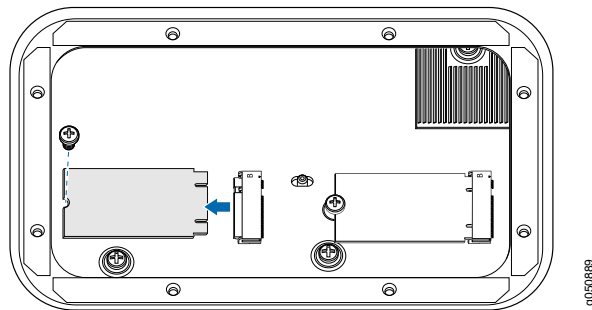
To remove a SATA SSD in a PTX10001:

1. Place an electrostatic bag or antistatic mat on a flat, stable surface to receive the SATA SSD.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
3. Remove the eight captive screws securing the SSD cover plate by using the Phillips (+) screwdriver, number 1. The SSD cover plate is located on the top of the chassis (see [Figure 41 on page 105](#)).

Figure 41: Removing the SATA SSD Cover Plate



4. Remove the single screw holding the SATA SSD in place and slide the drive out of the plug (see [Figure 42 on page 106](#)).

Figure 42: Removing the SATA SSD

5. Place the SATA SSD in an electrostatic bag or on an antistatic mat.
6. Place the SSD cover plate back on the chassis and tighten the eight captive screws securing the SSD cover plate.

Installing a SATA Solid State Drive in a PTX10001

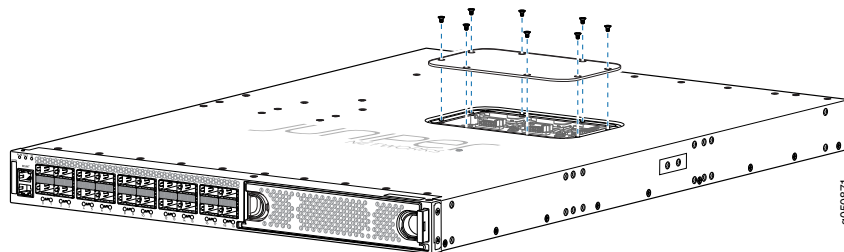
Before you install an SATA SSD in the device, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 143.

Ensure that you have the following parts and tools available to install an SATA SSD in the PTX10001:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- An electrostatic bag or antistatic mat

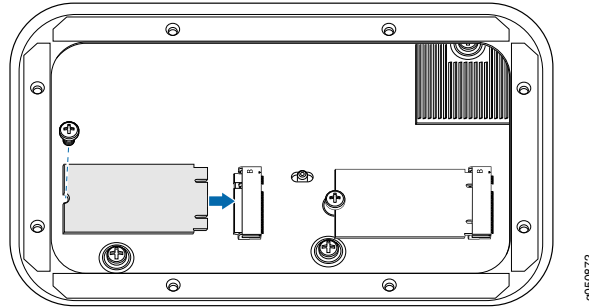
To install a SATA SSD in a PTX10001:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Remove the eight captive screws securing the SSD cover plate by using the Phillips (+) screwdriver, number 1. The SSD cover plate is located on the top of the chassis (see [Figure 43](#) on page 106).

Figure 43: Removing the SATA SSD Cover Plate

- Slide the drive into the SSD plug and tighten the single screw holding the SATA SSD. (see [Figure 44 on page 107](#)).

Figure 44: Installing the SATA SSD



- Place the SSD cover plate back on the chassis and tighten the eight captive screws securing the SSD cover plate.

Related Documentation

Uninstalling the PTX10001

- [Removing a PTX10001 from a Rack or Cabinet on page 107](#)

Removing a PTX10001 from a Rack or Cabinet

If you need to relocate an installed PTX10001, use the procedure described in this topic. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)



NOTE: When you remove multiple devices from a rack, remove the device at the top of the rack first and proceed to remove the rest of the devices from top to bottom.

Before removing a PTX10001 from a rack:

- Ensure that the rack is stable and secured to the building.
- Ensure that there is enough space to place the removed PTX10001 in its new location and along the path to the new location.
- Read “[General Safety Guidelines and Warnings](#)” on page 122 and “[PTX10001 Installation Safety Guidelines](#)” on page 64.
- Use the power off sequence described in *Powering Off the PTX10001* to safely power off the device..

- Disconnect the power cords.
- Ensure that you have disconnected any cables or wires attached to the PTX10001 (see [“Disconnecting a Fiber-Optic Cable from the PTX10001” on page 101](#)).

Ensure that you have the following parts and tools available:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for removing the PTX10001 from the rack.

To remove a PTX10001 from a rack:

1. Have one person support the weight of the switch while another person uses the screwdriver to remove the front mounting screws that attach the chassis mounting brackets to the rack.
2. Remove the PTX10001 from the rack.
3. Use the screwdriver to remove the mounting screws that attach the mounting blades attached to the rear of the rack.
4. Place the removed screws and rear-mounting blades in a labeled bag. You will need them when you reinstall the chassis.
5. Transport the PTX10001 to your desired new location.

See Also

- Related Documentation**
- [Unpacking and Mounting the PTX10001 on page 65](#)

CHAPTER 5

Troubleshooting Hardware

- [Troubleshooting the PTX10001 on page 109](#)

Troubleshooting the PTX10001

- [PTX10001 Troubleshooting Resources Overview on page 109](#)
- [PTX10001 Alarm Messages Overview on page 110](#)
- [Chassis Alarm Messages on the PTX10001 on page 110](#)

PTX10001 Troubleshooting Resources Overview

To troubleshoot a PTX10001, you use the Junos OS CLI, alarms, and LEDs on the network ports, management panel, and components.

- **LEDs**—When the Routing Engine detects an alarm condition, it lights the red or yellow alarm LED on the management panel as appropriate. In addition, you can also use component LEDs and network port LEDs to troubleshoot the PTX10001. For more information, see the following topics:
 - [PTX10001 Chassis Status LEDs on page 25](#)
 - [PTX10001 Management Port LEDs on page 26](#)
 - [PTX10001 Network Port LEDs on page 27](#)
 - [PTX10001 Fan Module LEDs on page 31](#)
 - [PTX10001 AC Power Supply LEDs on page 33](#)
 - [PTX10001 DC Power Supply LEDs on page 36](#)
- **CLI**—The CLI is the primary tool for controlling and troubleshooting hardware, Junos OS, routing protocols, and network connectivity. CLI commands display information from routing tables, information specific to routing protocols, and information about network connectivity derived from the ping and traceroute utilities. For information about using the CLI to troubleshoot Junos OS, see the appropriate Junos OS configuration guide.
- **JTAC**—If you need assistance during troubleshooting, you can contact the Juniper Networks Technical Assistance Center (JTAC) by using the Web or by telephone. If you encounter software problems, or problems with hardware components not discussed here, contact JTAC.

PTX10001 Alarm Messages Overview

When the Routing Engine detects an alarm condition, it lights the red or yellow alarm LED on the management panel as appropriate. To view a more detailed description of the alarm cause, issue the **show chassis alarms** CLI command:

```
user@host> show chassis alarms

2 alarms currently active
Alarm time           Class  Description
2017-01-23 02:39:29 PST Major  PEM 3 Not Present
2017-01-23 02:39:29 PST Major  PEM 1 Not Present
```

Chassis Alarm Messages on the PTX10001

Chassis alarms indicate a failure on the device or one of its components. Chassis alarms are preset and cannot be modified.

Chassis alarms on PTX10001 routers have two severity levels:

- Major (red)—Indicates a critical situation on the device that has resulted from one of the conditions described in [Table 33 on page 111](#). A red alarm condition requires immediate action.
- Minor (yellow or amber)—Indicates a noncritical condition on the device that, if left unchecked, might cause an interruption in service or degradation in performance. A yellow alarm condition requires monitoring or maintenance.

[Table 33 on page 111](#) describes the chassis alarm messages on the PTX10001.

Table 33: PTX10001 Chassis Alarm Messages

Component	Alarm Type	CLI Message	Recommended Action
Fans	Major (red)	Fan Failure	Replace the fan module and report the failure to customer support.
		Fan I2C Failure	Check the system log for one of the following messages and report the error message to customer support: <ul style="list-style-type: none"> • CM ENV Monitor: Get fan speed failed. • <i>fan-number</i> is NOT spinning @ correct speed, where <i>fan-number</i> can be 1, 2, 3, 4, or 5.
		Fan <i>fan-number</i> Not Spinning	Remove and check the fan module for obstructions, and then reinsert the fan module. If the problem persists, replace the fan module.
	Minor (yellow)	Fan/Blower Absent	Check the system log for the message <i>fan-number</i> Absent , where <i>fan-number</i> can be 1, 2, 3, 4, or 5. Install the fan module.

