Juniper Networks | Engineering Simplicity

QFX5200 Switch Hardware Guide

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QFX5200 Switch Hardware Guide

The information in this document is current as of the date on the title page.

YEAR 2000 NOTICE

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About the Documentation

IN THIS SECTION

Use this guide to plan, install, perform initial software configuration, perform routine maintenance, and to troubleshoot QFX5200 switches.

After completing the installation and basic configuration procedures covered in this guide, refer to the Junos OS documentation for further software configuration.

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/.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

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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 xiii 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 xiii 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`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*

Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
Italic text like this	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** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• 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** **(*string1* | *string2* | *string3*)**
# (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*]**

Indention and braces ({ })	Identifies a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
GUI Conventions		

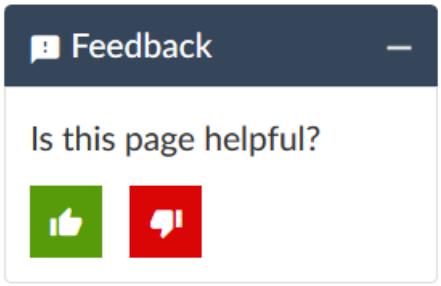
Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	• 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.

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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/.

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CHAPTER

Overview

QFX5200 System Overview

IN THIS SECTION

QFX5200 Switch Description

IN THIS SECTION

The QFX5200 line offers line-rate, low-latency 10/25/40/50/100GbE switches for building large IP fabrics. QFX5200 Switches are an optimal choice for spine-and-leaf IP fabric deployments as well as metro use cases.

This topic covers:

QFX5200 Hardware

IN THIS SECTION

QFX5200 line of switches offer compact 1 U models that provide a line rate configuration packet performance, very low latency, and a rich set of Layer 3 features.

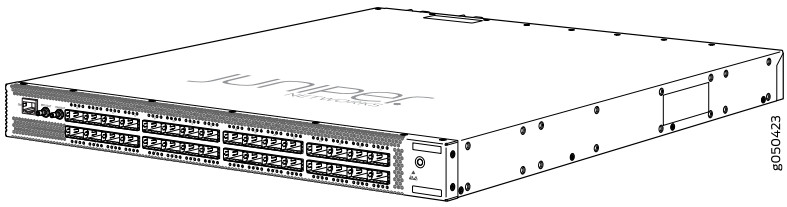
QFX5200-32C and QFX5200-32C-L Hardware

The QFX5200-32C and QFX5200-32C-L are compact 1 U standalone switches that provides a line rate configuration packet performance, very low latency, and a rich set of Layer 3 features. The routing engine and control plane are driven by the 1.8 Ghz quad-core Intel CPU with 16 GB of memory and two 32 GB solid-state drives (SSD) for storage. The QFX5200-32C models run standard Junos Operating System (OS); the QFX5200-32C-L models run Junos OS Evolved.

As shown in Figure 1 on page 19, the QFX5200-32C and QFX5200-32C-L are 100 Gigabit Ethernet top-of-rack switches that support both quad small form-factor pluggable (QSFP+), 100-Gbps QSFP+ (QSFP28) transceivers, and break out cables in the 32 QSFP28 sockets. The ports **0** through **31** can be configured as either uplinks or as access ports. The QSFP28 ports are configured as 100-Gigabit Ethernet ports by default, but can also be configured to speeds of 50, 40, 25, or 10-Gigabit Ethernet.

The QFX5200-32C and QFX5200-32C-L comes standard with redundant fans and redundant power supplies. Switches can be ordered with either ports-to-FRUs or FRUs-to-ports airflow. The QFX5200-32C is available with AC or DC power supplies; the QFX5200-32C-L is available only with AC power supplies.

Figure 1: QFX5200-32C Port Panel



The QFX5200-32C-L is supported as a standalone switch (Junos OS Evolved Release 18.3R1 and later).

The QFX5200-32C can be used as:

- A standalone switch (Junos OS Release 15.1X53-D30 and later).

- A member in an all QFX5200-32C Virtual Chassis (Junos OS Release 17.3R2 and later).

  You can create an all QFX5200-32C Virtual Chassis with up to three members. The QFX5200-32C is used in all three member roles: primary RE, backup RE, and line card.

- A satellite device in a Junos Fusion Provider Edge system (Junos OS Release 18.1R2 and later). A switch in standalone mode must be converted to a satellite device.

QFX5200-48Y Hardware

The QFX5200-48Y is a flexible switch for environments with the need for native 25 Gbps port speeds. The 48 small form-factor pluggable 28 (SFP28) ports support 10 Gbps or native 25 Gbps speeds, and the 6 QSFP28 support either 40 Gbps or 100 Gbps speeds. The 48 SFP28 default to 10 Gigabit Ethernet and must be configured in groups of four ports to support 25 Gigabit Ethernet. You can alternate each group of four ports with either 10 Gbps or 25 Gbps across the 48 ports. For details on configuring the SFP28 ports, see “Port Groups” on page 30.

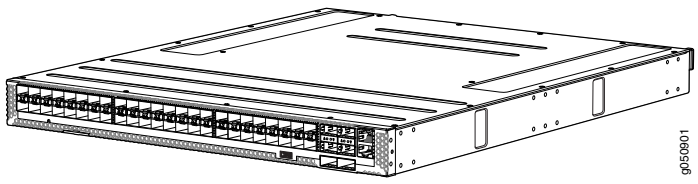
The 6 QSFP28 ports auto-detect the optic speed of transceivers and set the port speed accordingly. The six QSFP28 ports can be channelized when configured to 40 Gigabit Ethernet to 4 independent 10 Gigabit Ethernet ports.

The routing engine and control plane of the switch are driven by the 2.20 Ghz quad-core Intel CPU with 16 GB of memory and a 32 GB solid-state drive (SSD) for storage. The QFX5200-48Y provides an aggregate throughput of 3.6 Tbps (full duplex).

As shown in Figure 2 on page 20, the QFX5200-48Y has a 1 U form factor and comes standard with redundant fans and redundant power supplies. The switch can be ordered with either ports-to-FRUs or FRUs-to-ports airflow and with AC or DCpower supplies.

The QFX5200-48Y is supported on Junos OS Release 18.1R1 and later.

Figure 2: QFX5200-48Y Port Panel



Benefits of QFX5200 Switches

QFX5200 switches offer:

- Future proof and investment protection
- Open and standards based for multi-vendor networks

- Support for Zero Touch Provisioning (ZTP) for simplified operation

QFX5200-32C Channelization

Starting in Junos OS Release 17.3R1, ports are channelized automatically by detecting the cable type. The mode and number of channels are set based on the channel link status:

- When the port is configured for 40-Gigabit Ethernet and a 4x10G breakout cable is detected, the system converts the port into 4 independent 10-Gigabit Ethernet ports
- When the port is configured for 100-Gigabit Ethernet and a 2x50G breakout cable is detected, the system converts the port into 2 independent 50-Gigabit Ethernet ports
- When the port is configured for 100-Gigabit Ethernet and a 4x25G breakout cable is detected, the system converts the port into 4 independent 25-Gigabit Ethernet ports

QFX5200-32C-L Channelization

Starting in Junos OS Evolved Release 18.3R1, ports can be channelized by configuration.

- When the port is configured for 40-Gigabit Ethernet and a 4x10G breakout cable is detected, the system converts the port into 4 independent 10-Gigabit Ethernet ports
- When the port is configured for 100-Gigabit Ethernet and a 4x25G breakout cable is detected, the system converts the port into 4 independent 25-Gigabit Ethernet ports

QFX5200-48Y Channelization

When one of the 6 QSFP28 ports are configured for 40-Gigabit Ethernet and a 4x10G breakout cable is detected, the system converts the port into 4 independent 10-Gigabit Ethernet ports. Channelization is not supported on the 48 SFP28 ports.

System Software

Customers who purchase a QFX5200-32C or QFX5200-48Y may either enable the Junos OS by purchasing a Junos OS Base Services license. Customers purchasing a QFX5200-32C-L enable Junos OS Evolved by purchasing a Junos OS Evolved Base Services license.

QFX Series devices use the Junos OS, which provides Layer 2 and Layer 3 switching, routing, and security services. The Junos image is installed on one of the 32 GB solid state drives.The Junos OS Evolved software running on the QFX5200-32C-L does not support Layer 2 features.

For more information about which features are supported on QFX Series devices, see Feature Explorer.

You manage the switch using the Junos OS command-line interface (CLI), accessible through the console and out-of-band management ports on the device.

QFX5200 Hardware Component Overview

The QFX5200 supports the components in listed in alphabetic order.

Table 3: QFX5200 Hardware Components

Component	Chassis Model	Spare Juniper Model Number	CLI Output
Chassis	QFX5200-32C QFX5200-32C-L QFX5200-48Y	Not available QFX5200-32C-CHAS QFX5200-48Y-CHAS	QFX5200-32C-32Q QFX5200-32C-L QFX5200-48Y
Fan module	QFX5200-32C and QFX5200-32C-L	QFX5200-32C-FANAFI (FRUs to ports airflow) QFX5200-32C-FANAFO (Ports to FRUs airflow)	**Fan tray *n* fan-*n*** Back to Front Airflow - AFI **Fan tray *n* fan-*n*** Front to Back Airflow - AFO
	QFX5200-48Y	QFX520048Y-FAN-AI (FRUs to ports airflow) QFX520048Y-FAN-AO (Ports to FRUs airflow)	**Fan tray *n* fan-*n*** Back to Front Airflow - AFI **Fan tray *n* fan-*n*** Front to Back Airflow - AFO

Table 3: QFX5200 Hardware Components *(continued)*

Component	Chassis Model	Spare Juniper Model Number	CLI Output
Power supplies	QFX5200-32C and QFX5200-32C-L	JPSU-850W-AC-AFI (FRUs to ports airflow) JPSU-850W-AC-AFO (Ports to FRUs airflow)	**AC AFI 850W PSU** **AC AFO 850W PSU**
	QFX5200-32C	JPSU-850W-DC-AFI (FRUs to ports airflow) JPSU-850W-DC-AFO (Ports to FRUs airflow)	**DC AFI 850W PSU** **DC AFO 850W PSU**
	QFX5200-48Y	QFX520048Y-APSU-AI (FRUs to ports airflow) QFX520048Y-APSU-AO (Ports to FRUs airflow) QFX520048Y-DPSU-AI (FRUs to ports airflow) QFX520048Y-DPSU-AO (Ports to FRUs airflow)	**AC AFI 650W PSU** **AC AFO 650W PSU** **DC AFI 650W PSU** **DC AFO 650W PSU**

SEE ALSO

QFX5200 Port Panels | **25**
QFX5200 Cooling System | **43**

QFX5200 Component Redundancy

The following hardware components provide redundancy on a QFX5200 switch:

- Power supplies—The QFX5200 switches have one or two power supplies. Each power supply provides power to all components in the switch. If two power supplies are installed, 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 QFX5200-32C and QFX5200-32C-L switch models have five fan modules. The QFX5200-48Y switch models has six fan modules. If a fan module fails and is unable to keep the QFX5200 switch within the desired temperature thresholds, chassis alarms occur and the QFX5200 switch can shut down.

QFX5200 Field-Replaceable Units

Field-replaceable units (FRUs) are components that you can replace at your site. The QFX5200 device FRUs are hot-insertable and hot-removable: you can remove and replace one of them without powering off the switch or disrupting the switching function.

> **CAUTION:** Replace a failed power supply with a new power supply within one minute of removal to prevent chassis overheating. The switch continues to operate with only one power supply running. Replace a failed fan module with a new fan module within one minute of removal to prevent chassis overheating. Do not operate the switch with missing FRUs for longer than one minute.

Table 4 on page 24 lists the FRUs for the QFX5200 device and actions to take before removing them.

Table 4: FRUs in a QFX5200 Switch

FRU	Required Action
Power supplies	None.
Fan modules	None.
Optical transceivers	None. We recommend that you disable the interface using the **set interfaces *interface-name* disable** command before you remove the transceiver. See "Disconnect a Fiber-Optic Cable" on page 143

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.

RELATED DOCUMENTATION

Installing and Removing QFX5200 Hardware Components

QFX5200 Cooling System | 43

QFX5200 Power System | 52

QFX5200 Port Panels

IN THIS SECTION

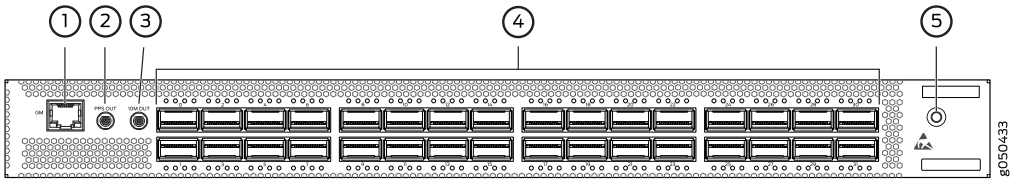
QFX5200-32C and QFX5200-32C-L Port Panel

IN THIS SECTION

The port panel of the QFX5200-32C and QFX5200-32C-L supports port configuration speeds of 100, 50, 40, 25, or 10 Gigabit Ethernet. The QFX5200-32C and QFX500-32C-L uses 28-Gbps quad small-form factor pluggable plus (QSFP28) sockets that are configured as 100 Gigabit Ethernet ports by default. Any of the 32 ports **0** through **31** can be configured as uplinks or as access ports.

Figure 3 on page 26 shows the port panel of the QFX5200-32C and QFX5200-32C-L.

Figure 3: QFX5200-32C and QFX5200-32C-L Port Panel



1–RJ45 connection to grand master clock	4–32 QSFP28 ports
2–1 pulse per second (PPS) output connection for clocking messages	5–Electrostatic discharge (ESD) terminal
3–Output clock at 10 Mhz	

This topic describes:

Network Ports

The QFX5200-32C and QFX5200-32C-L network ports, (**0** to **31**) support:

- 100 Gbps QSFP28 transceivers
- 40 Gbps QSFP+ transceivers
- 100 Gbps active optical cables (AOC)

> **NOTE:** For interoperability with other QFX Series switches, ensure auto-negotiation on the QFX5200-32C is disabled.

- 40 Gbps AOC
- QSFP28 direct attach copper (DAC) cables
- QSFP+ DAC cables
- (QFX5200-32C only) QSFP+ to QSFP+ direct attach copper break out (DACBO) cables (100 Gbps breaks out to 50 Gbps or 25 Gbps)
- (QFX5200-32C only) QSFP+ to SFP+ DACBO cables (40 Gbps breaks out to 10 Gbps)

Starting in Junos OS Release 19.3R1, you can also use a QSFP+ to SFP+ adapter (QSA) in the QSFP+ ports to provide either 40 Gigabit Ethernet or 4x10 Gigabit Ethernet speeds.

Channelizing Interfaces

For downstream traffic, the QFX5200-32C has 32 physical or 128 logical ports (32 x 4) that can be used for port channelization. The 100 Gigabit Ethernet ports can be channelized using breakout cables either to 2 independent downstream 50 Gigabit Ethernet or to 4 independent 25 Gigabit Ethernet ports. The default 100 Gigabit Ethernet ports can also be configured as 40 Gigabit Ethernet and in this configuration can either operate as dedicated 40 Gigabit Ethernet ports or can be channelized to 4 independent 10 Gigabit Ethernet ports using breakout cables.

The QFX5200-32C ports support auto-channelization starting in Junos OS Release 15.1X53-D230.

The QFX5200-32C-L does not support channelization.

Network Port LEDs

The Link/Activity LED configuration for QFX5200-32C and QFX5200-32C-L switches use bi-colored LEDs. The link LED indicates link activity or a fault. See Table 5 on page 27.

Table 5: QFX5200-32C and QFX5200-32C-L Access Port and Uplink LED Locations

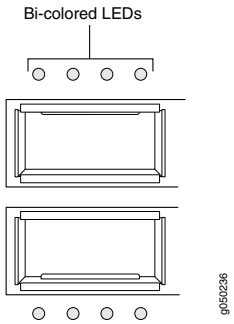
Port Type	Indicators	Location
QSFP28 and QSFP+	Speed Link Status Channelization	**Figure 4: QFX5200-32C and QFX5200-32C-L Port LEDs** 

Table 6 on page 28 describes how to interpret the QSFP28 port LEDs.

Table 6: Network Port LEDs on QSFP28 Ports on a QFX5200-32C and QFX5200-32C-L Switch

Color	State	QFX5200-32C and QFX5200-32C-L Description
Unlit	Off	The port is administratively disabled, there is no power, the link is down, or there is a fault.
		When configured for 25-Gigabit Ethernet, the LED remains unlit only if all four of the 25-Gigabit Ethernet QSFP+ breakout links are down.
Green	On steadily	A link is established, but there is no link activity.
		When configured for 25-Gigabit Ethernet, the LED is lit green when at least one of the four 25-Gigabit Ethernet QSFP+ breakout links is established.
	Blinking	A link is established, and there is link activity.
		When configured for 25-Gigabit Ethernet, the LED is lit green when at least one of the four 25-Gigabit Ethernet QSFP+ breakout links is established.
Amber	Blinking	The beacon is enabled on the port.

As shown in Table 7 on page 28, there are four bi-color LEDs for each QSFP+ port. The first LED is used and the remaining LEDs are not used when the interface is configured for 100-Gigabit Ethernet and connected to a QSFP28 transceiver. All four LEDs are used when the interface is configured for 25-Gigabit Ethernet and the port is connected using an optical splitter cable or a copper DACBO cable.
Table 7 on page 28 describes how to interpret the QSFP+ LEDs.

Table 7: Network Port Link/Activity LEDs on QSFP+ Ports on a QFX5200-32C and QFX5200-32C-L

Color	State	Description
Unlit	Off	The port is administratively disabled, there is no power, the link is down, or there is a fault. **NOTE:** When configured for 10-Gigabit Ethernet, the LED remains unlit only if all four of the 10-Gigabit Ethernet SFP+ breakout links are down.
Green	On steadily	A link is established, but there is no link activity. **NOTE:** When configured for 10-Gigabit Ethernet, the LED is lit green when at least one of the four 10-Gigabit Ethernet SFP+ breakout links is established.
	Blinking	A link is established, and there is link activity. **NOTE:** When configured for 10-Gigabit Ethernet, the LED is lit green when at least one of the four 10-Gigabit Ethernet SFP+ breakout links is established.

Table 7: Network Port Link/Activity LEDs on QSFP+ Ports on a QFX5200-32C and QFX5200-32C-L *(continued)*

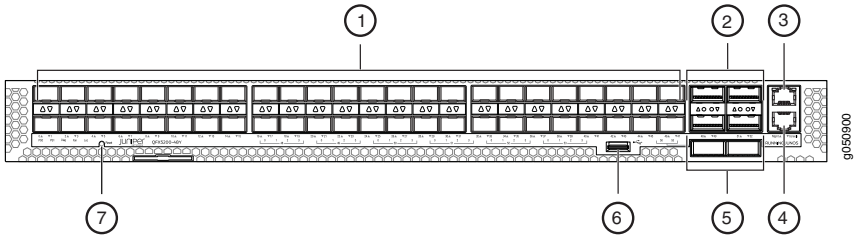
Color	State	Description
Amber	Blinking	All four LEDs blink to indicate the beacon function was enabled on the port.

QFX5200-48Y Port Panel

IN THIS SECTION

The port panel of the QFX5200-48Y supports port configuration speeds of 100 or 40 Gigabit Ethernet, and 25 or 10 Gigabit Ethernet. The QFX5200-48Y has 48 small form-factor pluggable 28 (SFP28) ports (**0** through **47**) that can be configured as either 10 Gigabit Ethernet or 25 Gigabit Ethernet. The QFX5200-48Y also has six quad small form-factor pluggable (QSFP28) ports (**48** through **53** that can be configured as either 100 Gigabit Ethernet or 40 Gigabit Ethernet. The SFP28 ports default to 10 Gigabit Ethernet but can be configured in groups of four ports to 25 Gbps speeds. The QSFP28 ports auto-sense the speed of inserted optics and configure the port to the appropriate speed for that transceiver. See Figure 5 on page 30.

Figure 5: Port Panel of QFX5200-48Y



1–48 SFP28 ports	5–2 QSFP28 ports
2–4 QSFP28 ports	6–USB port
3–RJ45 management port	7–System status LEDs
4–RJ45 console	

Network Ports

The QFX5200-48Y ports, (**0** to **47**) are normally used as access ports. They support:

- 10 Gbps SFP+ transceivers
- 10 Gbps direct attach copper (DAC) cables
- 25 Gbps SFP28 transceivers
- 25 Gbps SFP28 DAC cables

The QFX5200-48Y ports, (**48** to **53**) are normally used as uplinks. They support:

- 25 Gbps active optical cables (AOC)
- 40 Gbps QSFP+ transceivers
- 40 Gbps DACBO cables (40 Gbps to 10 Gbps)
- 100 Gbps QSFP28 transceivers
- 100 Gbps AOC

Port Groups

The 48 SFP28 ports default to 10 Gigabit Ethernet but can be configured to 25 Gigabit Ethernet by port groups. The SFP28 ports are divided into 12 port groups, with four contiguous ports in each port group. Each port group can be configured to either 10 Gbps or 25 Gbps speeds, but mixing port speeds within a port group is not allowed. See Table 8 on page 31

Table 8: Available Port Groups for QFX5200-48Y

Port Groups
0 – 3
4 – 7
8 – 11
12 – 15
16 – 19
29 – 23
24 – 27
28 – 31
32 – 35
36 – 39
40 – 43
44 – 47

Use the **set chassis fpc** command to set an SFP28 port group to either 10 Gbps or 25 Gbps speeds. You will receive a warning message that you are changing the port configuration for the four ports. Committing the change does cause the FPC to reboot. For example, to change ports **0** through **3** to 25 Gbps from the default 10 Gbps, issue the following command:

```
[edit]
user@host# set chassis fpc 0 pic 0 port 0 speed 25g
user@host# commit
```

```
warning: 25g config will be applied to ports 0 to 3

{master:0}[edit]
root@sw-symphony-03# commit
```

```
configuration check succeeds
commit complete
```

Network Port LEDs

The QFX5200-48Y uses bi-colored LEDS to indicate link and activity on the port. SFP28 ports have a single green/amber LED. QSFP28 ports have four blue/amber ports. Only the first (left-most) LED is used. See Table 9 on page 32 and Table 10 on page 33.

