Juniper Networks | Engineering Simplicity

QFX5220 Switch Hardware Guide

Published
2026-02-11

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QFX5220 Switch Hardware Guide
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About This Guide

Use this guide to plan, install, perform initial software configuration, perform routine maintenance, and to troubleshoot QFX5220 switches.

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

CHAPTER 1

Fast Track: Initial Installation

IN THIS CHAPTER

- Fast Track to Rack Installation and Power | **2**
- Onboard, Configure, and Monitor QFX5220 | **10**

Fast Track to Rack Installation and Power

SUMMARY

This procedure walks you through the most basic steps for installing your QFX5220 switch in a rack and connecting it to power.

IN THIS SECTION

- Mount the Device by Using the QFX5K-4PST-RMK-E Rack Mount Kit On a Square Hole Rack | **2**
- Connect to Power | **7**

You can install the QFX5220-32CD switch on a 19-in. four-post rack or cabinet using the QFX5K-4PST-RMK-E rack mount kit (RMK). We'll walk you through the steps to install the QFX5220-32CD switch on a square hole rack using the QFX5K-4PST-RMK-E RMK.

You can install a QFX5220-128C in a four post rack by using the QFX5220-4PRMK-4U rack mount kit. See "Mount a QFX5220-128C in a Four Post Rack by Using the QFX5220-4PRMK-4U Rack Mount Kit " on page 167.

Before you install the switch, review:

- "QFX5220 Site Guidelines and Requirements" on page 110.
- General Safety Guidelines and Warnings.
- "Unpacking a QFX5220 " on page 146.

Mount the Device by Using the QFX5K-4PST-RMK-E Rack Mount Kit On a Square Hole Rack

Ensure that you have the following tools and parts available:

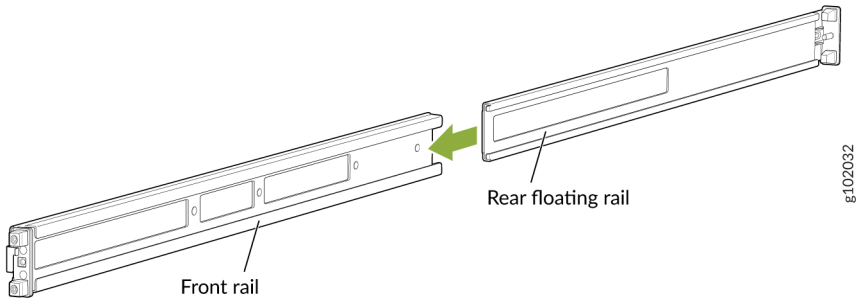
- An ESD grounding strap—not provided.
- Number 2 Phillips (+) screwdriver—not provided
- A pair of front and rear mounting rails. These mounting rails attach to the front and rear rack posts—provided with the rack mount kit
- A pair of side mounting brackets and 16 flat head M4 x 6mm Phillips screws. These brackets attach to the device if not pre-installed—provided with the rack mount kit

- A pair of Spacers—provided with the rack mount kit

To mount the device on four posts in a rack by using the QFX5K-4PST-RMK-E rack mount kit:

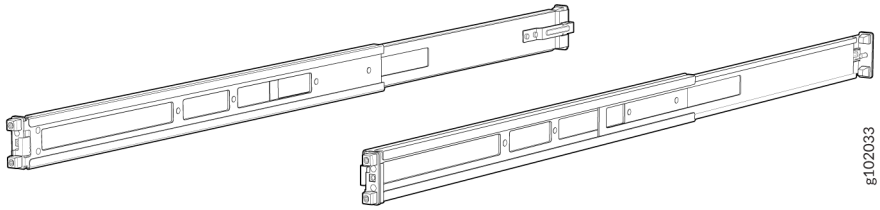
1. Wrap and fasten the ESD grounding strap to your bare wrist and an connect the other end of the strap to the ESD point on the device.
2. Assemble the mounting rails.
   a. Slide the rear floating rails into the front rails. See Figure 1 on page 3.

Figure 1: Assemble the Mounting Rails



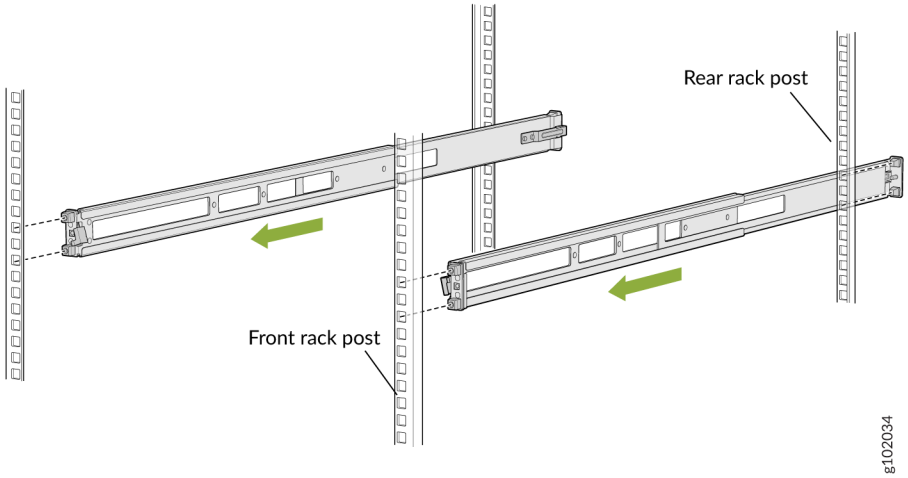
   b. Mounting rails assembled. See Figure 2 on page 3.

Figure 2: Front and Rear Rails Assembled



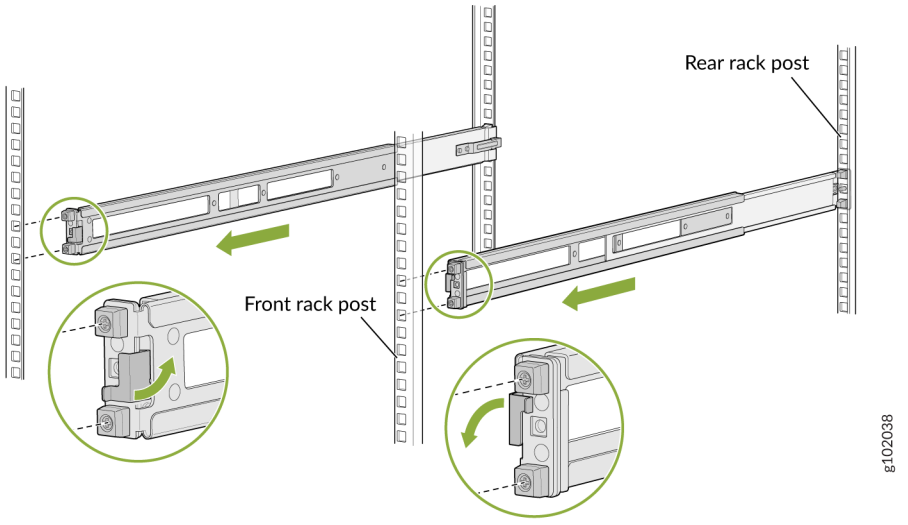
3. Attach the mounting rails to the rack.
   a. Standing in front of the rack, align the guide blocks of the rear mounting rails with the rear-post holes. Pull the rear mounting rails toward the front of the rack to lock the rails in place. You will hear a click sound when the latch locks into the corresponding rack holes. See Figure 3 on page 4.

Figure 3: Install the Rear Floating Rails



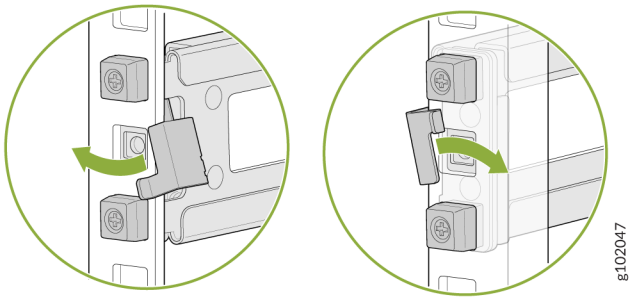
b. Move the latch lock on the front mounting rail to open position, slide the front mounting rail, and insert the guide blocks into the front rack posts. See Figure 4 on page 4.

Figure 4: Install the Front Mounting Rails



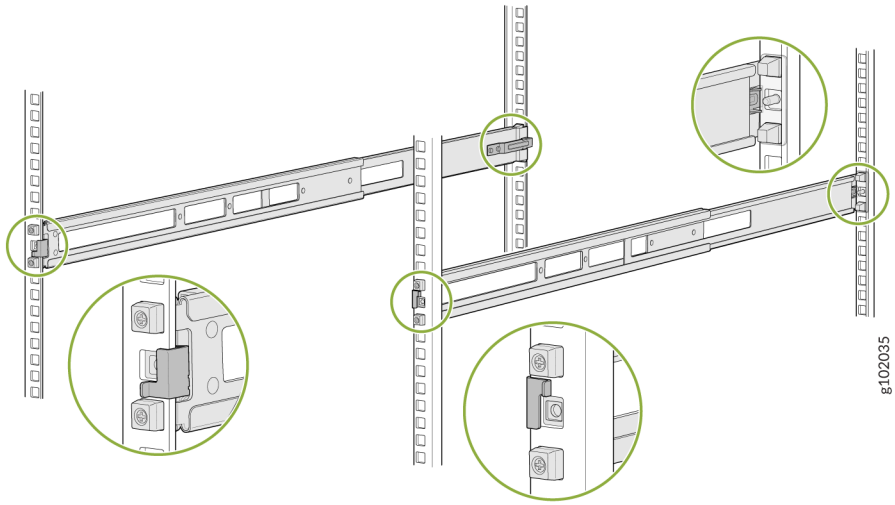
c. Push the lock latch to the locked position. See Figure 5 on page 5.

Figure 5: Front Mounting Rail's Lock Latch



d. Visually ensure that the front and rear latches are locked into place on the mountingrails. See Figure 6 on page 5.

Figure 6: Mounting Rails Installed and Locked

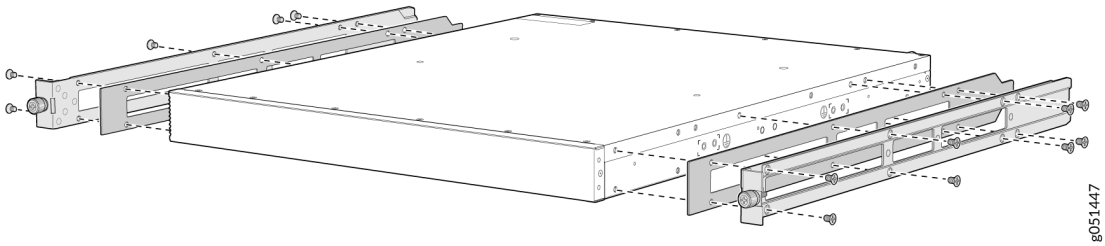


4. Attach the spacers and the mounting brackets to the device if not pre-installed. If your device already has the spacers and mounting brackets pre-installed than skip this step and move to the next step.

   a. Align the holes on the spacer and the mounting bracket with the screw holes that are on the side panel of the chassis.

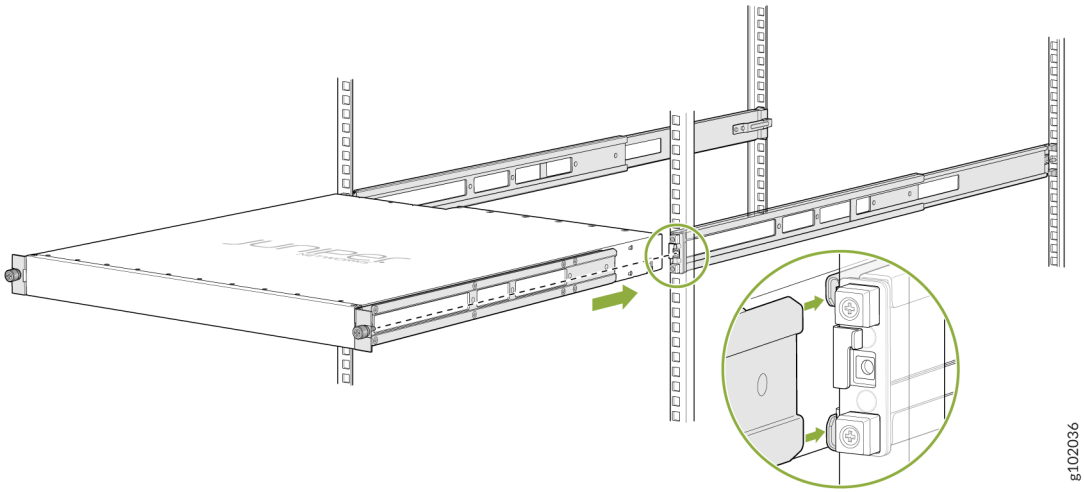
   b. Insert the flat head M4 x 6mm Phillips screws to attach the spacer and the mounting bracket into the aligned holes on the chassis (see Figure 7 on page 6). Tighten the screws.

Figure 7: Attach the Spacers and the Mounting Brackets to the Device



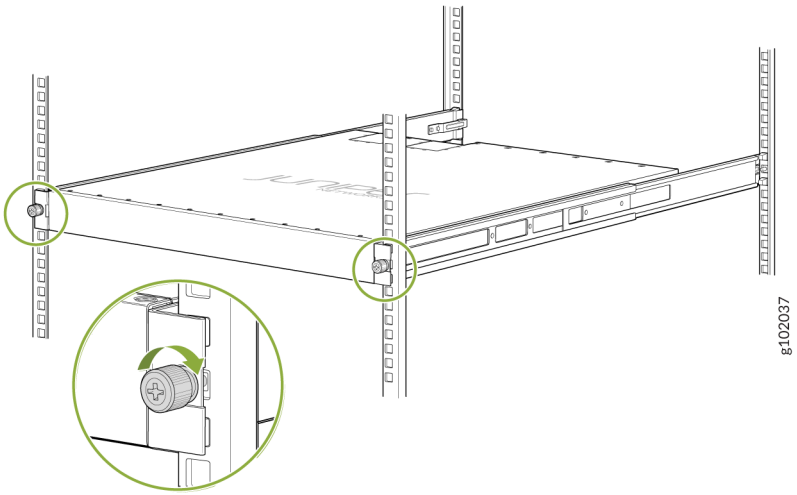
5. Position the device in such a manner that the **AIR OUT** labels on components are next to the hot aisle.
6. Lift the device and position it in the rack, aligning the side mounting brackets with the mounting rails. Slide the device into the channels of the rack mounting rails. See Figure 8 on page 6.

Figure 8: Slide the Device into the Rack



7. Tighten the two thumbscrews to secure the device. See Figure 9 on page 7.

Figure 9: Tighten Thumb Screws



Connect to Power

IN THIS SECTION

- Ground the QFX5220-128C | **7**
- Connect Power to the QFX5220-128C | **8**

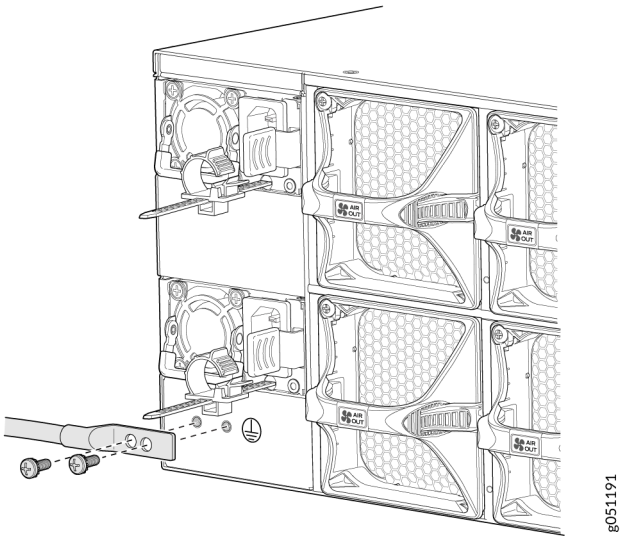
To connect the QFX5220-128C switch to AC power, you must perform the following tasks:

Ground the QFX5220-128C

To connect earth ground to a QFX5220-128C:

1. Use two 10-32 x 0.25 in. screws with number10 split-lock washers (not provided) to secure the grounding lug and attached cable (not provided) to the FRU panel of the chassis. The posts on the grounding lug should point to the right. See Figure 10 on page 8.

Figure 10: Connecting a Grounding Cable to a QFX5220-128C



2. Connect the remaining end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
3. Dress the grounding cable. Ensure that it does not touch or block access to other device components and does not drape where people could trip over it.

Connect Power to the QFX5220-128C

The QFX5220-128C is shipped from the factory with four 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 a replacement power supply in either of the two slots next to the fan modules without powering off the switch or disrupting the switching function.

To connect AC power to a QFX5220-128C:

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

   For each power supply:

   a. Ensure the loop on the power cord retainer is open. There must be enough space to insert the power cord coupler into the inlet. If the loop is closed, press the small tab on the retainer to loosen the loop.

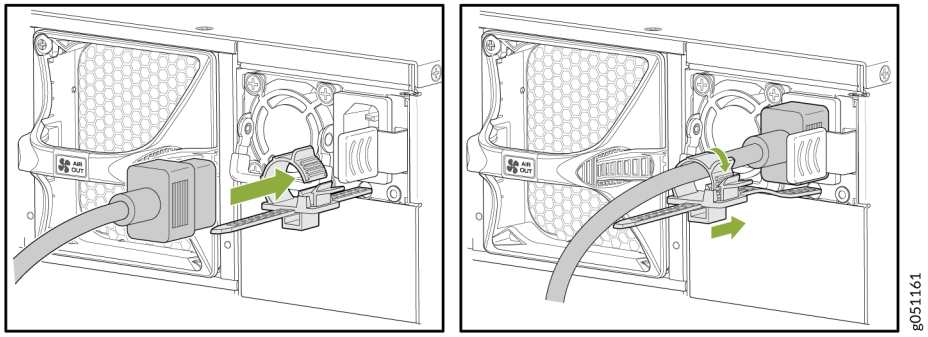
   b. Thread the power cord coupler through the power cord retainer loop.

   c. Insert the power cord coupler firmly into the AC inlet on the power supply faceplate.

d. Slide the power cord retainer loop toward the power supply until it is snug against the base of the coupler.

e. Press the tab on the loop and draw out the loop to enclose the power cord. See Figure 11 on page 9.

Figure 11: Attaching the Power Cord Retainer



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

4. 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. The device has no power switch.

5. Insert the power cord plug into an AC power source outlet.
6. If the AC power source outlet has a power switch, set it to the ON (|) position.
7. 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 "How to Remove a Power Supply from a QFX5220" on page 217). Do not remove the power supply until you have a replacement power supply ready: the power supplies must be installed in the switch to ensure proper airflow.

Onboard, Configure, and Monitor QFX5220

SUMMARY

This topic provides you with pointers to onboard, configure, and monitor QFX5220 switches using Juniper Apstra or CLI (configure only).

You can use Juniper Apstra to onboard, configure, and monitor the QFX5220 switch. See Table 1 on page 10 for more information.

Table 1: Onboard, Configure, and Monitor QFX5220 Using Juniper Apstra

If You Want To	Then
Install and configure Juniper Apstra	See Juniper Apstra Quick Start Guide
Use Juniper Apstra	See Juniper Apstra User Guide
See all documentation available for Juniper Apstra	See Juniper Apstra Documentation

You can configure the QFX5220 switch using the CLI. See Table 2 on page 10 for more information.