Table 33: PTX10001 Chassis Alarm Messages (continued)

Component	Alarm Type	CLI Message	Recommended Action
Power supplies	Major (red)	PEM <i>pem-number</i> Airflow not matching Chassis Airflow	Replace the power supply with a power supply that supports the same airflow direction as the chassis.
		PEM <i>pem-number</i> I2C Failure	Check the system log for one of the following messages and report the error message to customer support: <ul style="list-style-type: none"> • I2C Read failed for device <i>number</i>, where <i>number</i> may be from 123 to 125. • PS <i>number</i>: Transitioning from online to offline, where power supply (PS) <i>number</i> may be 1 or 2.
		PEM <i>pem-number</i> is not powered	Check the power cord connection and reconnect, if necessary.
		PEM <i>pem-number</i> is not supported	Replace the power supply with a supported power supply.
		PEM <i>pem-number</i> Not OK	Indicates a problem with the incoming AC power or outgoing DC power. Report the error to customer support.
	Minor (yellow)	PEM <i>pem-number</i> Absent	A power supply is not installed. Install a supported power supply in the appropriate slot.
		PEM <i>pem-number</i> Power Supply Type Mismatch	Check if there is a mix of AC and DC power supplies in the same chassis. Reboot the device with only AC or only DC power supplies.
		PEM <i>pem-number</i> Removed	Replace the removed power supply.

Table 33: PTX10001 Chassis Alarm Messages (continued)

Component	Alarm Type	CLI Message	Recommended Action
Temperature sensors	Major (red)	<i>sensor-location</i> Temp Sensor Fail	Check the system log for the following message and report it to customer support: Temp sensor <i>sensor-number</i> failed , where <i>sensor-number</i> ranges from 1 through 10.
		<i>sensor-location</i> Temp Sensor Too Hot	Check environmental conditions and alarms on other devices. Ensure that environmental factors (such as hot air blowing around the equipment) do not affect the temperature sensor. If the condition persists, the device might shut down.
	Minor (yellow)	<i>sensor-location</i> Temp Sensor Too Warm	For information only. Check environmental conditions and alarms on other devices. Ensure that environmental factors (such as hot air blowing around the equipment) do not affect the temperature sensor.
Routing Engine	Major (red)	RE <i>RE number</i> /var partition is full	Clean up the system file storage space on the device. For more information, see <i>request system storage cleanup</i> .
	Minor (yellow)	RE <i>RE number</i> /var partition usage is high	Clean up the system file storage space on the device. For more information, see <i>request system storage cleanup</i> .
Management Ethernet interface	Major (red)	Management Ethernet 1 Link Down	Check whether a cable is connected to the management Ethernet interface, or whether the cable is defective. Replace the cable, if required. If you are unable to resolve the problem, open a support case by using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (tollfree, US or 1-408-745-9500 (from outside the United States)).

See Also

- Related Documentation**
- [PTX10001 Management Panel on page 28](#)
 - [Definitions of Safety Warning Levels on page 123](#)
 - [Configuring Junos OS to Determine Conditions That Trigger Alarms on Different Interface Types](#)

- *alarm*
- [Contacting Customer Support on page 115](#)

CHAPTER 6

Contacting Customer Support and Returning the Chassis or Components

- Returning the PTX10001 Chassis or Components on page 115

Returning the PTX10001 Chassis or Components

- Contacting Customer Support on page 115
- Locating the Serial Number on a PTX10001 Chassis or Component on page 116
- Returning a Hardware Component to Juniper Networks, Inc. on page 118
- Guidelines for Packing Hardware Components for Shipment on page 118
- Packing a PTX10001 Chassis or Component for Shipping on page 119

Contacting Customer Support

You can contact Juniper Networks Technical Assistance Center (JTAC) 24 hours a day, 7 days a week in one of the following ways:

- On the Web, using the Service Request Manager link at:

<https://support.juniper.net/support/>

- By telephone:
 - From the US and Canada: 1-888-314-JTAC
 - From all other locations: 1-408-745-9500



NOTE: If contacting JTAC by telephone, enter your 12-digit service request number followed by the pound (#) key if this is an existing case, or press the star (*) key to be routed to the next available support engineer.

When requesting support from JTAC by telephone, be prepared to provide the following information:

- Your existing service request number, if you have one
- Details of the failure or problem

- Type of activity being performed on the device when the problem occurred
- Configuration data displayed by one or more **show** commands
- Your name, organization name, telephone number, fax number, and shipping address

The support representative validates your request and issues an RMA number for return of the component.

Locating the Serial Number on a PTX10001 Chassis or Component

If you are returning a PTX10001 or a PTX10001 field-replaceable unit (FRU) to Juniper Networks for repair or replacement, you must locate the serial number of the router or FRU. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain a Return Materials Authorization (RMA). See [“Returning a Hardware Component to Juniper Networks, Inc.” on page 118](#).

If the PTX10001 is operational and you can access the command-line interface (CLI), you can list serial numbers for the router and some components with a CLI command. If you do not have access to the CLI or if the serial number for the FRU does not appear in the command output, you can locate the serial number ID label on the router or FRU.



NOTE: If you want to find the serial number ID label on a component, you need to remove the component from the chassis, for which you must have the required parts and tools available.



NOTE: You must remove the fan module to read the serial number from the serial number ID label. The fan module serial number cannot be viewed through the CLI.

- [Listing the Chassis and Component Details by Using the CLI on page 116](#)
- [Locating the Chassis Serial Number ID Label on a PTX10001 on page 117](#)
- [Locating the Serial Number ID Labels on FRU Components on page 117](#)

Listing the Chassis and Component Details by Using the CLI

To list the PTX10001 and components and their serial numbers, use the **show chassis hardware** CLI operational mode command.

```
user@host> show chassis hardware
```

```
Hardware inventory:
Item          Version  Part number  Serial number  Description
Chassis                               00000        JNP10001-20C [PTX10001]
Pseudo CB 0
Routing Engine 0
FPC 0         REV 09   750-071236   ACVE0400       JNP10001-CHAS
  CPU         REV 06   711-068842   ACVE0775       JNP10001-CPU
  PIC 0       BUILTIN  BUILTIN      20X100G
    Xcvr 0    REV 01   740-061409   1GCQA127069    QSFP-100GBASE-LR4-T2
    Xcvr 1    REV 01   740-032986   QF460216       QSFP+-40G-SR4
```

Xcvr 2	REV 01	740-061408	1HTQ5051H0Z-Q	QSFP-100G-CWDM4
Xcvr 4	REV 01	740-032986	QF4701ED	QSFP+-40G-SR4
Xcvr 5	REV 01	740-038623	MOC12106230128	QSFP+-40G-CU1M
Xcvr 6	REV 01	740-061405	1ECQ11391HN	QSFP-100GBASE-SR4
Xcvr 8	REV 01	740-062254	1AMP2225062	QSFP+40GE-LX4
Xcvr 10	REV 01	740-032986	QF450185	QSFP+-40G-SR4
Xcvr 11	REV 01	740-061408	1AMQ522803Y	QSFP-100G-CWDM4
Xcvr 12	REV 01	740-058732	1GCQA1470PQ	QSFP-100GBASE-LR4
Xcvr 13	REV 01	740-053202	APF1716010875J	QSFP+-40G-ACU10M
Xcvr 14	REV 01	740-032986	QF4900EC	QSFP+-40G-SR4
Xcvr 15	REV 01	740-064980	1ACS720800T	QSFP28-100G-AOC-30M
Xcvr 18	REV 01	740-061001	1PC422020KP	QSFP28-100G-CU3M
Xcvr 19	FEV 01	740-052306	APF16260052LUL	QSFP+-40G-ACU5M
PIC 1	REV 11	750-069308	CAHY4373	16xQSFP28 Macsec TIC
Xcvr 0	REV 01	740-061409	1AMQA11501W	QSFP-100GBASE-LR4-T2
Xcvr 1	REV 01	740-061409	1FCQA14800G	QSFP-100GBASE-LR4-T2
Xcvr 2	REV 01	740-038624	MOC15266240025	QSFP+-40G-CU3M
Xcvr 4	REV 01	740-032986	ES400LR	QSFP+-40G-SR4
Xcvr 5	REV 01	740-061405	1ECQ1119089	QSFP-100GBASE-SR4
Xcvr 7	REV 01	740-032986	QF4503W3	QSFP+-40G-SR4
Xcvr 9	REV 01	740-038624	MOC16416241425	QSFP+-40G-CU3M
Xcvr 10	REV 01	740-064103	BU10009	QSFP+40GE-SWDM4
Xcvr 12	REV 01	740-061001	1PC422020HN	QSFP28-100G-CU3M
Xcvr 13	REV 01	740-068217	1ACS520803Q	QSFP28-100G-AOC-15M
Xcvr 14	REV 01	740-062254	1AMP203400R	QSFP+40GE-LX4
Xcvr 15	REV 01	740-038153	MOC11411530901	QSFP+-40G-CU3M
Power Supply 0	REV 04	740-053352	1GD16491144	JPSU-850W-AC-AFO
Power Supply 1	REV 04	740-053352	1GD16490978	JPSU-850W-AC-AFO
Fan Tray 0				PTX10001-M20C Fan
Controller 0, Front to Back Airflow - AFO				
Fan Tray 1				PTX10001-M20C Fan
Controller 1, Front to Back Airflow - AFO				
Fan Tray 2				PTX10001-M20C Fan
Controller 2, Front to Back Airflow - AFO				
Fan Tray 3				PTX10001-M20C Fan
Controller 3, Front to Back Airflow - AFO				
Fan Tray 4				PTX10001-M20C Fan
Controller 4, Front to Back Airflow - AFO				

Locating the Chassis Serial Number ID Label on a PTX10001

The serial number ID label is located on a label on the top cover.