NOTE: The up and down arrow LEDs for QSFP28 ports **48**, **49**, **51**, and **52** are not used.

Table 9: QFX5200-48Y Access Port and Uplink LED Locations

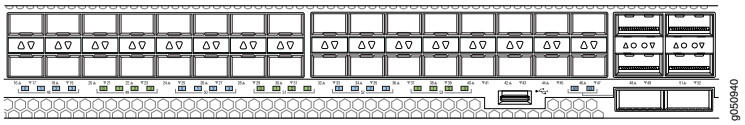
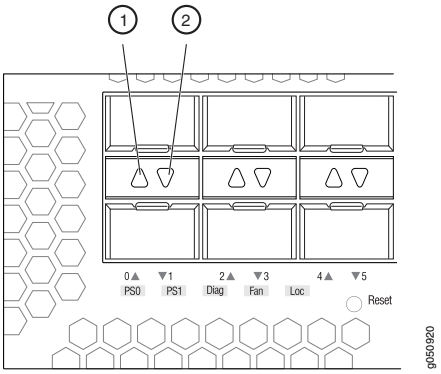
Port Type	Indicators	Location
QSFP28	Speed Link Status	**Figure 6: QFX5200-48Y QSFP28 Port LEDs** 
SFP28	Speed Link Status	**Figure 7: QFX5200-48Y SFP28 Port LEDs** 

Table 10: Network Port LEDs on a QFX5200-48YSwitch

Transceivers Supported	Color	State	LED Description
SFP28	Unlit	Off	The port is administratively disabled, there is no power, the link is down, or there is a fault.
	Amber	On steadily	A link is established for 10 Gbps or 25 Gbps, but there is no activity.
		Blinking	A link is established for 10 Gbps or 25 Gbps and there is link activity.
QSFP28	Unlit	Off	The port is administratively disabled, there is no power, the link is down, or there is a fault.
	Green	On steadily	A link is established for 40 Gbps or 100 Gbps, but there is no activity.
		Blinking	A link is established for 40 Gbps or 100 Gbps and there is link activity.

RELATED DOCUMENTATION

QFX5200 Field-Replaceable Units | 24

Channelizing Interfaces on QFX5200-32C Switches

Installing and Removing QFX5200 Hardware Components

QFX5200 Switch Management

IN THIS SECTION

QFX5200 Management Panel Overview

IN THIS SECTION

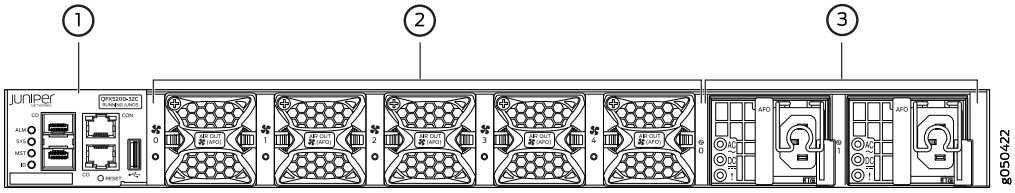
The management panel allows you to have a management channel into the switch that is separate from production traffic. The management panel is found on the Field Replaceable Unit (FRU) end of the QFX5200-32C and QFX5200-32C-L and on the port panel of the QFX5200-48Y.

This topic covers:

QFX5200-32C and QFX5200-32C-L Management Panel

The management panel of the QFX5200-32C and QFX5200-32C-L is found on the Field Replaceable Unit (FRU) end of the switch next to the fan modules. See Figure 8 on page 34 to locate the management panel.

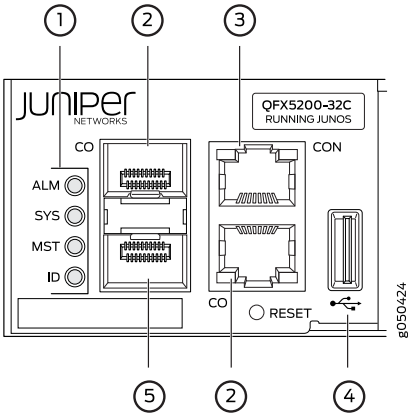
Figure 8: QFX5200-32C and QFX5200-32C-L, FRU End



1–Management panel	3–Power supply units
2–Fan modules	

Figure 9 on page 35 describes the connections and components of the QFX5200-32C and QFX5200-32C-L management panel.

Figure 9: Management Panel Components on QFX5200-32C and QFX5200-32C-L



1–Status LEDs	4–USB port
2–QFX5200-32C—Use **C0** for the em0 interface using either RJ-45 (1000 Base-T) or fiber SFP connections. QFX5200-32C-L –use **C0** for the re0:mgmt-0 management interface.	5–For QFX5200-32C only–em1–SFP management Ethernet port (**C1**) Cage (socket for either 1 GbE copper SFP or fiber SFP).QFX5200-32C-L does not support a second management interface.
3–RJ-45 console port (**CON**))	

The management panel consists of the following components:

- Chassis status LEDs
- Switch product number
- Management Ports C0 and C1
  - C0–Use the RJ-45 connectors for 10/100/1000 BaseT or to cable a virtual management Ethernet (VME) interface for spine members in a VCF. See "Connect a Device to a Network for Out-of-Band Management" on page 110.

    NOTE: For product SKUs with C0 available in both copper and fiber, the copper C0 has priority over fiber C0.

  - C1–Use the SFP connector for 1000 BaseX on QFX5200-32C only.
- USB port for image updates.
- Console port (RJ-45) to support RS-232 serial ports. The LEDs above the port indicate status and link.

QFX5200-32C and QFX5200-32C-L Management Port and Console Port LEDs

The management ports and console port on a QFX5200-32C and QFX5200-32C-L have two LEDs that indicate link status and link activity. The management ports are labeled **C0** for 10/100/1000 BASE-T and **C1** for 10/100/1000 BASE-T and SFP 1000 BASE-X connections. The left LED indicates status; the right LED indicates link/activity.

Table 11 on page 36 describes the management ports and Table 12 on page 36 the console LED.

Table 11: Management Ports LEDs on a QFX5200-32C and QFX5200-32C-L

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.
Status	Unlit	Off	Either the port speed is 10 M or the link is down.
	Green	On steadily	The port speed is 1000 M.
	Amber	On steadily	The port speed is 100 M.

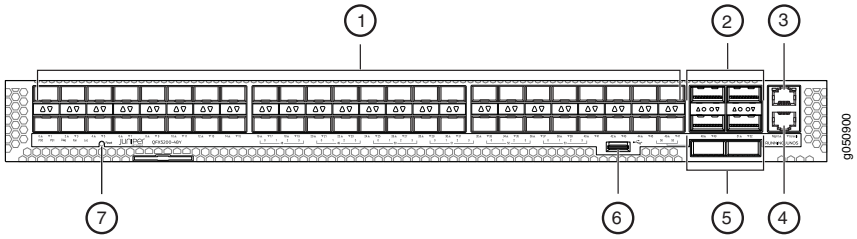
Table 12: Console Port LED on a QFX5200-32C and QFX5200-32C-L

LED	Color	State	Description
Status	Unlit	Off	The console is off.
	Green	On steadily	The console is on.

QFX5200-48Y Management Panel

The management panel of the QFX5200-48Y is found on the port panel next to right of the quad small-form factor pluggable plus (QSFP28) ports. See Figure 10 on page 37 to locate the management panel.

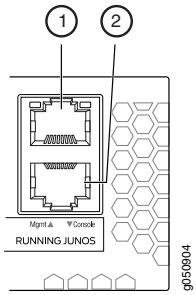
Figure 10: QFX5200-48Y Port Panel



1–48 SFP28 ports	5–2 QSFP28 ports
2–4 QSFP28 ports	6–USB port
3–RJ45 management port	7–System status LEDs
4–RJ45 console	

Figure 11 on page 37 describes the connections and components of the QFX5200-48Y management panel.

Figure 11: Management Panel Components on QFX5200-48Y



1–em0–RJ-45 (1000 BASE-T) management Ethernet port (**Mgmt**)	2–RJ-45 console port (**Console**)

QFX5200-48Y Management Port LEDs

The management port and console port on a QFX5200-48Y have two LEDs that indicate link status and link activity. The management port is labeled **Mgmt** for 10/100/1000 BASE-T connections. The left LED indicates status; the right LED indicates link/activity.

Table 13 on page 38 describes the management port LEDs.

Table 13: Management Port LEDs on a QFX5200-48Y Switch

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.
Status	Unlit	Off	The link is down.
	Green	On steadily	The link is up.

Table 14: Console Port LED on a QFX5200-48Y

LED	Color	State	Description
Status	Unlit	Off	The console is off.
	Green	On steadily	The console is on.

QFX5200 Chassis Status LEDs

IN THIS SECTION

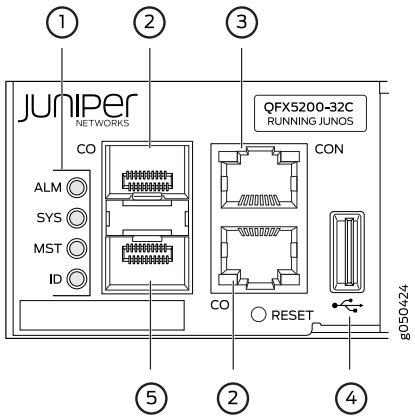
The QFX5200 has a series of LEDs that indicate system status. The QFX5200-32C and QFX5200-32C-L have four chassis status LEDs on the management panel; the QFX5200-48Y has five chassis status LEDs on the port panel.

This topic includes:

QFX5200-32C and QFX5200-32C-L Chassis Status LEDs

The QFX5200-32C and QFX5200-32C-L have four status LEDs on the FRU side of the chassis, next to the management ports (see Figure 12 on page 39).

Figure 12: Locating Chassis Status LEDs on a QFX5200-32C and QFX5200-32C-L



1–Status LEDs	4–USB port
2–em0–RJ-45 (10/100/1000 BASE-T) management Ethernet port (C0)	5–em1–SFP management Ethernet port (C1) Cage (socket for either 10/100/1000 Base-T RJ45 SFP or 1GbE fiber SFP)
3–RJ-45 console port (CON))	

Table 15 on page 40 describes the chassis status LEDs on a QFX5200-32C and QFX5200-32C-L, their colors and states, and the status they indicate. You can view the colors of the three LEDs remotely through the CLI by issuing the operational mode command **show chassis lcd**.

Table 15: Interpreting Chassis Status LEDs on a QFX5200-32C and QFX5200-32C-L

Name	Color	State	Description
ALM–Alarm or beacon	Unlit	Off	The switch 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 switch has halted. Power off the QFX5200-32C or QFX5200-32C-L 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 switch to cool down. Power on the QFX5200-32C and QFX5200-32C-L.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 QFX5200 or QFX5200-32C-L by setting the AC power source outlet to the OFF (O) position, or unplugging the AC power cords. Power on the QFX5200-32C or QFX5200-32C-L and monitor the status LEDs to ensure that Junos OS boots properly.
SYS–System	Unlit	Off	The switch is powered off or halted.
	Green	On steadily	Junos OS for QFX Series is loaded on the switch.
MST–Primary RE in a QFX5200-32C Virtual Chassis	Unlit	Off	The switch is standalone.
	Green	On steadily	The switch is operating as the primary RE in a QFX5200-32C Virtual Chassis.

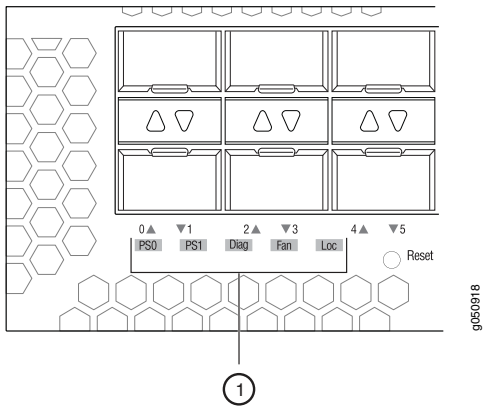
Table 15: Interpreting Chassis Status LEDs on a QFX5200-32C and QFX5200-32C-L *(continued)*

Name	Color	State	Description
ID–Identification	Unlit	Off	The beacon feature is not enabled on the switch. This feature is enabled using the **request chassis beacon** command.
	Blue	Blinking	The beacon feature is enabled on the switch. This feature is enabled using the **request chassis beacon** command.

QFX5200-48Y Chassis Status LEDs

The QFX5200-48Y switch has five status LEDs on the port side of the chassis, (see Figure 13 on page 41.)

Figure 13: Locating Chassis Status LEDs on QFX5200-48Y



1–Chassis status LEDs

Table 16 on page 42 describes the chassis status LEDs on a QFX5200-48Y, their colors and states, and the status they indicate.

Table 16: Interpreting Chassis Status LEDs on a QFX5200-48Y

Name	Color	State	Description
PS1 (Power Supply Status)	Unlit	Off	Power supply not present.
	Green	On steadily	Power supply is working correctly.
	Amber	On steadily	Power supply is faulty
PS2 (Power Supply Status)	Unlit	Off	Power supply not present.
	Green	On steadily	Power supply is working correctly.
	Amber	On steadily	Power supply present but faulty.
Diag (Diagnostic)	Green	On steadily	System self-diagnostic test successfully completed.
	Amber	On steadily	System self-diagnostic test has detected a fault. (Fan, thermal or any interface fault.)
FAN	Unlit	Off	The switch is powered off.
	Green	On steadily	Fan operating normally.
	Amber	On steadily	Fan present but faulty.
LOC	Unlit	Off	Not a switch to trace its location.
	Amber	Flashing	Flashing by remote management command. Assists the technician in finding the right device for service in the rack.

RELATED DOCUMENTATION

show chassis alarms

request chassis beacon

QFX5200 Cooling System

IN THIS SECTION

QFX5200 Cooling System Description

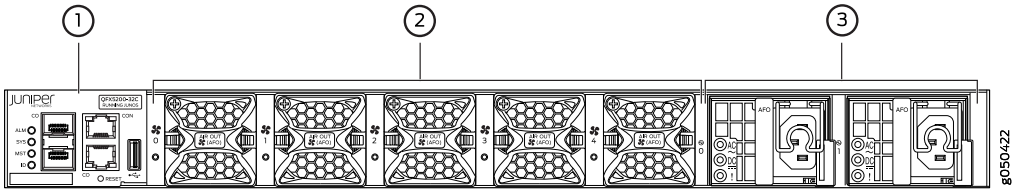
IN THIS SECTION

The cooling system in an QFX5200-32C and QFX5200-32C-L consists of five fan modules and a single fan in each power supply; QFX5200-48Y cooling system consists of six fan modules and a single fan in each power supply, see Figure 14 on page 44 and Figure 15 on page 44. The switch can be set up to work in one of two airflow directions:

- Airflow In–Air comes into the switch through the vents in the field-replaceable units (FRUs).
- Airflow Out–Air comes into the switch through the vents in the port panel.

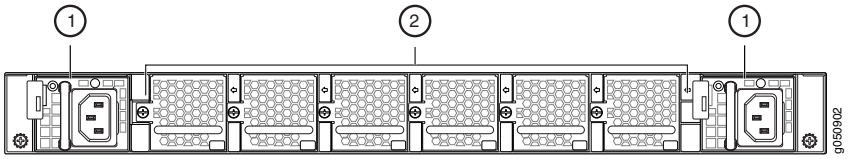
CAUTION: Airflow In and Airflow Out fans and power supplies cannot be mixed in the same chassis.

Figure 14: QFX5200-32C and QFX5200-32C-L FRU Panel



1–Management panel	3–Power supplies
2–Fan modules	

Figure 15: QFX5200-48Y FRU Panel



1–Power supplies	2–Fan modules

Fan Modules

The fan modules in QFX5200 devices are hot-insertable and hot-removable field-replaceable units (FRUs). These fan modules are designed for one of the two available airflow directions (Airflow In or Airflow Out). The fan modules are also color-coded for the airflow direction as well. The fan modules are installed in the fan module slots on the FRU panel.

The QFX5200-32C and QFX5200-32C-L fan modules have five fan modules numbered **0** through **4** when counting from left to right.

The QFX5200-48Y fan modules have six fan modules numbered **0** through **5** when counting from left to right.

Figure 16 on page 45 and Figure 17 on page 45 shows the fan modules.

Figure 16: QFX5200-32C and QFX5200-32C-L Fan Modules

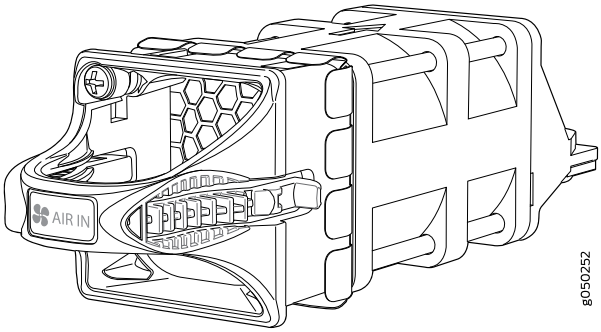
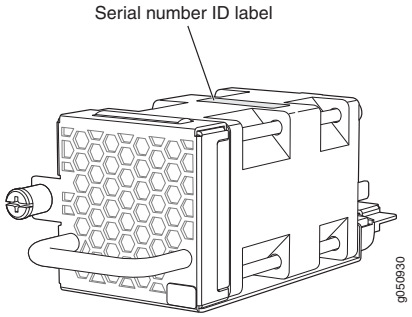


Figure 17: QFX5200-48Y Fan Module



You remove and replace a fan module from the FRU end of the chassis. The switch continues to operate for a limited period of time (30 seconds) during the replacement of the fan module without thermal shutdown.

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

The fan modules are available in four product SKUs that have different airflow directions—FRU-to-port airflow and port-to-FRU airflow On legacy switches or switches with LCDs, this airflow is also called front-to-back and back-to-front. Table 17 on page 46 lists the available fan module product SKUs and the direction of airflow in them:

Table 17: Fan Modules in QFX5200 Switches

Fan Module	Airflow Diagram	Label on the Fan Module	Color of Fan Module	Direction of Airflow in the Fan Module	Power Supplies
QFX5200-32C-FANAFI **NOTE:** Used for both QFX5200-32C-AFI and QFX5200-32C-LAFI	Figure 18 on page 47	**AIR IN**	Juniper Azure Blue	FRU-to-port, that is, air comes in from the end of the switch with the fans; air exhausts from the switch end with ports (also known as back-to-front airflow).	You must install only power supplies that have **AIR IN** labels in switches in which the fan modules have **AIR IN** labels.
QFX5200-32C-FANAFO **NOTE:** Used for both QFX5200-32C-AFO and QFX5200-32C-LAFO	Figure 19 on page 48	**AIR OUT**	Juniper Gold	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 switches in which the fan modules have **AIR OUT** labels.
QFX5200-48Y-FAN-AFI	Figure 20 on page 48	**AIR IN**	Blue	FRU-to-port, that is, air comes in from the end of the switch with the fans; air exhausts from the switch end with ports (also known as back-to-front airflow).	You must install only power supplies that have **AIR IN** labels in switches in which the fan modules have **AIR IN** labels.

Table 17: Fan Modules in QFX5200 Switches *(continued)*

Fan Module	Airflow Diagram	Label on the Fan Module	Color of Fan Module	Direction of Airflow in the Fan Module	Power Supplies
QFX5200-48Y-FAN-AFO	Figure 21 on page 49	**AIR OUT**	Red	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 switches in which the fan modules have **AIR OUT** labels.

In data center deployments, position the switch in such a manner that the **AIR IN** labels on switch components are next to the cold aisle, and **AIR OUT** labels on switch components are next to the hot aisle.