Table 2: Configure QFX5220 Using the CLI

If You Want To	Then
Customize the basic configuration	See "Performing the Initial Software Configuration for QFX5220 Switches" on page 208
Configure supported software features on QFX5220	See Software Documentation
Stay up-to-date about new and changed features, and known and resolved issues	See Junos OS Evolved Release Notes

2

CHAPTER

Overview

IN THIS CHAPTER

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QFX5220 System Overview

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- Benefits of the QFX5220-32CD | 15
- QFX5220 Hardware Component Overview | 15
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- QFX5220 Field-Replaceable Units | 18

The QFX5220 line of switches offer two models for environments requiring 100-Gigabit Ethernet and 400-Gigabit Ethernet speeds.

QFX5220-128C Switch Description

The QFX5220-128C offers 128 ports of 100-Gigabit Ethernet in a 4-U form factor. With 12.8 terabits per second (Tbps) bandwidth, the QFX5220-128C is an optimal choice for spine-and-leaf IP fabric deployments as well as metro use cases. The 100-Gigabit Ethernet ports can be configured either for 100-Gbps or 40-Gbps speeds. The 100-Gbps ports can also be channelized into 4 x 25 Gbps or 4 x 10 Gbps. There are two dedicated small-form factor plugable plus (SFP+) ports for 10 Gigabit or 1 Gigabit Ethernet support.

An Intel Xeon D-1518 processor drives the QFX5220 control plane, which runs the Junos OS Evolved software. The Junos OS Evolved software image is stored on two internal 50-GB solid-state drives (SSDs). The QFX5220-128C is available with ports-to-FRUs airflow (Airflow Out) and with AC or DC power supplies.

Figure 12: QFX5220-128C Front Panel

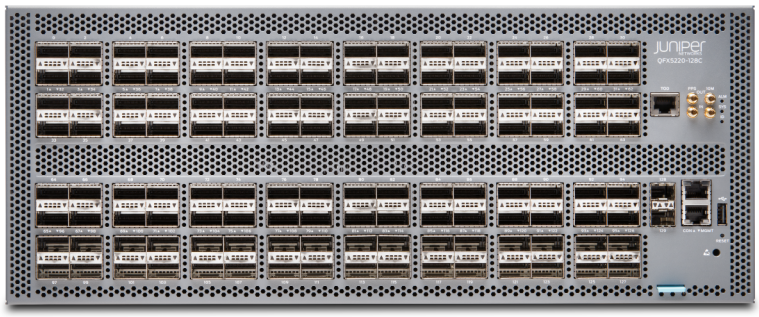


Figure 13: QFX5220-128C FRU Panel

Benefits of the QFX5220-128C

- Serves the spine layer needs of a wide range of enterprises. Examples include: cloud and high-performance computing data centers; Software as a Service (SaaS) providers; streaming video service providers; cable operators; financial service providers and enterprises that run large-scale Web applications, analytics, and deep learning workloads.
- Serves as a DC edge or DCI platform for metro MPLS use cases.
- Supports IEEE 1588 Precision Time Protocol (PTP), Transparent Clock, and hardware timestamping for distributing precise time and frequency over packet networks. PTP is an important prerequisite in real-time sensitive workloads such as those employed in financial trading, real-time video streaming, and broadcasting networks.

- Aligns well with the needs of environments whose aggregate traffic comprises lossless classes of traffic such as access to a remote flash storage, support for advanced congestion control, and flow-aware traffic scheduling support.
- Supports zero touch provisioning at the ports, which automates provisioning and deployment with minimal manual intervention, saving time and effort for network operators.
- Provides improved power efficiency and lowered costs per 100-Gigabit Ethernet port making this the industry best-in-class solution to support ever-expanding bandwidth needs.

QFX5220-32CD Switch Description

The QFX5220-32CD offers 32 ports of 400-Gigabit Ethernet in a low-profile 1-U form factor. With 12.8-Tbps bandwidth, the QFX5220-32CD is an optimal choice for very large, dense, and fast spine-and-leaf IP fabric deployments, as well as metro use cases. The high-speed ports support a wide variety of port configurations that include speeds of 400 Gbps, 100 Gbps, 25 Gbps, 40 Gbps, and 10 Gbps.

An Intel Xeon D-1500 processor drives the QFX5220 control plane, which runs the Junos OS Evolved software. The Junos OS Evolved software image is stored on two internal 50-GB solid-state drives (SSDs).

The QFX5220-32CD is available with either ports-to-FRUs or FRUs-to-ports airflow and with AC or DC power supplies. See Figure 14 on page 14 and Figure 15 on page 14.

Figure 14: Front Panel View of the QFX5220-32CD

Figure 15: FRU Panel View of the QFX5220-32CD

Benefits of the QFX5220-32CD

- Reduces compute-intensive workloads for hyperscale cloud and high-performance computing (HPC) data centers. Examples of these compute-intensive workloads include AI, machine learning, deep learning applications, and storage disaggregation workloads such as Non-Volatile Express over Fabrics (NVMe over Fabrics).
- Enables data center re-architecture with flattened pods that slash switch hop latency.
- Serves as a DC edge or DCI platform for metro MPLS use cases.
- Enables a fast response by demanding applications, such as those encountered in financial exchanges by reducing intracluster switch latency.
- Allows current Junos OS users to seamlessly migrate to Junos OS Evolved Linux software. With Junos OS Evolved, you can run Linux using your familiar Junos OS CLI, and run third-party Linux applications with Juniper Extension Toolkit (JET) API support, telemetry support for monitoring the DC network, and support for module-level in-service software upgrade (ISSU).
- Saves you energy costs by highly reducing power consumption per Gbps of network traffic passing through the switch.
- Provides an extensive roadmap to new features and functions, such as:
  - Advanced Precision Time Protocol (PTP) support (enhanced mirroring with PTP) for running real-time analytics on network flows
  - Comprehensive Remote Direct Memory Access over Converged Ethernet version 2 (RoCEv2)
  - Advanced congestion control and flow-aware traffic scheduling
  - Support for container networking and segment routing
  - Scale-out load balancing and multipathing
  - Support for advanced network instrumentation adopted by cloud data centers

QFX5220 Hardware Component Overview

The QFX5220 supports the components listed in Table 3 on page 16.

Table 3: QFX5220 Hardware Components

Component	Chassis Model	Spare Juniper Model Number	CLI Output
Chassis	QFX5220-32CD QFX5220-128C	QFX5220-32CD-CHAS QFX5220-128C-CHAS	QFX5220-32CD QFX5220-128C
Fan module	QFX5220-32CD QFX5220-128C	QFX5220-32CD-FANAI (FRUs-to-ports airflow) QFX5220-32CD-FANAO (ports-to-FRUs airflow) QFX5220-128C-FANAO	`Fan tray n fan-n` Back-to-front airflow - AFI **NOTE**: The QFX5220-128C is not available in AFI airflow. `Fan tray n fan-n` Front-to-back airflow - AFO

Power supplies	QFX5220-32CD	JPSU-1600W-1UACAFI (FRUs-to-ports airflow)
		JPSU-1600W-1UACAFO (ports-to-FRUs airflow)
		JPSU-1600W-1UDCAFI (FRUs-to-ports airflow)
		JPSU-1600W-1UDCAFO (ports-to-FRUs airflow)
			`AC AFI 1600W PSU`
			`AC AFO 1600W PSU`
			`DC AFI 1600W PSU`
			`DC AFO 1600W PSU`

	QFX5220-128C-AFO	JPSU-1600W-AC-AFO JPSU-1600W-DC-AFO	`AC AFO 1600W PSU` **NOTE**: The QFX5220-128C is not available in AFI airflow.

System Software

The Junos OS Evolved software on the QFX5220 provides Layer 2 and Layer 3 switching, routing, and security services. Junos OS Evolved is installed on the switch solid-state drive (SSD).

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

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

The QFX5220-32CD is supported on Junos OS Evolved Release 19.1R1 and later. The QFX5200-128C is supported on Junos OS Evolved Release 19.2R1 and later.

The DC version, QFX5220-32CD-D, is supported on Junos OS Evolved Release 19.3R1 and later.

QFX5220 Component Redundancy

The following hardware components provide redundancy on a QFX5220 switch:

- QFX5220-32CD power supplies—The QFX5220-32CD 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.

- QFX5220-128C power supply modules—The QFX5220-128C switches support a maximum of four power supplies, and offer 2 + 2 redundancy. If all four power supplies are installed, they provide full power redundancy to the device. If one power supply fails in a fully redundant system, or is removed, the other power supplies balance the electrical load without interruption.

  The system can also run on two power supplies without redundancy. You must follow these guidelines if you install only two power supplies:

  - If you install a power supply in slot 0, you must install the second power supply in slot 2 or 3, and not in slot 1.
  - If you install a power supply in slot 1, you must install the second power supply in slot 2 or 3, and not in slot 0.

- QFX5220-32CD cooling system—The QFX5220-32CD switch models have six fan modules and can operate with one fan not in operation (5+1 redundancy). If more than one fan module fails and is unable to keep the QFX5220-32CD within the desired temperature thresholds, chassis alarms occur and the QFX5220-32CD switch can shut down.

- QFX5220-128C cooling system—This switch model has 12 fans in 6 fan modules. There is one fan out of the 12 fans for redundancy. This is known as (5x2+1)+1 redundancy). Any additional fan failures cause the switch to overheat, chassis alarms to occur and shutdown the switch.

QFX5220 Field-Replaceable Units

Field-replaceable units (FRUs) are components that you can replace at your site. The QFX5220 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 3 minutes of removal to prevent chassis overheating. The QFX5220-32CD switch continues to operate with only one power supply running. The QFX5220-128C can operate with only two power supplies running. For best performance, we advise replacing failed power supplies and fan modules as quickly as possible to protect against another failure.

Table 4 on page 18 lists the FRUs for the QFX5220 device and actions to take before removing them.

Table 4: FRUs in a QFX5220 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.

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

QFX5220 Management Panel | 70

QFX5220 Cooling System | 77

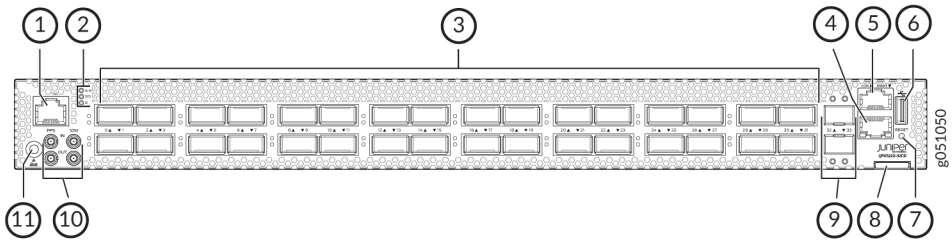
QFX5220 Power System | 87

QFX5220-32CD Port Panel

IN THIS SECTION

- Network Ports | 20
- Setting Port Speed and Channelization | 20
- QFX5220-32CD Network LEDs | 21

The port panel of the QFX5220-32CD has 32 high-speed ports that support transmission at 400-Gbps, 100-Gbps, or 25-Gbps speeds. It also has 2 dedicated ports for 10 Gbps.



1– RJ-45 connection to grandmaster clock	7– Reset button (do not use unless directed by JTAC)
2– Chassis status LEDs	8– Chassis serial number pull-out
3– 32 high-speed ports-QSFP-DD cages	9– 10 Gigabit Ethernet ports–SFP+ cages
4– RJ-45 management port (100 Mbps/1000 Mbps/ 10000 Mbps)	10– Clock input and output connectors (10 MHz and 1 PPS)
5– RJ-45 console port	11– ESD grounding point
6– USB port (USB 2.0/3.0 standard)	

Network Ports

The QFX5220-32CD network ports (**0** to **31**) support:

- 400-Gbps QSFP-DD direct attach copper (DAC) cables
- 400 Gbps active optic cable (AOC) (starting in Junos OS Evolved Release 19.3R2)
- 100-Gbps QSFP28 transceivers
- 100 Gbps active optic break outcables (AOCBO) QSFP28 to four SFP25G interfaces
- 40-Gbps QSFP+ to SFP+ DACBO cables (40-Gbps breaks out to 4 independent 10-Gbps connections)–Junos OS Evolved Release 20.2R1 and later

The 10-Gbps network ports **32** and **33** support small form-factor plus (SFP+) transceivers.

Setting Port Speed and Channelization

The default port speed for ports **0** through **31** is 400 Gbps. Only QSFP-DD optics inserted in these ports will link without configuration.

Table 5: QFX5220-32CD Port Speed Autodetection

Transceiver, DAC, AOC, DACBO, or AOCBO	Sets Default Speed to
QSFP-DD	400 Gbps, link up
QSFP28	400 Gbps, link down
QSFP	400 Gbps, link down
SFP+ (ports **32** and **33** only) and management port	10 Gbps, link up

NOTE: The QFX5220-32CD network ports (**0** to **31**) support:

- The last two SFP+ ports cannot support 1GbE modules. These two ports support only 10GbE modules.

If a port already has a speed configured, you can manually configure the ports. To set the speed, use the `set chassis fpc` *`FPC number`* `pic` *`pic number`* `port` *`port number`* `speed` *`25|40|100|200|400`* configuration mode CLI command. For example, to set port **2** to 100 Gbps:

```
[edit chassis]
user@host#set chassis fpc 0 pic 0 port 2 speed 100g
```

NOTE: On QFX5220-32CD devices, there is a single FPC and PIC, which is always 0.

After you set a port speed, you can channelize the port into 4 independent 25-Gigabit Ethernet interfaces by configuring the number of subports and speed. You should use the `set chassis fpc` *`FPC number`* `pic` *`pic number`* `port` *`port number`* `number-of-sub-ports` *`1|2|3|4`* command. For example, to configure 100-Gbps port **4** to four independent 25-Gbps interfaces:

```
[edit chassis]
user@host#set chassis fpc 0 pic 0 port 4 speed 25g number-of-sub-ports 4
```

Be sure to `save` and `commit` your changes.

WARNING: An incorrectly configured port can cause unexpected port and switch behavior. The system software does not check whether the port speed or the attached optic are supported at the time of the commit. Use the `show chassis alarms` and the `show chassis pic fpc-slot 0 pic-slot 0` to locate incorrectly configured ports. See "Configuration Changes Leading to Unexpected QFX5220 Behavior" on page 240.

QFX5220-32CD Network LEDs

The high-speed QSFP-DD network ports use a single bi-colored LED to indicate link status, activity on the link, or a fault condition. The 10-Gbps SFP+ ports have separate bi-colored LEDs; the left LED indicates link and activity and the right LED indicates fault conditions.

Figure 16: Link/Activity LEDs on QFX5220-32CD

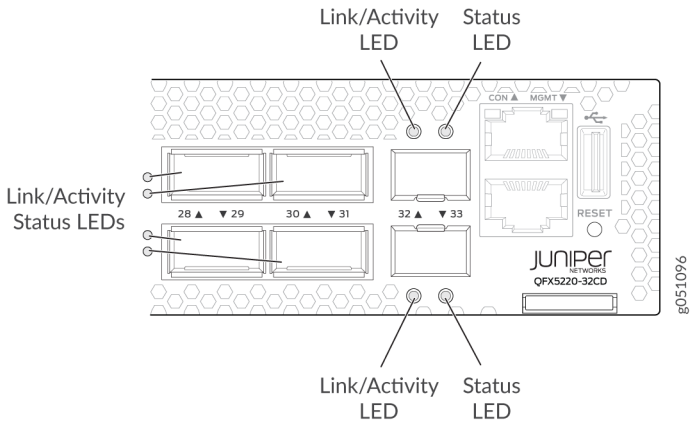


Table 6 on page 22 describes the various states of the network port LED for the high-speed ports. Table 7 on page 23 describes how to interpret the link and activity LED and the status LEDs for the SFP+ ports.

Table 6: QSFP-DD Network Port LEDs Table 6 on page 22 **on a QFX5220-32CD**

Color	State	Channelized	Description
Unlit	Off	No	Off is the default mode. The LED can be unlit even when power is present and a transceiver is present in the port. • The port is administratively disabled. • The link is down. • A fault is detected on the link.
		Yes	The port is administratively disabled.
Green	On steadily	No	A 400-Gbps or 100-Gbps link is established, but there is no activity.
		Yes	All channels or subports have link established but there is no activity.

Table 6: QSFP-DD Network Port LEDs Table 6 on page 22 **on a QFX5220-32CD *(Continued)***

Color	State	Channelized	Description
	Flashing	No	A 400-Gbps or 100-Gbps link is established, and there is link activity.
		Yes	All channels or subports have links established and there is link activity.
	All LEDs Blipping (slow flashing)	Either	Indicates that the beacon feature is activated (service request).
Amber	Blinking	Either	One or more interface or connection errors has occurred.
	Flashing	Yes	At least one channel or subport has a link, but not all channels or subports have links established.

Table 7: SFP+ Network Port LEDs on QFX5220-32CD

LED	Color	State	Description
Link/Activity	Off	Link down	Link down—The port does not have a connection.
	Green	On steadily	Link up—The port has a connection, but there is no activity.
		Flashing	Active link—The port has a connection and there is activity.
		Blipping (slow flashing)	Beacon–The port has a service request.
Status	Green	On steadily	The port is configured for 10 Gbps.

Table 7: SFP+ Network Port LEDs on QFX5220-32CD *(Continued)*

LED	Color	State	Description
	Amber	Blinking	Fault–The port has an interface error.

RELATED DOCUMENTATION

Channelizing Interfaces on QFX3500, QFX3600, QFX5100, QFX10002, QFX10008, QFX10016, and EX4600 Switches

QFX5220 Network Cable and Transceiver Planning | **121**

Maintaining Transceivers and Fiber Optic Cables on a QFX5220 | **223**

QFX5220-128C Port Panel

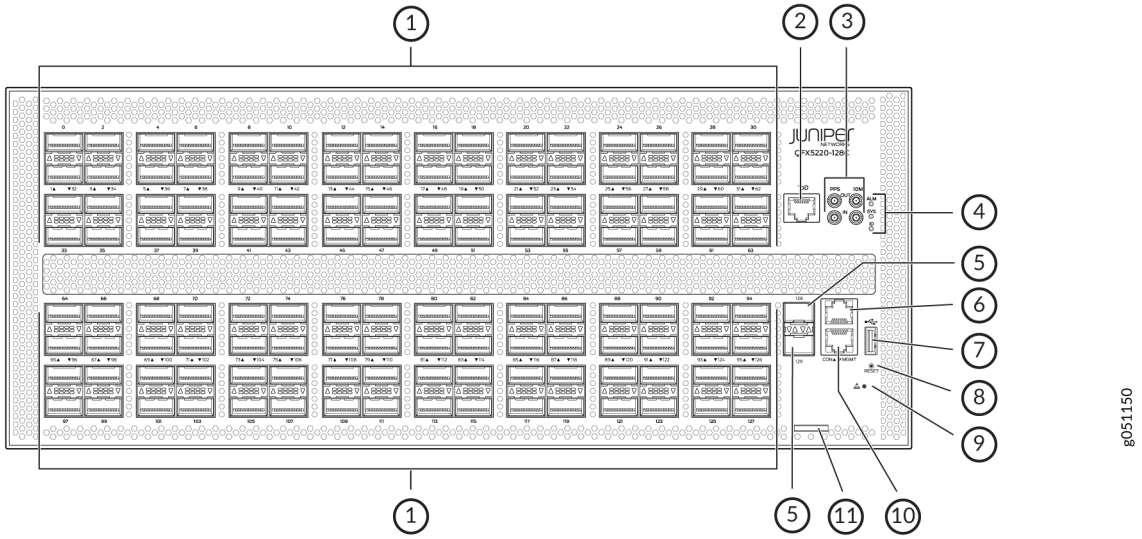
IN THIS SECTION

- QFX5230-64CD Port Panel | **47**

Overview

The port panel of the QFX5220-128C consists of 128 high-density 100-Gigabit Ethernet quad small form-factor pluggable solution (QSFP28) ports and the management panel. The highly flexible ports support 100-Gbps or 40-Gbps port speeds. The QFX5220-128C supports channelizing the QSFP28 ports to 4 independent 25-Gbps speed interfaces. The switch has two dedicated 10-Gigabit Ethernet ports; 32 of the 128 ports can be channelized to 4 x 25-Gbps. See Figure 17 on page 25.