Locating the Serial Number ID Labels on FRU Components

For each FRU, you must remove the FRU from the chassis to see the FRU's serial number ID label.

- AC power supply—The serial number ID label is on the top of the AC power supply.
- DC power supply—The serial number ID label is on the top of the DC power supply.
- Fan module—The serial number ID label is on the top of the fan module.

See Also

Returning a Hardware Component to Juniper Networks, Inc.

In the event of a hardware failure, please contact Juniper Networks, Inc. to obtain a Return Material Authorization (RMA) number. This number is used to track the returned material at the factory and to return repaired or new components to the customer as needed.



NOTE: Do not return any component to Juniper Networks, Inc. unless you have first obtained an RMA number. Juniper Networks, Inc. reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer by collect freight.

For more information about return and repair policies, see the customer support Web page at <https://support.juniper.net/support/>.

For product problems or technical support issues, contact the Juniper Networks Technical Assistance Center (JTAC) by using the Service Request Manager link at <https://support.juniper.net/support/> or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

To return a defective hardware component:

1. Determine the part number and serial number of the defective component.
2. Obtain an RMA number from the Juniper Networks Technical Assistance Center (JTAC). You can send e-mail or telephone as described above.
3. Provide the following information in your e-mail message or during the telephone call:
 - Part number and serial number of component
 - Your name, organization name, telephone number, and fax number
 - Description of the failure
4. The support representative validates your request and issues an RMA number for return of the component.
5. Pack the component for shipment.

Guidelines for Packing Hardware Components for Shipment

To pack and ship individual components:

- When you return components, make sure they are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
- Use the original shipping materials if they are available.

- Place individual components in antistatic bags.
- Write the RMA number on the exterior of the box to ensure proper tracking.



CAUTION: Do not stack any of the hardware components.

Packing a PTX10001 Chassis or Component for Shipping

If you are returning a PTX10001 or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you pack a PTX10001 or component:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 143](#).
- Retrieve the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials (see [“Contacting Customer Support” on page 115](#)).

Ensure that you have the following parts and tools available:

- ESD grounding strap.
- Antistatic bag, one for each component.
- If you are returning the chassis, an appropriate screwdriver for the mounting screws used on your rack or cabinet.
- [Packing a PTX10001 for Shipping on page 119](#)
- [Packing PTX10001 Components for Shipping on page 120](#)

Packing a PTX10001 for Shipping

To pack a PTX10001 for shipping:

1. Power off the PTX10001 and remove the AC power cords or DC power cables. See [Powering Off the PTX10001](#).
2. Remove the cables that connect the PTX10001 to all external devices. See [“Disconnecting a Fiber-Optic Cable from the PTX10001” on page 101](#).
3. Remove all field-replaceable units (FRUs) from the router. See:
 - [Removing a Fan Module from the PTX10001 on page 85](#)
 - [Removing a Power Supply from the PTX10001 on page 88](#)
4. Remove the PTX10001 from the rack or cabinet. See [“Uninstalling the PTX10001” on page 107](#).
5. Place the PTX10001 in an antistatic bag.

6. Place the PTX10001 in the shipping carton.
7. Place the packing foam on top of and around the PTX10001.
8. If you are returning accessories or FRUs with the PTX10001, pack them as instructed in [“Packing PTX10001 Components for Shipping” on page 120](#).
9. Close the top of the cardboard shipping box and seal it with packing tape.
10. Write the return materials authorization (RMA) number on the exterior of the box to ensure proper tracking. See [“Returning a Hardware Component to Juniper Networks, Inc.” on page 118](#) for instructions on obtaining an RMA number.

Packing PTX10001 Components for Shipping



CAUTION: Do not stack PTX10001 components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

To pack and ship PTX10001 components:

1. Place individual FRUs in antistatic bags.
2. Ensure that the components are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
3. Close the top of the cardboard shipping box and seal it with packing tape.
4. Write the RMA number on the exterior of the box to ensure proper tracking. See [“Returning a Hardware Component to Juniper Networks, Inc.” on page 118](#) for instructions on obtaining an RMA number.

See Also

Related Documentation

CHAPTER 7

Safety and Compliance Information

- General Safety Guidelines and Warnings on page 122
- Definitions of Safety Warning Levels on page 123
- Qualified Personnel Warning on page 124
- Warning Statement for Norway and Sweden on page 125
- Fire Safety Requirements on page 125
- Installation Instructions Warning on page 126
- Chassis and Component Lifting Guidelines on page 127
- Restricted Access Warning on page 127
- Ramp Warning on page 128
- Rack-Mounting and Cabinet-Mounting Warnings on page 129
- Grounded Equipment Warning on page 133
- Laser and LED Safety Guidelines and Warnings on page 133
- Radiation from Open Port Apertures Warning on page 135
- Maintenance and Operational Safety Guidelines and Warnings on page 136
- General Electrical Safety Guidelines and Warnings on page 141
- Action to Take After an Electrical Accident on page 142
- Prevention of Electrostatic Discharge Damage on page 143
- AC Power Electrical Safety Guidelines on page 144
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- DC Power Electrical Safety Guidelines on page 145
- DC Power Copper Conductors Warning on page 146
- DC Power Disconnection Warning on page 146
- DC Power Grounding Requirements and Warning on page 148
- DC Power Wiring Sequence Warning on page 149
- DC Power Wiring Terminations Warning on page 150
- Multiple Power Supplies Disconnection Warning on page 151
- TN Power Warning on page 152
- PTX10001 Agency Approvals and Compliance Statements on page 153

General Safety Guidelines and Warnings

The following guidelines help ensure your safety and protect the device from damage. The list of guidelines might not address all potentially hazardous situations in your working environment, so be alert and exercise good judgment at all times.

- Perform only the procedures explicitly described in the hardware documentation for this device. Make sure that only authorized service personnel perform other system services.
- Keep the area around the device clear and free from dust before, during, and after installation.
- Keep tools away from areas where people could trip over them while walking.
- Do not wear loose clothing or jewelry, such as rings, bracelets, or chains, which could become caught in the device.
- Wear safety glasses if you are working under any conditions that could be hazardous to your eyes.
- Do not perform any actions that create a potential hazard to people or make the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.
- Never install or manipulate wiring during electrical storms.
- Never install electrical jacks in wet locations unless the jacks are specifically designed for wet environments.
- Operate the device only when it is properly grounded.
- Ensure that the separate protective earthing terminal provided on this device is permanently connected to earth.
- Replace fuses only with fuses of the same type and rating.
- Do not open or remove chassis covers or sheet-metal parts unless instructions are provided in the hardware documentation for this device. Such an action could cause severe electrical shock.
- Do not push or force any objects through any opening in the chassis frame. Such an action could result in electrical shock or fire.
- Avoid spilling liquid onto the chassis or onto any device component. Such an action could cause electrical shock or damage the device.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.
- Some parts of the chassis, including AC and DC power supply surfaces, power supply unit handles, SFB card handles, and fan tray handles might become hot. The following label provides the warning of the hot surfaces on the chassis:



- Always ensure that all modules, power supplies, and cover panels are fully inserted and that the installation screws are fully tightened.

Definitions of Safety Warning Levels

The documentation uses the following levels of safety warnings (there are two *Warning* formats):



NOTE: You might find this information helpful in a particular situation, or you might overlook this important information if it was not highlighted in a Note.



CAUTION: You need to observe the specified guidelines to prevent minor injury or discomfort to you or severe damage to the device.



WARNING: This symbol alerts you to the risk of personal injury from a laser.



WARNING: This symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

Waarschuwing Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.

Varoitus Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.

Attention Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.

Warnung Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.

Avvertenza Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

Advarsel Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.

Aviso Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.

¡Atención! Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.

Varning! Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.

Qualified Personnel Warning



WARNING: Only trained and qualified personnel should install or replace the device.

Waarschuwing Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.

Varoitus Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.

Attention Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.

Warnung Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.

Avvertenza Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.

Advarsel Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.

Aviso Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.

¡Atención! Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.

Varning! Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

Warning Statement for Norway and Sweden



WARNING: The equipment must be connected to an earthed mains socket-outlet.

Advarsel Apparatet skal kobles til en jordet stikkontakt.

Varning! Apparaten skall anslutas till jordat nätuttag.

Fire Safety Requirements

In the event of a fire emergency, the safety of people is the primary concern. You should establish procedures for protecting people in the event of a fire emergency, provide safety training, and properly provision fire-control equipment and fire extinguishers.

In addition, you should establish procedures to protect your equipment in the event of a fire emergency. Juniper Networks products should be installed in an environment suitable for electronic equipment. We recommend that fire suppression equipment be available in the event of a fire in the vicinity of the equipment and that all local fire, safety, and electrical codes and ordinances be observed when you install and operate your equipment.

Fire Suppression

In the event of an electrical hazard or an electrical fire, you should first turn power off to the equipment at the source. Then use a Type C fire extinguisher, which uses noncorrosive fire retardants, to extinguish the fire.

Fire Suppression Equipment

Type C fire extinguishers, which use noncorrosive fire retardants such as carbon dioxide and Halotron™, are most effective for suppressing electrical fires. Type C fire extinguishers displace oxygen from the point of combustion to eliminate the fire. For extinguishing fire on or around equipment that draws air from the environment for cooling, you should use

this type of inert oxygen displacement extinguisher instead of an extinguisher that leaves residues on equipment.