Figure 18: Air In Airflow Through QFX5200-32C and QFX5200-32C-L

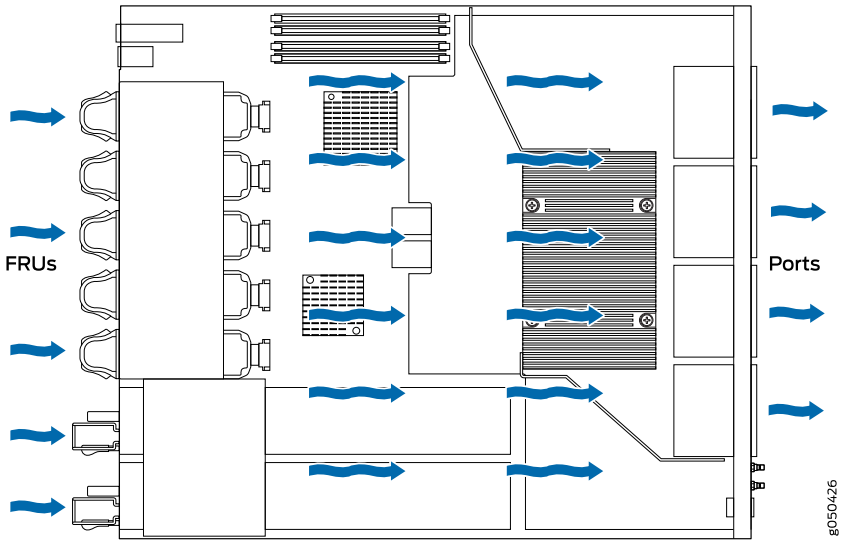


Figure 19: Air Out Airflow Through QFX5200-32C and QFX5200-32C-L

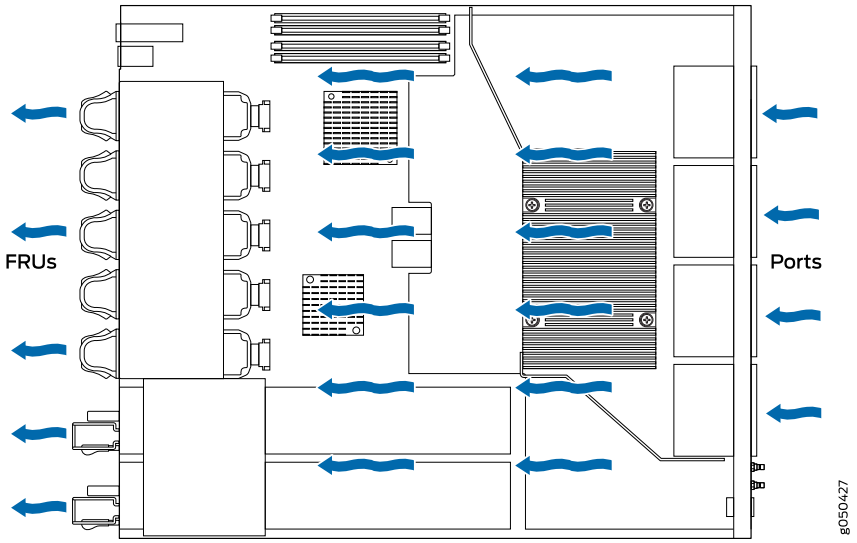


Figure 20: Air In Airflow Through QFX5200-48Y

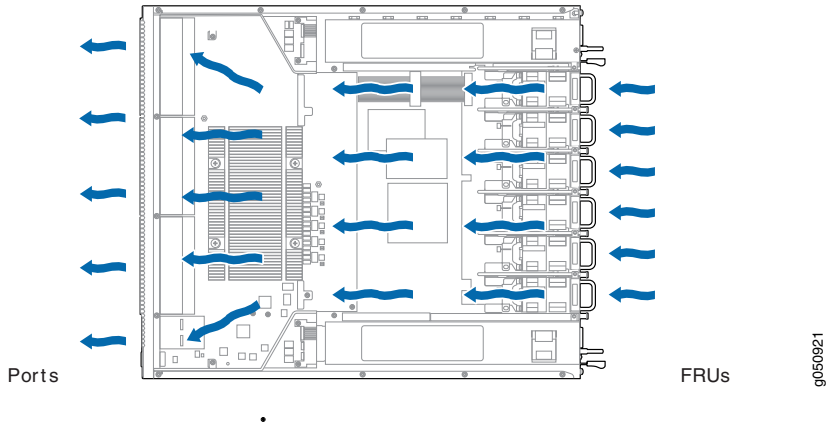
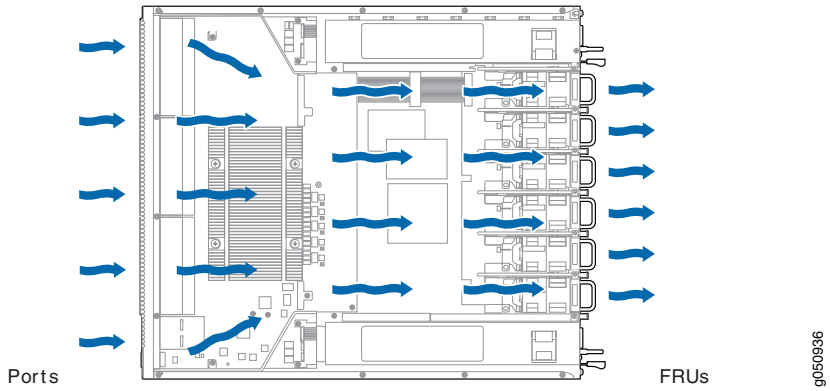


Figure 21: Air Out Airflow Through QFX5200-48Y



Do Not Install Components with Different Airflow or Wattage in the Switch

Do not mix power supplies with different airflow. If the power supplies are color-coded, ensure they are either all match. Likewise, ensure that all fan modules have the same airflow and match the airflow of the power supplies. Fan modules are also color-coded that match the power supplies.

Mixing components with different airflows in the same chassis hampers the performance of the cooling system of the switch and leads to overheating of the chassis.

CAUTION: 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.

Do not mix fan modules with different wattage. Only use the replacement fan modules that are designed for use with your product number. See Table 17 on page 46 for the correct part number for your QFX5200 device.

CAUTION: Do not mix AC and DC power supplies in the same QFX5200-32C or QFX5200-32C-L chassis. You may mix AC and DC power supplies in the same QFX5200-48Y chassis, but the fans and power supplies must have the same airflow direction. Also note that load sharing is not the same for AC and DC power supplies.

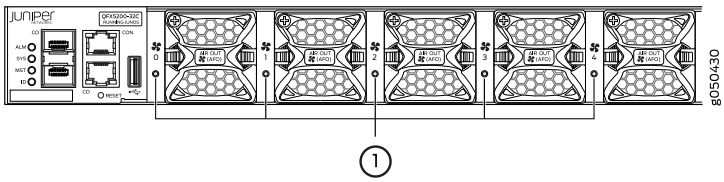
However if you need to convert a QFX5200 device to have a different airflow, you can change the airflow pattern. To convert an **AIR IN** product SKU to an **AIR OUT** product SKU or an **AIR OUT** product SKU to

a **AIR IN** product SKU, you must replace all of the fans and power supplies at one time to use the new direction. The system raises an alarm when the system is converted, which is normal.

QFX5200-32C and QFX5200-32C-L Fan Module LED

On the QFX5200-32C and QFX5200-32C-L switches the fan module LEDs are located on the chassis next to the fan module slot. QFX5200-48Y fan modules do not have LED indicators. Figure 22 on page 50 shows the location of the fan module LEDs next to the fan module on a QFX5200-32C and QFX5200-32C-L switch.

Figure 22: Fan Module LED in a QFX5200-32C or QFX5200-32C-L Switch



1–Fan module LED

Table 18 on page 50 describes the function of the fan tray LED.

Table 18: Fan Tray LED in a QFX5200-32C or QFX5200-32C-L Switch

Name	Color	State	Description
Fan	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.

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. Use the **show chassis fan** and on Junos OS Evolved systems the **show system alarms** operational CLI command. For example:

```
user@host> show chassis fan
```

```
Item                      Status   % RPM     Measurement
      Fan Tray 0 Fan 1          Ok       104%      19081 RPM
      Fan Tray 0 Fan 2          Ok       107%      22500 RPM
      Fan Tray 1 Fan 1          Ok       105%      19217 RPM
      Fan Tray 1 Fan 2          Ok       103%      21686 RPM
      Fan Tray 2 Fan 1          Ok       104%      19014 RPM
      Fan Tray 2 Fan 2          Ok       104%      21951 RPM
      Fan Tray 3 Fan 1          Ok       104%      18947 RPM
      Fan Tray 3 Fan 2          Ok       102%      21428 RPM
      Fan Tray 4 Fan 1          Ok       101%      18556 RPM
      Fan Tray 4 Fan 2          Ok       101%      21259 RPM
```

For Junos OS Evolved systems only:

```
user@host> show system alarms
```

```
8 alarms currently active
Alarm time               Class  Description
2018-10-11 15:55:58 UTC  Major  Fan Tray 0 Failure
2018-10-11 15:55:58 UTC  Major  Fan Tray 1 Failure
2018-10-11 15:55:58 UTC  Major  Fan Tray 2 Failure
2018-10-11 15:55:58 UTC  Major  Fan Tray 3 Failure
2018-10-11 15:55:58 UTC  Major  Fan Tray 4 Failure
```

RELATED DOCUMENTATION

Maintaining QFX5200 Cooling System | 130

QFX5200 Power System

IN THIS SECTION

QFX5200 AC Power Supply Description

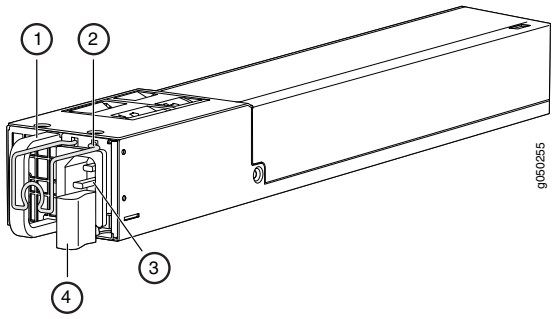
The two power supplies in QFX5200 are hot-removable and hot-insertable field-replaceable units (FRUs). The power supplies are installed in the switch at the factory. You can install replacement power supplies from the management panel without powering off the switch or disrupting the switching function. QFX5200 switches can operate with one PSU, but two power supplies are required to run without error messages and to have redundancy. See Figure 23 on page 53 and Figure 24 on page 53 for examples of QFX5200 AC power supplies.

The AC power supply in QFX5200-32C and QFX5200-32C-L switches is 850 W; the AC power supply in QFX5200-48Y switches is 650 W. Be sure to use the correct power supply for your chassis product SKU (see Table 19 on page 54).

CAUTION: Do not mix power supplies with different airflow or different wattage. The system raises an alarm when a power supply having a different airflow or wattage is inserted into the chassis.

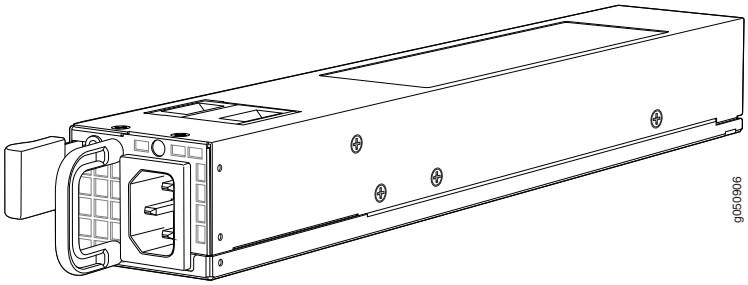
You may mix AC and DC power supplies with the same airflow in QFX5200-48Y, but load sharing is different between the two designs.

Figure 23: 850 W AC Power Supply for QFX5200-32C and QFX5200-32C-L



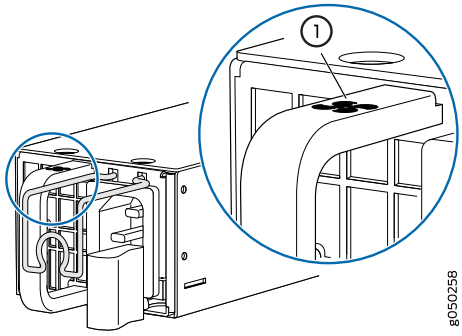
1–Handle	3–AC appliance inlet
2–Security latch	4–Ejector lever

Figure 24: 650 W AC Power Supply for QFX5200-48Y



The power supply provides FRU-to-port or port-to-FRU airflow depending on the product SKU you purchase. The power supplies have color-coded indicators to indicate the airflow direction. Either the PSU handle or the panel behind the handle are color-coded. See Figure 25 on page 53 for an example of the QFX5200-32C and QFX5200-32C-L power supplies and Table 19 on page 54 to determine the airflow of the PSU.

Figure 25: Power Supply Handle Detail



1–Fan icon on handle	

Table 19: Color Indicators for Airflow Direction

Model	Part Number	Airflow Direction	Color Indicator
QFX5200-32C and QFX5200-32C-L	JPSU-850W-AC-AFI	Airflow In (FRU-to port)	Juniper Azure Blue handle
	JPSU-850W-AC-AFO	Airflow Out (port-to-FRU)	Juniper Gold handle
QFX5200-48Y	QFX520048Y-APSU-AI	Airflow In	Blue panel
	QFX520048Y-APSU-AO	Airflow Out	Red panel

CAUTION: Verify that the airflow direction on the power supply handle matches the direction of airflow in the chassis. Ensure that each power supply you install in the chassis has the same airflow direction. If you install power supplies with two different airflow directions, Junos OS raises an alarm. If you need to convert the airflow pattern on a chassis, you must change out all the fans and power supplies at one time to use the new direction.

To supply sufficient power, terminate the DC input wiring on a facility DC source that is capable of supplying a minimum of 7 A at –48 VDC.

To avoid electrical injury, carefully follow instructions in "Connecting AC Power to a QFX5200" on page 116.

QFX5200 AC Power Specifications

Table 20 on page 54 describes the AC power specifications for a QFX5200.

Table 20: AC Power Specifications for a QFX5200

Item	Specification
AC input voltage	Operating range: • 100 / 240 VAC
AC input line frequency	50–60 Hz

Table 20: AC Power Specifications for a QFX5200 *(continued)*

Item	Specification	
AC input current rating	QFX5200-32C and QFX5200-32C-L	4.5 A at 100–120 VAC 2.0 A at 200–240 VAC
	QFX5200-48Y	7.8 A at 100–120 VAC 3.8 A at 200-240 VAC
Typical power consumption	QFX5200-32C and QFX5200-32C-L	380 W
	QFX5200-48Y	382 W
Maximum power consumption	QFX5200-32C and QFX5200-32C-L	480 W
	QFX5200-48Y	430 W

QFX5200 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 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). The cords that can be ordered for the QFX Series switches are in compliance.

Table 21 on page 56 lists AC power cord specifications provided for each country or region.

Table 21: AC Power Cord Specifications

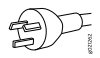
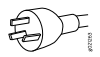
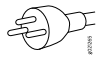
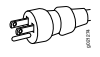
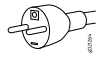
Country/Region	Electrical Specifications	Plug Standards	Shipped Juniper Model Number	Spare Juniper Model Number	Graphic
Australia	250 VAC, 10 A, 50 Hz	AS/NZ 3109-1996	CG_CBL-C13-06-AU	CBL-EX-PWR-C13-AU	
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3		CBL-PWR-C15M-HITEMP-BR	
China	250 VAC, 10 A, 50 Hz	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	
Israel	250 VAC, 10 A, 50 Hz	SI 32/1971 Type IL/3G	CBL_CBL-C13-06-IL	CBL-EX-PWR-C13-IL	
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	125 VAC, 13 A, 60 Hz 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 Africa and India	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3		CBL-PWR-C15M-HITEMP-SA	
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			CG_CBL-C13-06-SZ	CBL-EX-PWR-C13-SZ	

Table 21: AC Power Cord Specifications *(continued)*

Country/Region	Electrical Specifications	Plug Standards	Shipped Juniper Model Number	Spare Juniper Model Number	Graphic
	250 VAC, 10 A, 50 Hz	SEV 1011 SEV 1991; EN 60320 C13			
Taiwan	125 VAC, 11 A and 15 A, 50 Hz	NEMA 5-15P Type N5-15P	CG_CBL-C13-06-TW	CBL-EX-PWR-C13-TW	
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A	CG_CBL-C13-06-UK	CBL-EX-PWR-C13-UK	

QFX5200 AC Power Supply LEDs

The QFX5200-32C and QFX5200-32C-L uses three LEDs to indicate power status, while the QFX5200-48Y has a single bi-colored LED for power status.Figure 26 on page 57 shows the location of the LEDs on the QFX5200-32C power supply. Figure 27 on page 58 shows the LED location on a QFX5200-48Y power supply.

Figure 26: AC Power Supply LEDs on QFX5200-32C and QFX5200-32C-L Switches

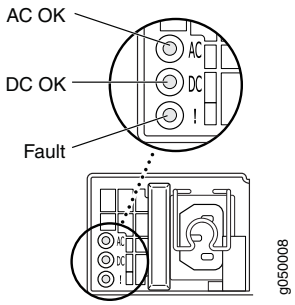
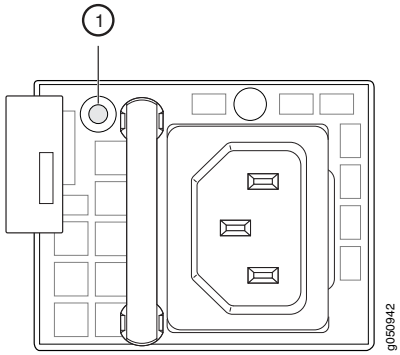


Figure 27: AC Power Supply LED on a QFX5200-48Y Switch



1–Bi-colored LED

Table 22 on page 58 and Table 23 on page 59 describe the LED behavior on the AC power supplies.

Table 22: AC Power Supply LEDs on QFX5200-32C and QFX5200-32C-L

LED	Color	State	Description
AC OK	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.
DC OK	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 OK** LED and the **DC OK** LED are unlit, either the AC power cord is not installed properly or the power supply fuse has failed. If the **AC OK** LED is lit and the **DC OK** LED is unlit, the AC power supply is installed properly, but the power supply has an internal failure.

Table 23: AC Power Supply LED on a QFX5200-48Y

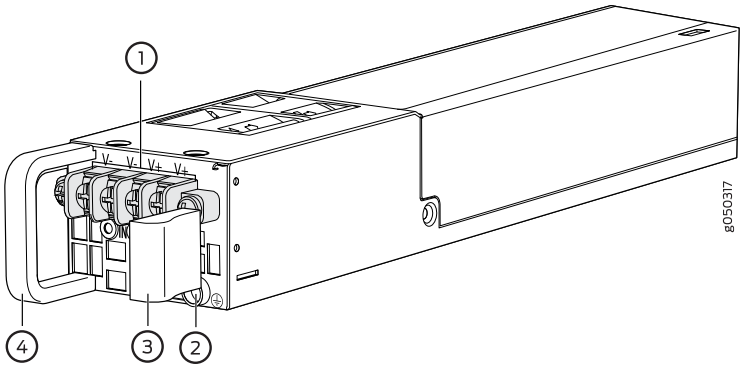
Color	State	Description
Unlit	Off	The power supply is disconnected from power, or power is not coming into the power supply.
Green	Blinking	The PSU is in standby mode. Power is coming into the power supply at +5V..
	On steadily	The power supply is sending out power correctly.
Alternating red/green	Blinking	Power supply warning. Check the logs for related messages.
Red	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.
	Blinking	The internal fan in the power supply has failed. 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.

QFX5200 DC Power Supply Description

The power supplies in QFX5200 switches (see Figure 28 on page 60 and Figure 29 on page 60) are hot-removable and hot-insertable field-replaceable units (FRUs). You can install the power supplies without powering off the switch or disrupting the switching function. QFX5200 switches can operate with one PSU, but two power supplies are required to run without error messages and to have redundancy.

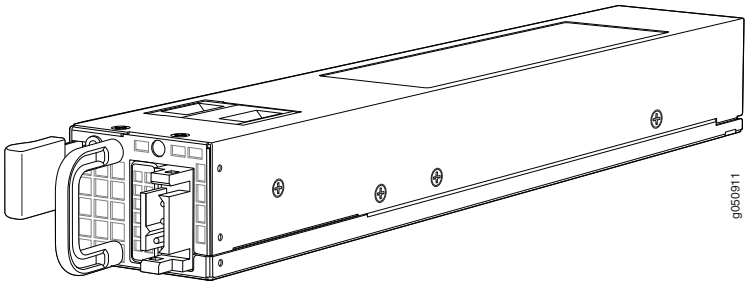
The DC power supply in QFX5200-32C is 1100 W with dual feeds for power resiliency.

Figure 28: QFX5200-32C DC Power Supply



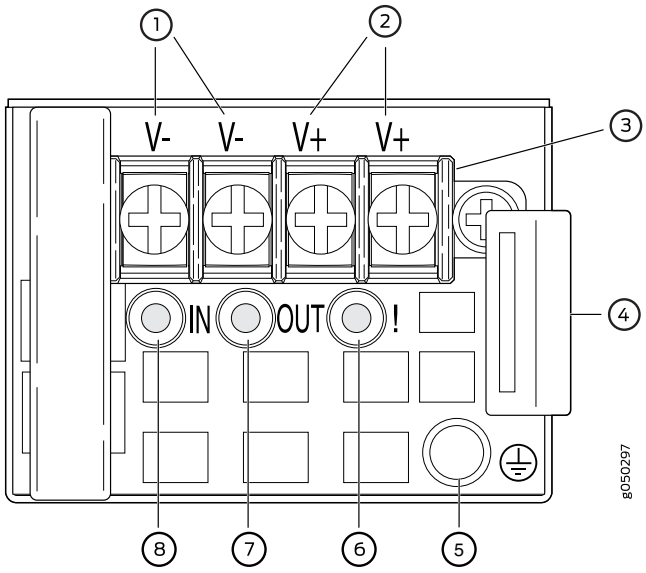
1–Terminal block	3–Ejector lever
2–Protective earthing terminal	4–Handle

Figure 29: QFX5200-48Y DC Power Supply



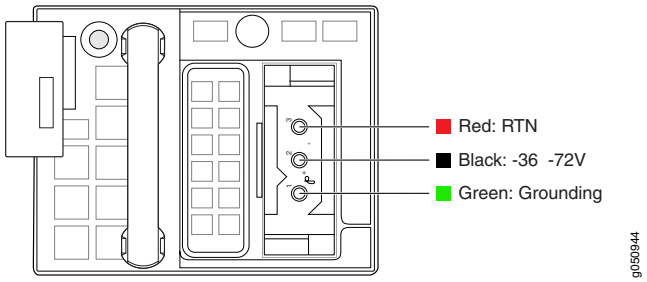
NOTE: The DC power supply in the switch has four terminals labeled V-, V-, V+, and V+ (see Figure 30 on page 61 and Figure 31 on page 61) for connecting DC power source cables labeled positive (+) and negative (–).

Figure 30: QFX5200-32C DC Power Supply Faceplate



1–Shunt negative input terminals (-48V)	5–Protective earthing terminal
2–Shunt positive input terminals (+RTN)	6–Fault LED
3–Terminal block	7–Output LED
4–Ejector lever	8–Input LED

Figure 31: QFX5200-48Y DC Power Supply Faceplate



To avoid electrical injury, carefully follow instructions in “Maintaining QFX5200 Power System” on page 133.

QFX5200 DC Power Specifications

Table 24 on page 62 describes the QFX5200 DC power specifications.

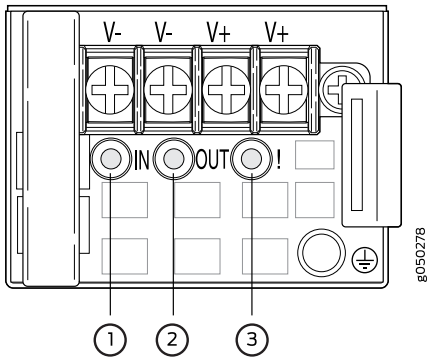
Table 24: DC Power Specifications for a QFX5200

Item	Model	Specifications
DC input voltage	QFX5200-32C	• Rated operating voltage: –48 VDC to -60 VDC • Operating voltage range: -40 VDC through –72 VDC
	QFX5200-48Y	Rated operating voltage: –48 VDC to -60 VDC
DC input current rating	QFX5200-32C	10 A maximum
	QFX5200-48Y	–48 VDC to –60 VDC: 21A –36 VDC to –72 VDC: 25A to 11A
Typical power consumption	QFX5200-32C	300 W
	QFX5200-48Y	315 W
Maximum power consumption	QFX5200-32C	385 W
	QFX5200-48Y	470 W

QFX5200 DC Power Supply LEDs

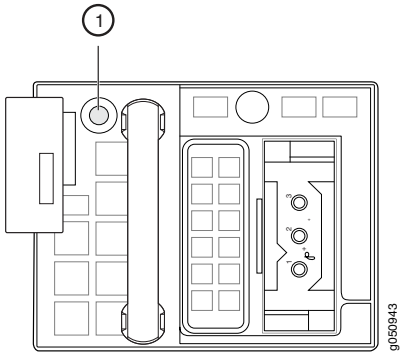
Figure 32 on page 62 and Figure 33 on page 63 show the location of the LEDs on the QFX5200-32C DC power supply.