Figure 17: QFX5220-128C Port Panel



1– 128 QSFP28 ports	7– USB 2.0 port
2– RJ-45 time-of-day message port	8– Reset button
3– PTP-capable connections: SMB In, SMB Out, 10 MHz In, 10 MHz Out	9– ESD point
4– Chassis status alarms	10– RJ-45 **MGMT** connection for the re0:mgmt-0 management interface
5– 2 SFP+ ports	11– Chassis serial number pull-out tab
6– RJ-45 console port (CON) to support RS-232 serial ports. (The LEDs indicate status and link.)	

Network Ports

The QFX5220-128C QSFP28 network ports (**0** to **127**) support:

- 100-Gbps QSFP28 transceivers
- 100-Gbps QSFP28 direct attach copper (DAC) cables
- 100-Gbps QSFP28 to 25-Gbps SFP28 direct attach copper break out (DACBO) cables (100-Gbps breaks out to 4 independent 25-Gbps ports)
- 100-Gbps active optic cables (AOC)

- 40-Gbps QSFP+ transceivers
- 40-Gbps AOC
- 40 Gbps QSFP+ DAC cables
- 40 Gbps QSFP+ transceivers

NOTE:

- Ports qualified for channelization support 100-Gbps QSFP28 to 25-Gbps SFP28 direct attach copper break out (DACBO) cables (100-Gbps breaks out to 4 independent 25-Gbps.
- The last two SFP+ ports cannot support 1GbE modules. These two ports support only 10GbE modules.

The 10-Gbps network ports **128** (et-0/0/128) and **129** (et-0/0/129) support SFP+ transceivers.

Port Configurations

The QFX5220-128C has 128 QSFP28 ports and 2 SFP+ ports. You can configure any of these ports in these combinations:

- Any of the QSFP28 ports can be configured as 100 Gbps.
- For Junos OS Evolved releases up to 20.2R1, you can configure any even-numbered QSFP28 port 40 Gbps speed. The system configures the next (odd) port as unused. For Junos OS Evolved releases 20.2R1 and later, you can configure all 128 QSFP28 ports for 40 Gbps speed.
- Every first port (0, 4, 8...124) can be configured as channelized 4 x 25 Gbps. However before configuring a port as channelized, the next three ports must be configured as unused.
- Any SFP+ port can be configured as 10 Gbps or 1 Gbps.

Table 8 on page 27 shows how each QSFP28 port can be configured. You can mix and match speeds as long as you adhere to the port rules. For example, on the same device you can configure port 0 as 40 Gbps, ports 2 and 3 as 100 Gbps, and port port as 4 x 25 Gbps. In this example, port 1 and port 5-7 must be configured as unused unless you are running Junos OS Evolved Release 20.2R1 or later..

Table 8: QFX5220-128C Valid 100-Gbps Configurations

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
0	✓	✓	✓
1	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
2	✓	✓	Configure as unused
3	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
4	✓	✓	✓
5	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
6	✓	✓	Configure as unused
7	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
8	✓	✓	✓
9	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
10	✓	✓	Configure as unused
11	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
12	✓	✓	✓
13	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
14	✓	✓	Configure as unused
15	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
16	✓	✓	✓
17	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
18	✓	✓	Configure as unused
19	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
20	✓	✓	✓
21	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
22	✓	✓	Configure as unused
23	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
24	✓	✓	✓
25	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
26	✓	✓	Configure as unused
27	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
28	✓	✓	✓
29	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
30	✓	✓	Configure as unused
31	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
32	✓	✓	✓
33	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
34	✓	✓	Configure as unused
35	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
36	✓	✓	✓
37	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
38	✓	✓	Configure as unused
39	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
40	✓	✓	✓
41	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
42	✓	✓	Configure as unused
43	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
44	✓	✓	✓
45	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
46	✓	✓	Configure as unused
47	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
48	✓	✓	✓
49	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
50	✓	✓	Configure as unused
51	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
52	✓	✓	✓
53		Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
54	✓	✓	Configure as unused
55	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
56	✓	✓	✓
57	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
58	✓	✓	Configure as unused
59	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
60	✓	✓	✓
61	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
62	✓	✓	Configure as unused
63	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
64	✓	✓	✓
65	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
66	✓	✓	Configure as unused
67	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
68	✓	✓	✓
69	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
70	✓	✓	Configure as unused
71	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
72	✓	✓	✓
73	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
74	✓	✓	Configure as unused
75	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
76	✓	✓	✓
77	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
78	✓	✓	Configure as unused
79	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
80	✓	✓	✓
81	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
82	✓	✓	Configure as unused
83	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
84	✓	✓	✓
85	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
86	✓	✓	Configure as unused
87	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
88	✓	✓	✓
89	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
90	✓	✓	Configure as unused
91	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
92	✓	✓	✓
93	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
94	✓	✓	Configure as unused
95	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
96	✓	✓	✓
97	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
98	✓	✓	Configure as unused
99	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
100	✓	✓	✓
101	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
102	✓	✓	Configure as unused
103	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
104	✓	✓	✓
105	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
106	✓	✓	Configure as unused
107	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
108	✓	✓	✓
109	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
110	✓	✓	Configure as unused
111	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
112	✓	✓	✓
113	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
114	✓	✓	Configure as unused
115	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
116	✓	✓	✓
117	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
118	✓	✓	Configure as unused
119	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

Table 8: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
120	✓	✓	✓
121	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
122	✓	✓	Configure as unused
123	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
124	✓	✓	✓
125	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
126	✓	✓	Configure as unused
127	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

100-Gbps Port Configuration

All QSFP28 ports support either 40 Gbps or 100 Gbps. Use the `set chassis fpc 0 pic 0 port port-num speed 100g` command to configure ports **0** to **127** for 100-Gbps speed and commit the configuration.

40-Gbps Port Configuration

Before configuring a port for 40 Gbps, determine its associated used port (see Table 8 on page 27). In the following example, you would need to configure the neighboring port first before configuring port et-0/0/0. If you are running a newer software release, you can skip to Step "2" on page 43.

1. Block the port following the desired 40-Gbps port as unused and commit the configuration. For example, because you are configuring et-0/0/0 as 40 Gbps, you must first configure the following port (et-0/0/1) as unused and commit that configuration.

```
# set chassis fpc 0 pic 0 port 1 unused
# commit
```

2. Configure the speed on the desired port (et-0/0/0) as 40 Gbps and commit the configuration.

```
# set chassis fpc 0 pic 0 port 0 speed 40g
# commit
```

4 x 25 Gbps Port Channelization

Before configuring a port for channelization, determine its associated used ports (see Table 8 on page 27). In the following example, you'll configure port et-0/0/4 to operate as a 4 x 25 Gbps channelized port.

1. Block the three ports following the desired channelized port as unused, and commit the configuration. For example, because you are configuring et-0/0/4 as 4 x 25 Gbps, you must first configure the following ports (et-0/0/5, et-0/0/6, and et-0/0/7) as unused and commit the configuration.

```
# set chassis fpc 0 pic 0 port 5 unused
# set chassis fpc 0 pic 0 port 6 unused
```

```
# set chassis fpc 0 pic 0 port 7 unused
# commit
```

Software removes these ports and updates the configuration.

2. Configure the speed on the desired port (et-0/0/4) as 25 Gbps, the `number -of sub-ports` as 4, and commit the configuration:

```
# set chassis fpc 0 pic 0 port 4 speed 25g number-of-sub-ports 4
# commit
```

Delete 4 x 25 Gbps Port Channelization

To remove the channelization configuration from a set of QFX5220-128C ports, delete the configuration from the channelized port and commit the configuration. For example:

```
# delete chassis fpc 0 pic 0 port port-number number-of-sub-ports 4
# delete chassis fpc 0 pic 0 port port-number speed port-speed
# commit
```

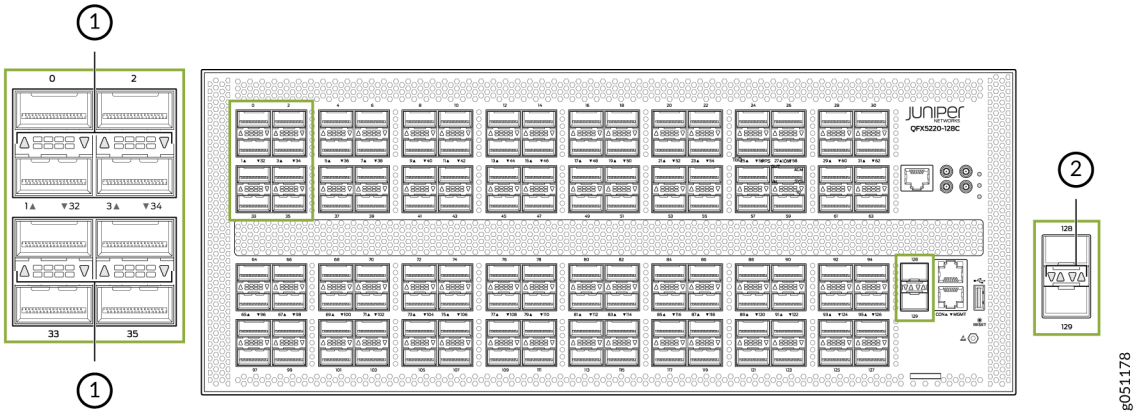
WARNING: An incorrectly configured port can cause unexpected port and switch behavior. The system software does not check whether the port speed or the attached optic are supported at the time of the commit. Use the `show chassis alarms` and the `show chassis pic fpc-slot 0 pic-slot 0` to locate incorrectly configured ports. See "Configuration Changes Leading to Unexpected QFX5220 Behavior" on page 240.

QFX5220-128C Network LEDs

The QSFP28 network ports use a single bi-colored LED for each port or channel to indicate link status, activity on the link, or a fault condition. When the port is channelized, there is an LED for each channel; when the port is not channelized, the left-most LED indicates the port link status.

The 10-Gbps SFP+ ports have separate bi-colored LEDs; the left LED indicates link and activity and the right LED indicates a fault condition. See Figure 18 on page 45.

Figure 18: Link/Activity and Status LEDs on QFX5220-128C



1– QSFP28 LEDs that indicate link/ activity,status, and channelization	2– SFP+ :LEDs that indicate link/activity and status

Table 9 on page 45 describe the various states of the LEDs for the QSFP28 ports and Table 10 on page 46 describe the LED states for the SFP+ ports.

Table 9: Network Port LEDs on QSFP28 Ports on a QFX5220-128C Switch

Color	State	Non-Channelized	Channelized
Unlit	Off	The port is administratively disabled, there is no power, the link is down, no module is present, or the interface is disabled.	A module is not present, all sub-channels are disabled, or there is no link.
Green	On steadily	A link is established, but there is no link activity.	All sub-channels are up.
	Flashing	A link is established, and there is link activity.	The interface is up with activity.
	Blipping	The beacon is enabled on the port.	The beacon is enabled on the port.

Table 9: Network Port LEDs on QSFP28 Ports on a QFX5220-128C Switch *(Continued)*

Color	State	Non-Channelized	Channelized
Amber	On steadily	NA	At least one, but not all sub-channels are up.
	Blinking	There is an interface error.	There is an error on one or more sub-channels.
	Flashing	NA	At least one, but not all sub-channels are up with activity.

Table 10: Network Port LEDs on SFP+ Ports on a QFX5220-128C Switch

LED	Color	State	Description
Link/Activity	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, but there is no link activity.
		Blinking	A link is established, and there is link activity.
	Amber	Blinking	The beacon is enabled on the port.
Status	Unlit	Off	The link is down or there is a fault.
	Green	On steadily	A 10-Gigabit Ethernet transceiver is installed in the port and link is established.
	Green	Blinking	A 1-Gigabit Ethernet transceiver is installed in the port and the link is established.
	Amber	Slow blipping	The beacon function is enabled on the port.

QFX5230-64CD Port Panel

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Overview

The port panel of the QFX5230-64CD consists of 64 high-density 100-Gigabit Ethernet quad small form-factor pluggable solution (QSFP56-DD) ports and the management panel. It also contains 2 SFP+ ports. The QFX5230-64CD supports channelizing the QSFP28 ports to 4 independent 25-Gbps speed interfaces. The switch has two dedicated 10-Gigabit Ethernet ports; 32 of the 128 ports can be channelized to 4 x 25-Gbps. .

Figure 19: QFX5230-64CD Port Panel

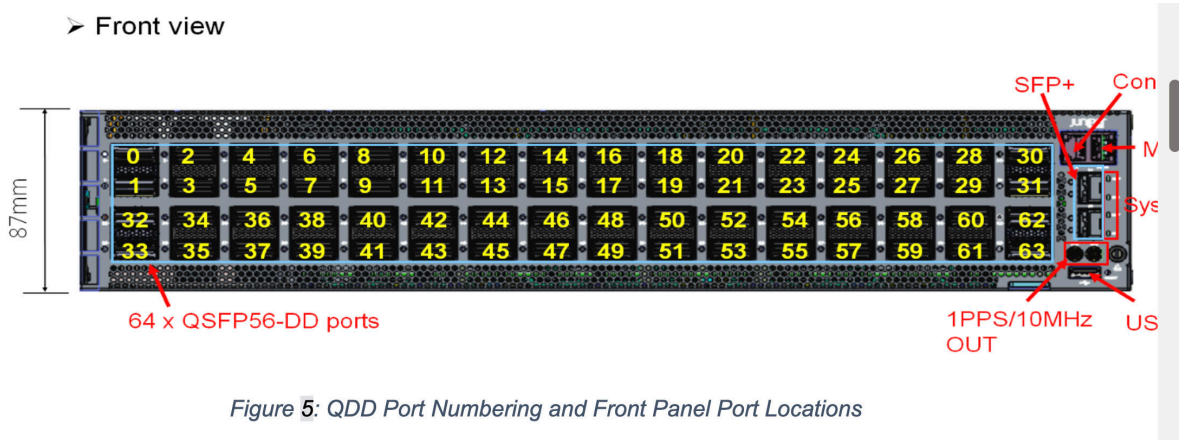


Figure 5: QDD Port Numbering and Front Panel Port Locations

Network Ports

Ethernet Ports à 64xQSFP56-DD user ports

PHY less connection to QSFP56-DD ports

Flexible SerDes that contains Serdes lanes per BlackhawkCore, configured to operate in any of the following configurations: 10GbE KR, SFI, XFI (1-lane) 40GbE XLAUI, XLPPI (4-lane), 50GbE KR-2 (2-lane), 100GbE CR4, KR-4, CAUI-4 (4-lane), 50GbE CR, KR (1-lane), 100GbE CR-2, KR-2 (2-lane), 200GbE CR-4, KR-4, GAUI-4 (4-lane), 400GbE GAUI-8 (8-lane)

2xSFP+ user ports

10G/1GE SFP+ ports

System management port and Console port

1x RJ45 MGMT port for 1GE connectivity to the network

1x RJ45 Console port

PTP timing support10MHz and 1PPS clock signal output via 2x DIN connectors

1x USB 2.0 Type A

The QFX5220-128C QSFP28 network ports (**0** to **127**) support:

- 100-Gbps QSFP28 transceivers
- 100-Gbps QSFP28 direct attach copper (DAC) cables
- 100-Gbps QSFP28 to 25-Gbps SFP28 direct attach copper break out (DACBO) cables (100-Gbps breaks out to 4 independent 25-Gbps ports)
- 100-Gbps active optic cables (AOC)
- 40-Gbps QSFP+ transceivers
- 40-Gbps AOC
- 40 Gbps QSFP+ DAC cables
- 40 Gbps QSFP+ transceivers

NOTE:

- Ports qualified for channelization support 100-Gbps QSFP28 to 25-Gbps SFP28 direct attach copper break out (DACBO) cables (100-Gbps breaks out to 4 independent 25-Gbps.
- The last two SFP+ ports cannot support 1GbE modules. These two ports support only 10GbE modules.

The 10-Gbps network ports **128** (et-0/0/128) and **129** (et-0/0/129) support SFP+ transceivers.

Port Configurations

The QFX5220-128C has 128 QSFP28 ports and 2 SFP+ ports. You can configure any of these ports in these combinations:

- Any of the QSFP28 ports can be configured as 100 Gbps.
- For Junos OS Evolved releases up to 20.2R1, you can configure any even-numbered QSFP28 port 40 Gbps speed. The system configures the next (odd) port as unused. For Junos OS Evolved releases 20.2R1 and later, you can configure all 128 QSFP28 ports for 40 Gbps speed.
- Every first port (0, 4, 8...124) can be configured as channelized 4 x 25 Gbps. However before configuring a port as channelized, the next three ports must be configured as unused.
- Any SFP+ port can be configured as 10 Gbps or 1 Gbps.

Table 8 on page 27 shows how each QSFP28 port can be configured. You can mix and match speeds as long as you adhere to the port rules. For example, on the same device you can configure port 0 as 40 Gbps, ports 2 and 3 as 100 Gbps, and port port as 4 x 25 Gbps. In this example, port 1 and port 5-7 must be configured as unused unless you are running Junos OS Evolved Release 20.2R1 or later..

Table 11: QFX5220-128C Valid 100-Gbps Configurations

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
0	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
1	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
2	✓	✓	Configure as unused
3	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
4	✓	✓	✓
5	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
6	✓	✓	Configure as unused
7	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
8	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
9	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
10	✓	✓	Configure as unused
11	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
12	✓	✓	✓
13	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
14	✓	✓	Configure as unused
15	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
16	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
17	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
18	✓	✓	Configure as unused
19	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
20	✓	✓	✓
21	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
22	✓	✓	Configure as unused
23	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
24	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
25	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
26	✓	✓	Configure as unused
27	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
28	✓	✓	✓
29	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
30	✓	✓	Configure as unused
31	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
32	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
33	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
34	✓	✓	Configure as unused
35	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
36	✓	✓	✓
37	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
38	✓	✓	Configure as unused
39	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
40	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
41	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
42	✓	✓	Configure as unused
43	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
44	✓	✓	✓
45	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
46	✓	✓	Configure as unused
47	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
48	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
49	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
50	✓	✓	Configure as unused
51	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
52	✓	✓	✓
53		Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
54	✓	✓	Configure as unused
55	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
56	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
57	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
58	✓	✓	Configure as unused
59	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
60	✓	✓	✓
61	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
62	✓	✓	Configure as unused
63	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
64	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
65	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
66	✓	✓	Configure as unused
67	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
68	✓	✓	✓
69	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
70	✓	✓	Configure as unused
71	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
72	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
73	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
74	✓	✓	Configure as unused
75	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
76	✓	✓	✓
77	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
78	✓	✓	Configure as unused
79	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
80	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
81	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
82	✓	✓	Configure as unused
83	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
84	✓	✓	✓
85	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
86	✓	✓	Configure as unused
87	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
88	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
89	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
90	✓	✓	Configure as unused
91	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
92	✓	✓	✓
93	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
94	✓	✓	Configure as unused
95	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
96	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
97	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
98	✓	✓	Configure as unused
99	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
100	✓	✓	✓
101	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
102	✓	✓	Configure as unused
103	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
104	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
105	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
106	✓	✓	Configure as unused
107	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
108	✓	✓	✓
109	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
110	✓	✓	Configure as unused
111	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
112	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
113	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
114	✓	✓	Configure as unused
115	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
116	✓	✓	✓
117	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
118	✓	✓	Configure as unused
119	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
120	✓	✓	✓

Table 11: QFX5220-128C Valid 100-Gbps Configurations *(Continued)*

Port	Ports Configurable as 100 Gbps	Ports Configurable as 40 Gbps	Ports Configurable as channelized 4 x 25 Gbps
121	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
122	✓	✓	Configure as unused
123	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
124	✓	✓	✓
125	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused
126	✓	✓	Configure as unused
127	✓	Configure as unused for initial Junos OS Evolved releases ✓ for Junos OS Evolved 20.2R1 and later	Configure as unused

100-Gbps Port Configuration

All QSFP28 ports support either 40 Gbps or 100 Gbps. Use the `set chassis fpc 0 pic 0 port` *`port-num`* `speed` *`100g`* command to configure ports **0** to **127** for 100-Gbps speed and commit the configuration.