Do not use multipurpose Type ABC chemical fire extinguishers (dry chemical fire extinguishers). The primary ingredient in these fire extinguishers is monoammonium phosphate, which is very sticky and difficult to clean. In addition, in the presence of minute amounts of moisture, monoammonium phosphate can become highly corrosive and corrodes most metals.

Any equipment in a room in which a chemical fire extinguisher has been discharged is subject to premature failure and unreliable operation. The equipment is considered to be irreparably damaged.



NOTE: To keep warranties effective, do not use a dry chemical fire extinguisher to control a fire at or near a Juniper Networks device. If a dry chemical fire extinguisher is used, the unit is no longer eligible for coverage under a service agreement.

We recommend that you dispose of any irreparably damaged equipment in an environmentally responsible manner.

Installation Instructions Warning



WARNING: Read the installation instructions before you connect the device to a power source.

Waarschuwing Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.

Varoitus Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.

Attention Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

Warnung Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.

Avvertenza Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.

Advarsel Les installasjonsinstruksjonene før systemet kobles til strømkilden.

Aviso Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.

¡Atención! Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

Varning! Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

Chassis and Component Lifting Guidelines

- Before moving the device to a site, ensure that the site meets the power, environmental, and clearance requirements.
- Before lifting or moving the device, disconnect all external cables and wires.
- As when lifting any heavy object, ensure that most of the weight is borne by your legs rather than your back. Keep your knees bent and your back relatively straight. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.
- Use the following lifting guidelines to lift devices and components:
 - Up to 39.7 lb (18 kg): One person.
 - 39.7 lb (18 kg) to 70.5 lb (32 kg): Two or more people.
 - 70.5 lb (32 kg) to 121.2 lb (55 kg): Three or more people.
 - Above 121.2 lbs (55 kg): Material handling systems (such as levers, slings, lifts and so on) must be used. When this is not practical, specially trained persons or systems must be used (riggers or movers).

Restricted Access Warning



WARNING: This unit is intended for installation in restricted access areas. A restricted access area is an area to which access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and which is controlled by the authority responsible for the location.

Waarschuwing Dit toestel is bedoeld voor installatie op plaatsen met beperkte toegang. Een plaats met beperkte toegang is een plaats waar toegang slechts door servicepersoneel verkregen kan worden door middel van een speciaal instrument, een slot en sleutel, of een ander veiligheidsmiddel, en welke beheerd wordt door de overheidsinstantie die verantwoordelijk is voor de locatie.

Varoitus Tämä laite on tarkoitettu asennettavaksi paikkaan, johon pääsy on rajoitettua. Paikka, johon pääsy on rajoitettua, tarkoittaa paikkaa, johon vain huoltohenkilöstö pääsee jonkin erikoistyökalun, lukkoon sopivan avaimen tai jonkin muun turvalaitteen avulla ja joka on paikasta vastuussa olevien toimivaltaisten henkilöiden valvoma.

Attention Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout

autre moyen de sécurité. L'accès aux zones de sécurité est sous le contrôle de l'autorité responsable de l'emplacement.

Warnung Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang hat, und der von dem für die Anlage zuständigen Gremium kontrolliert wird.

Avvertenza Questa unità deve essere installata in un'area ad accesso limitato. Un'area ad accesso limitato è un'area accessibile solo a personale di assistenza tramite un'attrezzo speciale, lucchetto, o altri dispositivi di sicurezza, ed è controllata dall'autorità responsabile della zona.

Advarsel Denne enheten er laget for installasjon i områder med begrenset adgang. Et område med begrenset adgang gir kun adgang til servicepersonale som bruker et spesielt verktøy, lås og nøkkel, eller en annen sikkerhetsanordning, og det kontrolleres av den autoriteten som er ansvarlig for området.

Aviso Esta unidade foi concebida para instalação em áreas de acesso restrito. Uma área de acesso restrito é uma área à qual apenas tem acesso o pessoal de serviço autorizado, que possua uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta área é controlada pela autoridade responsável pelo local.

¡Atención! Esta unidad ha sido diseñada para instalarse en áreas de acceso restringido. Área de acceso restringido significa un área a la que solamente tiene acceso el personal de servicio mediante la utilización de una herramienta especial, cerradura con llave, o algún otro medio de seguridad, y que está bajo el control de la autoridad responsable del local.

Varning! Denna enhet är avsedd för installation i områden med begränsat tillträde. Ett område med begränsat tillträde får endast tillträdas av servicepersonal med ett speciellt verktyg, lås och nyckel, eller annan säkerhetsanordning, och kontrolleras av den auktoritet som ansvarar för området.

Ramp Warning



WARNING: When installing the device, do not use a ramp inclined at more than 10 degrees.

Waarschuwing Gebruik een oprijplaat niet onder een hoek van meer dan 10 graden.

Varoitus Älä käytä sellaista kaltevaa pintaa, jonka kaltevuus ylittää 10 astetta.

Attention Ne pas utiliser une rampe dont l'inclinaison est supérieure à 10 degrés.

Warnung Keine Rampen mit einer Neigung von mehr als 10 Grad verwenden.

Avvertenza Non usare una rampa con pendenza superiore a 10 gradi.

Advarsel Bruk aldri en rampe som heller mer enn 10 grader.

Aviso Não utilize uma rampa com uma inclinação superior a 10 graus.

¡Atención! No usar una rampa inclinada más de 10 grados

Varning! Använd inte ramp med en lutning på mer än 10 grader.

Rack-Mounting and Cabinet-Mounting Warnings

Ensure that the rack or cabinet in which the device is installed is evenly and securely supported. Uneven mechanical loading could lead to a hazardous condition.



WARNING: To prevent bodily injury when mounting or servicing the device in a rack, take the following precautions to ensure that the system remains stable. The following directives help maintain your safety:

- The device must be installed in a rack that is secured to the building structure.
- The device should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the device on a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing equipment, install the stabilizers before mounting or servicing the device in the rack.

Waarschuwing Om lichamelijk letsel te voorkomen wanneer u dit toestel in een rek monteert of het daar een servicebeurt geeft, moet u speciale voorzorgsmaatregelen nemen om ervoor te zorgen dat het toestel stabiel blijft. De onderstaande richtlijnen worden verstrekt om uw veiligheid te verzekeren:

- De Juniper Networks switch moet in een stellage worden geïnstalleerd die aan een bouwsel is verankerd.
- Dit toestel dient onderaan in het rek gemonteerd te worden als het toestel het enige in het rek is.

- Wanneer u dit toestel in een gedeeltelijk gevuld rek monteert, dient u het rek van onderen naar boven te laden met het zwaarste onderdeel onderaan in het rek.
- Als het rek voorzien is van stabiliseringshulpmiddelen, dient u de stabilisatoren te monteren voordat u het toestel in het rek monteert of het daar een servicebeurt geeft.

Varoitus Kun laite asetetaan telineeseen tai huolletaan sen ollessa telineessä, on noudatettava erityisiä varotoimia järjestelmän vakavuuden säilyttämiseksi, jotta vältetään loukkaantumiselta. Noudata seuraavia turvallisuusohjeita:

- Juniper Networks switch on asennettava telineeseen, joka on kiinnitetty rakennukseen.
- Jos telineessä ei ole muita laitteita, aseta laite telineen alaosaan.
- Jos laite asetetaan osaksi täytettyyn telineeseen, aloita kuormittaminen sen alaosasta kaikkein raskaimmalla esineellä ja siirry sitten sen yläosaan.
- Jos telinettä varten on vakaimet, asenna ne ennen laitteen asettamista telineeseen tai sen huoltamista siinä.

Attention Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Le rack sur lequel est monté le Juniper Networks switch doit être fixé à la structure du bâtiment.
- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

Warnung Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Der Juniper Networks switch muß in einem Gestell installiert werden, das in der Gebäudestruktur verankert ist.
- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.

- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

Avvertenza Per evitare infortuni fisici durante il montaggio o la manutenzione di questa unità in un supporto, occorre osservare speciali precauzioni per garantire che il sistema rimanga stabile. Le seguenti direttive vengono fornite per garantire la sicurezza personale:

- Il Juniper Networks switch deve essere installato in un telaio, il quale deve essere fissato alla struttura dell'edificio.
- Questa unità deve venire montata sul fondo del supporto, se si tratta dell'unica unità da montare nel supporto.
- Quando questa unità viene montata in un supporto parzialmente pieno, caricare il supporto dal basso all'alto, con il componente più pesante sistemato sul fondo del supporto.
- Se il supporto è dotato di dispositivi stabilizzanti, installare tali dispositivi prima di montare o di procedere alla manutenzione dell'unità nel supporto.

Advarsel Unngå fysiske skader under montering eller reparasjonsarbeid på denne enheten når den befinner seg i et kabinett. Vær nøye med at systemet er stabilt. Følgende retningslinjer er gitt for å verne om sikkerheten:

- Juniper Networks switch må installeres i et stativ som er forankret til bygningsstrukturen.
- Denne enheten bør monteres nederst i kabinettet hvis dette er den eneste enheten i kabinettet.
- Ved montering av denne enheten i et kabinett som er delvis fylt, skal kabinettet lastes fra bunnen og opp med den tyngste komponenten nederst i kabinettet.
- Hvis kabinettet er utstyrt med stabiliseringsutstyr, skal stabilisatorene installeres før montering eller utføring av reparasjonsarbeid på enheten i kabinettet.