Figure 32: DC Power Supply Faceplate on a QFX5200-32C



1–Input LED	3–Fault LED
2–Output LED	

Figure 33: DC Power Supply Faceplate on a QFX5200-48Y



1–Bi-colored 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.

Table 25 on page 63 and Table 26 on page 64 describe the LEDs on the DC power supplies.

Table 25: DC Power Supply LEDs on a QFX5200-32C

Name	Color	State	Description
Input	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.
Output	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.

Table 25: DC Power Supply LEDs on a QFX5200-32C *(continued)*

Name	Color	State	Description
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.

Table 26: DC Power Supply LED on a QFX5200-48Y

Color	State	Description
Unlit	Off	The power supply is disconnected from power, or power is not coming into the power supply.
Green	Blinking	The PSU is in standby mode. Power is coming into the power supply at +5V.
	On steadily	The power supply is sending out power correctly.
Alternating red/green	Blinking	Power supply warning. Check the logs for related messages.
Red	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.
	Blinking	The internal fan in the power supply has failed. 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.

RELATED DOCUMENTATION

Maintaining QFX5200 Power System | 133

2

CHAPTER

Site Planning, Preparation, and Specifications

QFX5200 Site Preparation Checklist

The checklist in Table 27 on page 66 summarizes the tasks you need to perform when preparing a site for a QFX5200 installation.

Table 27: Site Preparation Checklist

Item or Task	For More Information	Performed By	Date
Architecture			
Determine whether the QFX5200-32C will operate as a standalone switch or as a member in a Virtual Chassis. QFX5200-48Y and QFX5200-32C-L are supported only as a standalone switches.	"Planning a Virtual Chassis Deployment using QFX Devices" on page 67		
Environment			
Verify that environmental factors such as temperature and humidity do not exceed switch tolerances.	"QFX5200 Environmental Requirements and Specifications" on page 73		
Power			
Measure the distance between external power sources and switch installation site.			
Calculate the power consumption and requirements.	"QFX5200 Power System" on page 52		
Rack or Cabinet			
Verify that your rack or cabinet meets the minimum requirements for the installation of the switch.	"QFX5200 Rack Requirements" on page 79 "QFX5200 Cabinet Requirements" on page 80"Determining QFX5200 Optical Interface Support" on page 82		

Table 27: Site Preparation Checklist *(continued)*

Item or Task	For More Information	Performed By	Date
Plan rack or cabinet location, including required space clearances.	"QFX5200 Clearance Requirements for Airflow and Hardware Maintenance" on page 76		
Secure the rack or cabinet to the floor and building structure.			
Cables			
Acquire cables and connectors: • 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.	"Determining QFX5200 Optical Interface Support" on page 82		
Plan the cable routing and management.			

RELATED DOCUMENTATION

General Safety Guidelines and Warnings | 172
QFX5200 Installation Overview | 99

Planning a Virtual Chassis Deployment using QFX Devices

IN THIS SECTION

You can deploy QFX Series switches as members in three types of Virtual Chassis:

- QFX Virtual Chassis (QFX3500, QFX3600, QFX5100, and EX4300)
- QFX5110 Virtual Chassis (QFX5110 and QFX5100)
- QFX5200 Virtual Chassis (QFX5200-32C only)

QFX Virtual Chassis and QFX5110 Virtual Chassis allow you to interconnect a mixture of up to ten switches into one logical device and manage the device as a single chassis. QFX5200 Virtual Chassis is limited to three QFX5200-32C members.

A Virtual Chassis configuration has two Routing Engines—the primary switch and the backup switch. All other participating switches operate as line cards. You create a Virtual Chassis by cabling the switches in a ring topology and configuring SFP+, QSFP+, or QSFP28 interfaces into Virtual Chassis ports (VCPs). VCPs are responsible for passing all data and control traffic between member switches in the Virtual Chassis. All non-channelized QSFP28 or QSFP+ uplink interfaces on the switches can be configured into VCPs. All fixed SFP+ interfaces can also be configured into VCPs.

All members of the Virtual Chassis are required to run the same Junos OS Release. You can check the version and release by issuing the **show chassis version** CLI command.

This topic covers:

Valid Configurations for a QFX Virtual Chassis

Valid configurations are:

- All QFX5100 members (homogenous)–Supported QFX5100 models are:
  - QFX5100-24Q
  - QFX5100-48S
  - QFX5100-48T
  - QFX5100-96S
- All QFX3600 members (homogenous)
- All QFX3500 members (homogenous)

- A mixture of QFX3600 and QFX3500 members (heterogeneous)
- A mixture of QFX5100, QFX3600, and QFX3500 members (heterogeneous)–use the QFX5100 switches as primary RE and backup RE whenever possible.
- A mixture of QFX5100, QFX3600, QFX3500, and EX4300 members (heterogeneous). EX4300 switches as the primary RE or backup RE is not supported; use QFX5100 switches in these roles whenever possible.

An all EX4300 member is simply considered an EX4300 Virtual Chassis. See *Understanding EX Series Virtual Chassis*.

If the QSFP+ interfaces are not available for VCP, 10-Gigbit interfaces can be used.

Valid Configurations for a QFX5110 Virtual Chassis

Valid configurations are:

- All QFX5110 members (homogenous)–Supported QFX5110 models are:
  - QFX5110-32Q
  - QFX5110-48S
- A mixture of QFX5110 and QFX5100 members (homogenous)–use the QFX5110 models as the primary RE and backup RE. Use the following QFX5100 switches in the line card role:
  - QFX5100-24Q
  - QFX5100-48S
  - QFX5100-48T
  - QFX5100-96S

Valid Configurations for a QFX5200 Virtual Chassis

You can create an all QFX5200-32C Virtual Chassis with up to three members. Use the QFX5200-32C in all three member roles: primary RE, backup RE, and line card. Configure the Virtual Chassis Ports (VCPs) as 40-Gigabit Ethernet only. QFX5200-48Y is not supported in a QFX5200 Virtual Chassis.

VC Deployment Checklist

Use Table 28 on page 70 to plan your deployment:

Table 28: Deployment Checklist

Item or Task	For More Information	Performed By	Date
Components			
Determine the number of devices in the Virtual Chassis and the role of each device (primary RE, backup RE, or linecard). **NOTE:** A Virtual Chassis is not constrained to a single building; the limits for the optic cable are the only consideration.	*Understanding QFX Series Virtual Chassis* *Understanding Virtual Chassis Components*		
Environment			
Evaluate the provisioning options and determine the configuration method that applies to your deployment.	*Configuring an EX4650 or a QFX Series Virtual Chassis*		
Power			
Measure the distance between external power sources and switch installation site.			
Calculate the power consumption and requirements.	*QFX5110 AC Power Specifications* *AC Power Specifications for a QFX5100 Device* *AC Power Specifications for a QFX3600 or QFX3600-I Device* *AC Power Specifications for a QFX3500 Device* *AC Power Specifications for an EX4600 Switch* *AC Power Supply Specifications for EX4300 Switches*		
Rack or Cabinet			

Table 28: Deployment Checklist *(continued)*

Item or Task	For More Information	Performed By	Date
Verify that your rack or cabinet meets the minimum requirements for the installation of the switch.	*QFX5110 Rack Requirements* *Rack Requirements for a QFX5100 Device* *Cabinet Requirements for a QFX5100 Device* *Rack Requirements for a QFX3600 or QFX3600-I Device* *Cabinet Requirements for a QFX3600 or QFX3600-I Device* *Rack Requirements for a QFX3500 Device* *Cabinet Requirements for a QFX3500 Device* *Rack Requirements for an EX4600 Switch* *Cabinet Requirements for an EX4600 Switch* *Rack Requirements for a EX4300 Device* *Cabinet Requirements for a EX4300 Device*		
Plan rack or cabinet location, including required space clearances.	*Clearance Requirements for Airflow and Hardware Maintenance for a QFX5100 Device* *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3600 or QFX3600-I Device* *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device* *Clearance Requirements for Airflow and Hardware Maintenance for an EX4600 Switch* *Clearance Requirements for Airflow and Hardware Maintenance for EX4300 Switches*		
Secure the rack or cabinet to the floor and building structure.			
Cables			

Table 28: Deployment Checklist *(continued)*

Item or Task	For More Information	Performed By	Date
Acquire cables and connectors: • 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.	• Cable Specifications for QSFP+ and QSFP28 Transceivers on page 83 • Cable Specifications for Console and Management Connections for the QFX Series on page 89 • *Understanding EX Series Switches Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion* • Understanding QFX Series Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion on page 85		
Plan the cable routing and management.			

RELATED DOCUMENTATION

- *QFX5110 Site Preparation Checklist*
- *Site Preparation Checklist for a QFX5100 Device*
- *Site Preparation Checklist for a QFX3600 or QFX3600-I Device*
- *Site Preparation Checklist for a QFX3500 Device*
- *Site Preparation Checklist for EX4300 Switches*

QFX5200 Site Guidelines and Requirements

IN THIS SECTION

QFX5200 Environmental Requirements and Specifications

The switch 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 switch cooling system.
- Maintain ambient airflow for normal switch operation. If the airflow is blocked or restricted, or if the intake air is too warm, the switch might overheat, leading to the switch temperature monitor shutting down the device to protect the hardware components.

Table 29 on page 73 provides the required environmental conditions for normal switch operation.

Table 29: QFX5200 Switch Environmental Tolerances

Description	Model	Tolerance
Altitude	QFX5200-32C and QFX5200-32C-L	No performance degradation to 6,562 feet (2000 meters)
	QFX5200-48Y	No performance degradation to 13,000 feet (3,962 meters)

Table 29: QFX5200 Switch Environmental Tolerances *(continued)*

Description	Model	Tolerance
Relative humidity, operating	QFX5200-32C and QFX5200-32C-L	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 **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.
	QFX5200-48Y	Normal operation ensured in relative humidity range of 5% through 93%, noncondensing for airflow out (AFO) models and 10% through 93%, noncondensing for airflow in (AFI) models
Temperature	QFX5200-32C and QFX5200-32C-L	• 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)
	QFX5200-48Y	• Normal operation ensured in temperature range of 32° F through 113° F (0° C through 45° C) for AFO models, 32° F through 104° F (0° C through 40° C) for AFI models • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C) for both AFO and AFI
Seismic	QFX5200 all models	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.

NOTE: Install QFX Series devices 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, 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.

QFX5200 Grounding Cable and Lug Specifications

To ground a QFX5200, connect a grounding cable to earth ground and then attach it to the chassis protective earthing terminals. See "Connect the QFX5200 to Earth Ground" on page 113.

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

CAUTION: Before switch installation begins, a licensed electrician must attach a cable lug to the grounding cables that you supply. A cable with an incorrectly attached lug can damage the switch.

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

- The grounding lug required for a QFX5200-32C or a QFX5200-32C-L is a Panduit LCD10-10A-L or equivalent (not provided). The grounding lug should accommodates 14–10 AWG (2–5.3 mm^2) stranded wire. The grounding lug required for a QFX5200-48Y is tin-plated brass 4.3 mm ring terminal that supports 18–14 AWG (0.8-2 mm^2) and an M4 screw.
- The grounding cable that you provide for a QFX5200 must be 14 AWG (2 mm^2), minimum 90° C wire, or as permitted by the local code. If you are using the alternate method of grounding the chassis on a

QFX5200-32C-DC system, the recommended grounding cable is 12 AWG (2.5 mm^2) standard wire, 90° C wire or heavier.

- For QFX5200-32C or a QFX5200-32C-L, ensure you have two SAE 10-32 washers and screws to attach the cable and bracket (not provided).

QFX5200 Clearance Requirements for Airflow and Hardware Maintenance

When planning the site for installing a QFX5200, you must allow sufficient clearance around the installed chassis (see Figure 34 on page 76 and Figure 35 on page 77).

Figure 34: Clearance Requirements for Airflow and Hardware Maintenance for a QFX5200-32C and QFX5200-32C-L

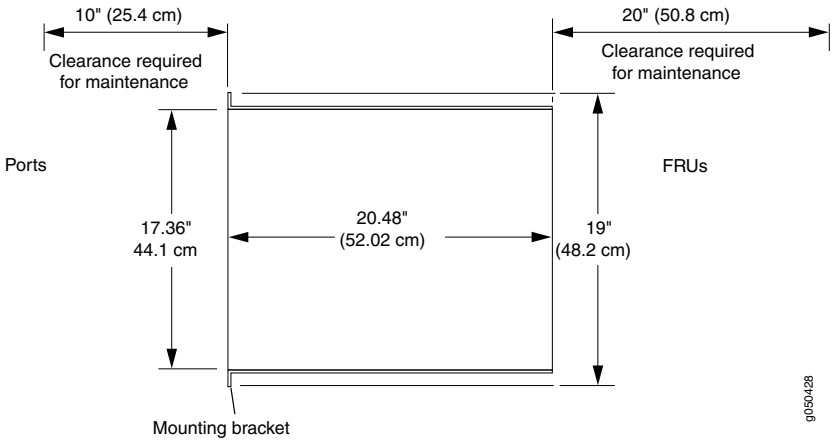
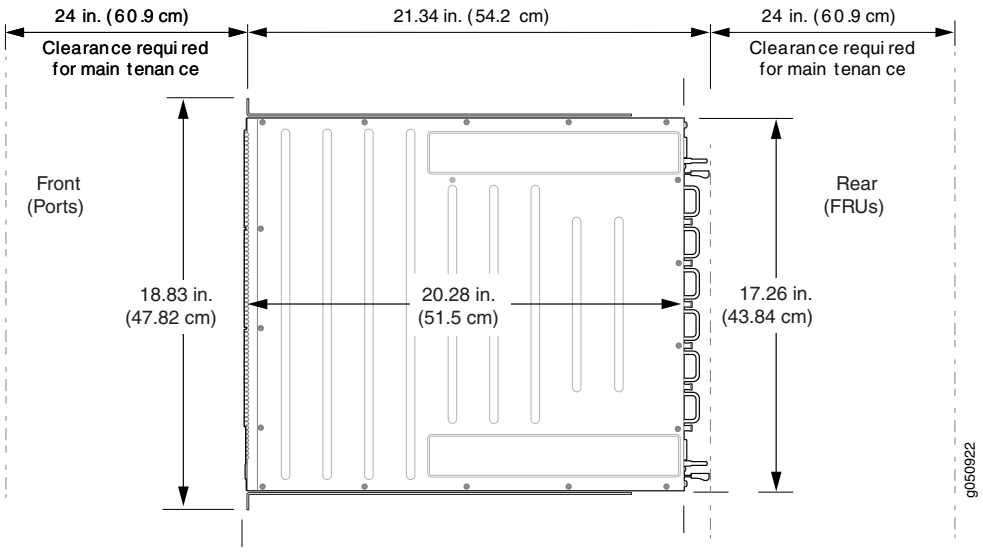


Figure 35: Clearance Requirements for Airflow and Hardware Maintenance for a QFX5200-48Y



- For the cooling system to function properly, the airflow around the chassis must be unrestricted. See "QFX5200 Cooling System Description" on page 43 for more information about the airflow through the chassis.
- If you are mounting a QFX5200 in a rack or cabinet with other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.
- Leave at least 24 in. (61 cm) both in front of and behind the QFX5200. For service personnel to remove and install hardware components, you must leave adequate space at the front and back of the switch. 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 or cabinet.

QFX5200 Chassis Physical Specifications

The QFX5200 is a rigid sheet-metal structure that houses the hardware components. Table 30 on page 77 summarizes the physical specifications of the QFX5200.

Table 30: Physical Specifications for the QFX5200

Product SKU	Height	Width	Depth	Weight
QFX5200-32C and QFX5200-32C-L	1.72 in. (4.3 cm)	17.36 in. (44.1 cm)	20.48 in. (52 cm)	23.5 lbs (10.66 kg)

Table 30: Physical Specifications for the QFX5200 *(continued)*

Product SKU	Height	Width	Depth	Weight
QFX5200-48Y	1.71 in. (4.34 cm)	17.25 in. (43.81 cm)	20.27 in. (51.48 cm)	30.00 lbs (13.60 kg)

Site Electrical Wiring Guidelines

Table 31 on page 78 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 use electrical surge-suppression devices.

Avertissement Vous devez établir un environnement protégé et convenablement mis à la terre et utiliser des dispositifs de parasurtension.

Table 31: Site Electrical Wiring Guidelines

Site Wiring Factor	Guidelines
Signaling limitations	If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding: • 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	To reduce or eliminate RFI from your site wiring, do the following: • 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.

Table 31: Site Electrical Wiring Guidelines *(continued)*

Site Wiring Factor	Guidelines
Electromagnetic compatibility	If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice. Some of the problems caused by strong sources of electromagnetic interference (EMI) are: • 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

QFX5200 Rack Requirements

QFX5200 switches are designed to be installed on four-post racks.

Rack requirements consist of:

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

Table 32 on page 79 provides the rack requirements and specifications for the QFX5200.

Table 32: Rack Requirements for the QFX5200

Rack Requirement	Guidelines
Rack type	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. A U is the standard rack unit defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310–D) published by the Electronics Industry Association.
Mounting bracket hole spacing	The holes in the mounting brackets are spaced at 1 U (1.75 in. or 4.45 cm), so that the switch can be mounted in any rack that provides holes spaced at that distance.

Table 32: Rack Requirements for the QFX5200 *(continued)*

Rack Requirement	Guidelines
Rack size and strength	• Ensure that the rack complies with the standards for a 19-in. or 23-in. rack as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310–D) published by the Electronics Industry Association. • A 600-mm rack as defined in the four-part *Equipment Engineering (EE); European telecommunications standard for equipment practice* (document numbers ETS 300 119-1 through 119-4) published by the European Telecommunications Standards Institute (href="http://www.etsi.org">http://www.etsi.org). The horizontal spacing between the rails in a rack that complies with this standard is usually wider than the device'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 switch chassis' external dimensions. The outer edges of the front-mounting brackets extend the width to 19 in. (48.26 cm). • For four-post installations, the front and rear rack rails must be spaced between 23.5 in. (59.7 cm) to 30.6 in. (77.7 cm) front-to-back. • The rack must be strong enough to support the weight of the switch. • Ensure that the spacing of rails and adjacent racks allows for proper clearance around the switch and rack.
Rack connection to building structure	• 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.

QFX5200 Cabinet Requirements

You can mount the QFX5200 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 33 on page 81 provides the cabinet requirements and specifications for the QFX5200.

Table 33: Cabinet Requirements for the QFX5200

Cabinet Requirement	Guidelines
Cabinet size and clearance	The minimum cabinet size for accommodating a QFX5200 device is 36 in. (91.4 cm) deep. Large cabinets improve airflow and reduce the chance of overheating.
Cabinet airflow requirements	When you mount the switch in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating. • Ensure that the cool air supply you provide through the cabinet adequately dissipates the thermal output of the switch (or switches). • Ensure that the cabinet allows the chassis hot exhaust air to exit the cabinet without recirculating into the switch. 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 QFX5200 fans exhaust hot air either through the vents on the port panel or through the fans and power supplies. Install the switch 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 switch and cabinet.

RELATED DOCUMENTATION

QFX5200 Installation Overview | 99

Connect the QFX5200 to Earth Ground | 113

QFX5200 Cooling System Description | 43

QFX5200 Network Cable and Transceiver Planning

IN THIS SECTION

Determining QFX5200 Optical Interface Support

You can find information about the optical transceivers supported on your Juniper device by using the Hardware Compatibility Tool. In addition to transceiver and connection 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 QFX5200-32C and QFX5200-32C-L is located at https://apps.juniper.net/hct/product/#prd=QFX5200-32C and https://apps.juniper.net/hct/product/#prd=QFX5200-48Y

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.

NOTE: For interoperability with other QFX Series switches, ensure auto-negotiation on the QFX5200 is disabled.

Cable Specifications for QSFP+ and QSFP28 Transceivers

The 40-Gigabit Ethernet QSFP+ and 100-Gigabit Ethernet QSFP28 transceivers that are used in QFX Series switches use 12-ribbon multimode fiber crossover cables with socket MPO/UPC connectors. The fiber can be either OM3 or OM4. These cables are not sold by Juniper Networks.

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

TIP: 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 QSFP+ or QSFP28 transceivers, ensure that the proper polarity is maintained through the cable plant.

Table 34 on page 83 describes the signals on each fiber. Table 35 on page 84 shows the pin-to-pin connections for proper polarity.

Table 34: QSFP+ and QSFP28 Optical Module Receptacle Pinouts

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)

Table 34: QSFP+ and QSFP28 Optical Module Receptacle Pinouts *(continued)*

Fiber	Signal
11	Rx1 (Receive)
12	Rx0 (Receive)

Table 35: QSFP+ MPO Fiber-Optic Crossover Cable Pinouts

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

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

IN THIS SECTION

To determine the power budget and power margin needed for fiber-optic connections, you need to understand how signal loss, attenuation, and dispersion affect transmission. The QFX Series uses various types of network cables, including multimode and single-mode fiber-optic cables.

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

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 light sources. They spray varying wavelengths of light into the multimode fiber, which reflect 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 (layers of lower refractive index material in close contact with a core material of higher refractive index), higher-order mode loss occurs. Together, these factors reduce the transmission distance of multimode fiber compared to that of single-mode fiber.

Single-mode fiber is so small in diameter that rays of light 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 to multimode fiber, single-mode fiber has a higher bandwidth and can carry signals for longer distances. It is consequently more expensive.

For information about the maximum transmission distance and supported wavelength range for the types of single-mode and multimode fiber-optic cables that are connected to the QFX Series, see the Hardware Compatibility Tool. Exceeding the maximum transmission distances can result in significant signal loss, which causes unreliable transmission.