40-Gbps Port Configuration

Before configuring a port for 40 Gbps, determine its associated used port (see Table 8 on page 27). In the following example, you would need to configure the neighboring port first before configuring port et-0/0/0. If you are running a newer software release, you can skip to Step "2" on page 43.

1. Block the port following the desired 40-Gbps port as unused and commit the configuration. For example, because you are configuring et-0/0/0 as 40 Gbps, you must first configure the following port (et-0/0/1) as unused and commit that configuration.

```
# set chassis fpc 0 pic 0 port 1 unused
# commit
```

2. Configure the speed on the desired port (et-0/0/0) as 40 Gbps and commit the configuration.

```
# set chassis fpc 0 pic 0 port 0 speed 40g
# commit
```

4 x 25 Gbps Port Channelization

Before configuring a port for channelization, determine its associated used ports (see Table 8 on page 27). In the following example, you'll configure port et-0/0/4 to operate as a 4 x 25 Gbps channelized port.

1. Block the three ports following the desired channelized port as unused, and commit the configuration. For example, because you are configuring et-0/0/4 as 4 x 25 Gbps, you must first configure the following ports (et-0/0/5, et-0/0/6, and et-0/0/7) as unused and commit the configuration.

```
# set chassis fpc 0 pic 0 port 5 unused
# set chassis fpc 0 pic 0 port 6 unused
# set chassis fpc 0 pic 0 port 7 unused
# commit
```

   Software removes these ports and updates the configuration.

2. Configure the speed on the desired port (et-0/0/4) as 25 Gbps, the `number -of sub-ports` as 4, and commit the configuration:

```
# set chassis fpc 0 pic 0 port 4 speed 25g number-of-sub-ports 4
# commit
```

Delete 4 x 25 Gbps Port Channelization

To remove the channelization configuration from a set of QFX5220-128C ports, delete the configuration from the channelized port and commit the configuration. For example:

```
# delete chassis fpc 0 pic 0 port port-number number-of-sub-ports 4
# delete chassis fpc 0 pic 0 port port-number speed port-speed
# commit
```

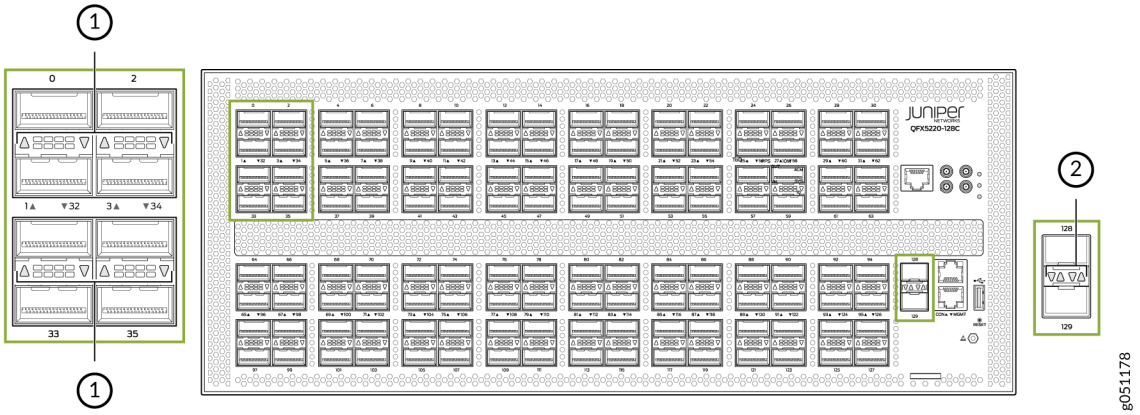
WARNING: An incorrectly configured port can cause unexpected port and switch behavior. The system software does not check whether the port speed or the attached optic are supported at the time of the commit. Use the `show chassis alarms` and the `show chassis pic fpc-slot 0 pic-slot 0` to locate incorrectly configured ports. See "Configuration Changes Leading to Unexpected QFX5220 Behavior" on page 240.

QFX5220-128C Network LEDs

The QSFP28 network ports use a single bi-colored LED for each port or channel to indicate link status, activity on the link, or a fault condition. When the port is channelized, there is an LED for each channel; when the port is not channelized, the left-most LED indicates the port link status.

The 10-Gbps SFP+ ports have separate bi-colored LEDs; the left LED indicates link and activity and the right LED indicates a fault condition. See Figure 18 on page 45.

Figure 20: Link/Activity and Status LEDs on QFX5220-128C



1– QSFP28 LEDs that indicate link/ activity,status, and channelization	2– SFP+ :LEDs that indicate link/activity and status

Table 9 on page 45 describe the various states of the LEDs for the QSFP28 ports and Table 10 on page 46 describe the LED states for the SFP+ ports.

Table 12: Network Port LEDs on QSFP28 Ports on a QFX5220-128C Switch

Color	State	Non-Channelized	Channelized
Unlit	Off	The port is administratively disabled, there is no power, the link is down, no module is present, or the interface is disabled.	A module is not present, all sub-channels are disabled, or there is no link.
Green	On steadily	A link is established, but there is no link activity.	All sub-channels are up.
	Flashing	A link is established, and there is link activity.	The interface is up with activity.
	Blipping	The beacon is enabled on the port.	The beacon is enabled on the port.

Table 12: Network Port LEDs on QSFP28 Ports on a QFX5220-128C Switch *(Continued)*

Color	State	Non-Channelized	Channelized
Amber	On steadily	NA	At least one, but not all sub-channels are up.
	Blinking	There is an interface error.	There is an error on one or more sub-channels.
	Flashing	NA	At least one, but not all sub-channels are up with activity.

Table 13: Network Port LEDs on SFP+ Ports on a QFX5220-128C Switch

LED	Color	State	Description
Link/Activity	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, but there is no link activity.
		Blinking	A link is established, and there is link activity.
	Amber	Blinking	The beacon is enabled on the port.
Status	Unlit	Off	The link is down or there is a fault.
	Green	On steadily	A 10-Gigabit Ethernet transceiver is installed in the port and link is established.
	Green	Blinking	A 1-Gigabit Ethernet transceiver is installed in the port and the link is established.
	Amber	Slow blipping	The beacon function is enabled on the port.

QFX5220 Management Panel

IN THIS SECTION

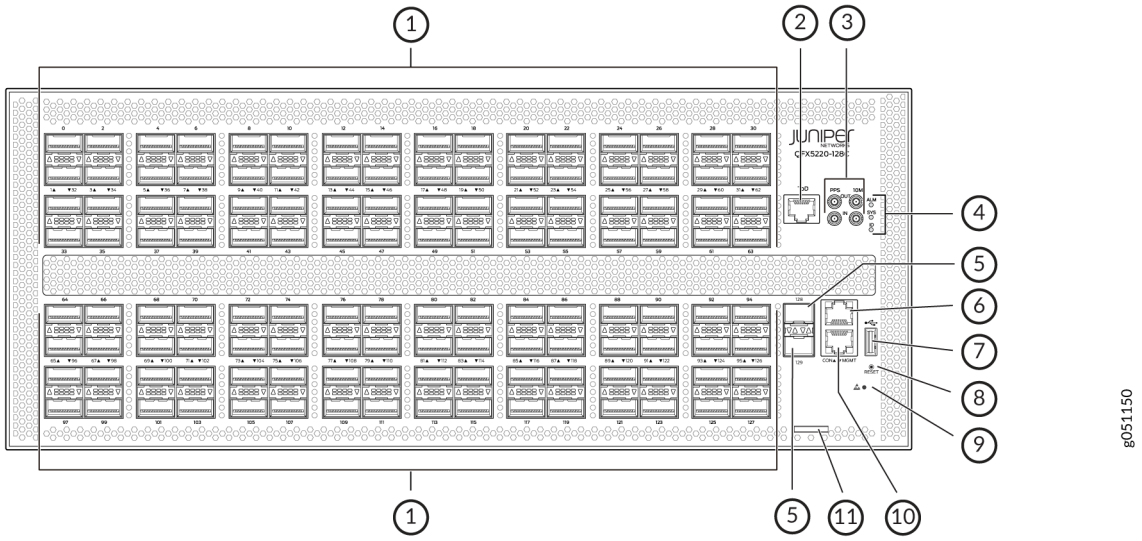
- QFX5220-128C Management Panel Overview | 70
- QFX5220-32CD Management Panel Overview | 71
- QFX5220-32CD Management Panel LEDs | 72

The management panel allows you to have a management channel into the switch that is separate from production traffic.

QFX5220-128C Management Panel Overview

The management panel of the QFX5220-128C is located to the right of the network ports. Figure 21 on page 70 shows the connections and components of the management panel and the network ports.

Figure 21: QFX5220-128C Port and Management Panels

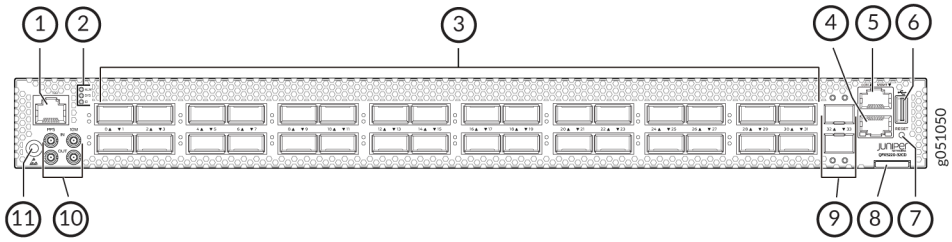


1– Network ports or port panel, 128 ports of QSFP28	7– USB port for image updates
2– RJ-45 grandmaster time-of-day connection	8– Reset button (do not use unless under the direction of JTAC)
3– PTP capable connections: pulses per second (PPS) Out , PPS In, 10 MHz Out, 10 MHz In	9– ESD connection point
4– Chassis alarms LEDs	10– RJ-45 (1000BASE-T) management Ethernet (**MGMT** port for the re0:mgmt-0 management interface)
5– 1-Gbps or 10-Gbps ports, 2 ports of SFP+	11– Slide-out tab for chassis serial number
6– RJ-45 console (**CON**) port	

QFX5220-32CD Management Panel Overview

The management panel of the QFX5220-32CD is divided in two sections, with the port panel in between these sections. Figure 22 on page 71 shows the connections and components of the management panel and the network ports.

Figure 22: QFX5220-32CD Port and Management Panels



1– RJ-45 grandmaster time-of-day connection	7– Reset button (do not use unless under the direction of JTAC)
2– Chassis alarms LEDs	8– Slide out tab for chassis serial number
3– Network ports or port panel, 32 ports of QSFP-DD	9– Network ports, 10-Gigabit Ethernet ports
4– RJ-45 (1000BASE-T) management Ethernet (**MGMT** port for the re0:mgmt-0 management interface)	10– PTP and external clock connections
5– RJ-45 console (**CON**) port	11– ESD connection point
6– USB port for image updates	

QFX5220-32CD Management Panel LEDs

IN THIS SECTION

- QFX5220 Chassis Status LEDs | 72
- RJ-45 Management Port LEDs | 76

You can find LEDs on these management panel ports:

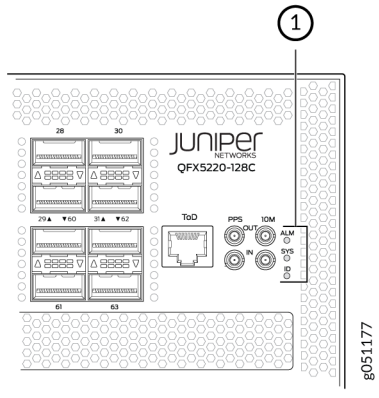
- Chassis status LEDs
- RJ-45 Console and Management Port LEDs

The following sections explain how to interpret these LEDs.

QFX5220 Chassis Status LEDs

Both models of the QFX5220 have a series of three LEDs that indicate system status. On the QFX5220-128C, you can find these LEDs to the right of the network ports (see Figure 23 on page 72). On the QFX5220-32CD, you can find these LEDs to the left of the network ports (see Figure 24 on page 73).

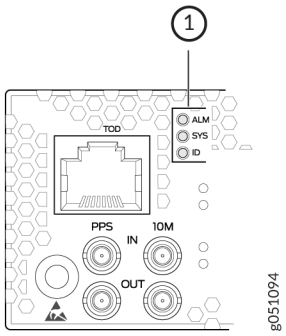
Figure 23: QFX5220-128C Chassis Status LEDs



1– ALM—Chassis alarm or fault
SYS—System status

ID—Beacon	

Figure 24: QFX5220-32CD Chassis Status LEDs



1– ALM—Chassis alarm or fault SYS—System status ID—Beacon	

Table 14 on page 74 describes the chassis status LEDs on a QFX5220, the 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`.

```
user@host> show chassis led
 ----------------------------------
LEDs status:
    Alarm LED : Red
    Beacon LED: Off
    System LED: Green

Interface               STATUS LED      LINK/ACTIVITY LED
-----------------------------------------------------------
et-0/0/0                N/A             Off
et-0/0/1                N/A             Off
et-0/0/2                N/A             Off
et-0/0/3                N/A             Off
et-0/0/4                N/A             Off
et-0/0/5                N/A             Off
et-0/0/6                N/A             Off
et-0/0/7                N/A             Off
et-0/0/8                N/A             Off
et-0/0/9                N/A             Off
et-0/0/10               N/A             Green
```

```
et-0/0/11              N/A             Off
et-0/0/12              N/A             Off
et-0/0/13              N/A             Off
et-0/0/14              N/A             Off
et-0/0/15              N/A             Off
et-0/0/16              N/A             Green
et-0/0/17              N/A             Off
et-0/0/18              N/A             Green
et-0/0/19              N/A             Off
et-0/0/20              N/A             Off
et-0/0/21              N/A             Off
et-0/0/22              N/A             Off
et-0/0/23              N/A             Off
et-0/0/24              N/A             Off
et-0/0/25              N/A             Off
et-0/0/26              N/A             Green
et-0/0/27              N/A             Green
et-0/0/28              N/A             Green
et-0/0/29              N/A             Off
et-0/0/30              N/A             Green
et-0/0/31              N/A             Off
et-0/0/32              N/A             Off
et-0/0/33              N/A             Off
```

Table 14: Chassis Status LEDs on a QFX5220-Devices

Name	Color	State	Description
ALM–Alarm	Unlit	Off	The switch is halted or there is no alarm.

Table 14: Chassis Status LEDs on a QFX5220-Devices *(Continued)*

Name	Color	State	Description
	Red	On steadily	A major hardware fault has occurred, such as a temperature alarm, power failure, or media failure. The device has halted. Power off the device by setting the AC power source outlet to the OFF (O) position, or unplugging the AC power cords. Correct any voltage or site temperature issues, and allow the switch to cool down. Power on the QFX5220. Monitor the power supply and fan LEDs to help determine where the error is occurring.
	Amber	On steadily	A minor system level alarm has occurred, such as a software error or a missing rescue configuration. Power off the device by setting the AC power source outlet to the OFF (O) position, or unplugging the AC power cords. Power on the QFX5220 and monitor the status LEDs to ensure that Junos OS Evolved boots properly.
SYS–System	Unlit	Off	The device is powered off or halted.
	Green	On steadily	Junos OS Evolved is loaded on the device.
ID–Identification	Unlit	Off	The beacon feature is not enabled on the switch. Enable this feature by using the `request chassis beacon fpc 0 on` operational CLI command.

Table 14: Chassis Status LEDs on a QFX5220-Devices *(Continued)*

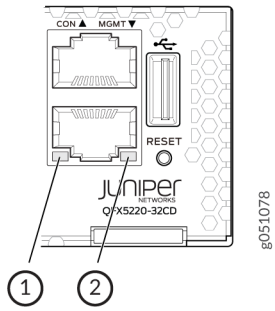
Name	Color	State	Description
	Blue	Blinking	The beacon feature is enabled on the switch. Disable this feature by using the `request chassis beacon fpc 0 off` operational CLI command.

TIP: To find the status of the beacon, use the `show chassis beacon` operational CLI command.

```
user@host> show chassis beacon fpc 0
    FPC 0                 OFF
```

RJ-45 Management Port LEDs

The management port on a QFX5220-32CD has two LEDs that indicate link status and link activity. The management port is labeled **MGMT** for 10/100/1000BASE-T connections.



1– Link and activity LED	2– Status LED

Table 15 on page 76 describes the management port LEDs.

Table 15: Management Port LEDs on a QFX5220-32CD

LED	Color	State	Description
Link/Activity	Unlit	Off	No link is established, there is a fault, or the link is down.

Table 15: Management Port LEDs on a QFX5220-32CD *(Continued)*

LED	Color	State	Description
	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 MB or the link is down.
	Green	On steadily	The port speed is 1-Gbps.
	Amber	On steadily	The port speed is 100 MB.

QFX5220 Cooling System

IN THIS SECTION

- QFX5220-128C Cooling System Description | **78**
- QFX5220-128C Fan Module LED | **79**
- QFX5220-32CD Cooling System Description | **80**
- QFX5220-32CD Fan Module LED | **84**
- Fan Module Status | **86**

QFX5220-128C Cooling System Description

IN THIS SECTION

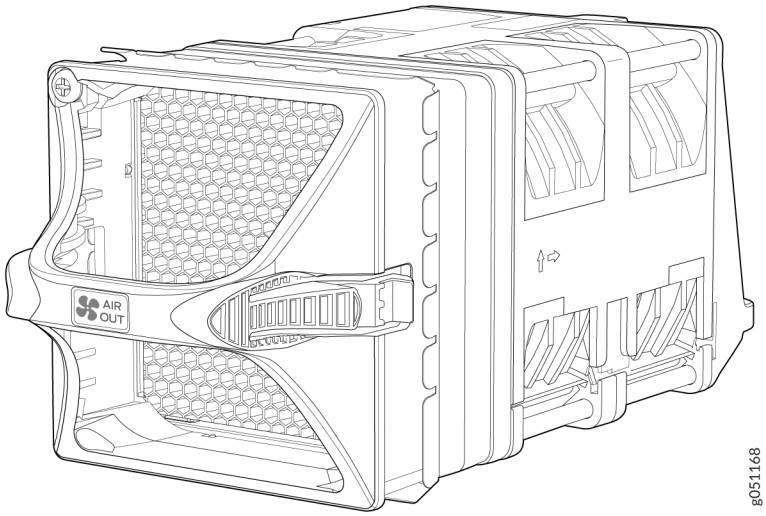
- Fan Modules | 78

The cooling system in an QFX5220-128C consists of six 80-W fan modules and two counter-rotating fans housed in each of the four power supplies.

Fan Modules

The fan modules in a QFX5220-128C are hot-removable and hot-insertable FRUs designed for port-to-FRU airflow. The fan module are numbered across from top left **0** to the bottom right corner **5**. Each fan is 2 U high. See Figure 25 on page 78.