Aviso Para se prevenir contra danos corporais ao montar ou reparar esta unidade numa estante, deverá tomar precauções especiais para se certificar de que o sistema possui um suporte estável. As seguintes directrizes ajudá-lo-ão a efectuar o seu trabalho com segurança:

- O Juniper Networks switch deverá ser instalado numa prateleira fixa à estrutura do edifício.
- Esta unidade deverá ser montada na parte inferior da estante, caso seja esta a única unidade a ser montada.
- Ao montar esta unidade numa estante parcialmente ocupada, coloque os itens mais pesados na parte inferior da estante, arrumando-os de baixo para cima.
- Se a estante possuir um dispositivo de estabilização, instale-o antes de montar ou reparar a unidade.

¡Atención! Para evitar lesiones durante el montaje de este equipo sobre un bastidor, oerriormente durante su mantenimiento, se debe poner mucho cuidado en que el sistema quede bien estable. Para garantizar su seguridad, proceda según las siguientes instrucciones:

- El Juniper Networks switch debe instalarse en un bastidor fijado a la estructura del edificio.
- Colocar el equipo en la parte inferior del bastidor, cuando sea la única unidad en el mismo.
- Cuando este equipo se vaya a instalar en un bastidor parcialmente ocupado, comenzar la instalación desde la parte inferior hacia la superior colocando el equipo más pesado en la parte inferior.
- Si el bastidor dispone de dispositivos estabilizadores, instalar éstos antes de montar o proceder al mantenimiento del equipo instalado en el bastidor.

Varning! För att undvika kroppsskada när du installerar eller utför underhållsarbete på denna enhet på en ställning måste du vidta särskilda försiktighetsåtgärder för att försäkra dig om att systemet står stadigt. Följande riktlinjer ges för att trygga din säkerhet:

- Juniper Networks switch måste installeras i en ställning som är förankrad i byggnadens struktur.
 - Om denna enhet är den enda enheten på ställningen skall den installeras längst ned på ställningen.
 - Om denna enhet installeras på en delvis fylld ställning skall ställningen fyllas nedifrån och upp, med de tyngsta enheterna längst ned på ställningen.
 - Om ställningen är försedd med stabiliseringsdon skall dessa monteras fast innan enheten installeras eller underhålls på ställningen.
-

Grounded Equipment Warning



WARNING: The device is intended to be grounded. During normal use, ensure that you have connected earth ground to the chassis.

Waarschuwing Deze apparatuur hoort geaard te worden. Zorg dat de host-computer tijdens normaal gebruik met aarde is verbonden.

Varoitus Tämä laitteisto on tarkoitettu maadoitettavaksi. Varmista, että isäntälaitte on yhdistetty maahan normaalikäytön aikana.

Attention Cet équipement doit être relié à la terre. S'assurer que l'appareil hôte est relié à la terre lors de l'utilisation normale.

Warnung Dieses Gerät muß geerdet werden. Stellen Sie sicher, daß das Host-Gerät während des normalen Betriebs an Erde gelegt ist.

Avvertenza Questa apparecchiatura deve essere collegata a massa. Accertarsi che il dispositivo host sia collegato alla massa di terra durante il normale utilizzo.

Advarsel Dette utstyret skal jordes. Forviss deg om vertsterminalen er jordet ved normalt bruk.

Aviso Este equipamento deverá estar ligado à terra. Certifique-se que o host se encontra ligado à terra durante a sua utilização normal.

¡Atención! Este equipo debe conectarse a tierra. Asegurarse de que el equipo principal esté conectado a tierra durante el uso normal.

Varning! Denna utrustning är avsedd att jordas. Se till att värdenheten är jordad vid normal användning.

Laser and LED Safety Guidelines and Warnings

Juniper Networks devices are equipped with laser transmitters, which are considered a Class 1 Laser Product by the U.S. Food and Drug Administration and are evaluated as a Class 1 Laser Product per EN 60825-1 requirements.

Observe the following guidelines and warnings:

- [General Laser Safety Guidelines on page 134](#)
- [Class 1 Laser Product Warning on page 134](#)
- [Class 1 LED Product Warning on page 134](#)
- [Laser Beam Warning on page 135](#)

General Laser Safety Guidelines

When working around ports that support optical transceivers, observe the following safety guidelines to prevent eye injury:

- Do not look into unterminated ports or at fibers that connect to unknown sources.
- Do not examine unterminated optical ports with optical instruments.
- Avoid direct exposure to the beam.



WARNING: Unterminated optical connectors can emit invisible laser radiation. The lens in the human eye focuses all the laser power on the retina, so focusing the eye directly on a laser source—even a low-power laser—could permanently damage the eye.

Class 1 Laser Product Warning



WARNING: Class 1 laser product.

Waarschuwing Klasse-1 laser produkt.

Varoitus Luokan 1 lasertuote.

Attention Produit laser de classe I.

Warnung Laserprodukt der Klasse 1.

Avvertenza Prodotto laser di Classe 1.

Advarsel Laserprodukt av klasse 1.

Aviso Produto laser de classe 1.

¡Atención! Producto láser Clase I.

Varning! Laserprodukt av klass 1.

Class 1 LED Product Warning



WARNING: Class 1 LED product.

Waarschuwing Klasse 1 LED-product.

Varoitus Luokan 1 valodiodituote.

Attention Alarme de produit LED Class I.

Warnung Class 1 LED-Produktwarnung.

Avvertenza Avvertenza prodotto LED di Classe 1.

Advarsel LED-produkt i klasse 1.

Aviso Produto de classe 1 com LED.

¡Atención! Aviso sobre producto LED de Clase 1.

Varning! Lysdiodprodukt av klass 1.

Laser Beam Warning



WARNING: Do not stare into the laser beam or view it directly with optical instruments.

Waarschuwing Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.

Varoitus Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.

Attention Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.

Warnung Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.

Avvertenza Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.

Advarsel Stirr eller se ikke direkte p strlen med optiske instrumenter.

Aviso Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.

¡**Atención!** No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.

Varning! Rikta inte blicken in mot strålen och titta inte direkt på den genom optiska instrument.

Radiation from Open Port Apertures Warning



WARNING: Because invisible radiation might be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.

Waarschuwing Aangezien onzichtbare straling vanuit de opening van de poort kan komen als er geen fiberkabel aangesloten is, dient blootstelling aan straling en het kijken in open openingen vermeden te worden.

Varoitus Koska portin aukosta voi emittoitua näkymätöntä säteilyä, kun kuitukaapelia ei ole kytkettynä, vältä säteilylle altistumista äläkä katso avoimiin aukkoihin.

Attention Des radiations invisibles à l'il nu pouvant traverser l'ouverture du port lorsqu'aucun câble en fibre optique n'y est connecté, il est recommandé de ne pas regarder fixement l'intérieur de ces ouvertures.

Warnung Aus der Port-Öffnung können unsichtbare Strahlen emittieren, wenn kein Glasfaserkabel angeschlossen ist. Vermeiden Sie es, sich den Strahlungen auszusetzen, und starren Sie nicht in die Öffnungen!

Avvertenza Quando i cavi in fibra non sono inseriti, radiazioni invisibili possono essere emesse attraverso l'apertura della porta. Evitate di esporvi alle radiazioni e non guardate direttamente nelle aperture.

Advarsel Unngå utsettelse for stråling, og stirr ikke inn i åpninger som er åpne, fordi usynlig stråling kan emitteres fra portens åpning når det ikke er tilkoblet en fiberkabel.

Aviso Dada a possibilidade de emissão de radiação invisível através do orifício da via de acesso, quando esta não tiver nenhum cabo de fibra conectado, deverá evitar a exposição à radiação e não deverá olhar fixamente para orifícios que se encontrarem a descoberto.

¡Atención! Debido a que la apertura del puerto puede emitir radiación invisible cuando no existe un cable de fibra conectado, evite mirar directamente a las aperturas para no exponerse a la radiación.

Varning! Osynlig strålning kan avges från en portöppning utan ansluten fiberkabel och du bör därför undvika att bli utsatt för strålning genom att inte stirra in i oskyddade öppningar.

Maintenance and Operational Safety Guidelines and Warnings

While performing the maintenance activities for devices, observe the following guidelines and warnings:

- [Battery Handling Warning on page 137](#)
- [Jewelry Removal Warning on page 138](#)
- [Lightning Activity Warning on page 139](#)
- [Operating Temperature Warning on page 139](#)
- [Product Disposal Warning on page 141](#)

Battery Handling Warning



WARNING: Replacing a battery incorrectly might result in an explosion. Replace a battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Waarschuwing Er is ontploffingsgevaar als de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type dat door de fabrikant aanbevolen is. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften weggeworpen te worden.

Varoitus Räjähdyksen vaara, jos akku on vaihdettu väärään akkuun. Käytä vaihtamiseen ainoastaan saman- tai vastaavantyyppistä akkua, joka on valmistajan suosittelema. Hävitä käytetyt akut valmistajan ohjeiden mukaan.