Attenuation and Dispersion in Fiber-Optic Cable

An optical data link functions correctly provided that modulated light reaching the receiver has enough power to be demodulated correctly. Attenuation is the reduction in strength of the light signal during transmission. Passive media components such as cables, cable splices, and connectors cause attenuation. 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 transmit enough light to overcome attenuation.

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

- Chromatic dispersion, which is the spreading of the signal over time caused by the different speeds of light rays.
- Modal dispersion, which is the spreading of the signal over time caused by 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 limits the 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 within the limits specified for the type of link in the 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. How to Calculate Power Budget for Fiber-Optic Cable | 87
2. How to Calculate Power Margin for Fiber-Optic Cable | 87

How to Calculate 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):

$$P_B = P_T - P_R$$

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

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

How to Calculate 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 36 on page 87 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 36: 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 36: 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 36 on page 87 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:

$P_M = P_B - LL$

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

$P_M = 13\ dB - 2\ dB - 2.5\ dB - 1\ dB - 0.5\ dB$

$P_M = 7\ dB$

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 36 on page 87 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:

$P_M = P_B - LL$

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

$P_M = 13\ dB - 4\ dB - 3.5\ dB$

$P_M = 5.5\ dB$

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

QFX5200 Management Cable Specifications and Pinouts

IN THIS SECTION

Cable Specifications for Console and Management Connections for the QFX Series

Table 37 on page 89 lists the specifications for the cables that connect the QFX Series switch to a management device.

NOTE: The QFX Series can be configured with SFP management ports that support 1000BASE-SX transceivers. See the Hardware Compatibility Tool for more on the fiber-optic cables required for use with these transceivers.

Table 37: Cable Specifications for Console and Management Connections for the QFX Series

Port on QFX Series Device	Cable Specification	Cable Supplied	Maximum Length	Device Receptacle
Console 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 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

RJ-45 Management Port Connector Pinout Information

Table 38 on page 90 provides the pinout information for the RJ-45 connector for the management port on Juniper Networks devices.

Table 38: RJ-45 Management Port Connector Pinout Information

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
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 QFX Series

The console port (labeled **CON**, or **CONSOLE**) 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 39 on page 91 provides the pinout information for the RJ-45 console connector. An RJ-45 cable and RJ-45 to DB-9 adapter are supplied with the QFX Series device.

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

Table 39: Console Port Connector Pinouts for the QFX Series

Pin	Signal	Description
3	TxD Output	Transmit data
4	Signal Ground	Signal ground
5	Signal Ground	Signal ground
6	RxD Input	Receive data

RJ-45 Port, SFP Port, SFP+ Port, QSFP+ Port, and QSFP28 Port Connector Pinout Information

The tables in this topic describe the connector pinout information for the RJ-45, SFP, SFP+, QSFP+, and QSFP28 ports.

- Table 40 on page 91—10/100/1000-Mbps BASE-T Ethernet RJ-45 network port connector pinout information
- Table 41 on page 92—SFP port connector pinout information
- Table 42 on page 93—SFP+ port connector pinout information
- Table 43 on page 94—QSFP+ and QSFP28 ports connector pinout information

Table 40: 10/100/1000BASE-T Ethernet Network Port Connector Pinout Information

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1 Negative Vport (in PoE models)
2	TRP1-	Transmit/receive data pair 1 Negative Vport (in PoE models)
3	TRP2+	Transmit/receive data pair 2 Positive Vport (in PoE models)
4	TRP3+	Transmit/receive data pair 3

Table 40: 10/100/1000BASE-T Ethernet Network Port Connector Pinout Information *(continued)*

Pin	Signal	Description
5	TRP3-	Transmit/receive data pair 3
6	TRP2-	Transmit/receive data pair 2 Positive Vport (in PoE models)
7	TRP4+	Transmit/receive data pair 4
8	TRP4-	Transmit/receive data pair 4

Table 41: SFP Port Connector Pinout Information

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock
6	MOD_ABS	Module absent
7	RS	Rate select
8	RX_LOS	Receiver loss of signal indication
9	VeeR	Module receiver ground
10	VeeR	Module receiver ground
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output
14	VeeR	Module receiver ground

Table 41: SFP Port Connector Pinout Information *(continued)*

Pin	Signal	Description
15	VccR	Module receiver 3.3 V supply
16	VccT	Module transmitter 3.3 V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

Table 42: SFP+ Port Connector Pinout Information

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock
6	MOD_ABS	Module absent
7	RS0	Rate select 0, optionally controls SFP+ module receiver
8	RX_LOS	Receiver loss of signal indication
9	RS1	Rate select 1, optionally controls SFP+ transmitter
10	VeeR	Module receiver ground
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output

Table 42: SFP+ Port Connector Pinout Information *(continued)*

Pin	Signal	Description
14	VeeR	Module receiver ground
15	VccR	Module receiver 3.3-V supply
16	VccT	Module transmitter 3.3-V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

Table 43: QSFP+ and QSFP28 Ports Connector Pinout Information

Pin	Signal
1	GND
2	TX2n
3	TX2p
4	GND
5	TX4n
6	TX4p
7	GND
8	ModSelL
9	LPMode_Reset
10	VccRx
11	SCL
12	SDA

Table 43: QSFP+ and QSFP28 Ports Connector Pinout Information *(continued)*

Pin	Signal
13	GND
14	RX3p
15	RX3n
16	GND
17	RX1p
18	RX1n
19	GND
20	GND
21	RX2n
22	RX2p
23	GND
24	RX4n
25	RX4p
26	GND
27	ModPrsL
28	IntL
29	VccTx
30	Vcc1
31	Reserved
32	GND
33	TX3p

Table 43: QSFP+ and QSFP28 Ports Connector Pinout Information *(continued)*

Pin	Signal
34	TX3n
35	GND
36	TX1p
37	TX1n
38	GND

USB Port Specifications for the QFX Series

The following Juniper Networks USB flash drives have been tested and are officially supported for the USB port in the QFX Series:

- RE-USB-1G-S—1-gigabyte (GB) USB flash drive (except QFX3100 Director device)
- RE-USB-2G-S—2-GB USB flash drive (except QFX3100 Director device)
- RE-USB-4G-S—4-GB USB flash drive

CAUTION: Any USB memory product not listed as supported for the QFX Series has not been tested by Juniper Networks. The use of any unsupported USB memory product could expose your device to unpredictable behavior. Juniper Networks Technical Assistance Center (JTAC) can provide only limited support for issues related to unsupported hardware. We strongly recommend that you use only supported USB flash drives.

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

NOTE: Executing the **request system snapshot** CLI command on a QFX3500 device requires an external USB flash drive with at least 4 GB of free space. We recommend using the RE-USB-4G-S flash drive.

NOTE: USB flash drives used with the QFX Series device must support USB 2.0 or later.

RELATED DOCUMENTATION

Connecting the QFX5200 to External Devices | **110**

3

CHAPTER

Initial Installation and Configuration

QFX5200 Installation Overview

IN THIS SECTION

Overview of Installing the QFX5200

You can mount a QFX5200:

- Flush with the front of a 19-in. four-post rack. Use the standard mounting brackets provided with the switch for this configuration.
- (QFX5200-32C and QFX5200-32C-L) Recessed 2 in. (5 cm) from the front of a 19-in. four-post rack. Use the extension bracket provided in the standard mounting kit for this configuration. Recessed mounting is primarily used in enclosed cabinets.

To install and connect a QFX5200:

1. Follow the instructions in "Unpacking a QFX5200" on page 101.

2. Determine how the switch is to be mounted.

   Flush or recessed mounted in a rack or cabinet, see "Mounting a QFX5200 in a Rack or Cabinet" on page 103.

3. Follow the instructions in:

   a. Connect the QFX5200 to Earth Ground on page 113

   b. "Connecting AC Power to a QFX5200" on page 116 or "Connecting DC Power to a QFX5200" on page 119, or Connecting DC Power to a QFX5200-48Y on page 124

   c. Register Products—Mandatory to Validate SLAs on page 102

4. Follow the instructions in "Performing the Initial Software Configuration for QFX5200 Switches" on page 126.

QFX5200 Installation Safety Guidelines

The weight of a fully -loaded QFX5200-32C and QFX5200-32C-L switch chassis is approximately 23.5 lb (10.66 kg); and a QFX5200-48Y weighs between 20.78 lbs (9.43 kg) to 21.16 (9.6 kg) with power supplies and fans installed. Observe the following guidelines for lifting and moving a QFX5200:

> **CAUTION:** If you are installing the QFX5200 above 60 in. (152.4 cm) from the floor, either remove the power supplies, fan modules, and any expansion modules before attempting to install the switch, or ask someone to assist you during the installation.

- Before installing a QFX5200, read the guidelines in "QFX5200 Site Preparation Checklist" on page 66 to verify that the intended site meets the specified power, environmental, and clearance requirements.
- Before lifting or moving the QFX5200, 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

QFX5200 Site Guidelines and Requirements | 72
Installation Instructions Warning | 179
General Safety Guidelines and Warnings | 172

Unpacking and Mounting the QFX5200

IN THIS SECTION

Unpacking a QFX5200

The QFX5200 switch chassis is a rigid sheet-metal structure that houses the hardware components. A QFX5200 is shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box and quick start instructions.

> **CAUTION:** The QFX5200 is maximally protected inside the shipping carton. Do not unpack the switch until you are ready to begin installation.

To unpack a QFX5200:

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 are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory box and verify the contents against the inventory included in the box. Table 44 on page 101 lists the inventory of components supplied with a QFX5200.
5. Pull out the packing material holding the switch in place.
6. Verify the chassis components received:
   - Two power supplies
   - Five fan modules for QFX5200-32C or QFX5200-32C-L and six fan modules for QFX5200-48Y
7. Save the shipping carton and packing materials in case you need to move or ship the switch later.

Table 44: Inventory of Components Supplied with a QFX5200 Device

Component	Quantity
Chassis with five or six fan modules and two power supplies	1
Fan modules	5 (QFX5200-32C or QFX5200-32C-L) 6 (QFX5200-48Y)
Power supplies	2

Table 44: Inventory of Components Supplied with a QFX5200 Device *(continued)*

Component	Quantity
Rack mount kit for QFX5200-32C or QFX5200-32C-L • Front mounting brackets • Rear mounting blades • Extension brackets • Flathead screws (Phillips, M4 x 6mm) The order number for a spare rack mount kit is EX-4PST-RMK.	1 • 2 • 2 • 2 • 12
Rack mount kit for QFX5200-48Y • Front mounting brackets • Rear mounting brackets • Flathead screws (Phillips, M4 x 6mm) • Washer head screws The order number for a spare rack mount kit is QFX520048Y-RMKT.	1 • 2 • 2 • 12 • 2
RJ-45 cable and RJ-45 to DB-9 adapter	1
Rack mount assembly drawing	1
Power cords with plugs appropriate to your geographical location	2
Documentation roadmap card	1
Warranty	1

Register Products—Mandatory to Validate SLAs

Register all new Juniper Networks hardware products and changes to an existing installed product using the Juniper Networks website to activate your hardware replacement service-level agreements (SLAs).

CAUTION: Register product serial numbers on the Juniper Networks website and update the installation base data if there is any addition or change to the installation base or if the installation base is moved. Juniper Networks will not be held accountable for not meeting the hardware replacement service-level agreement for products that do not have registered serial numbers or accurate installation base data.

Register your product(s) at https://tools.juniper.net/svcreg/SRegSerialNum.jsp. Update your installation base at https://www.juniper.net/customers/csc/management/updateinstallbase.jsp.

Mounting a QFX5200 in a Rack or Cabinet

IN THIS SECTION

You can mount all QFX5200 switches on a four post 19-in. rack or cabinet using the mounting kit provided with the switch.

For four post rack or cabinet installations, the mounting kit contains two front mounting rails with two matching rear mounting blades. This configuration allows either end of the switch to be mounted flush with the rack and still be adjustable for racks with different depths.

(The remainder of this topic uses “rack” to mean “rack or cabinet.”) The front and rear rack rails must be spaced between 23.5 in. (59.7 cm) and 30.6 in. (77.7 cm) front to back.

This topic describes:

Before You Begin Rack Installation

Before you begin mounting a QFX5200 switch in the rack or cabinet:

1. Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 206.

2. Verify that the site meets the requirements described in "QFX5200 Site Preparation Checklist" on page 66.

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 Site Guidelines" on page 75, with particular attention to "QFX5200 Installation Safety Guidelines" on page 100.

5. Remove the switch from the shipping carton (see "Unpacking a QFX5200" on page 101).

6. Ensure that you have the following parts and tools available to mount the switch in a rack:
   - ESD grounding strap (not provided).
   - Blades, rails, or brackets (provided).
     - For four-post installations:
       - One pair of rear mounting blades. These mounting blades support the rear of the chassis and must be installed (provided).
       - One pair of front mounting rails. The mounting blades slide into the mounting rails to support the switch (provided).
       - Screws to secure the mounting rails to the chassis (provided).
         - Twelve screws for QFX5200-32C or QFX5200-32C-L
         - Twenty screws for QFX5200-48Y
       - Eight screws to secure the chassis and rear installation blades to the rack (not provided).
   - Appropriate screwdriver for the 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: A QFX5200 switch must be supported at all four corners. Mounting the chassis using only the front brackets will damage the chassis and can result in serious bodily injury.

CAUTION: All QFX5200 switches require two people for installation, one person to lift the switch into place and another person to attach the switch to the rack. If you are installing the QFX5200 switch 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 switch.

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

Four Post Installation Procedure for QFX5200-32C or QFX5200-32C-L

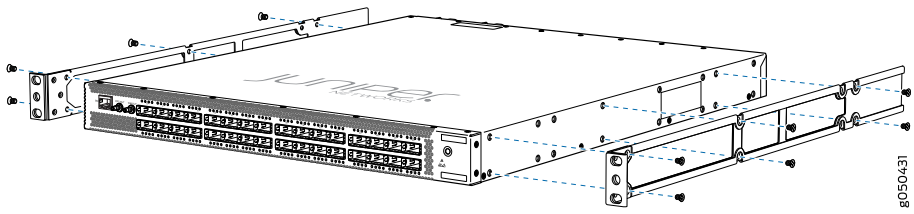
To mount the QFX5200-32C or QFX5200-32C-L on four posts in a rack using the provided mounting kit:

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 of the switch or the port end is to be placed at the front of the rack. Position the switch in such a manner that the **AIR IN** labels on components are next to the cold aisle and **AIR OUT** labels on components are next to the hot aisle.

3. Align the holes in the mounting rail with the holes on the side of the chassis. See Figure 36 on page 105 to see the proper alignment for the QFX5200-32C or QFX5200-32C-L switch.

Figure 36: Attaching Mounting Rails to the QFX5200-32C or QFX5200-32C-L



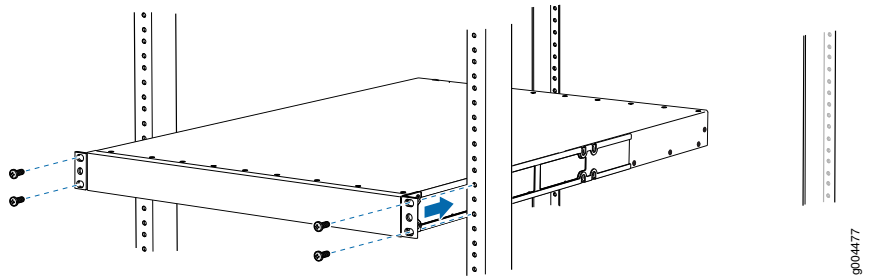
4. Attach the mounting rail to the switch using the mounting screws. Tighten the screws.

5. Repeats steps 3 and 4 on the opposite side of the switch.

6. Have one person grasp both sides of the switch, lift it, and position it in the rack so that the front bracket is aligned with the rack holes.

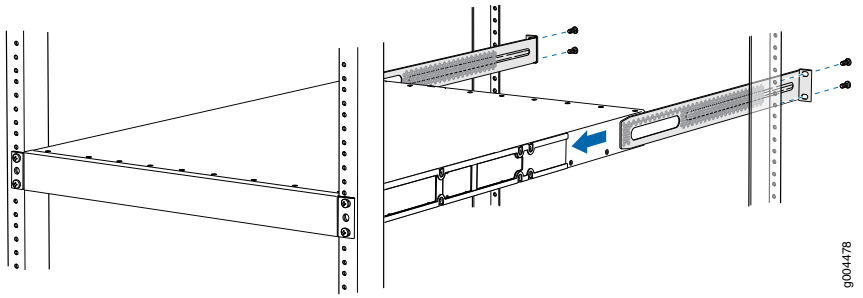
7. Have a second person secure the front of the switch to the rack using four mounting screws (and cage nuts and washers if your rack requires them.) Tighten the screws. See Figure 37 on page 106 for an example of connecting the mounting rails and blades to a QFX5200-32C or QFX5200-32C-L.

Figure 37: Attach QFX5200-32C or QFX5200-32C-L Switch to Rack



8. Continue to support the switch while sliding the rear mounting-blades into the channel of the side mounting-rails and securing the blades to the rack. Use the four mounting screws (and cage nuts and washers if your rack requires them) to attach each blade to the rack. Tighten the screws. See Figure 38 on page 106.

Figure 38: Slide Mounting Blade into Mounting Rail



9. Ensure that the switch 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.

Four Post Installation Procedure for QFX5200-48Y

To mount the QFX5200-48Y on four posts in a rack using the provided mounting kit:

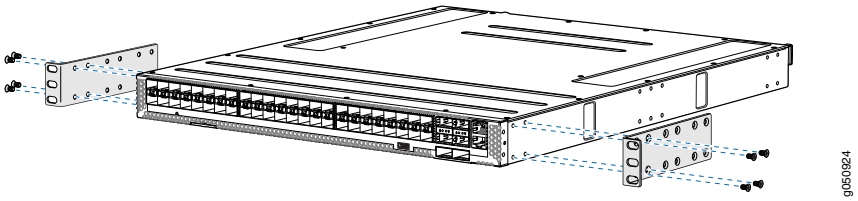
1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.

2. Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.

3. Decide whether the FRU end of the switch or the port end is to be placed at the front of the rack. For airflow in (AFI) installations, position the switch with the blue components next to the cold aisle and for airflow out (AFO) installations, position the switch with the red components next to the hot aisle.

4. Align the holes in the front mounting bracket with the holes on the side of the chassis so that the bracket is flush with the port panel. See Figure 39 on page 107.

Figure 39: Align the Front Mounting Bracket and Secure with Screws



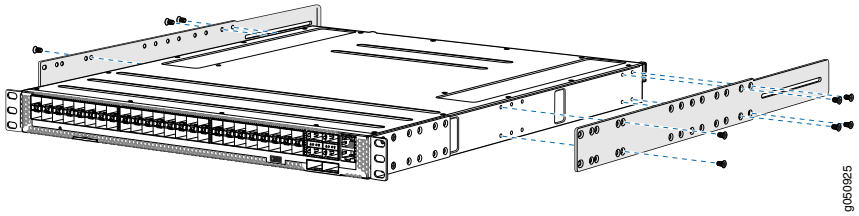
5. Using a Phillips screwdriver, attach the front mounting bracket to the switch using four of the flat head screws in the holes closest to the port panel. Tighten the screws.

6. Repeat Steps 4 and 5 on the opposite side of the switch.

7. Align the holes in the adjustable mounting rail with the remaining holes in the chassis. The alignment should permit two screws at mid-chassis and four screws nearest the power supplies. The adjustable blades fit standard racks between 22.05 in. (56 cm) to 29.5 in. (75 cm).

8. Attach the adjustable mounting rail to the chassis using the Phillips screwdriver and six of the flat head screws. Tighten the screws. See Figure 40 on page 108.

Figure 40: Align Holes for Mounting Rail and Attach with Screws

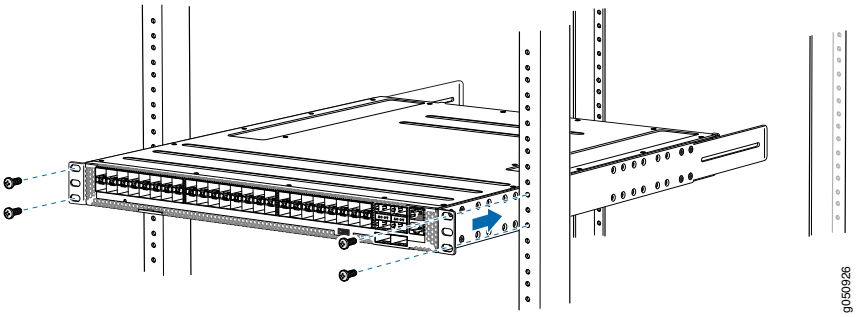


9. Repeat Steps 7 and 8 on the opposite side of the switch.

10. Have one person grasp both sides of the unit, lift it, and position it in the rack so that the front mounting bracket is aligned with the rack holes.

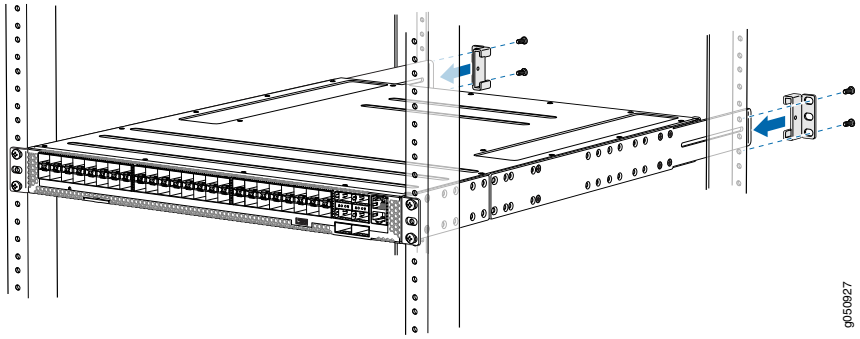
11. Have a second person secure the front of the device to the rack using four mounting screws (and cage nuts and washers if your rack requires them). Tighten the screws. See Figure 41 on page 108.

Figure 41: Attach the Front Mounting Bracket to the Rack



12. Continue to support the switch while sliding the rear mounting brackets into the channel of the adjustable mounting blades and securing the blades and the brackets to the rack. Use four mounting screws (and cage nuts and washers if your rack requires them) to attach the blades and rear mounting brackets to the rack. Tighten the screws. See Figure 42 on page 109.