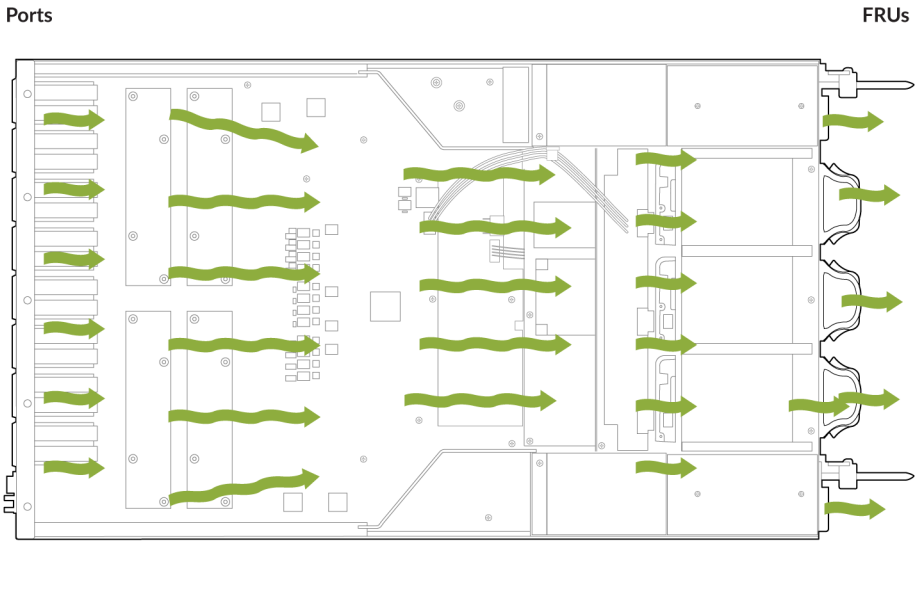
Figure 25: Fan module for QFX5220-128C



The QFX5220-128C brings air into the vents in the port panel and exhausts warmed air through the field-replaceable units (FRU) panel. This type of airflow is know as *airflow out* or *port-to-FRU* airflow. Airflow out fans are distinguished by **AIR OUT** marking on the orange (Juniper gold) handles. In data center deployments, position the switch in such a manner that the **AIR OUT** labels on the switch components are next to the hot aisle.

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. Figure 26 on page 79 shows the airflow through the chassis.

Figure 26: Air Out Airflow Through the QFX5220-128C Chassis

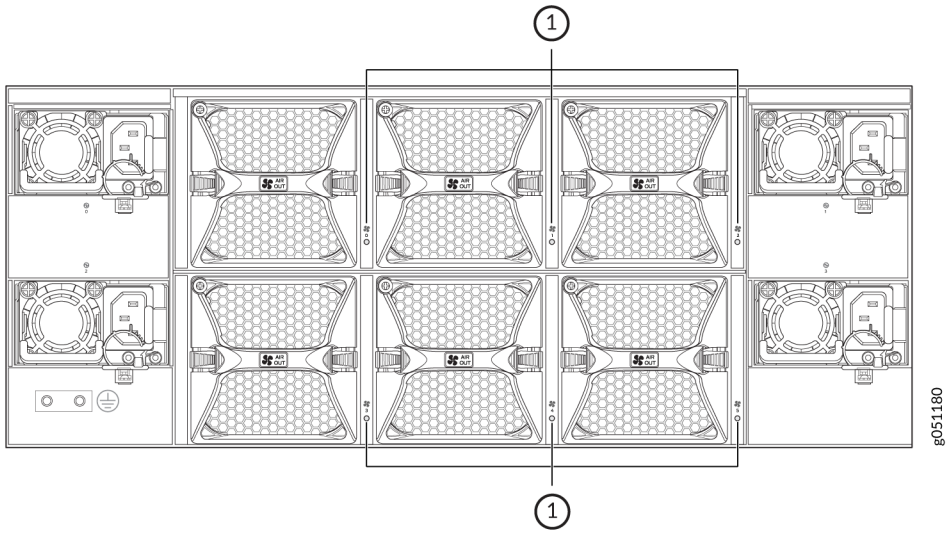


NOTE: The fans provide a (5x2+1)+1 redundancy. However, for optimal operation of the device, install all of the fans.

QFX5220-128C Fan Module LED

Each fan module has an associated LED to indicate status. On the QFX5220-128C, the fan LED is located to the right of each fan below a fan icon. See Figure 27 on page 80 for the location of these LEDs.

Figure 27: Fan Module LEDs on a QFX5220-128C



1– Fan module LEDs

The LED behavior is common for both QFX5220-32CD and QFX5220-128C. For information on how to interpret the LEDs, see Table 17 on page 85.

QFX5220-32CD Cooling System Description

IN THIS SECTION

- Fan Modules | **81**
- Do Not Install Components with Different Airflow or Wattage in the Switch | **84**

The cooling system in an QFX5220-32CD consists of six fan modules and a single fan in each power supply. The switch can ordered 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.

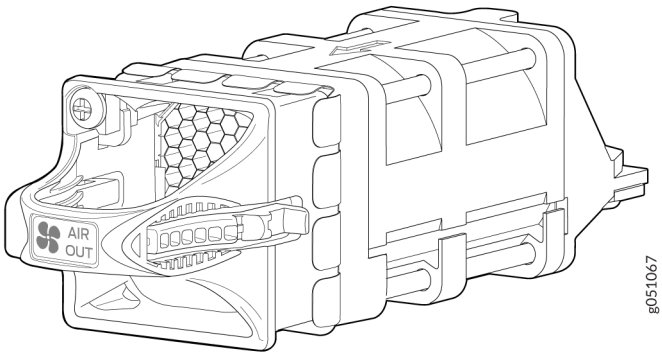
Fan Modules

The fan modules in QFX5220 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 QFX5220-32CD fan modules have six fan modules numbered **0** through **5** when counting from left to right.

Figure 28 on page 81 shows a fan module.

Figure 28: QFX5220-32CD Fan Module



You remove and replace a fan module from the FRU end of the chassis. The switch can work with only five fans. However, we recommend running with all six fans for redundancy and optimal operation of the switch. If a fan fails, or you want to run the switch without redundancy, leave the sixth fan in place to maintain proper airflow. When you replace a fan, the switch continues to operate for a limited period of time (3 minutes) without thermal alarms or shutdown.

The fan modules are available in two product variants that have different airflow directions—FRU-to-port airflow and port-to-FRU airflow Table 16 on page 82 lists the available fan module product variants and the direction of airflow in them:

Table 16: Fan Modules in QFX5220 Switches

Fan Module	Airflow Diagram	Label on the Fan Module	Color of Fan Module	Direction of Airflow in the Fan Module	Power Supplies
QFX5220-32CD-FANAI	Figure 29 on page 83	**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.
QFX5220-32CD-FANAO	Figure 30 on page 83	**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.

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 29: Air In Airflow Through QFX5220-32CD

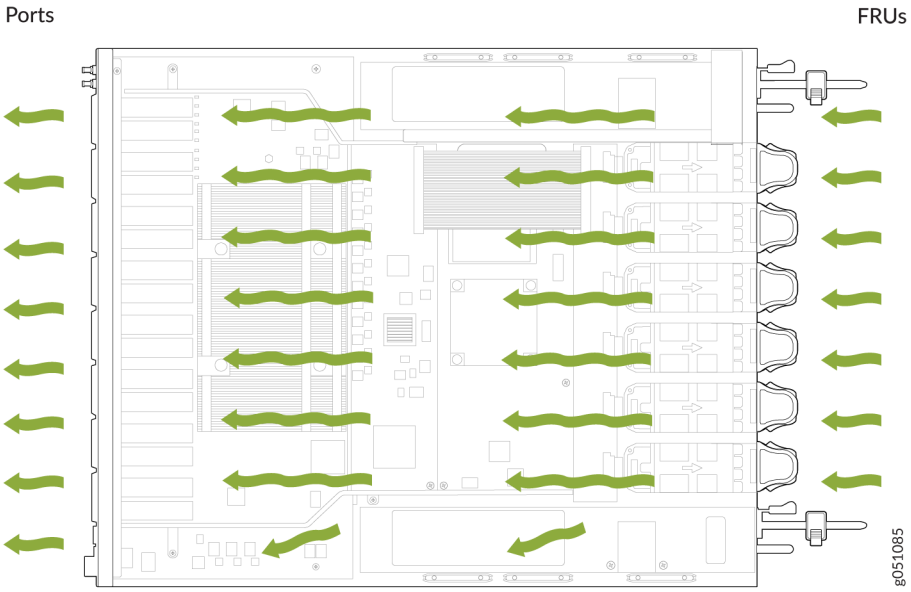
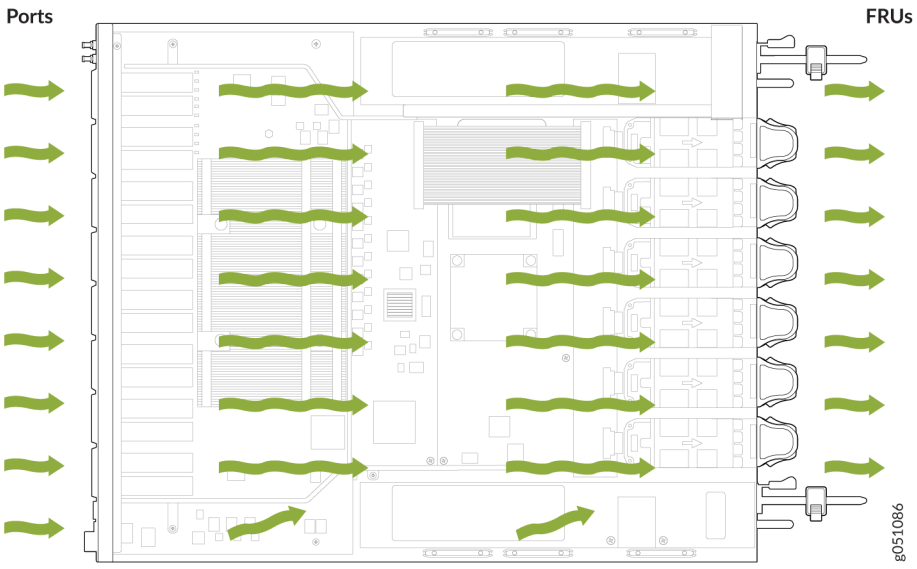


Figure 30: Air Out Airflow Through QFX5220-32CD



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

Do not mix airflow direction on fans or power supplies. You can use the color-coding on fan and power supply handles to ensure the airflow direction matches. The handles on Airflow In fans and power supplies are azure blue, compared to the Airflow Out fans and power supplies, which are Juniper gold.

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. The system takes 240 seconds to shut down after the red alarm threshold is reached.

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 16 on page 82 for the correct part number for your QFX5220 device.

CAUTION: Do not mix AC and DC power supplies in the same QFX5220 chassis.

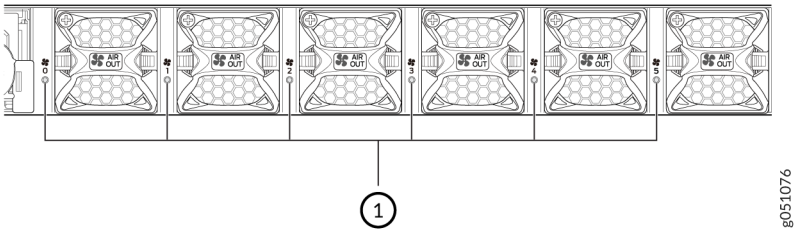
However, if you need to convert a QFX5220 device to have a different airflow, you can change the airflow pattern. To convert an **AIR IN** product variant to an **AIR OUT** product variant or an **AIR OUT** product variant to a **AIR IN** product variant, you must power off and replace all of the fans and power supplies at one time to use the new direction. The system raises an alarm when the system is converted, which is normal.

NOTE: If you change the switch to have a different airflow, be sure to update your JTAC install base to reflect the new configuration to ensure service warranties and contracts remain˙.

QFX5220-32CD Fan Module LED

On the QFX5220-32CD switches, the fan module LEDs are located on the chassis next to the fan module slot. Figure 31 on page 85 shows the location of the fan module LEDs next to the fan module on a QFX5220-32CD switch.

Figure 31: Fan Module LEDs on a QFX5220-32CD



1– Fan module LED

Table 17 on page 85 describes the function of the fan tray LED.

Table 17: Fan Tray LED Behavior in a QFX5220

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.

Fan Module Status

You can check the status of fan modules through the `show chassis temperature-thresholds`, `show system alarm`, or `show chassis environment` commands, or by looking at the LEDs next to each fan module. For example:

```
user@device> show chassis environment
Class Item                           Status
Measurement

Temp  PSM 1                          Ok         25 degrees C / 77 degrees
F
      PSM 3                          Ok         25 degrees C / 77 degrees F
      FPC 0 Sensor MainTopBack       Ok         32 degrees C / 89 degrees
F
      FPC 0 Sensor MainTopBackRight  Ok         32 degrees C / 89 degrees
F
      FPC 0 Sensor MezzPhysLeftSide  Ok         26 degrees C / 78 degrees
F
      FPC 0 Sensor MezzPhysRightSide Ok         26 degrees C / 78 degrees F
      FPC 0 Sensor NearTH3           Ok         30 degrees C / 86 degrees
F
      FPC 0 Sensor MainPhysLeftSide  Ok         26 degrees C / 78 degrees
F
      FPC 0 Sensor MainPhysRightSide Ok         26 degrees C / 78 degrees
F
      FPC 0 Sensor TopLeftCpuBoard   Ok         27 degrees C / 80 degrees
F
      FPC 0 Sensor TopBackRightCpuBoard Ok      27 degrees C / 80 degrees
F
      FPC 0 Sensor BottomMiddleCpuBoard Ok      31 degrees C / 87 degrees
F
      FPC 0 Sensor TH3 Max Reading   Ok         44 degrees C / 111 degrees
F
      Routing Engine 0 CPU Temperature Ok       41 degrees C / 105 degrees F
Fan   Fan Tray 0 Fan 1               Ok         4395
RPM

      Fan Tray 0 Fan 2               Ok         4688
RPM

      Fan Tray 1 Fan 1               Ok         4688
```

```
RPM

      Fan Tray 1 Fan 2              Ok          4688 RPM
      Fan Tray 2 Fan 1              Ok          4688
RPM

      Fan Tray 2 Fan 2              Ok          4981
RPM

      Fan Tray 3 Fan 1              Ok          4688
RPM

      Fan Tray 3 Fan 2              Ok          4981
RPM

      Fan Tray 4 Fan 1              Ok          4395 RPM
      Fan Tray 4 Fan 2              Ok          4981 RPM
      Fan Tray 5 Fan 1              Ok          4395 RPM
      Fan Tray 5 Fan 2              Ok          4981 RPM
```

The QFX5220 has a status LED (labeled **ST**) for each fan module. It indicates the status of all the fan modules.

RELATED DOCUMENTATION

Maintaining QFX5220 Cooling System | **213**

QFX5220 Power System

IN THIS SECTION

- QFX5220 AC Power Supply Modules Description | **89**
- QFX5220 AC Power Specifications | **91**
- AC Power Cord with Type C13 Coupler Specifications | **92**
- AC Power Cord with Type C15 Coupler Specifications | **94**

- QFX5220 AC Power Supply LEDs | **97**
- QFX5220 DC Power Supply Description | **98**
- QFX5220 DC Power Specifications | **100**
- QFX5220-128C DC Power Cable Specification | **101**
- QFX5220-128C DC Power Supply LED | **103**
- QFX5220-32CD-D DC Power Supply LED | **105**

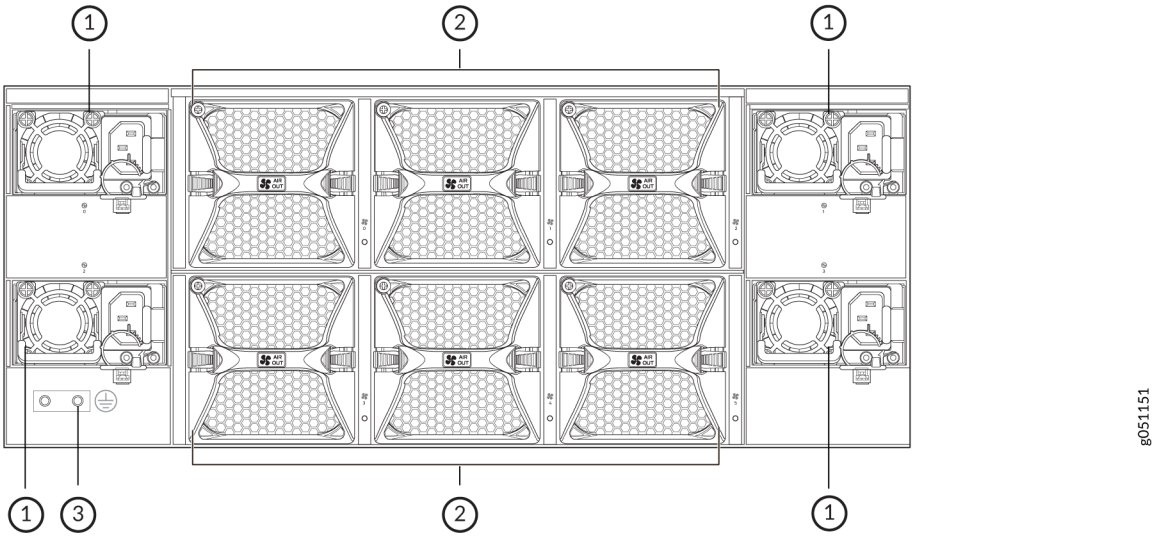
The power supplies in QFX5220 models are hot-removable and hot-insertable field-replaceable units (FRUs). You can install replacement power supplies without powering off the device or disrupting switching function. The power supplies are installed at the factory and shipped with the chassis. All power supplies for QFX5220 are 1600 W; however, the power supplies for the QFX5220-32CD and the QFX5220-128C are not interchangeable.

CAUTION: Only use the power supply for your model number and airflow. 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.

The power supplies for the QFX5220 are located on the FRU panel. See Figure 32 on page 89 and Figure 33 on page 89.

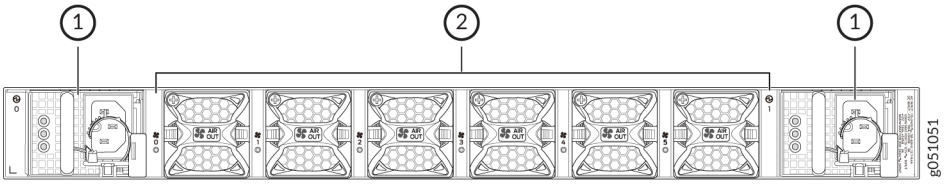
NOTE:
A QFX5220 chassis must have a minimum of one PSM available for a row. Acceptable PEM configurations with two PEMs are (0,2), (0,3), (1,2), and (1,3), while configurations with two PEMs that are not supported are (0,1), (2,3).

Figure 32: QFX5220-128C FRU Panel



1– Power supplies	3– Chassis protective earthing terminal
2– Fans	

Figure 33: QFX5220-32CD FRU Panel



1– Power supplies	2– Fans

QFX5220 AC Power Supply Modules Description

The QFX5220-32CD ships with two power supplies; the QFX5220-128C ships with four power supplies. While each model can operate with the minimum number of power supplies (one for QFX5220-32CD, two for QFX5220-128C), maximum power supplies are required to have redundancy. See Figure 34 on page 90 and Figure 35 on page 90 for examples of these power supply modules.