Attention Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

Warnung Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

Advarsel Det kan være fare for eksplosjon hvis batteriet skiftes på feil måte. Skift kun med samme eller tilsvarende type som er anbefalt av produsenten. Kasser brukte batterier i henhold til produsentens instruksjoner.

Avvertenza Pericolo di esplosione se la batteria non è installata correttamente. Sostituire solo con una di tipo uguale o equivalente, consigliata dal produttore. Eliminare le batterie usate secondo le istruzioni del produttore.

Aviso Existe perigo de explosão se a bateria for substituída incorrectamente. Substitua a bateria por uma bateria igual ou de um tipo equivalente recomendado pelo fabricante. Destrua as baterias usadas conforme as instruções do fabricante.

¡Atención! Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería exclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

Varning! Explosionsfara vid felaktigt batteribyte. Ersätt endast batteriet med samma batterityp som rekommenderas av tillverkaren eller motsvarande. Följ tillverkarens anvisningar vid kassering av använda batterier.

Jewelry Removal Warning



WARNING: Before working on equipment that is connected to power lines, remove jewelry, including rings, necklaces, and watches. Metal objects heat up when connected to power and ground and can cause serious burns or can be welded to the terminals.

Waarschuwing Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.

Varoitus Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitäntänapoihin.

Attention Avant d'accéder à cet équipement connecté aux lignes électriques, ôter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés à l'alimentation et reliés à la terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.

Warnung Vor der Arbeit an Geräten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließlich Ringe, Ketten und Uhren) abnehmen. Metallgegenstände erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschlußklemmen angeschweißt werden.

Avvertenza Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo può saldarsi ai terminali.

Advarsel Fjern alle smykker (inkludert ringer, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.

Aviso Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.

¡Atención! Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los

objetos de metal se calientan cuando se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.

Varning! Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledning. Metallobjekt hettas upp när de kopplas ihop med ström och jord och kan förorsaka allvarliga brännskador; metallobjekt kan också sammansvetsas med kontakterna.

Lightning Activity Warning



WARNING: Do not work on the system or connect or disconnect cables during periods of lightning activity.

Waarschuwing Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.

Varoitus Älä työskentele järjestelmän parissa äläkä yhdistä tai irrota kaapeleita ukkosilmalla.

Attention Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.

Warnung Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.

Avvertenza Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.

Advarsel Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller lyner.

Aviso Não trabalhe no sistema ou ligue e desligue cabos durante períodos de mau tempo (trovoada).

¡Atención! No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.

Varning! Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.

Operating Temperature Warning



WARNING: To prevent the device from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature. To

prevent airflow restriction, allow at least 6 in. (15.2 cm) of clearance around the ventilation openings.

Waarschuwing Om te voorkomen dat welke switch van de Juniper Networks router dan ook oververhit raakt, dient u deze niet te bedienen op een plaats waar de maximale aanbevolen omgevingstemperatuur van 40° C wordt overschreden. Om te voorkomen dat de luchtstroom wordt beperkt, dient er minstens 15,2 cm speling rond de ventilatie-openingen te zijn.

Varoitus Ettei Juniper Networks switch-sarjan reititin ylikuumentuusi, sitä ei saa käyttää tilassa, jonka lämpötila ylittää korkeimman suositellun ympäristölämpötilan 40° C. Ettei ilmanvaihto estyisi, tuuletusaukkojen ympärille on jätettävä ainakin 15,2 cm tilaa.

Attention Pour éviter toute surchauffe des routeurs de la gamme Juniper Networks switch, ne l'utilisez pas dans une zone où la température ambiante est supérieure à 40° C. Pour permettre un flot d'air constant, dégagez un espace d'au moins 15,2 cm autour des ouvertures de ventilations.

Warnung Um einen Router der switch vor Überhitzung zu schützen, darf dieser nicht in einer Gegend betrieben werden, in der die Umgebungstemperatur das empfohlene Maximum von 40° C überschreitet. Um Lüftungsverschluß zu verhindern, achten Sie darauf, daß mindestens 15,2 cm lichter Raum um die Lüftungsöffnungen herum frei bleibt.

Avvertenza Per evitare il surriscaldamento dei switch, non adoperateli in un locale che ecceda la temperatura ambientale massima di 40° C. Per evitare che la circolazione dell'aria sia impedita, lasciate uno spazio di almeno 15.2 cm di fronte alle aperture delle ventole.

Advarsel Unngå overoppheting av eventuelle rutere i Juniper Networks switch Disse skal ikke brukes på steder der den anbefalte maksimale omgivelsestemperaturen overstiger 40° C (104° F). Sørg for at klaringen rundt lufteåpningene er minst 15,2 cm (6 tommer) for å forhindre nedsatt luftsirkulasjon.

Aviso Para evitar o sobreaquecimento do encaminhador Juniper Networks switch, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 40° C. Para evitar a restrição à circulação de ar, deixe pelo menos um espaço de 15,2 cm à volta das aberturas de ventilação.

¡Atención! Para impedir que un encaminador de la serie Juniper Networks switch se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 40° C. Para impedir la restricción de la entrada de aire, deje un espacio mínimo de 15,2 cm alrededor de las aberturas para ventilación.

Varning! Förhindra att en Juniper Networks switch överhettas genom att inte använda den i ett område där den maximalt rekommenderade omgivningstemperaturen på 40° C överskrids. Förhindra att luftcirkulationen

inskränks genom att se till att det finns fritt utrymme på minst 15,2 cm omkring ventilationsöppningarna.

Product Disposal Warning



WARNING: Disposal of this device must be handled according to all national laws and regulations.

Waarschuwing Dit produkt dient volgens alle landelijke wetten en voorschriften te worden afgedankt.

Varoitus Tämän tuotteen lopullisesta hävittämisestä tulee huolehtia kaikkia valtakunnallisia lakeja ja säännöksiä noudattaen.

Attention La mise au rebut définitive de ce produit doit être effectuée conformément à toutes les lois et réglementations en vigueur.

Warnung Dieses Produkt muß den geltenden Gesetzen und Vorschriften entsprechend entsorgt werden.

Avvertenza L'eliminazione finale di questo prodotto deve essere eseguita osservando le normative italiane vigenti in materia

Advarsel Endelig disponering av dette produktet må skje i henhold til nasjonale lover og forskrifter.

Aviso A descartagem final deste produto deverá ser efectuada de acordo com os regulamentos e a legislação nacional.

¡Atención! El desecho final de este producto debe realizarse según todas las leyes y regulaciones nacionales

Varning! Slutlig kassering av denna produkt bör skötas i enlighet med landets alla lagar och föreskrifter.

General Electrical Safety Guidelines and Warnings



WARNING: Certain ports on the device are designed for use as intrabuilding (within-the-building) interfaces only (Type 2 or Type 4 ports as described in *GR-1089-CORE*) and require isolation from the exposed outside plant (OSP) cabling. To comply with NEBS requirements and protect against lightning surges and commercial power disturbances, the intrabuilding ports *must not* be metallically connected to interfaces that connect to the OSP or its wiring. The intrabuilding ports on the device are suitable for connection to intrabuilding or unexposed wiring or cabling only. The addition of primary protectors is not sufficient protection for connecting these interfaces metallically to OSP wiring.



CAUTION: Before removing or installing components of a device, connect an electrostatic discharge (ESD) grounding strap to an ESD point and wrap and fasten the other end of the strap around your bare wrist. Failure to use an ESD grounding strap could result in damage to the device.

- Install the device in compliance with the following local, national, and international electrical codes:
 - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code.
 - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7.
 - Evaluated to the TN power system.
 - Canada—Canadian Electrical Code, Part 1, CSA C22.1.
- Locate the emergency power-off switch for the room in which you are working so that if an electrical accident occurs, you can quickly turn off the power.
- Make sure that grounding surfaces are cleaned and brought to a bright finish before grounding connections are made.
- Do not work alone if potentially hazardous conditions exist anywhere in your workspace.
- Never assume that power is disconnected from a circuit. Always check the circuit before starting to work.
- Carefully look for possible hazards in your work area, such as moist floors, ungrounded power extension cords, and missing safety grounds.
- Operate the device within marked electrical ratings and product usage instructions.
- To ensure that the device and peripheral equipment function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

You can remove and replace many device components without powering off or disconnecting power to the device, as detailed elsewhere in the hardware documentation for this device. Never install equipment that appears to be damaged.

Action to Take After an Electrical Accident

If an electrical accident results in an injury, take the following actions in this order:

1. Use caution. Be aware of potentially hazardous conditions that could cause further injury.
2. Disconnect power from the device.
3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, then call for help.

Prevention of Electrostatic Discharge Damage

Device components that are shipped in antistatic bags are sensitive to damage from static electricity. Some components can be impaired by voltages as low as 30 V. You can easily generate potentially damaging static voltages whenever you handle plastic or foam packing material or if you move components across plastic or carpets. Observe the following guidelines to minimize the potential for electrostatic discharge (ESD) damage, which can cause intermittent or complete component failures:

- Always use an ESD wrist strap when you are handling components that are subject to ESD damage, and make sure that it is in direct contact with your skin.

If a grounding strap is not available, hold the component in its antistatic bag (see [Figure 45 on page 143](#)) in one hand and touch the exposed, bare metal of the device with the other hand immediately before inserting the component into the device.