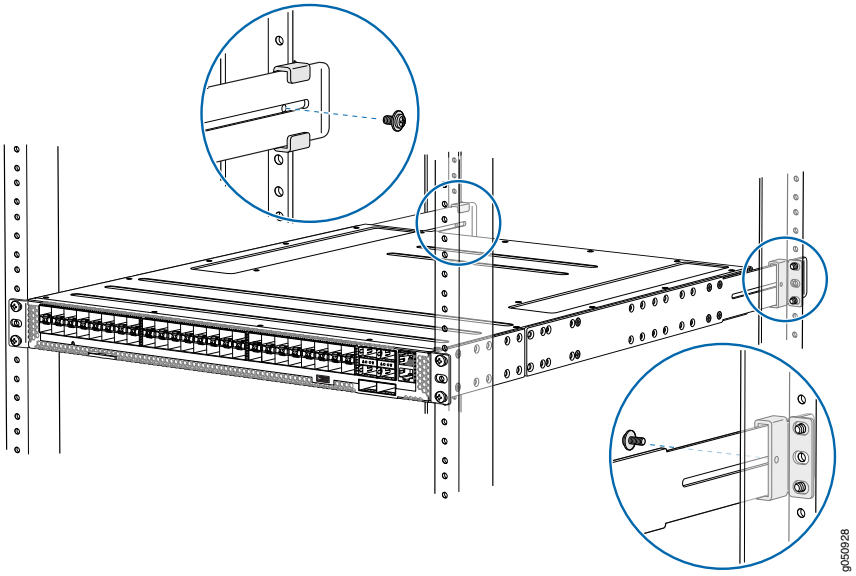
Figure 42: Slide Blades into Mounting Rails and Attach to the Rack



13. Ensure that the 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.

14. Secure the mounting rails to the rear mounting brackets using the two washer head screws. Tighten the screws. See Figure 43 on page 109.

Figure 43: Lock the Mounting Rails to the Rack



15. Attach a grounding cable to earth ground and then attach it to the chassis grounding points. .

RELATED DOCUMENTATION

Connecting the QFX5200 to External Devices

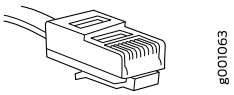
IN THIS SECTION

Connect a Device to a Network for Out-of-Band Management

You can monitor and manage the device by using a dedicated management channel. Each device has a management port to which you can connect an Ethernet cable with an RJ-45 connector. Use the management port to connect the device to the management device.

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end. Figure 44 on page 110 shows the RJ-45 connector of the Ethernet cable supplied with the device.

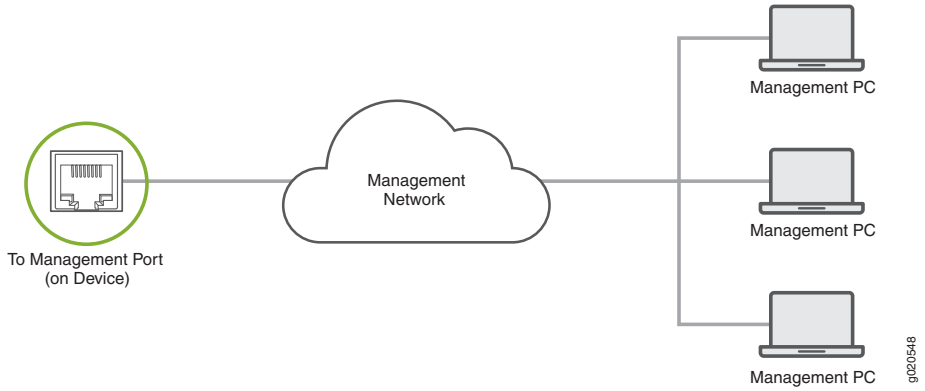
Figure 44: RJ-45 Connector on an Ethernet Cable



To connect a device to a network for out-of-band management (see Figure 45 on page 111):

1. Connect one end of the Ethernet cable to the management port on the device.
2. Connect the other end of the Ethernet cable to the management device.

Figure 45: Connect a Device to a Network for Out-of-Band Management



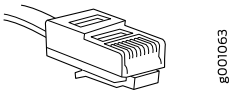
Connect a Device to a Management Console Using an RJ-45 Connector

You can configure and manage the device by using a dedicated management channel. Each device has a console port which you can connect to using an Ethernet cable with an RJ-45 connector. Use the console port to connect the device to the console server or management console. The console port accepts a cable that has an RJ-45 connector.

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end. One such cable and an RJ-45 to DB-9 serial port adapter are supplied with the device.

Figure 46 on page 111 shows the RJ-45 connector of the Ethernet cable.

Figure 46: RJ-45 Connector on an Ethernet Cable



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

To connect the device to a management console (see Figure 47 on page 112 and Figure 48 on page 112):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**, **CONSOLE**, or **CON1**) on the device.

2. Connect the other end of the Ethernet cable to the console server (see Figure 47 on page 112) or management console (see Figure 48 on page 112).

Figure 47: Connect a Device to a Management Console Through a Console Server

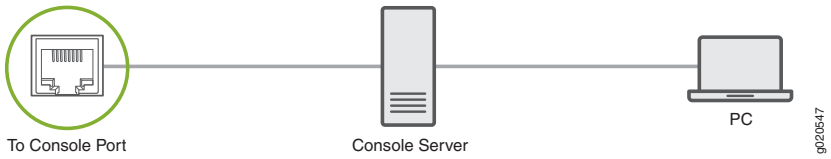


Figure 48: Connect a Device Directly to a Management Console

RELATED DOCUMENTATION

- General Safety Guidelines and Warnings | **172**
- Grounded Equipment Warning | **190**
- Connecting the QFX5200 to Power | **112**

Connecting the QFX5200 to Power

IN THIS SECTION

Connect the QFX5200 to Earth Ground

You must install the QFX5200 in a restricted-access location and ensure that the chassis is always properly grounded. The QFX5200 has a two-hole protective grounding terminal provided on the chassis. See Figure 49 on page 114. We recommend that you use this protective grounding terminal as the preferred method for grounding the chassis regardless of the power supply configuration. However, if additional grounding methods are available, you can also use those methods. For example, you can use the grounding wire in the power cord for AC power or use the grounding terminal or lug on a DC power supply. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

CAUTION: Ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable that you supply. Using a grounding cable with an incorrectly attached lug can damage the switch (for example by causing a short circuit.)

NOTE: Mount your switch in the rack or cabinet before attaching the grounding lug to the switch. See "Mounting a QFX5200 in a Rack or Cabinet" on page 103.

Ensure that you have the following parts and tools available:

- Grounding cable for your QFX5200 device—The grounding cable must be 14 AWG (2 mm^2), minimum 90° C wire, or as permitted by the local code (not provided).
- (QFX5200-32C and QFX5200-32C-L) Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent (not provided).
- For QFX5200-32C and QFX5200-32C-L, two 10-32 x 0.25 screws with #10 split-lock washers—Two screws are used to secure the grounding lug to the grounding lug bracket protective earthing terminal. These screws and washers are not provided.
- For QFX5200-48Y, two 4.3 ring terminals, 14-18 AWG, and the provided M4 screw with star washer.
- Number 2 screwdriver.

An AC-powered QFX5200 switch 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 "QFX5200 Power Cord Specifications" on page 55.

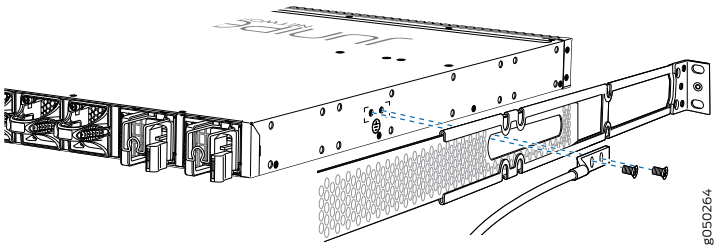
To connect earth ground to a QFX5200-32C or QFX5200-32C-L:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.

2. Place the grounding lug attached to the grounding cable over the protective earthing terminal.

3. Secure the grounding lug to the protective earthing terminal with two screws and washers. See Figure 49 on page 114.

Figure 49: Connecting a Grounding Cable to a QFX5200-32C and QFX5200-32C-L



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.

To connect earth ground to a QFX5200-48Y:

1. Ensure the rack is properly grounded and is in compliance with ETSI ETS 300 253.

2. Verify that there is a good electrical connection to the grounding point on the rack.

3. Attach the ring terminals to each end of the #14 AWG grounding wire.

4. Connect one of the ring terminals to the grounding point on the FRU panel.

5. Connect the other ring terminal to the rack ground.

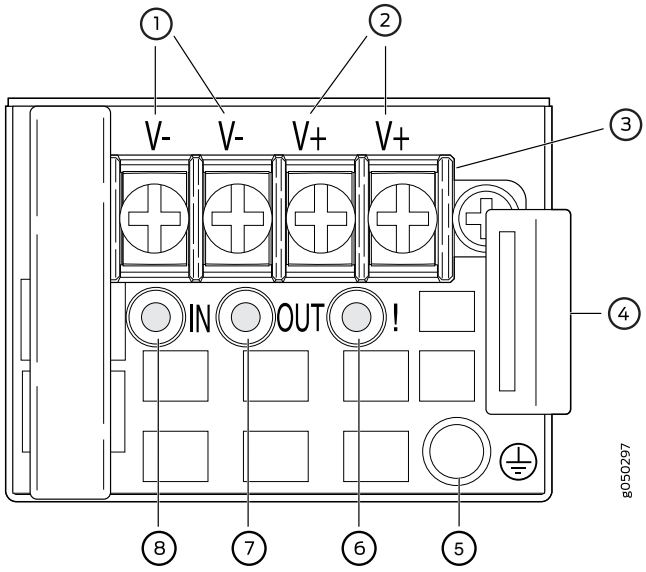
> **CAUTION:** Do not remove the earth connection until all power supply connections are disconnected.

Alternate Method to Ground QFX5200-32C-DC Systems

We recommend that you connect earth ground to a QFX5110 DC chassis using the "Connect the QFX5200 to Earth Ground" on page 113 method. However if you can't access the chassis using the two-holed grounding lug, you can ground the chassis using the DC protective earthing terminal on the DC power supply.

The DC power supplies have a protective earthing terminal on the face that holds an M5 pan-head screw with integrated washer. See Figure 50 on page 115.

Figure 50: DC Power Supply Faceplate on a QFX5200-32C-DC



1–Shunt negative input terminals (-48V)	5–Protective earthing terminal
2–Shunt positive input terminals (+RTN)	6–Fault LED
3–Terminal block	7–Output LED
4–Security latch	8–Input LED

Ensure that you have the following parts and tools available to ground the chassis using this method:

- M5 pan-head screw x .08 mm with integrated washer (not provided)
- M5 lug (not provided)
- 12 AWG (2.5 mm^2) standard wire, 90° C wire or heavier (not provided)
- Number 2 screwdriver (not provided)

To connect earth ground to a QFX5200-32C-DC power supply:

1. Have a licensed electrician attached the M5 grounding lug to the grounding cable that you supply.

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

2. Ensure that all grounding surfaces are clean and brought to a bright finish before grounding connections are made.

3. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.

4. Place the grounding lug that is attached to the grounding cable over the protective earthing terminal on the DC power supply.

5. Use a screwdriver to secure the grounding lug to the protective earthing terminal with a M5 pan-head screw with integrated washer.

6. 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.

Connecting AC Power to a QFX5200

The QFX5200 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 switch or disrupting the switching function.

Ensure that you have a power cord appropriate for your geographical location available to connect AC power to the switch.

Before you begin connecting AC power to the switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see “Prevention of Electrostatic Discharge Damage” on page 206).
- Ensure that you have connected the switch 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 "Connect the QFX5200 to Earth Ground" on page 113. 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 "QFX5200 Power Cord Specifications" on page 55).

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX5200, see "Installing a Power Supply in a QFX5200" on page 136.

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

To connect AC power to a QFX5200:

1. Attach the grounding strap to your bare wrist and to a site ESD 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 a that blank cover panel is installed over the second power supply slot.

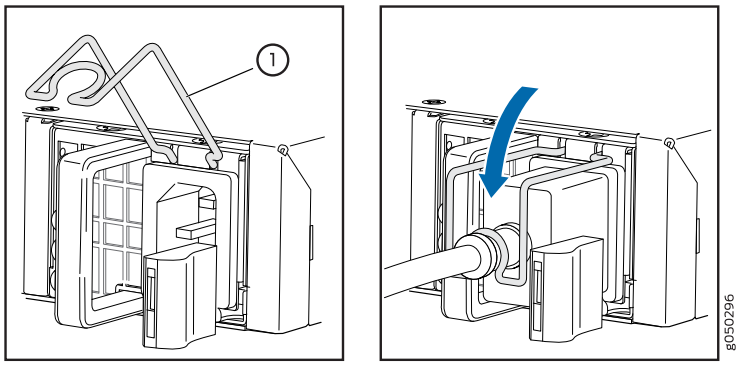
3. Locate the power cord or cords shipped with the switch; the cords have plugs appropriate for your geographical location.

WARNING: Ensure that the power cord does not block access to device components or drape where people can 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. For QFX5200-32C and QFX5200-32C-L models, push the power cord retainer onto the power cord (see Figure 51 on page 118). Power cord retainers are not available for QFX5200-48Y PSUs.

Figure 51: Connecting an AC Power Cord to an AC Power Supply in a QFX5200-32C and QFX5200-32C-L



1—Power cord retainer

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

> **NOTE:** The switch 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 (|) 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 Fan Module from a QFX5200" on page 130). 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 switch 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 chassis overheating.

CAUTION: A system reboot with Routing Engine FPGA version 7.1 might not successfully boot the Junos OS software. In case of a system reboot failure, you need to power cycle the switch. To check the current FPGA version, issue the **show chassis firmware** command.

Connecting DC Power to a QFX5200

IN THIS SECTION

The QFX5200 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 switch or disrupting the switching function.

WARNING: A DC-powered QFX5200 is 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).

NOTE: The QFX5200-32C-L is only available for AC.

This topic includes:

Before You Begin

Before you begin connecting DC power to the switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see “Prevention of Electrostatic Discharge Damage” on page 206).
- Ensure that you have connected the switch 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 “Connect the QFX5200 to Earth Ground” on page 113.

On QFX5200-32C-DC systems, you can also ground the chassis using the DC protective earthing terminal on the DC power supply as an alternate method. This method is useful if you are unable to access the chassis ground point by using the two-holed grounding lug, see “Alternate Method to Ground QFX5200-32C-DC Systems” on page 115.

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX5200, see “Installing a Power Supply in a QFX5200” on page 136.

Ensure that you have the following parts and tools available:

- For QFX5200-32C–DC power source cables (14–16 AWG) with ring lug (Molex 190700069 or equivalent) (not provided)
- For QFX5200-48Y–DC power source cables (12 AWG) with ring lug (provided)
- Phillips (+) screwdriver, number 2 (not provided)
- Multimeter (not provided)

Connecting DC Power to a QFX5200-32C-DC

To connect DC power to a QFX5200-32C:

1. Attach the grounding strap to your bare wrist and to a site ESD 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 216 and "DC Power Electrical Safety Guidelines" on page 210.

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 52 on page 123).

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 52 on page 123and Figure 53 on page 124).

   The QFX5200-32C 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 in QFX5200-32C; 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.

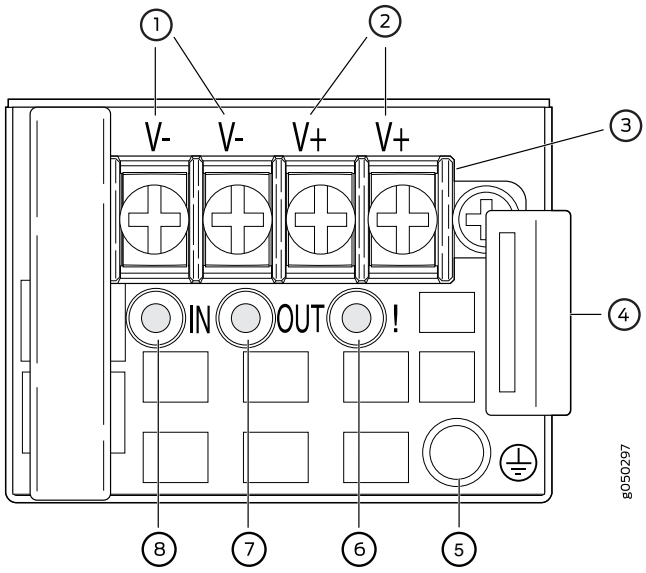
Do not connect two sources to a single power supply because doing so can potentially cause circulating current in feed wires whenever there is any difference in the voltage of the two sources.

   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.

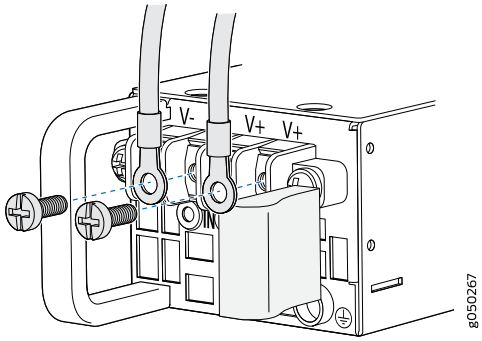
Figure 52: QFX5200-32C-DC Faceplate



1–Shunt negative input terminals (-48V)	5–Protective earthing terminal
2–Shunt positive input terminals (+RTN)	6–Fault LED
3–Terminal block	7–Output LED
4–Security latch	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 53: Securing Ring Lugs to the Terminals on the QFX5200-32C DC Power Supply



1–Shunt negative input terminals (+RTN)	5–Protective earthing terminal
2–Shunt positive input terminals (-48V)	6–Fault LED
3–Terminal block	7–Output LED
4–Ejector lever	8–Input LED

8. Replace the terminal block cover.

9. Close the input circuit breaker.

> **NOTE:** The switch 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.

Connecting DC Power to a QFX5200-48Y

To connect DC power to a QFX5200-48Y:

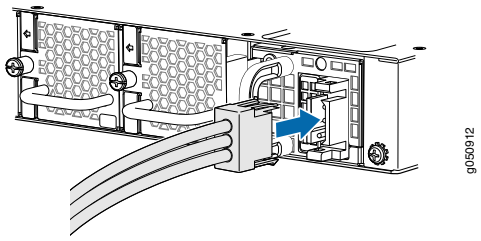
1. Attach the grounding strap to your bare wrist and to a site ESD point.

2. 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.

3. Ensure that the power supplies are fully inserted in the chassis.

4. .Connect each power supply to the power source by inserting the DC connector of the provided power cable into the power supply. See Figure 54 on page 125.

Figure 54: Connecting DC Power Cable to QFX5200-48Y



5. Connect each power cable 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

   - Connect the ring lug of the green-yellow cable to earth ground.
   - Connect the ring lug of the black cable to the negative (–) DC power source.
   - Connect the ring lug of the red cable to the positive (+) DC power source.

   The QFX5200-48Y 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 in QFX5200-48Y; 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.

   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.

6. Close the input circuit breaker.

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

7. Verify that the LED on each power supply is lit green and on steadily.

RELATED DOCUMENTATION

Performing the Initial Software Configuration for QFX5200 Switches

You must perform the initial configuration of the QFX5200 through the console port using the CLI or through Zero Touch Provisioning (ZTP). In order to use ZTP to provision the device, you must have access to a Dynamic Host Control Protocol (DHCP) server, and a File Transfer Protocol (anonymous FTP), Hypertext Transfer Protocol (HTTP), or Trivial File Transfer Protocol (TFTP) server on which the software image and configuration files are stored. For more information about using ZTP for provisioning the device, see Understanding Zero Touch Provisioning in the *Installation and Upgrade Guide*.

Before you begin connecting and configuring a QFX5200, set the following parameter values on the console server or PC:

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

To connect and configure the switch from the console:

1. Connect the console port to a laptop or PC using the supplied RJ-45 cable and RJ-45 to DB-9 adapter. The console (**CON**) port is located on the management panel of the switch.

2. Log in as **root**. There is no password. If the software booted 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 switch. If the name includes spaces, enclose the name in quotation marks (“ ”).

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

7. Configure the default gateway.

   - For standard Junos OS systems:

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

   - For Junos OS Evolved systems:

```
[edit]
root@# set system management-instance
root@# set routing-instances mgmt_junos routing-options static route prefix/prefix-length next-hop
default-gateway-ip-address
```

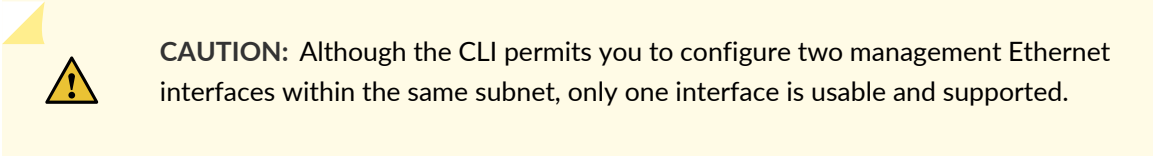
8. Configure the IP address and prefix length for the switch management interface.