Figure 34: 1600-W AC Power Supply for QFX5220-32CD

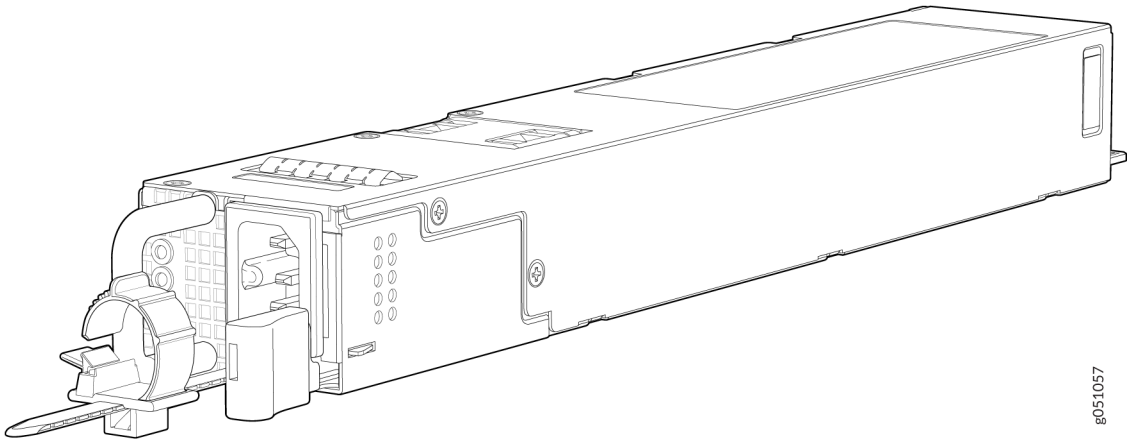
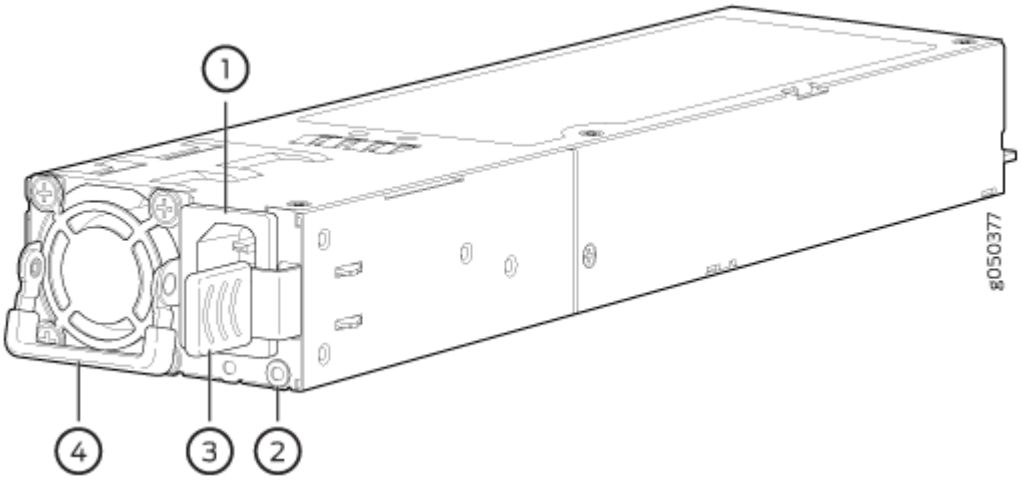


Figure 35: 1600-W AC Power Supply for QFX5220-128C



1– Power connector	3– Ejection lever
2– Power LED	4– Handle

An AC power supply for the QFX5220 is 1600 W. However, the power supplies for the QFX5220-32CD and the QFX5220-128C are not interchangeable. Be sure to use the correct power supply for your chassis product variant (see Table 18 on page 91).

The power supply provides FRU-to-port or port-to-FRU airflow depending on the model and variant you purchase. The power supplies have color-coded indicators to indicate the airflow direction.

Table 18: DC Power Supply Summary

Model	Product Number	Airflow Direction	Color Indicator
QFX5220-32CD	JPSU-1600W-1UACAFI	Airflow In (FRU-to port)	Juniper azure blue handle
	JPSU-1600W-1UACAFO	Airflow Out (port-to-FRU)	Juniper gold handle
QFX5220-128C	JPSU-1600W-AC-AFO	Airflow Out (port-to-FRU)	Juniper gold handle

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 avoid electrical injury, carefully follow instructions in "Connecting the QFX5220 to Power" on page 189.

QFX5220 AC Power Specifications

Table 19 on page 91 describes the AC power specifications for a QFX5220.

Table 19: AC Power Specifications for a QFX5220

Item	Specification	
AC input voltage	QFX5220-32CD	Operating range: 100 - 240 VAC
	QFX5220-128C	Operating range: 100 / 240 VAC
AC input line frequency	50–60 Hz	

Table 19: AC Power Specifications for a QFX5220 *(Continued)*

Item	Specification	
AC input current rating	QFX5220-32CD	12.7 A at 100-127 VAC 9.4 A at 200-240 VAC
	QFX5220-128C	19.36 A at 100-127 VAC 10.95 A at 200-240 VAC
Typical power consumption	QFX5220-32CD	220-240 V: 310-W
	QFX5220-128C	220-240 V: 942-W
Maximum power consumption	QFX5220-32CD	220-240 V: 834-W
	QFX5220-128C	220-240 V: 1506-W

NOTE: Typical power consumption is measured at 25°C ambient temperature with DACs, and at 50% load with IMIX traffic, excluding transceivers for QFX5220-32CD. Power consumption is subject to operating conditions and unit-to-unit variations. Maximum power consumption is measured at 40°C ambient temperature with SR optics, and at 100% load with IMIX traffic.

QFX5220-128C AC models use power cords with type C13 couplers, see "AC Power Cord with Type C13 Coupler Specifications" on page 92. The QFX5220-32CD AC model uses power cords with type C15 couplers, see "AC Power Cord with Type C15 Coupler Specifications" on page 94.

AC Power Cord with Type C13 Coupler 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 20 on page 93 lists AC power cord specifications provided for each country or region.

Table 20: AC Power Cord Specifications

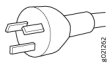
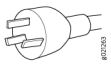
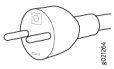
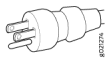
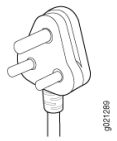
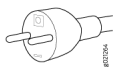
Country/Region	Electrical Specifications	Plug Standards	Shipped Juniper Model Number	Spare Juniper Model Number	Graphic
Australia	250 VAC, 10 A, 50 Hz	AS/NZ 3109-1996	CG_CBL-C13-06-AU	CBL-EX-PWR-C13-AU	
China	250 VAC, 10 A, 50 Hz	GB 1002-1996	CG_CBL-C13-06-CH	CBL-EX-PWR-C13-CH	
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII	CG_CBL-C13-06-EU	CBL-EX-PWR-C13-EU	
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16/VII	CG_CBL-C13-06-IT	CBL-EX-PWR-C13-IT	
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	JIS C8303	CG_CBL-C13-06-JP	CBL-EX-PWR-C13-JP	
North America	125 VAC, 13 A, 60 Hz	EN 60320 C13 NEMA 5-15P	CG_CBL-C13-06-US	CBL-EX-PWR-C13-US	

Table 20: AC Power Cord Specifications *(Continued)*

Country/Region	Electrical Specifications	Plug Standards	Shipped Juniper Model Number	Spare Juniper Model Number	Graphic
India	250 VAC, 10 A, 50 Hz	IS 1293 Type IND/3	CG_CBL-C13-06-IN	CBL-EX-PWR-C13-IN	
South Korea	250 VAC, 10 A, 60 Hz	KS C 8305 60227-5 IEC 60227-7 IEC	CG_CBL-C13-06-KR	CBL-EX-PWR-C13-KR	
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011 SEV 1991; EN 60320 C13	CG_CBL-C13-06-SZ	CBL-EX-PWR-C13-SZ	
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A	CG_CBL-C13-06-UK	CBL-EX-PWR-C13-UK	

AC Power Cord with Type C15 Coupler Specifications

Detachable AC power cords are shipped with the chassis, if you include them as part of your order. Some country-specific plugs are only available as spare orders. The coupler is type C15 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 with these guidelines.

Table 21 on page 95 lists the AC power cord specifications provided for each country or region.

Table 21: AC Power Cord Specifications

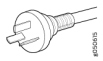
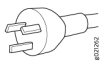
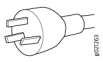
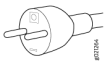
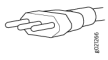
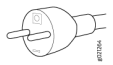
Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number	Spare Juniper Model Number	Graphic
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	–	CBL-PWR-C15M-HITEMP-AR	
Australia	250 VAC, 10 A, 50 Hz	AS/NZS 3112-2000 Type SAA/3	CG_CBL-C15-02-AU	CBL-PWR-C15M-HITEMP-AU	
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	–	CBL-PWR-C15M-HITEMP-BR	
China	250 VAC, 10 A, 50 Hz	GB 2099/GB 1002 Type PRC/3	CG_CBL-C15-02-CH	CBL-PWR-C15M-HITEMP-CH	
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CG_CBL-C15-02-EU	CBL-PWR-C15M-HITEMP-EU	
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	Europe patch cord - Straight,C15 Plug (EN 60320) to C14 Connector (EN 60320)-	CBL-PWR-C15-C14-EU		
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CG_CBL-C15-02-IT-CH	CBL-PWR-C15M-HITEMP-IT	

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

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number	Spare Juniper Model Number	Graphic
Japan	125 VAC, 15 A, 50 Hz	JIS 8303 Type 498GJ	CG_CBL-C15-02-JP	CBL-PWR-C15M-HITEMP-JP	
North America	125 VAC, 15 A, 50 Hz	NEMA 5-15 Type 498G	CG_CBL-C15-02-US	CBL-PWR-C15M-HITEMP-US	
North America	125 VAC, 15 A, 50 Hz	US Patch cord - Straight,C15 Plug (EN 60320) to C14 Connector (EN 60320)	CBL-PWR-C15-C14-US	CBL-PWR-C15M-HITEMP-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 and some parts of Europe	250 VAC, 10 A, 50 Hz	CEE(7) VII Type VIIG	–	CBL-PWR-C15M-HITEMP-KR	
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011/6534-2 Type 12G	CG_CBL-C15-02-SZ	CBL-PWR-C15M-HITEMP-SZ	
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CG_CBL-C15-02-UK	CBL-PWR-C15M-HITEMP-UK	

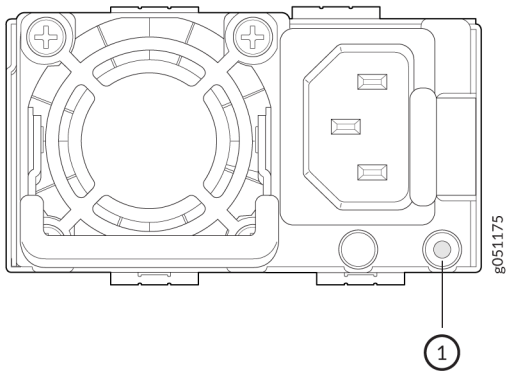
SEE ALSO

- General Safety Guidelines and Warnings | **260**
- General Electrical Safety Guidelines and Warnings | **283**

QFX5220 AC Power Supply LEDs

The QFX5220-128C uses a single bi-colored LED to indicate power status. Figure 36 on page 97 shows the location of the LED on the JPSU-1600W-AC-AFO and Table 26 on page 103 explains the LED behavior on QFX5220-128C power supplies.

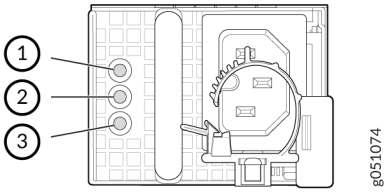
Figure 36: Power Supply Module LEDs for QFX5220-128C



1– Status LED	

The QFX5220-32CD uses three LEDs to indicate power status. Figure 37 on page 97 shows the location of the LEDs on the JPSU-1600W-1UAC power supply.

Figure 37: Power Supply Module LEDs for QFX5220-32CD



1– AC input okay	3– Fault condition
2– DC output okay	

Table 22 on page 98 describes the LED behavior on the QFX5220-32CD AC power supplies.

Table 22: AC Power Supply LEDs on a QFX5220-32CD

LED	Color	State	Description
AC input okay	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 output okay	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.
		Blinking	The power supply is an invalid model.

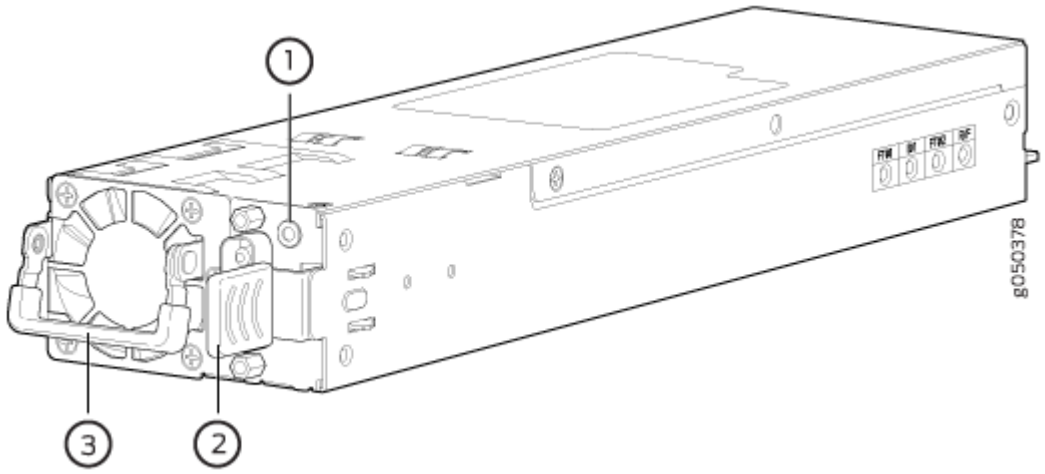
NOTE: If the input and output LEDs are unlit, either the AC power cord is not installed properly or the power supply fuse has failed. If the input LED is lit and the output LED is unlit, the AC power supply is installed properly, but the power supply has an internal failure.

QFX5220 DC Power Supply Description

The DC power supplies in the QFX5220 (see Figure 38 on page 99 and Figure 39 on page 99) are hot-removable and hot-insertable field-replaceable units (FRUs) that install without powering off the device or disrupting the switching function. The factory installed power supplies in both models are 1600-W, but are not interchangeable. The QFX5220-128C switch has four power supplies and the QFX5220-32CD is shipped with two power supplies. Each power supply provides 1600 W of power to the chassis.

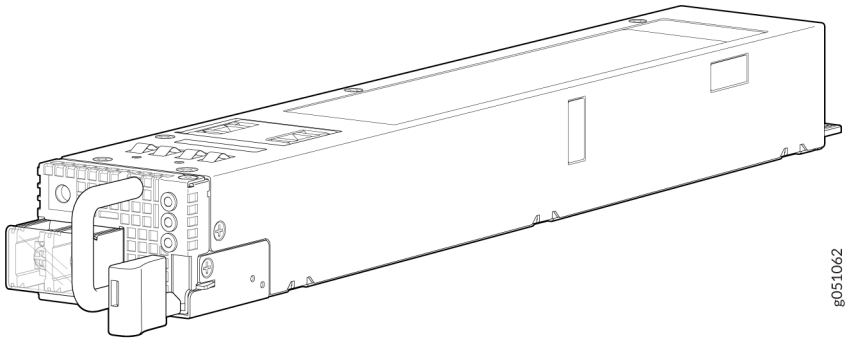
Both power supplies have double the amount of power supplies needed to power all of the components in the switch, which is known as 2*n redundancy*. When the switch has all of the power supplies installed, the switch has full power redundancy. If a power supply fails or is removed, a second power supply balances the electrical load without interruption. For more on redundancy features, see "QFX5220 Component Redundancy" on page 17. Each power supply provides 12-VDC output with a standby voltage of 12 VDC.

Figure 38: DC Power Supply in QFX5220-128C



1– Power LED	3– Handle
2– Ejector lever	

Figure 39: DC Power Supply in QFX5220-32CD



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 Evolved 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.

Table 23 on page 100 shows the characteristics of the power supply and the direction of the airflow.

Table 23: DC Power Supply Summary

Model	Wattage	Product Number	Direction of Airflow	Color of Power Supply Handle
QFX5220-128C	1600-W	JPSU-1600W-DC-AFO	Airflow Out (port-to-FRU)	Juniper gold
QFX5220-32CD	1600-W	JPSU-1600W-1UDCAFI	Airflow In (FRU-to port)	Juniper azure blue handle
	1600-W	JPSU-1600W-1UDCAFO	Airflow Out (port-to-FRU)	Juniper gold handle

We recommend that the 48 VDC facility DC source be equipped with a circuit breaker rated at 40 A (–48 VDC) minimum, or as required by local code.

To avoid electrical injury, carefully follow instructions in "Maintaining the QFX5220 Power System" on page 217 .

QFX5220 DC Power Specifications

Table 24 on page 101 describes the DC power specifications for the DC version of a QFX5220 switch.

Table 24: DC Power Specifications for a QFX5220 Switch

Item	Model	Specifications
DC input voltage		• Rated operating voltage: VDC -48 VDC through -60 VDC • Operating voltage range: –40 VDC through –72 VDC
DC input current rating	QFX5220-128C QFX5220-32CD	40 A maximum
Typical power consumption	QFX5220-32CD	328-W
	QFX5220-128C	955-W
Maximum power consumption	QFX5220-32CD	860-W
	QFX5220-128C	1530-W

NOTE: Typical power consumption is measured at 25°C ambient temperature with DACs, and at 50% load with IMIX traffic, excluding transceivers for QFX5220-32CD. Power consumption is subject to operating conditions and unit-to-unit variations. Maximum power consumption is measured at 40°C ambient temperature with SR optics, and at 100% load with IMIX traffic.

We recommend that the 48 VDC facility DC source be equipped with a circuit breaker rated at 40 A (–48 VDC) minimum, or as required by local code.

QFX5220-128C DC Power Cable Specification

QFX5220-128C DC power supplies require a D-Sub 3W3- type connector. The three pins on the connector provide –48 VDC input (–), return (+), and ground connections to the power supply.

NOTE: The optional right-angle DC power cables, CBL-JNP-PWR-DSUB2 and CBL-JNP-PWR-DSUB3, do not include a ground connection wire. Regardless which DC power cable you use, you must connect the QFX5220 to earth ground before you connect it to power, using the procedure described in "Ground the QFX5220-128C" on page 190.

DC power cables, each 4 m (approximately 13.1 ft) long, are supplied with the QFX5220-128C. The provided cables include the three-pin connector on one end and three insulated wires at the opposite end, for connection to the site's DC power distribution system.

Table 25 on page 102 lists the specifications for the QFX5220-128C DC power cables.

Table 25: QFX5220-128C DC Power Cable Specifications

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

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

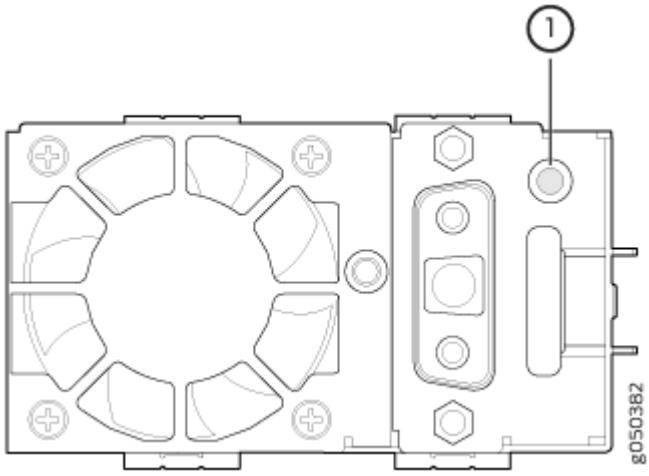
WARNING: Power cables must not block access to QFX5220 components or drape where people could trip on them.