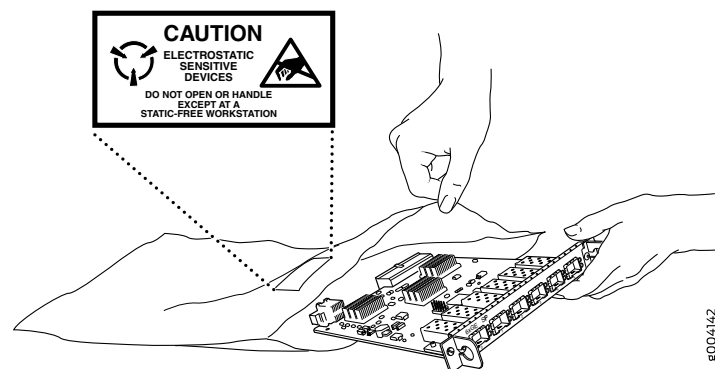
WARNING: For safety, periodically check the resistance value of the ESD grounding strap. The measurement must be in the range 1 through 10 Mohms.

- When handling any component that is subject to ESD damage and that is removed from the device, make sure the equipment end of your ESD wrist strap is attached to the ESD point on the chassis.

If no grounding strap is available, touch the exposed, bare metal of the device to ground yourself before handling the component.

- Avoid contact between the component that is subject to ESD damage and your clothing. ESD voltages emitted from clothing can damage components.
- When removing or installing a component that is subject to ESD damage, always place it component-side up on an antistatic surface, in an antistatic card rack, or in an antistatic bag (see [Figure 45 on page 143](#)). If you are returning a component, place it in an antistatic bag before packing it.

Figure 45: Placing a Component into an Antistatic Bag





CAUTION: ANSI/TIA/EIA-568 cables such as Category 5e and Category 6 can get electrostatically charged. To dissipate this charge, always ground the cables to a suitable and safe earth ground before connecting them to the system.

AC Power Electrical Safety Guidelines



CAUTION: For devices with AC power supplies, an external surge protective device (SPD) must be used at the AC power source.

The following electrical safety guidelines apply to AC-powered devices:

- Note the following warnings printed on the device:

“CAUTION: THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK.”

“ATTENTION: CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PRÉVENIR LES CHOCS ÉLECTRIQUES, DÉBRANCHER TOUT CORDON D'ALIMENTATION AVANT DE FAIRE LE DÉPANNAGE.”

- AC-powered devices are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. Do not circumvent this safety feature. Equipment grounding must comply with local and national electrical codes.
- You must provide an external certified circuit breaker (2-pole circuit breaker or 4-pole circuit breaker based on your device) rated minimum 20 A in the building installation.
- The power cord serves as the main disconnecting device for the AC-powered device. The socket outlet must be near the AC-powered device and be easily accessible.
- For devices that have more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the device is completely removed to prevent electric shock. To disconnect power, unplug all power cords (one for each power supply).

Power Cable Warning (Japanese)

WARNING: The attached power cable is only for this product. Do not use the cable for another product.

注意

附属の電源コードセットはこの製品専用です。
他の電気機器には使用しないでください。

9017253

AC Power Disconnection Warning



WARNING: Before working on the device or near power supplies, unplug all the power cords from an AC-powered device.

Waarschuwing Voordat u aan een frame of in de nabijheid van voedingen werkt, dient u bij wisselstroom toestellen de stekker van het netsnoer uit het stopcontact te halen.

Varoitus Kytke irti vaihtovirtalaitteiden virtajohto, ennen kuin teet mitään asennuspohjalle tai työskentelet virtalähteiden läheisyydessä.

Attention Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.

Warnung Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw.

Avvertenza Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA.

Advarsel Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut på vekselstrømsenheter.

Aviso Antes de trabalhar num chassis, ou antes de trabalhar perto de unidades de fornecimento de energia, desligue o cabo de alimentação nas unidades de corrente alternada.

¡Atención! Antes de manipular el chasis de un equipo o trabajar cerca de una fuente de alimentación, desenchufar el cable de alimentación en los equipos de corriente alterna (CA).

Varning! Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden.

DC Power Electrical Safety Guidelines

- A DC-powered device is equipped with a DC terminal block that is rated for the power requirements of a maximally configured device.

Incorporate an easily accessible disconnect device into the facility wiring. Be sure to connect the ground wire or conduit to a solid office earth ground. A closed loop ring is recommended for terminating the ground conductor at the ground stud.

- Run two wires from the circuit breaker box to a source of 48 VDC.
- A DC-powered device that is equipped with a DC terminal block is intended only for installation in a restricted-access location. In the United States, a restricted-access

area is one in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code ANSI/NFPA 70.



NOTE: Primary overcurrent protection is provided by the building circuit breaker. This breaker must protect against excess currents, short circuits, and earth grounding faults in accordance with NEC ANSI/NFPA 70.

- Ensure that the polarity of the DC input wiring is correct. Under certain conditions, connections with reversed polarity might trip the primary circuit breaker or damage the equipment.
- For personal safety, connect the green and yellow wire to safety (earth) ground at both the device and the supply side of the DC wiring.
- The marked input voltage of –48 VDC for a DC-powered device is the nominal voltage associated with the battery circuit, and any higher voltages are only to be associated with float voltages for the charging function.
- Because the device is a positive ground system, you must connect the positive lead to the terminal labeled **RTN**, the negative lead to the terminal labeled –48 VDC, and the earth ground to the device grounding points.

DC Power Copper Conductors Warning



WARNING: Use copper conductors only.

Waarschuwing Gebruik alleen koperen geleiders.

Varoitus Käytä vain kuparijohtimia.

Attention Utilisez uniquement des conducteurs en cuivre.

Warnung Verwenden Sie ausschließlich Kupferleiter.

Avvertenza Usate unicamente dei conduttori di rame.

Advarsel Bruk bare kobberledninger.

Aviso Utilize apenas fios condutores de cobre.

¡Atención! Emplee sólo conductores de cobre.

Varning! Använd endast ledare av koppar.

DC Power Disconnection Warning



WARNING: Before performing any of the DC power procedures, ensure that power is removed from the DC circuit. To ensure that all power is off, locate

the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the device handle of the circuit breaker in the OFF position.

Waarschuwing Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom naar het gelijkstroom circuit uitgeschakeld is. Om u ervan te verzekeren dat alle stroom UIT is geschakeld, kiest u op het schakelbord de stroomverbreker die het gelijkstroom circuit bedient, draait de stroomverbreker naar de UIT positie en plakt de schakelaarhendel van de stroomverbreker met plakband in de UIT positie vast.

Varoitus Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin, käännä suojakytkin KATKAISTU-asentoon ja teippaa suojakytkimen varsi niin, että se pysyy KATKAISTU-asennossa.

Attention Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifiez que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

Warnung Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

Avvertenza Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

Advarsel Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

Aviso Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

¡Atención! Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para

asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF), y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

Varning! Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.

DC Power Grounding Requirements and Warning

An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors but is identifiable by green and yellow stripes is installed as part of the branch circuit that supplies the device. The grounding conductor is a separately derived system at the supply transformer or motor generator set.



WARNING: When you install the device, the ground connection must always be made first and disconnected last.

Waarschuwing Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.

Varoitus Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.

Attention Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.

Warnung Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.

Avvertenza In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.

Advarsel Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.

Aviso Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.

iAtención! Al instalar el equipo, conectar la tierra la primera y desconectarla la última.

Varning! Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.

DC Power Wiring Sequence Warning



WARNING: Wire the DC power supply using the appropriate lugs. When connecting power, the proper wiring sequence is ground to ground, +RTN to +RTN, then –48 V to –48 V. When disconnecting power, the proper wiring sequence is –48 V to –48 V, +RTN to +RTN, then ground to ground. Note that the ground wire must always be connected first and disconnected last.

Waarschuwing De juiste bedradingsvolgorde verbonden is aarde naar aarde, +RTN naar +RTN, en –48 V naar –48 V. De juiste bedradingsvolgorde losgemaakt is en –48 V naar –48 V, +RTN naar +RTN, aarde naar aarde.

Varoitus Oikea yhdistettävä kytkentäjäjärjestys on maajohto maajohtoon, +RTN varten +RTN, –48 V varten –48 V. Oikea irrotettava kytkentäjäjärjestys on –48 V varten –48 V, +RTN varten +RTN, maajohto maajohtoon.

Attention Câblez l'alimentation d'alimentation CC En utilisant les crochets appropriés à l'extrémité de câblage. En reliant la puissance, l'ordre approprié de câblage est rectifié pour rectifier, +RTN à +RTN, puis –48 V à –48 V. En débranchant la puissance, l'ordre approprié de câblage est –48 V à –48 V, +RTN à +RTN, a alors rectifié pour rectifier. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois.

Warnung Die Stromzufuhr ist nur mit geeigneten Ringösen an das DC Netzteil anzuschliessen. Die richtige Anschlusssequenz ist: Erdanschluss zu Erdanschluss, +RTN zu +RTN und dann –48V zu –48V. Die richtige Sequenz zum Abtrennen der Stromversorgung ist –48V zu –48V, +RTN zu +RTN und dann Erdanschluss zu Erdanschluss. Es ist zu beachten dass der Erdanschluss immer zuerst angeschlossen und als letztes abgetrennt wird.