   - For standard Junos OS systems:

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

   - For Junos OS Evolved systems:

```
[edit]
root@# set interfaces re0:mgmt-0 unit 0 family inet address ip-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.

> **NOTE:** On the QFX5200-48Y, the management port **em0** is the top right-hand RJ-45 port on the port panel.

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 services such as SSH and Telnet.

> **NOTE:** You will not be able to log in to the switch as the **root** user through Telnet. Root login is allowed only through SSH.

- The default option for SSH is **yes**. Select this to enable SSH.
- The default option for Telnet is **no**. Change this to **yes** to enable Telnet.

RELATED DOCUMENTATION

QFX5200 Installation Overview | 99

4

CHAPTER

Maintaining Components

Maintaining QFX5200 Cooling System

IN THIS SECTION

Removing a Fan Module from a QFX5200

The fan modules in QFX5200 are hot-removable and hot-insertable field-replaceable units (FRUs): you can remove and replace them without powering off the switch or disrupting switch functions.

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

Before you remove a fan module from a QFX5200, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 206).

Ensure that you have the following parts and tools available to remove a fan module from a QFX5200:

- ESD grounding strap
- Antistatic bag or an antistatic mat

To remove a fan module from a QFX5200-32C or a QFX5200-32C-L (see Figure 55 on page 131 and Figure 56 on page 131):

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 a Phillips screwdriver, loosen the locking screw (3 or 4 turns).

4. On QFX5200-32C and QFX5200-32C-L models, grasp the handle on the fan module and squeeze the outside of the handle to release the module. On QFX5200-48Y models, use a screwdriver to loosen the captive screw with 3 or 4 turns.

   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 stop spinning, use your other hand to support the fan and 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 55: Removing a Fan Module from a QFX5200-32C or QFX5200-32C-L

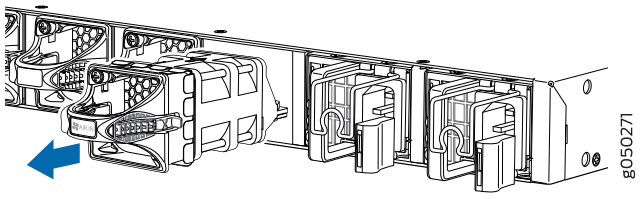
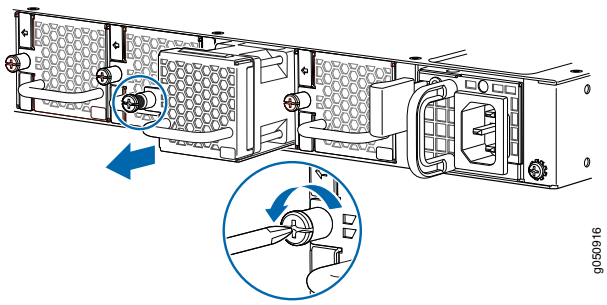


Figure 56: Removing a Fan Module from a QFX5200-48Y



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 a QFX5200

The fan modules in a QFX5200 are hot-removable and hot-insertable field-replaceable units (FRUs): you can remove and replace them without powering off the switch or disrupting switch functions.

> **CAUTION:** Replace a failed fan module with a new fan module within 1 minute of removal to prevent chassis overheating. Before removing the fan module, ensure you have a replacement fan module at hand.

> **NOTE:** The fan module provides FRU-to-port or port-to-FRU airflow depending on the switch product SKU you purchase. In legacy switches, or switches with an LCD, this airflow is called front to back and back to front.

Before you install a fan module in a QFX5200, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 206).

To install a fan module in a QFX5200 (see Figure 57 on page 133 and Figure 58 on page 133):

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 management panel of the chassis and slide it in until it is fully seated.

   > **CAUTION:** Damage can occur if you attempt to install a fan module into a chassis with a different airflow direction. Compare the switch product SKU with the airflow marking on the handle to ensure that you are installing a fan module with the same airflow direction as the chassis. The fan modules are designed so that they can only be inserted into the QFX5200 product SKU that supports the same airflow type. See "QFX5200 Cooling System" on page 43 for more information.

4. On QFX5200-48Y models, use a Phillips screwdriver to turn the locking screw until it is tight.

Figure 57: Installing a Fan Module in a QFX5200-32C and QFX5200-32C-L

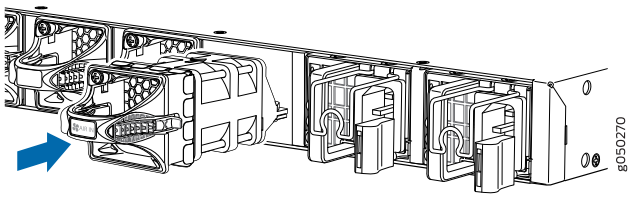
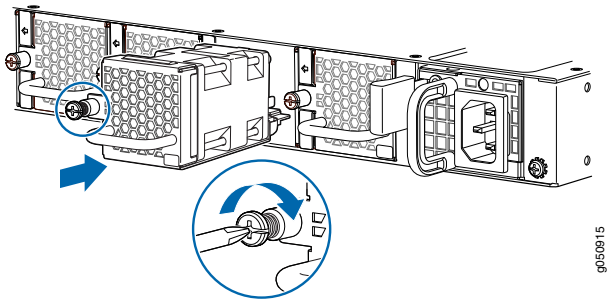


Figure 58: Installing a Fan Module in a QFX5200-48Y



RELATED DOCUMENTATION

- QFX5200 Cooling System | 43
- QFX5200 Field-Replaceable Units | 24
- QFX5200 Switch Management | 33

Maintaining QFX5200 Power System

IN THIS SECTION

Removing a Power Supply from a QFX5200

The QFX5200 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 switch or disrupting the switching function.

Before you remove a power supply from a QFX5200, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 206).

Ensure that you have the following parts and tools available to remove a power supply from a QFX5200:

- 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.

To remove a power supply from a QFX5200 (see Figure 59 on page 135 and Figure 60 on page 135):

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 only one power supply is installed in your QFX5200, you need to power off the switch before removing the power supply. See "Powering Off a QFX5200" on page 146.

3. Disconnect power to the switch:

   - 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 plug 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 socket end of the power cord connected to the power supply faceplate.
   - DC power supply—On QFX5200-32C,, 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.

     On QFX5200-48Y, remove the power source cables from the power supply

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.

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

Figure 59: Removing a Power Supply from a QFX5200-32C or a QFX5200-32C-L

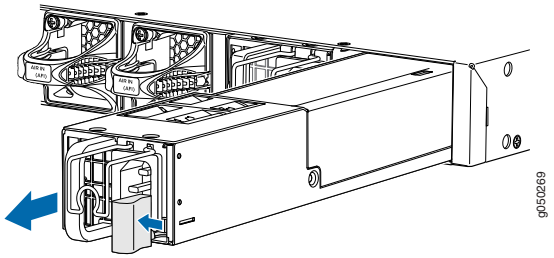
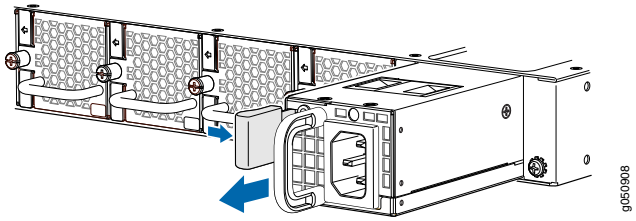


Figure 60: Removing a Power Supply from a QFX5200-48Y



Installing a Power Supply in a QFX5200

The QFX5200 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 switch or disrupting the switching function.

- Before you install a power supply in a QFX5200, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 206).
- Ensure that the airflow direction of the power supply is the same as the chassis. Labels on the power supply handle indicate the direction of airflow. See "QFX5200 Cooling System" on page 43 for more information.

To install a power supply in a QFX5200 (see Figure 61 on page 136 and Figure 62 on page 137):

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.

> **CAUTION:** Verify that the direction of the arrow on the power supply handle matches the direction of airflow in the chassis. Ensure that each power supply you install in the chassis has the same airflow direction. If you install power supplies with two different airflow directions, Junos OS raises an alarm, and the status (**ALM**) LED blinks amber.

3. Using both hands, place the power supply in the power supply slot on the FRU panel of the switch and slide it in until it is fully seated and the locking lever slides into place.

Figure 61: Installing a Power Supply in a QFX5200-32C or a QFX5200-32C-L

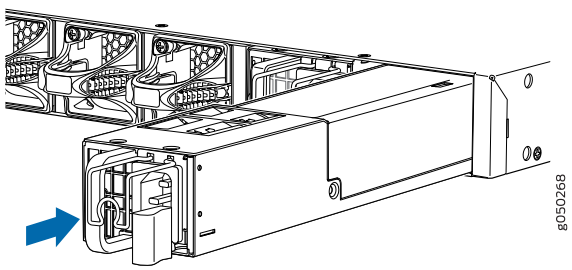
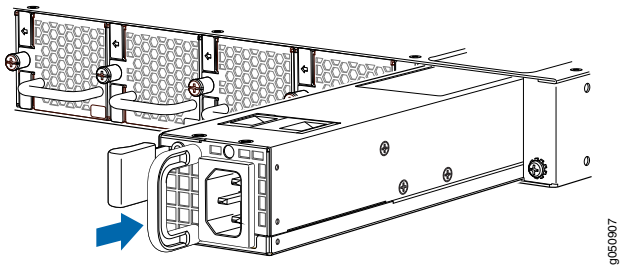


Figure 62: Installing a Power Supply in a QFX5200-48Y



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.

RELATED DOCUMENTATION

- QFX5200 Power System | 52
- Connecting the QFX5200 to Power | 112
- QFX5200 Field-Replaceable Units | 24

Maintaining Transceivers and Fiber Optic Cables on QFX5200

IN THIS SECTION

QFX5200-32C-L Time Allowance

NOTE: When removing and inserting optics in Junos OS Evolved systems, maintain a 5 second pause between removing the optic and inserting an optic In a port.

Remove 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 remove 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 191).

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 63 on page 140 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 a site ESD point.

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 (see "Disconnect a Fiber-Optic Cable" on page 143). 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. If there is a cable management system, arrange the cable in the cable management system 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 in the cable management system. Placing fasteners on the loop helps to maintain its shape.

CAUTION: Do not bend the 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. To remove an SFP, SFP+, XFP, or a QSFP+ transceiver:

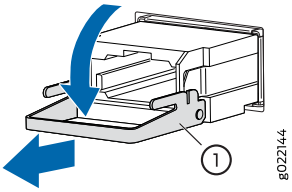
   a. By using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.

   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 ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

Figure 63: Remove 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 ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

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

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

9. Place the dust cover over the empty port or install the replacement transceiver.

Install 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 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 191).

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

Figure 64 on page 143 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 a site ESD point.

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.

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.

5. Using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. 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.

6. 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.

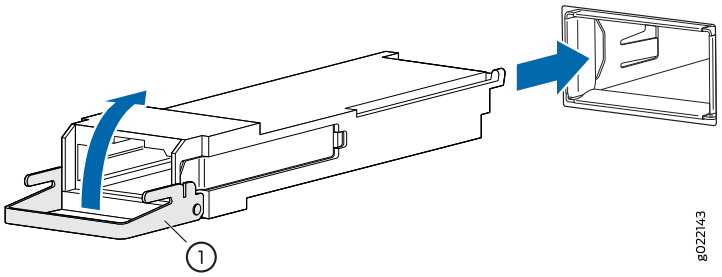
> **CAUTION:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

7. If there is a cable management system, arrange the cable in the cable management system 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 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.

Figure 64: Install a Transceiver



1–Ejector lever

Disconnect a Fiber-Optic Cable

Juniper Networks devices have optical transceivers to which you can connect fiber-optic cables.

Before you disconnect a fiber-optic cable from an optical transceiver, ensure that you have taken the necessary precautions for safe handling of lasers. See “Laser and LED Safety Guidelines and Warnings” on page 191.

Ensure that you have the following parts and tools available:

- A rubber safety cap to cover the transceiver
- A rubber safety cap to cover the fiber-optic cable connector

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

1. Disable the port in which the transceiver is installed by issuing the following command:

   ```
   [edit interfaces]
   user@device# 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.

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.

Connect a Fiber-Optic Cable

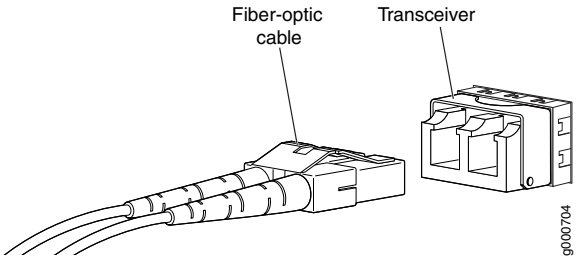
Before you connect a fiber-optic cable to an optical transceiver installed in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see “Laser and LED Safety Guidelines and Warnings” on page 191).

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

> **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.

1. If the fiber-optic cable connector is covered with a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the optical transceiver. Save the cap.
3. Insert the cable connector into the optical transceiver (see Figure 65 on page 145).

Figure 65: Connect a Fiber-Optic Cable to an Optical Transceiver Installed in a Device



4. Secure the cables so that they do not support their 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. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.
>
> 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.

How to Handle Fiber-Optic Cables

Fiber-optic cables connect to optical transceivers that are installed in Juniper Networks devices.

To maintain fiber-optic cables:

- When you unplug a fiber-optic cable from a transceiver, place rubber safety caps over the transceiver and on the end of the cable.
- Anchor fiber-optic cables to prevent stress on the connectors. When you attach 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.
- Avoid bending fiber-optic cables beyond their minimum bend radius. Bending fiber-optic cables into arcs smaller than a few inches in diameter 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 instructions 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 Opptex Cletop-S® Fiber Cleaner. Follow the instructions in the cleaning kit you use.

RELATED DOCUMENTATION

QFX5200 Network Cable and Transceiver Planning | 82

Powering Off a QFX5200

NOTE: Use the following procedure to turn off power on a QFX5200 standalone switch.

Before you remove the power cord to power off a QFX5200:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See “Prevention of Electrostatic Discharge Damage” on page 206.

- Ensure that you do not need to forward traffic through the switch.

Ensure that you have the following parts and tools available to power off the switch:

- 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 QFX5200 switch:

1. Connect to the switch using one of the following methods:

   - Connect a management device to the console (**CON**) port on a QFX5200. For instructions about connecting a management device to the console (**CON**) port, see "Connect a Device to a Management Console Using an RJ-45 Connector" on page 111.
   - You can shut down the QFX5200 from a management device on your out-of-band management network. For instructions about connecting a management device to the management (**CO**) port, see "Connect a Device to a Network for Out-of-Band Management" on page 110.

2. Shut down Junos OS from the external management device.

   For Junos OS Evolved systems:

   a. Issue the **request system shutdown power-off** operational mode CLI command. This command shuts down the switch gracefully and preserves system state information. A message appears on the console, confirming that the operating system has halted.

      On Junos OS Evolved systems, you see the following output:

      ```
      user@host>request system shutdown power-off
      Power off the system ? [yes,no] (n) yes

      poweroff the system at Tue Sep 18 11:15:27 2018
      ```

   For standard Junos OS systems:

a. Issue the **request system halt** operational mode CLI command. This command shuts down the switch gracefully and preserves system state information. A message appears on the console, confirming that the operating system has halted.

   You see the following output (or something similar, depending on the hardware being shut down) after entering the command:

```
Shutdown NOW!
System going down IMMEDIATELY


Terminated
Poweroff for hypervisor to respawn
Oct 25 10:35:05 init: event-processing (PID 1114) exited with status=1
Oct 25 10:35:05 init: packet-forwarding-engine (PID 1424) exited with status=8
.
Waiting (max 60 seconds) for system process `vnlru_mem' to stop...done
Waiting (max 60 seconds) for system process `vnlru' to stop...done
Waiting (max 60 seconds) for system process `bufdaemon' to stop...done
Waiting (max 60 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining...0 0 0 0 done

syncing disks... All buffers synced.
Uptime: 11h0m30s
Normal shutdown (no dump device defined)
unloading fpga driver
unloading fx-scpld
Powering system off using ACPI
kvm: 28646: cpu0 disabled perfctr wrmsr: 0xc1 data 0xabcd
pci-stub 0000:01:00.2: transaction is not cleared; proceeding with reset
anyway
pci-stub 0000:01:00.1: transaction is not cleared; proceeding with reset
anyway
hub 1-1:1.0: over-current change on port 1
Stopping crond: [  OK  ]
Stopping libvirtd daemon: [  OK  ]
Shutting down ntpd: [  OK  ]
Shutting down system logger: [  OK  ]
Shutting down sntpc: [  OK  ]
Stopping sshd: [  OK  ]
Stopping vehostd: [  OK  ]
Stopping watchdog: [  OK  ]
Stopping xinetd: [  OK  ]
Sending all processes the TERM signal... [  OK  ]
Sending all processes the KILL signal... [  OK  ]
```

```
Saving random seed:  [  OK  ]
Syncing hardware clock to system time [  OK  ]
Turning off swap:  [  OK  ]
Unmounting file systems:  [  OK  ]
init: Re-executing /sbin/init
Halting system...
System halted.
```

CAUTION: Wait at least 60 seconds after first seeing the final message before following the instructions in Step 4 and Step 5 to power off the switch.

3. Attach the grounding strap to your bare wrist and to a site ESD point.

4. Disconnect power to the switch by performing one of the following tasks:

   - 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 plug 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 socket 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.

6. Uncable the switch before removing it from the rack or cabinet.

RELATED DOCUMENTATION

Connecting the QFX5200 to Power | 112

5
CHAPTER

Troubleshooting Hardware

Troubleshooting the QFX5200

IN THIS SECTION

QFX5200 Troubleshooting Resources Overview

To troubleshoot a QFX5200, 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 QFX5200. For more information, see the following topics:
  - QFX5200 Chassis Status LEDs on page 38
  - QFX5200 Management Panel Overview on page 34
  - QFX5200-32C and QFX5200-32C-L Port Panel on page 25
  - QFX5200-48Y Port Panel on page 29
  - QFX5200-32C and QFX5200-32C-L Fan Module LED on page 50
  - QFX5200 AC Power Supply LEDs on page 57
  - QFX5200 DC Power Supply LEDs on page 62
- 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.
- Knowledge Base articles–Knowledge Base.

SEE ALSO

Contact Customer Support

QFX Series Alarm Messages Overview

When a QFX Series switch 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
```

```
6 alarms currently active
Alarm time               Class  Description
2018-02-07 12:12:18 PST  Major  FPC Management1 Ethernet Link Down
2018-02-07 12:11:54 PST  Minor  FPC0: LED 3:Alarm LED Read Error
2018-02-07 12:11:54 PST  Minor  FPC0: LED 3:Alarm LED Write Error
2018-02-07 12:11:54 PST  Major  FPC0: PEM 1 Not Supported
2018-02-07 12:11:54 PST  Major  FPC0: PEM 0 Not Supported
2018-02-07 12:11:54 PST  Major  FPC0: PEM 0 Not Powered
```

For Junos OS Evolved systems, **show system alarms** CLI command indicates major and minor alarms on the system. In this example from a Junos OS Evolved system, a fan tray error is shown in slot **4**.

```
user@host> show system alarms
```

```
2 alarms currently active
Alarm time               Class  Description
2018-11-15 11:52:22 PST  Major  Fan Tray 4 Failure   <<<<<
2018-11-15 10:40:08 PST  Minor  Host 0 Disk 2 Labelled incorrectly
```

Chassis Alarm Messages

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

Chassis alarms on QFX5200 devices have two severity levels:

- Major (red)—Indicates a critical situation on the device that has resulted from one of the conditions described in Table 45 on page 154. A red alarm condition requires immediate action.
- Minor (yellow)—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 45 on page 154 describes the chassis alarm messages on QFX5200-32C and QFX5200-48Y devices. For QFX5200-32C-L devices see Table 46 on page 158.

Table 45: Chassis Alarm Messages for QFX5200-32C and QFX5200-48Y

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 error messages and report the message to customer support: • **CM ENV Monitor: Get fan speed failed**. • ***fan-number* is NOT spinning @ correct speed**, where ***fan-number*** can be 1, 2, 3, 4, or 5.
		Fan *fan-number* 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 error message ***fan-number* Absent**, where ***fan-number*** can be can be 1, 2, 3, 4, or 5. Install fan modules in the slots where they are absent.

Table 45: Chassis Alarm Messages for QFX5200-32C and QFX5200-48Y *(continued)*

Component	Alarm Type	CLI Message	Recommended Action
Power supplies	Major (red)	**PEM *pem-number* Airflow not matching Chassis Airflow**	Replace the power supply with a power supply that supports the same airflow direction as supported by the chassis.
		PEM *pem-number* I2C Failure	Check the system log for one of the following error messages and report the message to customer support: • **I2C Read failed for device *number***, where ***number*** where number ranges from 123 through 125. • **PS *number*: Transitioning from online to offline**, where power supply ***number*** is 1 or 2.
		PEM *pem-number* is not powered	Check the power cord connection and reconnect, if necessary.
		PEM *pem-number* is not supported	Replace the power supply with a supported power supply.
		PEM *pem-number* Not OK	Indicates a problem with the incoming AC power or outgoing DC power. Report the error to customer support.
	Minor (yellow)	**PEM *pem-number* Absent**	Reboot the switch after removing one of the power supply. The switch can continue to operate with a single power supply. OR Replace the removed power supply and reboot the switch.
		PEM *pem-number* Power Supply Type Mismatch	Check whether there is a mix of AC and DC power supplies in the same chassis. Reboot the switch with only AC or only DC power supplies.
		PEM *pem-number* Removed	

Table 45: Chassis Alarm Messages for QFX5200-32C and QFX5200-48Y *(continued)*

Component	Alarm Type	CLI Message	Recommended Action
			Replace the removed power supply or reboot the switch. The switch can continue to operate with a single power supply.
Temperature sensors	Major (red)	***sensor-location* Temp Sensor Fail**	Check the system log for the following error message and report the message to customer support: **Temp sensor *sensor-number* failed**, where *sensor-number* ranges from 1 through 10.
		***sensor-location* 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)	***sensor-location* Temp Sensor Too Warm**	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.

Table 45: Chassis Alarm Messages for QFX5200-32C and QFX5200-48Y *(continued)*

Component	Alarm Type	CLI Message	Recommended Action
Routing Engine	Minor (yellow)	**RE *RE number* /var partition usage is high**	Clean up the system file storage space on the switch. For more information, see *Cleaning Up the System File Storage Space*.
	Major (red)	**RE *RE number* /var partition is full**	Clean up the system file storage space on the switch. For more information, see *Cleaning Up the System File Storage Space*.
	Minor (yellow)	**Rescue configuration is not set**	Use the **request system configuration rescue save** command to set the rescue configuration. For more information, see *Setting or Deleting the Rescue Configuration*.
		***Feature* usage requires a license** or **License for *feature* expired**	Install the required license for the feature specified in the alarm. For more information, see *Software Features That Require Licenses on the QFX Series*.
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. On models that have both em0 and em1 management interfaces available, you must connect both interfaces. If both interfaces are not connected, the alarm is raised. However, the alarm has no service impact. 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).

Junos OS Evolved systems, such as QFX5200-32C-L are based on a new alarm infrastructure, not all power supplies and fan alarms are supported. Table 46 on page 158 shows these alarms.

Table 46: Chassis Alarm Messages for QFX5200-32C-L

Component	Alarm Type	CLI Message	Recommended Action
Fans	Red (major)	**Fan Tray *fan-tray-number* Absent**	Install fan modules in the slots where they are absent.
		Fan Tray *fan-tray-number* Failure	Remove and check fan module for obstructions. Reinsert the fan module. If the problem persists, replace the fan module.
	Yellow (minor)	**FAN *fan-number* Fan Sensor Fail**	Remove and check fan module for obstructions. Reinsert the fan module. If the problem persists, check the system log for the message related to the sensor and report the message to customer service.
Power Supplies	Red (major)	**PEM *pem-number* Not Powered**	Install a power supply into the empty slot and ensure the power supply is powered.
Temperature sensors	Major (red)	**FPC 0 Temperature 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)	**FPC 0 Temperature Warm**	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.
		FPC 0 Temp Sensor Fail	Check the system log for the following error message and report the message to customer support:

Table 46: Chassis Alarm Messages for QFX5200-32C-L *(continued)*

Component	Alarm Type	CLI Message	Recommended Action
Management Ethernet interface	Major (red)	**Management interface *management-interface-name* down on *node***	Check whether a cable is connected to the management Ethernet interface, or whether the cable is defective. Replace the cable, if required.

RELATED DOCUMENTATION

Definitions of Safety Warning Levels | **173**

Configuring Junos OS to Determine Conditions That Trigger Alarms on Different Interface Types

alarm

CHAPTER 6

Contacting Customer Support and Returning the Chassis or Components

Contact Customer Support to Obtain Return Material Authorization

If you are returning a device or hardware component to Juniper Networks for repair or replacement, obtain a Return Material Authorization (RMA) number from Juniper Networks Technical Assistance Center (JTAC).

After locating the serial number of the device or hardware component you want to return, open a service request with Juniper Networks Technical Assistance Center (JTAC) on the Web or by telephone.

Before you request an RMA number from JTAC, be prepared to provide the following information:

- Your existing service request number, if you have one
- Serial number of the component
- Your name, organization name, telephone number, fax number, and shipping address
- 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

You can contact JTAC 24 hours a day, seven days a week on the Web or by telephone:

- Service Request Manager: https://support.juniper.net/support
- Telephone: +1-888-314-JTAC (+1-888-314-5822), toll free in U.S., Canada, and Mexico

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

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

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

Returning the QFX5200 Chassis or Components

IN THIS SECTION

Locating the Serial Number on a QFX5200 Device or Component

IN THIS SECTION

If you are returning a switch or component to Juniper Networks for repair or replacement, you must locate the serial number of the switch or component. 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).

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

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

Listing the Chassis and Component Details Using the CLI

To list the QFX5200 switch and components and their serial numbers, use the **show chassis hardware** CLI operational mode command. The following examples shows the output for the QFX5200-32C models.