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

QFX5220-128C DC Power Supply LED

Figure 40 on page 103 shows the location of the status LED on the QFX5220-128C DC power supply.

Figure 40: DC Power Supply LED



1– Status LED

Table 26 on page 103 describes the status LED behavior on QFX5220-128C power supplies.

Table 26: DC Power Supply LEDs on a QFX5220-128C

LED Color	State	Description
Unlit	Off	The power supply is disconnected from power, or power is not coming into the power supply.
Green	On steadily	The power supply is operating correctly.

Table 26: DC Power Supply LEDs on a QFX5220-128C *(Continued)*

LED Color	State	Description
Amber	On steadily	A power supply fault or error has occurred 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.

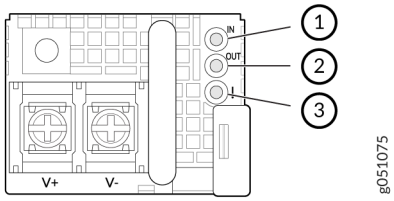
You can get additional information about the status of the power modules using the `show chassis environment pem`. For example:

```
user@device> show chassis environment pem

PSM1
status:

  State
Online

  Temperature                25 degrees C / 77 degrees
F

  Fans
OK

  DC Output
Failed

PSM3
status:

  State
Online

  Temperature                25 degrees C / 77 degrees
F

  Fans
OK

  DC Output                  Failed
```

QFX5220-32CD-D DC Power Supply LED

Figure 41 on page 105 shows the location of the power supply status LEDs.

Figure 41: QFX5220-32CD-D Status LEDs



1– Input OK	3– Fault
2– Output OK	

Table 27 on page 105 describes the status LED behavior on QFX5220-32CD power supplies.

Table 27: DC Power Supply LEDs on a QFX5220-32CD

Status	LED Color	Description
Input OK	Off	The power supply is disconnected from power, or power is not coming into the power supply.
	Green, on steadily	Input voltage is present and is within range.
Output OK	Off	The power supply is running at the power limit or is over current.
	Green, on steadily	The power supply is operating correctly.
Fault	Amber, on steadily	A power supply fault or error has occurred 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.
	Amber, blinking	The power supply is not valid. Check the model number.

RELATED DOCUMENTATION

Maintaining the QFX5220 Power System | 217

CHAPTER 3

Site Planning, Preparation, and Specifications

IN THIS CHAPTER

- QFX5220 Site Preparation Checklist | **108**
- QFX5220 Site Guidelines and Requirements | **110**
- QFX5220 Network Cable and Transceiver Planning | **121**
- QFX5220 Management Cable Specifications and Pinouts | **128**

QFX5220 Site Preparation Checklist

The checklist in Table 28 on page 108 summarizes the tasks you need to perform when preparing a site for a QFX5220 installation.

Table 28: Site Preparation Checklist

Item or Task	For More Information	Performed By	Date
Environment			
Verify that environmental factors such as temperature and humidity do not exceed switch tolerances.	"QFX5220 Environmental Requirements and Specifications" on page 110		
Power			
Measure the distance between external power sources and switch installation site.	—		
Calculate the power consumption and requirements.	"QFX5220 Power System" on page 87		
Rack or Cabinet			
Verify that your rack or cabinet meets the minimum requirements for the installation of the switch.	• "QFX5220 Rack Requirements" on page 117 • "QFX5220 Cabinet Requirements" on page 119 • "Determining QFX5220 Optical Interface Support" on page 121		

Table 28: Site Preparation Checklist *(Continued)*

Item or Task	For More Information	Performed By	Date
Plan rack or cabinet location, including required space clearances.	"QFX5220 Clearance Requirements for Airflow and Hardware Maintenance" on page 114		
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 QFX5220 Optical Interface Support" on page 121		
Plan the cable routing and management.	—		

RELATED DOCUMENTATION

General Safety Guidelines and Warnings | **260**

QFX5220 Installation Overview | **144**

QFX5220 Site Guidelines and Requirements

IN THIS SECTION

- QFX5220 Environmental Requirements and Specifications | **110**
- General Site Guidelines | **112**
- QFX5220 Grounding Cable and Lug Specifications | **112**
- QFX5220 Clearance Requirements for Airflow and Hardware Maintenance | **114**
- QFX5220 Chassis Physical Specifications | **115**
- Site Electrical Wiring Guidelines | **116**
- QFX5220 Rack Requirements | **117**
- QFX5220 Cabinet Requirements | **119**

QFX5220 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 111 provides the required environmental conditions for normal switch operation.

Table 29: QFX5220-32CD Switch Environmental Tolerances

Description	Tolerance
Altitude	• QFX5220-128C-AFO–At 32° F through 104° F (0° C through 40° C) there is no performance degradation to 6000 feet (1828.8 meters • QFX5220-32CD-AFO–At 32° F through 104° F (0° C through 40° C) there is no performance degradation to 6000 feet (1828.8 meters) • QFX5220-32CD-AFI-At 32° F through 77° F (0° C through 25° C) there is no performance degradation to 6000 feet (1828.8 meters)
Relative humidity, operating	Normal operation ensured in relative humidity range of 5% through 90%, noncondensing
Temperature	QFX5220-128C-AFO • 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) QFX5220-32CD-AFO • 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) QFX5220-32CD-AFI • Normal operation ensured in temperature range of 32° F through 77° F (0° C through 25° C) • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)
Seismic	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.

General Site Guidelines

Efficient device operation requires proper site planning. For the device to operate properly, you must ensure maintenance and proper layout of the equipment, rack or cabinet, and wiring closet.

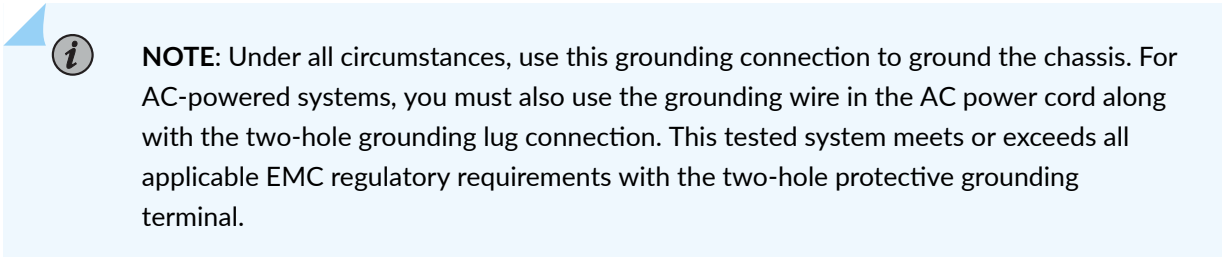
To plan and create an acceptable operating environment for your device and prevent environmentally caused equipment failures:

- Keep the area around the chassis free from dust and conductive material, such as metal flakes.
- Follow the prescribed airflow guidelines to ensure that the cooling system functions properly. Ensure that the 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.

QFX5220 Grounding Cable and Lug Specifications

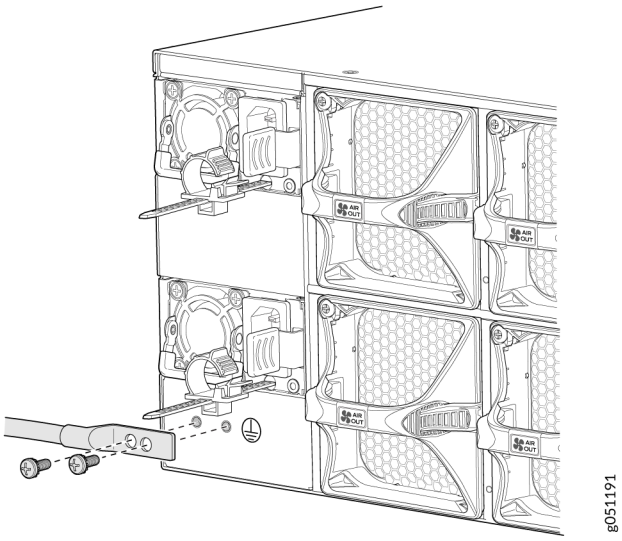
For installations that require a separate grounding conductor to the chassis, the switch must be adequately grounded before power is connected to ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements.

To ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements, you must connect an Juniper Product Name to earth ground before you connect power to the Chassis .



NOTE: Under all circumstances, use this grounding connection to ground the chassis. For AC-powered systems, you must also use the grounding wire in the AC power cord along with the two-hole grounding lug connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

Figure 42: Connecting a Grounding Cable to a QFX5220-128C



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

WARNING: To comply with GR-1089 requirements, all intrabuilding copper cabling used for SFP+ 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. See "Ground the QFX5220-32CD and Connect Power" on page 185 and "Ground the QFX5220-128C" on page 183. 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 the protective earthing terminal on a QFX5220 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 cable that you provide for a QFX5220 must be 14 AWG (2 mm^2), minimum 60° C wire, or as permitted by the local code.

- Ensure you have two 10-32 x 1/4 in. washers and screws to attach the cable and bracket (not provided).

QFX5220 Clearance Requirements for Airflow and Hardware Maintenance

When planning the site for installing a QFX5220, you must allow sufficient clearance around the installed chassis (see Figure 43 on page 114 and Figure 44 on page 115).

Figure 43: Clearance Requirements for Airflow and Hardware Maintenance for a QFX5220-32CD

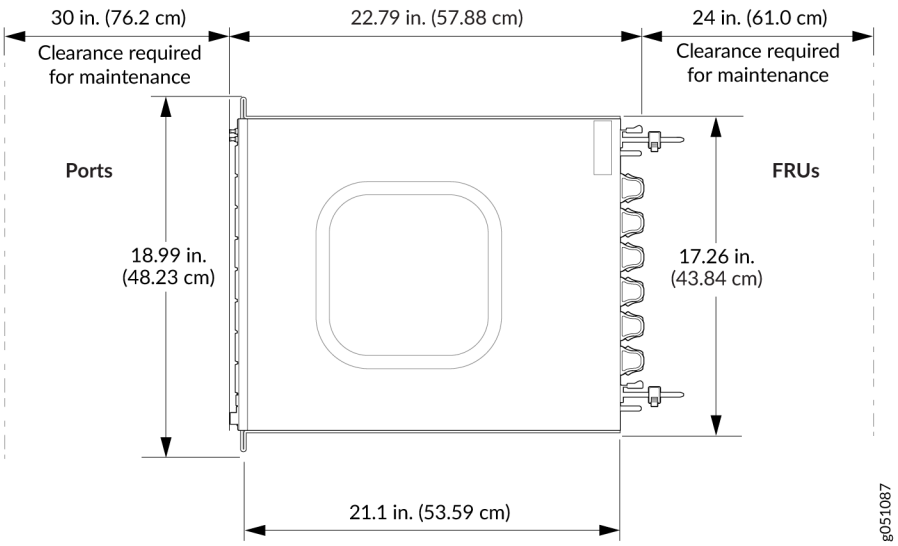
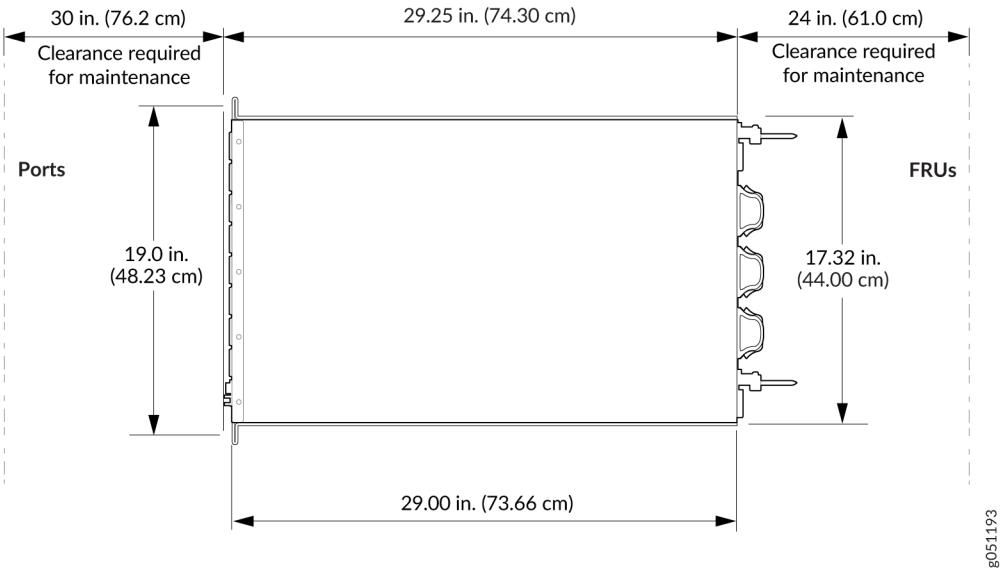


Figure 44: Clearance Requirements for Airflow and Hardware Maintenance for a QFX5220-128C



- For the cooling system to function properly, the airflow around the chassis must be unrestricted. See "QFX5220 Cooling System" on page 77 for more information about the airflow through the chassis.
- If you are mounting a QFX5220 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 QFX5220. 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.

QFX5220 Chassis Physical Specifications

The QFX5220 is a rigid sheet-metal structure that houses the hardware components (see Table 30 on page 116).

Table 30: Physical Specifications for the QFX5220

Product Model	Height	Width	Depth	Weight
QFX5220-32CD	1.72 in. (4.3 cm)	17.26 in. (43.8 cm)	21.1 in. (53.59 cm)	24.5 lb (11.11 kg) with power supplies and fans installed
QFX5220-128C	6.88 in. (17.48 cm)	17.32 in (44 cm)	29.25 in. (74.3 cm)	98 lb (44.45 kg) with power supplies and fans installed 76 lb (34.47 kg) chassis only

Site Electrical Wiring Guidelines

Table 31 on page 116 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: • Radio frequency interference (RFI) because of improperly installed wires. • Damage from lightning strikes occurring when wires exceed recommended distances or pass between buildings. • Damage to unshielded conductors and electronic devices as a result of electromagnetic pulses (EMPs) caused by lightning.

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

Site Wiring Factor	Guidelines
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 need to exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal, when applicable.
Electromagnetic compatibility	If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice. Strong sources of electromagnetic interference (EMI) can cause: • 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.

QFX5220 Rack Requirements

QFX5220 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 118 provides the rack requirements and specifications for the QFX5220.

Table 32: Rack Requirements for the QFX5220

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) increments, so that the switch can be mounted in any rack that provides holes spaced at that distance.
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. 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 23.6 in. (60 cm) and 36 in. (91.4 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.

Table 32: Rack Requirements for the QFX5220 *(Continued)*

Rack Requirement	Guidelines
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.

QFX5220 Cabinet Requirements

You can mount the QFX5220 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 119 provides the cabinet requirements and specifications for the QFX5220.

Table 33: Cabinet Requirements for the QFX5220

Cabinet Requirement	Guidelines
Cabinet size and clearance	The minimum cabinet size for accommodating a QFX5220 device is 36 in. (91.4 cm) deep. Large cabinets improve airflow and reduce the chance of overheating.

Table 33: Cabinet Requirements for the QFX5220 *(Continued)*

Cabinet Requirement	Guidelines
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 QFX5220 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

QFX5220 Installation Overview | **144**

Unpacking and Mounting the QFX5220 | **145**

QFX5220 Network Cable and Transceiver Planning

IN THIS SECTION

- Determining QFX5220 Optical Interface Support | 121
- Cable Specifications for QSFP+, QSFP28, and QSFP-DD Transceivers | 122
- Understand QFX Series Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion | 124
- Calculate Power Budget and Power Margin for Fiber-Optic Cables | 126

Determining QFX5220 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 QFX5220 is located at https://apps.juniper.net/hct/product/#prd=QFX5220.

CAUTION: The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party optical modules or cables. Your JTAC engineer will likely request that you check the third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

NOTE: For interoperability with other QFX Series switches, ensure autonegotiation on the QFX5220 is disabled.

Cable Specifications for QSFP+, QSFP28, and QSFP-DD Transceivers

The 40-GbE QSFP+, 100-GbE QSFP28, 400GbE (QDD-400G-DR4 and QDD-400G-SR4P2), and 800GbE transceivers that are used in QFX Series switches use 12-ribbon multimode fiber crossover cables with socket MPO-12 (UPC/APC) 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 122 describes the signals on each fiber. Table 35 on page 123 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

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

Fiber	Signal
6	Unused
7	Unused
8	Unused
9	Rx3 (Receive)
10	Rx2 (Receive)
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

Table 35: QSFP+ MPO Fiber-Optic Crossover Cable Pinouts *(Continued)*

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

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

IN THIS SECTION

- Signal Loss in Multimode and Single-Mode Fiber-Optic Cables | **124**
- Attenuation and Dispersion in Fiber-Optic Cable | **125**

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.

Calculate Power Budget and Power Margin for Fiber-Optic Cables

IN THIS SECTION

- Calculate Power Budget for Fiber-Optic Cables | 126
- How to Calculate Power Margin for Fiber-Optic Cables | 126

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 page 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:

Calculate Power Budget for Fiber-Optic Cables

To ensure that fiber-optic connections have sufficient power for correct operation, you need to calculate the link's power budget (P_B), 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 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 Cables

After calculating a link's P_B, you can calculate the power margin (P_M), which represents the amount of power available after subtracting attenuation or link loss (LL) from the 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 127 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
Faulty 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 P_B of 13 dB uses the estimated values from Table 36 on page 127. This example calculates 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 P_M is calculated as follows:

$P_M = P_B - LL$

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

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

$P_M = 7 \text{ dB}$

The following sample calculation for an 8-km-long single-mode link with a P_B of 13 dB uses the estimated values from Table 36 on page 127. This example calculates 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 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 the examples, the calculated P_M is greater than zero, indicating that the link has sufficient power for transmission and does not exceed the maximum receiver input power.

RELATED DOCUMENTATION

Maintaining Transceivers and Fiber Optic Cables on a QFX5220 | 223

QFX5220 Management Cable Specifications and Pinouts

IN THIS SECTION

- Cable Specifications for Console and Management Connections for the QFX Series | 129
- RJ-45 Management Port Connector Pinout Information | 130
- Console Port Connector Pinouts for the QFX Series | 130
- QSFP-DD Port Connector Pinout Information | 132
- QSFP+, QSFP28, and QSFP56 Port Connector Pinout Information | 137
- SFP, SFP+, and SFP28 Port Connector Pinout Information | 140
- USB Port Specifications for the QFX Series | 141

Cable Specifications for Console and Management Connections for the QFX Series

Table 37 on page 129 lists the specifications for the cables that connect the QFX Series switch to a management device.

NOTE: The QFX Series switches have small form-factor pluggable (SFP) management ports that support 1000BASE-SX transceivers. QFX switches come with a RJ-45 management port, and support 10-Gbps speed. See the Hardware Compatibility Tool for more information about 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	Maximum Length	Device Receptacle
Console port	RS-232 (EIA-232) serial cable	7 ft (2.13 m)	RJ-45
Management port	Category 5 cable or equivalent suitable for 1000BASE-T operation	328 ft (100 m)	RJ-45

NOTE: We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See, https://ftdichip.com/drivers/vcp-drivers/ to download the driver.

RJ-45 Management Port Connector Pinout Information

Table 38 on page 130 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. You can also use a RJ45 to USB 2.0 Type-A cable and a RJ45 to USB 2.0 Type-C cable.

Table 39 on page 131 provides the pinout information for the RJ-45 console connector.

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 an RJ-45 to DB-9 adapter and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

NOTE: We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See, https://ftdichip.com/drivers/vcp-drivers/ to download the driver.