Avvertenza Mostra la morsettiera dell'alimentatore CC. Cablare l'alimentatore CC usando i connettori adatti all'estremità del cablaggio, come illustrato. La corretta sequenza di cablaggio è da massa a massa, da positivo a positivo (da linea ad L) e da negativo a negativo (da neutro a N). Tenere presente che il filo di massa deve sempre venire collegato per primo e scollegato per ultimo.

Advarsel Riktig tilkoples tilkoplingssekvens er jord til jord, +RTN til +RTN, –48 V til –48 V. Riktig frakoples tilkoplingssekvens er –48 V til –48 V, +RTN til +RTN, jord til jord.

Aviso Ate con alambre la fuente de potencia cc Usando los terminales apropiados en el extremo del cableado. Al conectar potencia, la secuencia apropiada del cableado se muele para moler, +RTN a +RTN, entonces –48 V a –48 V. Al desconectar potencia, la secuencia apropiada del cableado es –48 V a –48 V, +RTN a +RTN, entonces molió para moler. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último.

Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último.

Atención! Wire a fonte de alimentação de DC Usando os talões apropriados na extremidade da fiação. Ao conectar a potência, a seqüência apropriada da fiação é moída para moer, +RTN a +RTN, então -48 V a -48 V. Ao desconectar a potência, a seqüência apropriada da fiação é -48 V a -48 V, +RTN a +RTN, moeu então para moer. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último.

Varning! Korrekt kopplingssekvens ar jord till jord, +RTN till +RTN, -48 V till -48 V. Korrekt kopplas kopplingssekvens ar -48 V till -48 V, +RTN till +RTN, jord till jord.

DC Power Wiring Terminations Warning



WARNING: When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations must be the appropriate size for the wires and must clamp both the insulation and conductor.

Waarschuwing Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitingspunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

Varoitus Jos säikeellinen johdin on tarpeen, käytä hyväksyttyä johdinliitäntää, esimerkiksi suljettua silmukkaa tai kourumaista liitäntää, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitäntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

Attention Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

Warnung Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. für einen geschlossenen Regelkreis oder gabelförmig, mit nach oben gerichteten Kabelschuhen zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

Avvertenza Quando occorre usare trecce, usare connettori omologati, come quelli a occhiello o a forcilla con linguette rivolte verso l'alto. I connettori

devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

Advarsel Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og ledaren.

Aviso Quando forem requeridas montagens de instalação eléctrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

¡Atención! Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de conexión vueltas hacia arriba. Estos terminales deberán ser del tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

Varning! När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av sluten eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

Multiple Power Supplies Disconnection Warning



WARNING: The network device has more than one power supply connection. All connections must be removed completely to remove power from the unit completely.

Waarschuwing Deze eenheid heeft meer dan één stroomtoevoerverbinding; alle verbindingen moeten volledig worden verwijderd om de stroom van deze eenheid volledig te verwijderen.

Varoitus Tässä laitteessa on useampia virtalähdekytkentöjä. Kaikki kytkennät on irrotettava kokonaan, jotta virta poistettaisiin täysin laitteesta.

Attention Cette unité est équipée de plusieurs raccordements d'alimentation. Pour supprimer tout courant électrique de l'unité, tous les cordons d'alimentation doivent être débranchés.

Warnung Diese Einheit verfügt über mehr als einen Stromanschluß; um Strom gänzlich von der Einheit fernzuhalten, müssen alle Stromzufuhren abgetrennt sein.

Avvertenza Questa unità ha più di una connessione per alimentatore elettrico; tutte le connessioni devono essere completamente rimosse per togliere l'elettricità dall'unità.

Advarsel Denne enheten har mer enn én strømtilkobling. Alle tilkoblinger må kobles helt fra for å eliminere strøm fra enheten.

Aviso Este dispositivo possui mais do que uma conexão de fonte de alimentação de energia; para poder remover a fonte de alimentação de energia, deverão ser desconectadas todas as conexões existentes.

¡Atención! Esta unidad tiene más de una conexión de suministros de alimentación; para eliminar la alimentación por completo, deben desconectarse completamente todas las conexiones.

Varning! Denna enhet har mer än en strömförsörjningsanslutning; alla anslutningar måste vara helt avlägsnade innan strömtillförseln till enheten är fullständigt bruten.

TN Power Warning



WARNING: The device is designed to work with a TN power system.

Waarschuwing Het apparaat is ontworpen om te functioneren met TN energiesystemen.

Varoitus Koje on suunniteltu toimimaan TN-sähkövoimajärjestelmien yhteydessä.

Attention Ce dispositif a été conçu pour fonctionner avec des systèmes d'alimentation TN.

Warnung Das Gerät ist für die Verwendung mit TN-Stromsystemen ausgelegt.

Avvertenza Il dispositivo è stato progettato per l'uso con sistemi di alimentazione TN.

Advarsel Utstyret er utfomet til bruk med TN-strømsystemer.

Aviso O dispositivo foi criado para operar com sistemas de corrente TN.

¡Atención! El equipo está diseñado para trabajar con sistemas de alimentación tipo TN.

Varning! Enheten är konstruerad för användning tillsammans med elkraftssystem av TN-typ.

PTX10001 Agency Approvals and Compliance Statements

- [PTX10001 Agency Approvals on page 153](#)
- [Compliance Statements for EMC Requirements on page 154](#)
- [Compliance Statements for Environmental Requirements on page 155](#)
- [Compliance Statements for NEBS on page 155](#)
- [PTX10001 Compliance Statements for Acoustic Noise on page 155](#)

PTX10001 Agency Approvals

The PTX10001 complies with the following standards:

- Safety
 - CAN/CSA-22.2 No. 60950-1-07/UL 60950-1, 2nd Ed., Safety of Information Technology Equipment
 - EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- EMC
 - AS/NZS 3548 Class A (Australia/New Zealand)
 - EN55022 Class A (Europe)
 - FCC Part 15 Class A (USA)
 - VCCI Class A (Japan)
- Immunity
 - EN-61000-3-3 Voltage Fluctuations and Flicker
 - EN-61000-4-2 ESD
 - EN-61000-4-3 Radiated Immunity
 - EN-61000-4-4 EFT
 - EN-61000-4-5 Surge
 - EN-61000-4-6 Low Frequency Common Immunity
- ETSI EN-300386-2 Telecommunication Network Equipment. Electromagnetic Compatibility Requirements

The PTX10001 is designed to comply with the following standard:

- NEBS Level 3
 - GR-1089-Core: EMC and Electrical Safety for Network Telecommunications Equipment
 - GR-63-Core: NEBS Requirements: Physical Protection
 - NEBS GR-1089 Issue 6 requirements



NOTE: The PTX10001 DC power supply does not meet the new battery return bonding isolation requirement (DC-I) of NEBS GR-1089 Issue 7 (Section 9.8.3, R9-16).

Compliance Statements for EMC Requirements

- Canada on page 154
- European Community on page 154
- Israel on page 154
- Japan on page 154
- United States on page 155

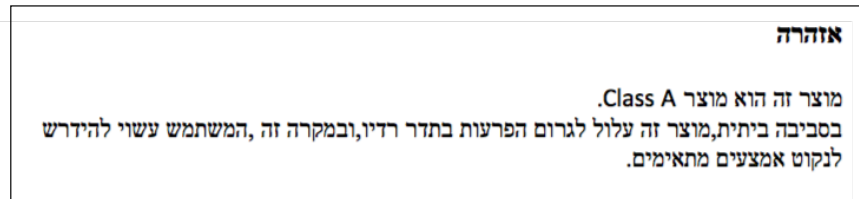
Canada

CAN ICES-3 (A)/NMB-3(A)

European Community

This is a Class A product. In a domestic environment, this product might cause radio interference in which case the user might be required to take adequate measures.

Israel



Translation from Hebrew—Warning: This product is Class A. In residential environments, the product might cause radio interference, and in such a situation, the user might be required to take adequate measures.

Japan

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

The preceding translates as follows:

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this product is used near a radio or television receiver in a domestic environment, it might cause radio interference. Install and use the equipment according to the instruction manual. VCCI-A.

United States

The hardware equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Compliance Statements for Environmental Requirements

Batteries in this product are not based on mercury, lead, or cadmium substances. The batteries used in this product are in compliance with EU Directives 91/157/EEC, 93/86/EEC, and 98/101/EEC. The product documentation includes instructional information about the proper method of reclamation and recycling.

Compliance Statements for NEBS

- The equipment is suitable for installation as part of the Common Bonding Network (CBN).
- The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
- The battery return connection is to be treated as an isolated DC return (that is, DC-I), as defined in GR-1089-CORE.



NOTE:

- PTX10001 meets the NEBS GR-1089 Issue 6 requirements.
 - The PTX10001 DC power supply does not meet the new battery return bonding isolation requirement (DC-I) of NEBS GR-1089 Issue 7 (Section 9.8.3, R9-16).
-
- You must provision a readily accessible device outside of the equipment to disconnect power. The device must also be rated based on local electrical code practice.

PTX10001 Compliance Statements for Acoustic Noise

Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70dB(A) oder weniger gemäss EN ISO 7779

Translation:

The emitted sound pressure is below 70 dB(A) per EN ISO 7779.