```
user@device> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                WH3615220019      Qfx5200-32c-32q
Pseudo CB 0
Routing Engine 0          BUILTIN      BUILTIN           QFX Routing Engine
FPC 0                     650-059719   WH3615220019      Qfx5200-32c-32q
  CPU                     BUILTIN      BUILTIN           FPC CPU
  PIC 0                   BUILTIN      BUILTIN           32X40G/32X100G-QSFP
    Xcvr 0       REV      740-038623   APF15200013GBR    QSFP+-40G-CU1M
    Xcvr 1       REV 01   740-032986   QC350639          QSFP+-40G-SR4
    Xcvr 2       REV 01   740-038624   MOC12526240244    QSFP+-40G-CU3M
    Xcvr 3       REV 01   740-038624   MOC12286240027    QSFP+-40G-CU3M
    Xcvr 4       REV      740-044512   APF151500097D5    QSFP+-40G-CU50CM
    Xcvr 5       REV 01   740-038623   MOC12526230201    QSFP+-40G-CU1M
    Xcvr 6       REV      740-044512   APF151500097DT    QSFP+-40G-CU50CM
    Xcvr 7       REV      740-044512   APF151500097DK    QSFP+-40G-CU50CM
    Xcvr 8       REV 01   740-038623   MOC12526230104    QSFP+-40G-CU1M
    Xcvr 9       REV 01   740-038623   MOC13016230274    QSFP+-40G-CU1M
    Xcvr 10      REV 01   740-038623   MOC13016230255    QSFP+-40G-CU1M
    Xcvr 11      REV 01   740-038623   MOC13016230234    QSFP+-40G-CU1M
    Xcvr 12      REV      740-044512   APF151500097CW    QSFP+-40G-CU50CM
    Xcvr 13      REV      740-044512   APF151500097D3    QSFP+-40G-CU50CM
    Xcvr 14      REV      740-044512   APF151500097DD    QSFP+-40G-CU50CM
    Xcvr 15      REV      740-038623   APF15200013GAK    QSFP+-40G-CU1M
    Xcvr 16      REV      740-038623   APF15200013GA5    QSFP+-40G-CU1M
    Xcvr 17      REV      740-038623   APF15200013GA9    QSFP+-40G-CU1M
    Xcvr 18      REV      740-038623   APF15200013GBK    QSFP+-40G-CU1M
    Xcvr 19      REV      740-038623   APF15200013GBH    QSFP+-40G-CU1M
    Xcvr 20      REV 01   740-038624   MOC12526240172    QSFP+-40G-CU3M
    Xcvr 21      REV 01   740-032986   QE483777          QSFP+-40G-SR4
    Xcvr 22      REV      740-038623   APF15200013GAP    QSFP+-40G-CU1M
    Xcvr 23      REV      740-038623   APF15200013GBC    QSFP+-40G-CU1M
    Xcvr 24      REV      740-044512   APF151500097DP    QSFP+-40G-CU50CM
    Xcvr 26      REV 01   740-053203   APF15050073YLU    QSFP+-40G-ACU7M
    Xcvr 27      REV      740-038623   APF15200013GAU    QSFP+-40G-CU1M
    Xcvr 28      REV 01   740-052307   APF14370078AJ2    QSFP+-40G-ACU7M
    Xcvr 29      REV 01   740-052307   APF14370078APW    QSFP+-40G-ACU7M
```

```
    Xcvr 30      REV 01   740-032986   QE481024         QSFP+-40G-SR4
    Xcvr 31      REV 01   740-032986   QD449842         QSFP+-40G-SR4
Fan Tray 0                                             fan-ctrl-2 0, Front to
Back Airflow - AFO
Fan Tray 1                                             fan-ctrl-2 1, Front to
Back Airflow - AFO
Fan Tray 2                                             fan-ctrl-2 2, Front to
Back Airflow - AFO
Fan Tray 3                                             fan-ctrl-2 3, Front to
Back Airflow - AFO
Fan Tray 4                                             fan-ctrl-2 4, Front to
Back Airflow - AFO

{master:0}
```

The next example shows the output from the QFX5200-32C-L models.

```
user@device> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                WN0218310472      QFX5200-32C-L
PSM 0            REV 05   740-053352   1GD18230909       JPSU-850W-AC-AFO
PSM 1            REV 05   740-053352   1GD18230901       JPSU-850W-AC-AFO
Routing Engine 0          BUILTIN      BUILTIN           RE-QFX5200-32C-32Q
CB 0             REV 02   650-088479   WN0218310472      QFX5200-32C-CHAS
FPC 0                     BUILTIN      BUILTIN           QFX5200-32C-32Q
  PIC 0                   BUILTIN      BUILTIN           32X40G/32X100G-QSFP
    Xcvr 0       REV 01   740-058734   1ACQ130900E       QSFP-100GBASE-SR4
    Xcvr 1       REVÿ01   740-038624   APF15170031W72    QSFP+-40G-CU3M
    Xcvr 2       REVÿ01   740-038625   APF165100537Y2    QSFP+-40G-CU5M
    Xcvr 3       REVÿ01   740-038625   APF165100538UE    QSFP+-40G-CU5M
    Xcvr 4       REVÿ01   740-038625   APF165100538AB    QSFP+-40G-CU5M
    Xcvr 5       REVÿ01   740-038624   APF1515003985L    QSFP+-40G-CU3M
    Xcvr 6       REV 01   740-032986   QF3608R5          QSFP+-40G-SR4
    Xcvr 7       REV 01   740-046565   QG1502LM          QSFP+-40G-SR4
    Xcvr 8       REV 01   740-032986   QB500134          QSFP+-40G-SR4
    Xcvr 9       REV 01   740-067442   QI110561          QSFP+-40G-SR4
    Xcvr 10      REV 01   740-032986   QB341588          QSFP+-40G-SR4
    Xcvr 11      REVÿ01   740-038624   APF151500398DK    QSFP+-40G-CU3M
    Xcvr 12      REV 01   740-058734   1ACQ110401G       QSFP-100GBASE-SR4
    Xcvr 13      REVÿ01   740-038624   APF15150039844    QSFP+-40G-CU3M
    Xcvr 14      REV 01   740-058734   1ACQ104202B       QSFP-100GBASE-SR4
    Xcvr 15      REV 01   740-061405   1ACQ13140NX       QSFP-100GBASE-SR4
```

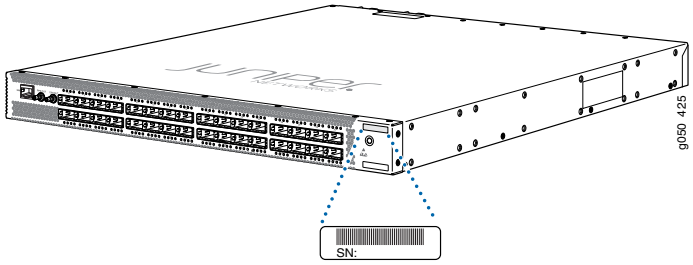
```
    Xcvr 16      REV 01   740-032986   QF4900G4          QSFP+-40G-SR4
    Xcvr 17      REVÿ01   740-038624   APF15150039889    QSFP+-40G-CU3M
    Xcvr 18      REV 01   740-046565   QF33003P          QSFP+-40G-SR4
    Xcvr 19      REV 01   740-052665   QH5002AK          QSFP+-40G-SR4
    Xcvr 20      REV 01   740-032986   QD477662          QSFP+-40G-SR4
    Xcvr 21      REV 01   740-067442   QI1200SR          QSFP+-40G-SR4
    Xcvr 22      REV 01   740-061405   1ECQ11200A9       QSFP-100GBASE-SR4
    Xcvr 23      REV 01   740-061405   1ACQ131416W       QSFP-100GBASE-SR4
    Xcvr 24      REV 01   740-061405   1ACQ131417A       QSFP-100GBASE-SR4
    Xcvr 25      REV 01   740-061405   1ACQ131417W       QSFP-100GBASE-SR4
    Xcvr 26      REV 01   740-061405   1ECQ1044045       QSFP-100GBASE-SR4
    Xcvr 27      REV 01   740-058734   1ACQ111308Y       QSFP-100GBASE-SR4
    Xcvr 28      REV 01   740-058734   1ACQ1305019       QSFP-100GBASE-SR4
    Xcvr 29      REV 01   740-052665   QH5002CM          QSFP+-40G-SR4
    Xcvr 30      REV 01   740-052665   QH5002D0          QSFP+-40G-SR4
    Xcvr 31      REV 01   740-058734   1ECQ11210G1       QSFP-100GBASE-SR4
Fan Tray 0                                              QFX5200 Fan Tray
Fan Tray 1                                              QFX5200 Fan Tray
Fan Tray 2                                              QFX5200 Fan Tray
Fan Tray 3                                              QFX5200 Fan Tray
Fan Tray 4                                              QFX5200 Fan Tray

user@device
```

NOTE: You must remove the fan module to read the fan serial number from the serial number ID label. The fan module serial number cannot be viewed through the CLI. **Fan Tray 2** refers to the third module from the left, counting from 0.

Locating the Chassis Serial Number ID Label on a QFX5200

The location for the chassis serial number ID label is located on the right side of the QFX5200-32C and QFX5200-32C-L port panel. See Figure 66 on page 166 for an example of where to find the serial number ID.

Figure 66: Location of the Serial Number ID Label on a QFX5200-32C or a QFX5200-32C-L Switch



The serial number is also available in the output of the **show chassis hardware** operational mode CLI command.

Locating the Serial Number ID Labels on FRU Components

The power supplies and fan modules installed in a QFX5200 are field-replaceable units (FRUs). For each FRU, you must remove the FRU from the switch chassis to see the FRU serial number ID label.

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

SEE ALSO

Returning a QFX5200 or Component for Repair or Replacement

How to Return a Hardware Component to Juniper Networks, Inc.

If a hardware component fails, 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 webpage 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 that 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 QFX5200 Device or Component for Shipping

IN THIS SECTION

If you are returning a QFX5200 or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you pack a QFX5200 or component:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 206.
- 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 to Obtain a Return Materials Authorization for a QFX Series Device or Component*.

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.

This topic describes:

Packing a QFX5200 Switch for Shipping

To pack a QFX5200 for shipping:

1. Power down the switch and remove the power cables. See "Powering Off a QFX5200" on page 146.
2. Remove the cables that connect the QFX5200 to all external devices.
3. Remove all field-replaceable units (FRUs) from the switch.
4. Have one person support the weight of the switch while another person unscrews and removes the mounting screws.

5. Remove the switch from the rack or cabinet (see "QFX5200 Installation Safety Guidelines" on page 100) and place the switch in an antistatic bag.

6. Place the switch in the shipping carton.

7. Place the packing foam on top of and around the switch.

8. If you are returning accessories or FRUs with the switch, pack them as instructed in "Packing QFX5200 Components for Shipping" on page 169.

9. Replace the accessory box on top of the packing foam.

10. Close the top of the cardboard shipping box and seal it with packing tape.

11. Write the RMA number on the exterior of the box to ensure proper tracking.

Packing QFX5200 Components for Shipping

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

To pack and ship QFX5200 components:

- Place individual FRUs in antistatic bags.
- Ensure that the components are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
- Close the top of the cardboard shipping box and seal it with packing tape.
- Write the RMA number on the exterior of the box to ensure proper tracking.

RELATED DOCUMENTATION

Contact Customer Support to Obtain Return Material Authorization | 161

CHAPTER 7

Safety and Compliance Information

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.
- Follow the instructions in this guide to properly ground the device 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.

Attention Veillez à respecter les consignes indiquées pour éviter toute incommodité ou blessure légère, voire des dégâts graves pour l'appareil.

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

Avertissement Ce symbole signale un risque de blessure provoquée par rayon 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.

Avertissement 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 vare 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.

Avertissement 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.

Avertissement 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 lb (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.

Avertissement 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.

Avertissement 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 vältytään 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.

Avertissement 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 edificio.
- 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, oeriormente 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: This device must be properly grounded at all times. Follow the instructions in this guide to properly ground the device to earth.

Waarschuwing Dit apparaat moet altijd goed geaard zijn. Volg de instructies in deze gids om het apparaat goed te aarden.

Varoitus Laitteen on oltava pysyvästi maadoitettu. Maadoita laite asianmukaisesti noudattamalla tämän oppaan ohjeita.

Avertissement L'appareil doit être correctement mis à la terre à tout moment. Suivez les instructions de ce guide pour correctement mettre l'appareil à la terre.

Warnung Das Gerät muss immer ordnungsgemäß geerdet sein. Befolgen Sie die Anweisungen in dieser Anleitung, um das Gerät ordnungsgemäß zu erden.

Avvertenza Questo dispositivo deve sempre disporre di una connessione a massa. Seguire le istruzioni indicate in questa guida per connettere correttamente il dispositivo a massa.

Advarsel Denne enheten på jordes skikkelig hele tiden. Følg instruksjonene i denne veiledningen for å jorde enheten.

Aviso Este equipamento deverá estar ligado à terra. Siga las instrucciones en esta guía para conectar correctamente este dispositivo a tierra.

¡Atención! Este dispositivo debe estar correctamente conectado a tierra en todo momento. Siga las instrucciones en esta guía para conectar correctamente este dispositivo a tierra.

Varning! Den här enheten måste vara ordentligt jordad. Följ instruktionerna i den här guiden för att jorda enheten ordentligt.

Laser and LED Safety Guidelines and Warnings

IN THIS SECTION

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

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.

Avertissement Les connecteurs à fibre optique sans terminaison peuvent émettre un rayonnement laser invisible. Le cristallin de l'œil humain faisant converger toute la puissance du laser sur la rétine, toute focalisation directe de l'œil sur une source laser, —même de faible puissance—, peut entraîner des lésions oculaires irréversibles.

Class 1 Laser Product Warning

WARNING: Class 1 laser product.

Waarschuwing Klasse-1 laser produkt.

Varoitus Luokan 1 lasertuote.

Avertissement 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.

Avertissement 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.

Avertissement 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.

Avertissement 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 emiteres 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 an 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

IN THIS SECTION

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

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.

Avertissement 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 baterían 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.

Avertissement 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 kraftledningar. 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.

Avertissement 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 ylikuumentuisi, 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.

Avertissement 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 aperturas 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.

Avertissement 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.

Avertissement Certains ports de l'appareil sont destinés à un usage en intérieur uniquement (ports Type 2 ou Type 4 tels que décrits dans le document *GR-1089-CORE*) et doivent être isolés du câblage de l'installation extérieure exposée. Pour respecter les exigences NEBS et assurer une protection contre la foudre et les perturbations de tension secteur, les ports pour intérieur *ne doivent pas* être raccordés physiquement aux interfaces prévues pour la connexion à l'installation extérieure ou à son câblage. Les ports pour intérieur de l'appareil sont réservés au raccordement de câbles pour intérieur ou non exposés uniquement. L'ajout de protections ne constitue pas une précaution suffisante pour raccorder physiquement ces interfaces au câblage de l'installation extérieure.

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.

Attention Avant de retirer ou d'installer des composants d'un appareil, raccordez un bracelet antistatique à un point de décharge électrostatique et fixez le bracelet à votre poignet nu. L'absence de port d'un bracelet antistatique pourrait provoquer des dégâts sur l'appareil.

- 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.
  - Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

    Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.

- 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 67 on page 207) 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.

  Avertissement Par mesure de sécurité, vérifiez régulièrement la résistance du bracelet antistatique. Cette valeur doit être comprise entre 1 et 10 mégohms (Mohms).

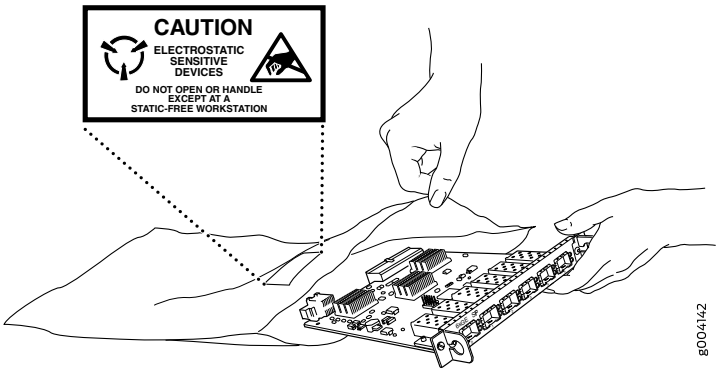
- When handling any component that is subject to ESD damage and that is removed from the device, make sure the equipment end of your ESD wrist strap is attached to the ESD point on the chassis.

  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 67 on page 207). If you are returning a component, place it in an antistatic bag before packing it.

Figure 67: 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.

Attention Les câbles ANSI/TIA/EIA-568, par exemple Cat 5e et Cat 6, peuvent emmagasiner des charges électrostatiques. Pour évacuer ces charges, reliez toujours les câbles à une prise de terre adaptée avant de les raccorder au système.

AC Power Electrical Safety Guidelines

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。

g017253

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.

Avertissement 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.
- For permanently connected equipment, a readily accessible disconnect device shall be incorporated external to the equipment.
- For pluggable equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible.
- Be sure to connect the ground wire or conduit to a solid central 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.
- 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.

Avertissement Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifier 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.

Avertissement 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.

¡Atención! 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 naar –48 V, +RTN naar +RTN, aarde naar aarde.

Varoitus Oikea yhdistettava kytkentajarjestys on maajohto maajohtoon, +RTN varten +RTN, –48 V varten – 48 V. Oikea irrotettava kytkentajarjestys on –48 V varten – 48 V, +RTN varten +RTN, maajohto maajohtoon.

Avertissement Câblez l'approvisionnement 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 nan 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.

Avertissement 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 forcella 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 lederen.

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.

Avertissement 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.

Avertissement 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.

Agency Approvals and Compliance Statements for the QFX5200 and QFX5220

IN THIS SECTION

See the following topics for agency and compliance information:

Agency Approvals for the QFX Series

The QFX Series complies with the following standards:

- Safety
  - CAN/CSA-C22.2 No. 60950-1 Safety of Information Technology Equipment
  - UL 62368-1 Audio/Video, Information and Communication Technology Equipment- Safety
  - IEC 62368-1: 2014 Audio/Video, Information and Communication Technology Equipment–Safety
  - IEC 60950-1: 2005/A2:2013 Information Technology Equipment -Safety (All country deviations): CB Scheme
  - EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- Electromagnetic Compatibility (EMC)
  - EN 300 386 V1.6.1 (2012) Telecom Network Equipment–EMC requirements
  - EN 55024: 1998/A1:2001/A2:2003 Information Technology Equipment Immunity Characteristics
  - TEC/SD/DD/EMC-221—India EMC standard
  - EN 301 489-1 V1.92 (2011-09)–EMC and Radio spectrum Matters
  - EN 55024
  - CISPR 24
  - BSMI, Class A
  - CNS 13438
- Electromagnetic Interference (EMI)
  - FCC 47 CFR Part 15, Class A (2009) USA Radiated Emissions
  - EN 55022 Class A (2010) European Radiated Emissions
  - VCCI Class A:(2010) Japanese Emissions
  - BSMI CNS 13438 and NCC C6357 Class A Taiwan Radiated Emissions
  - AS/NZS CISPR 22:2009: Class A, Australian/New Zealand Radiated Emissions
- Immunity
  - EN 55024: 1998/A1:2001/A2:2003 Information Technology Equipment Immunity Characteristics
  - EN-61000-3-2 (2006) Power Line Harmonics
  - EN-61000-3-3 (2013) Power Line Voltage Fluctuations
  - EN-61000-4-2 (2009) Electrostatic Discharge

- EN-61000-4-3 (2007) Radiated Immunity
- EN-61000-4-4 (2012) Electrical Fast Transients
- EN-61000-4-5 (2006) Surge
- EN-61000-4-6 (2009) Immunity to Conducted Disturbances
- EN-61000-4-11 (2004) Voltage Dips and Sags

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