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
7	DCD Input	Data carrier detect

QSFP-DD Port Connector Pinout Information

Table 40 on page 132 provides the pinout mapping for quad SFP double-density (QSFP-DD) port connectors.

Table 40: QSFP-DD Network Port Pinout Mapping

Pin	Symbol	Description
1	GND	Ground
2	TX2n	Transmitter inverted data input
3	TX2p	Transmitter non-inverted data input
4	GND	Ground
5	TX4n	Transmitter inverted data input
6	TX4p	Transmitter non-inverted data input
7	GND	Ground
8	ModSelL	Module select
9	ResetL	Module reset
10	VCC RX	+3.3 V power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground

Table 40: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
14	RX3p	Receiver non-inverted data output
15	RX3n	Receiver inverted data output
16	GND	Ground
17	RX1p	Receiver non-inverted data output
18	RX1n	Receiver inverted data output
19	GND	Ground
20	GND	Ground
21	RX2n	Receiver inverted data output
22	RX2p	Receiver non-inverted data output
23	GND	Ground
24	RX4n	Receiver inverted data output
25	RX4p	Receiver non-inverted data output
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt

Table 40: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
29	VCC TX	+3.3 V power supply transmitter
30	VCC1	+3.3 V power supply
31	LPMode	Low power mode
32	GND	Ground
33	TX3p	Transmitter non-inverted data input
34	TX3n	Transmitter inverted data input
35	GND	Ground
36	TX1p	Transmitter non-inverted data input
37	TX1n	Transmitter inverted data input
38	GND	Ground
39	GND	Ground
40	TX6n	Transmitter inverted data input
41	TX6p	Transmitter non-inverted data input
42	GND	Ground
43	TX8n	Transmitter inverted data input

Table 40: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
44	TX8p	Transmitter non-inverted data input
45	GND	Ground
46	TBD	Not used
47	TBD	Not used
48	VCC	+3.3 V power supply
49	TBD	Reserved
50	TBD	Reserved
51	GND	Ground
52	RX7p	Receiver non-inverted data output
53	RX7n	Receiver inverted data output
54	GND	Ground
55	RX5p	Receiver non-inverted data output
56	RX5n	Receiver inverted data output
57	GND	Ground
58	GND	Ground

Table 40: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
59	RX6n	Receiver inverted data output
60	RX6p	Receiver non-inverted data output
61	GND	Ground
62	RX8n	Receiver inverted data output
63	RX8p	Receiver non-inverted data output
64	GND	Ground
65	NC	No connect
66	TBD	Reserved
67	VCC	+3.3 V power supply
68	VCC	+3.3 V power supply
69	TBD	Reserved
70	GND	Ground
71	TX7p	Transmitter non-inverted data input
72	TX7n	Transmitter inverted data input
73	GND	Ground

Table 40: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
74	TX5p	Transmitter non-inverted data input
75	TX5n	Transmitter inverted data input
76	GND	Ground

QSFP+, QSFP28, and QSFP56 Port Connector Pinout Information

Table 41 on page 137 provides the pinout mapping for the quad small-form factor pluggable (QSFP) connectors QSFP+, QSFP28, and QSFP56.

Table 41: QSFP+, QSFP28, and QSFP56 Port Connector Pinout Mappng

Pin	Symbol	Description
1	GND	Ground
2	TX2n	Transmitter inverted data input
3	TX2p	Transmitter non-inverted data input
4	GND	Ground
5	TX4n	Transmitter inverted data input
6	TX4p	Transmitter non-inverted data input
7	GND	Ground

Table 41: QSFP+, QSFP28, and QSFP56 Port Connector Pinout Mappng *(Continued)*

Pin	Symbol	Description
8	ModSelL	Module select
9	LPMode_Reset	Low power mode reset
10	VccRx	+3.3 V power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground
14	RX3p	Receiver non-inverted data output
15	RX3n	Receiver inverted data output
16	GND	Ground
17	RX1p	Receiver non-inverted data output
18	RX1n	Receiver inverted data output
19	GND	Ground
20	GND	Ground
21	RX2n	Receiver inverted data output
22	RX2p	Receiver non-inverted data output

Table 41: QSFP+, QSFP28, and QSFP56 Port Connector Pinout Mappng *(Continued)*

Pin	Symbol	Description
23	GND	Ground
24	RX4n	Receiver inverted data output
25	RX4p	Receiver non-inverted data output
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	VccTx	+3.3 V power supply transmitter
30	Vcc1	+3.3 V power supply
31	TBD	Reserved
32	GND	Ground
33	TX3p	Transmitter non-inverted data input
34	TX3n	Transmitter inverted data input
35	GND	Ground
36	TX1p	Transmitter non-inverted data input
37	TX1n	Transmitter inverted data input

Table 41: QSFP+, QSFP28, and QSFP56 Port Connector Pinout Mappng *(Continued)*

Pin	Symbol	Description
38	GND	Ground

SFP, SFP+, and SFP28 Port Connector Pinout Information

Table 42 on page 140 provides the pinout mapping for small-form factor pluggable (SFP) connectors, SFP+ connectors, and SFP28 connectors.

Table 42: SFP, SFP+, and SFP28 Port Connector Pinout Mapping

Pin	Symbol	Description
1	VeeT	Transmitter ground
2	TX_Fault	Transmitter fault indication
3	TX_Disable	Optical output disabled when high
4	SDA	2-wire serial interface data (MOD-DEF2)
5	SCA	2-wire serial interface data (MOD-DEF1)
6	MOD_ABS	Module absent
7	RS0	Receiver rate select
8	RX_LOS	Receiver loss of signal indication
9	RS1	Transmitter rate select

Table 42: SFP, SFP+, and SFP28 Port Connector Pinout Mapping *(Continued)*

Pin	Symbol	Description
10	VeeR	Receiver ground
11	VeeR	Receiver ground
12	RD-	Receiver inverted DATA out
13	RD+	Receiver non-inverted DATA out
14	VeeR	Receiver ground
15	VccR	Receiver power supply
16	VccT	Transmitter power supply
17	VeeT	Transmitter ground
18	TD+	Transmitter non-inverted DATA in
19	TD-	Transmitter inverted DATA in
20	VeeT	Transmitter ground

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 QFX Series devices:

- 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 QFX5220 to External Devices | 182

CHAPTER 4

Initial Installation and Configuration

IN THIS CHAPTER

- QFX5220 Installation Overview | **144**
- Unpacking and Mounting the QFX5220 | **145**
- How to Install a ORv3-Compliant Switch with Tray Assembly (2OU) in Your ORv3 Rack | **173**
- Connecting the QFX5220 to External Devices | **182**
- Connecting the QFX5220 to Power | **189**
- Register Products—Mandatory to Validate SLAs | **208**
- Performing the Initial Software Configuration for QFX5220 Switches | **208**

QFX5220 Installation Overview

IN THIS SECTION

- Overview of Installing the QFX5220 | 144
- QFX5220 Installation Safety Guidelines | 145

Overview of Installing the QFX5220

You can mount a QFX5220:

- Flush with the front of a 19-in. four-post rack. Use the standard mounting brackets provided with the switch for this configuration.
- (QFX5200-32CD only) 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 allow room for cabling.

To install and connect a QFX5220:

1. Follow the instructions in "Unpacking a QFX5220 " on page 146.
2. Determine how the switch is to be mounted.

   Flush or recessed mounted in a rack or cabinet, see "Mount a QFX5220-32CD in a Rack or Cabinet by Using the QFX5220-32CD-4PRMK Rack Mount Kit " on page 150.
3. Follow the instructions in:

   a. "Ground the QFX5220-32CD and Connect Power" on page 185

   b. "Connecting the QFX5220 to Power" on page 189

   c. "Update Base Installation Data" on page 149
4. Follow the instructions in "Performing the Initial Software Configuration for QFX5220 Switches" on page 208.

QFX5220 Installation Safety Guidelines

The weight of a fully loaded QFX5220-32CD chassis is approximately 24.5 lb (11.11 kg) with power supplies and fans installed. The weight of a fully loaded QFX5220-128C is approximately 76 lbs (34 kg). Observe the following guidelines for lifting and moving a QFX5220:

> **CAUTION**: If you are installing the QFX5220 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 QFX5220, read the guidelines in "QFX5220 Site Preparation Checklist" on page 108 to verify that the intended site meets the specified power, environmental, and clearance requirements.
- Before lifting or moving the QFX5220, 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

QFX5220 Site Guidelines and Requirements | 110

Installation Instructions Warning | 265

General Safety Guidelines and Warnings | 260

Unpacking and Mounting the QFX5220

IN THIS SECTION

- Unpacking a QFX5220 | 146
- Update Base Installation Data | 149
- Before You Begin Rack Installation | 149
- Mount a QFX5220-32CD in a Rack or Cabinet by Using the QFX5220-32CD-4PRMK Rack Mount Kit | 150

- Mount a QFX5220-32CD in a Rack by Using the QFX5K-4PST-RMK-E Rack Mount Kit | **156**
- Mount a QFX5220-128C in a Four Post Rack by Using the QFX5220-4PRMK-4U Rack Mount Kit | **167**
- EMI Panel Installation on QFX5220-128C | **170**

Unpacking a QFX5220

The QFX5220 chassis is a rigid sheet-metal structure that houses the hardware components. A QFX5220 is shipped in a cardboard carton, secured with foam packing material.

CAUTION: The QFX5220 is maximally protected inside the shipping carton. Do not unpack the switch until you are ready to begin installation.

To unpack a QFX5220:

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. Pull out the packing material holding the switch in place.
5. Verify the contents against the inventory included in the box. Table 43 on page 146 lists the inventory of components supplied with a QFX5220-32CD and Table 44 on page 148 lists the inventory of components supplied with a QFX5220-128C.
6. Save the shipping carton and packing materials in case you need to move or ship the switch later.

Table 43: Inventory of Components Supplied with a QFX5220-32CD Device

Component	Quantity
Chassis	1
Fan modules	6, factory installed

Table 43: Inventory of Components Supplied with a QFX5220-32CD Device *(Continued)*

Component	Quantity
Power supplies • JPSU-1600W-1UACAFO for AC airflow out systems • JPSU-1600W-1UACAFI for AC airflow in systems	2, factory installed
Rack mount kit - QFX5K-4PST-RMK-E QFX5K-4PST-RMK-E rack mount kit consists of the following parts: • A pair of front and rear-mounting rails • A pair of mounting brackets • 16 flat-head M4 x 6mm Phillips screws • A pair of spacers Spare rack mount kits order numbers: • QFX5K-4PST-RMK-E • QFX5220-32CD-4PRMK	1
Rack mount assembly drawing	1
Power cords with plugs appropriate to your geographical location	2
Documentation roadmap card	1
Warranty	1

NOTE: We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device

package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See, https://ftdichip.com/drivers/vcp-drivers/ to download the driver.

Table 44: Inventory of Components Supplied with a QFX5220-128C Device

Component	Quantity
Chassis	1
Fan modules, QFX5220-128C-FANAO	6, factory installed
Power supplies. JPSU-1600W-AC-AFO	4, factory installed
Rack mount kit for QFX5220-128C • Mounting rails • Rear mounting blades • Flange • Flathead screws (Phillips, M4 x 6mm) • Flathead screws (Phillips, M4 x 8mm The order number for a spare rack mount kit is QFX5220-4PRMK-4U .	1 1. 2 2. 2 3. 2 4. 2 5. 6 6. 24
EMI front panel The order number for a spare EMI front panel is QFX5220-141-EMI-DR	1

Table 44: Inventory of Components Supplied with a QFX5220-128C Device *(Continued)*

Component	Quantity
C13 AC power cords with plugs appropriate to your geographical location (AC systems only)	2
Documentation roadmap card	1
Warranty	1

Update Base Installation Data

CAUTION: Update the installation base data if any addition or change to the installation base occurs or if the installation base is moved. Juniper Networks is not responsible for not meeting the hardware replacement SLA for products that do not have accurate installation base data.

Update your installation base at https://supportportal.juniper.net/s/CreateCase .

Before You Begin Rack Installation

Before you begin mounting a QFX5220 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 285.
2. Verify that the site meets the requirements described in "QFX5220 Site Preparation Checklist" on page 108.
3. Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
4. Read *Chassis and Component Lifting Guidelines*.
5. Remove the switch from the shipping carton (see "Unpacking a QFX5220 " on page 146).
6. In addition to the items in Table 43 on page 146 and Table 44 on page 148, ensure that you have the following parts and tools available that are not normally provided with the device to mount the switch in a rack:

- ESD grounding strap
- Appropriate screwdriver for the mounting screws
- Screws to attach the device to the rack
- Management host, such as a PC laptop, with a serial port
- Grounding lug, grounding wire, screws and washers
- Dust covers for unused ports

CAUTION: A QFX5220 requires two people for installation, one person to lift the device into place and another person to attach the device to the rack. If you are installing the QFX5220 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 device.

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

Mount a QFX5220-32CD in a Rack or Cabinet by Using the QFX5220-32CD-4PRMK Rack Mount Kit

IN THIS SECTION

- Mount the QFX5220-32CD in a Four-Post Rack Using the QFX5220-32CD-4PRMK Rack Mount Kit | **151**
- Four-Post Cabinet Installation for QFX5220-32CD | **153**

You can mount QFX5220-32CD switches only on a four-post 19-in. rack or cabinet using the rack mount kit provided with the switch. The rack mount kit can be adapted for either a four-post rack-only or a rack and cabinet installation. A four-post installation evenly supports the switch by all four corners.

For four-post rack or cabinet installations, the QFX5220-32CD-4PRMK mounting kits contains two front mounting rail assemblies and two rear mounting blades that match the front mounting rails. 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 front and rear rack rails must be spaced between 28 in. (71.1 cm) and 36 in. (91.4 cm) front to back.

This topic describes:

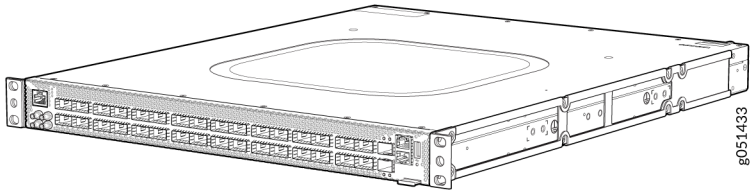
Mount the QFX5220-32CD in a Four-Post Rack Using the QFX5220-32CD-4PRMK Rack Mount Kit

To mount the QFX5220-32CD on a four-post rack using the provided QFX5220-32CD-4PRMK rack mount 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 device 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. If you receive a switch that has pre-attached mounting rails, you can skip Step 4, Step 5, and Step 6 . See Figure 45 on page 151

Figure 45: Pre-attached mounting rails on the QFX5220-32CD

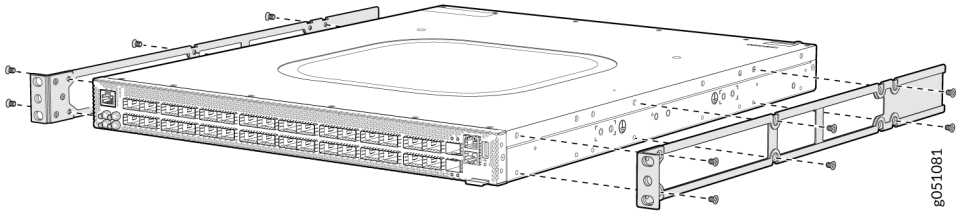
"



" on page 167

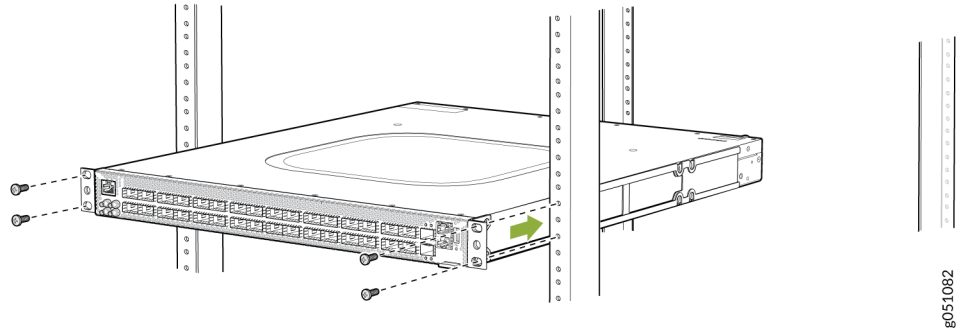
4. Align the holes in the mounting rail with the holes on the side of the chassis. See Figure 46 on page 152 to see the proper alignment for the QFX5220-32CD.

Figure 46: Attaching Mounting Rails to the QFX5220-32CD



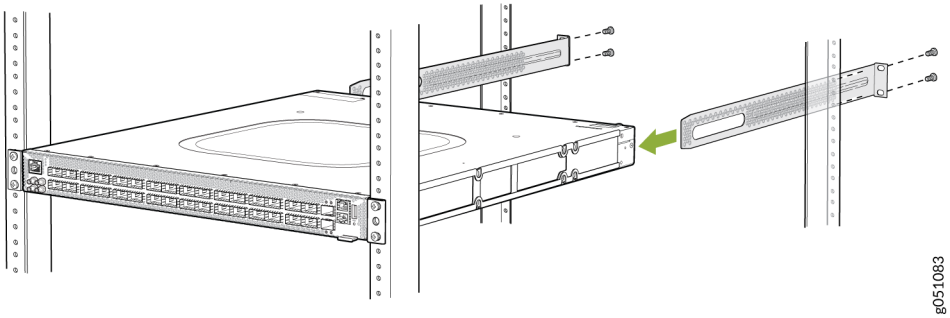
5. Attach the mounting rail to the switch using six mounting screws. Tighten the screws using a Phillips number 2 screwdriver.
6. Repeat Step 4 and Step 5 on the opposite side of the switch.
7. Have one person grasp both sides of the switch, lift it, and position it in the rack so that the front bracket is aligned with the rack holes.
8. 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 47 on page 152 for an example of connecting the mounting rails and blades to a QFX5220-32CD.

Figure 47: Attaching QFX5220-32CD to the Rack



9. 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 48 on page 153.

Figure 48: Sliding Mounting Blade into the Mounting Rail



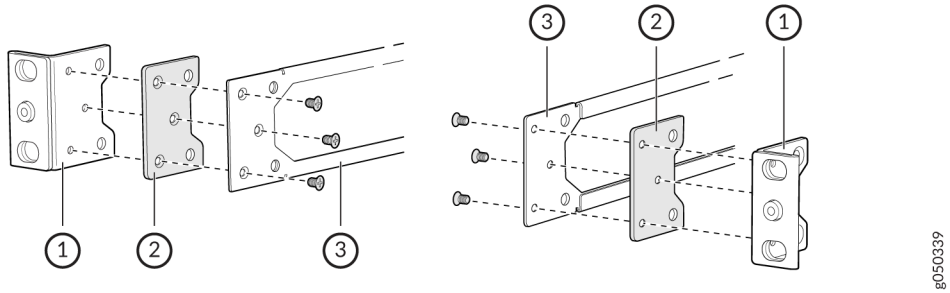
10. Ensure that the switch chassis is level by verifying that all the screws on the front of the rack are aligned with the screws at the back of the rack.
11. We recommend that you insert dust covers in any unused ports.

Four-Post Cabinet Installation for QFX5220-32CD

You can mount a QFX5220-32CD on four-post racks within a cabinet. For cabinet installations, you need to reconfigure the provided mounting rail. The mounting rail needs to be changed from a flush-mount to a set-back design to allow room in the cabinet for network cabling. Use the following procedure for a four-post cabinet installation:

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 device 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. Disassemble one of the front mounting rails by removing the three Phillips screws. See Figure 49 on page 153 for the rail assembly.

Figure 49: Disassembling the Front Mounting Rail

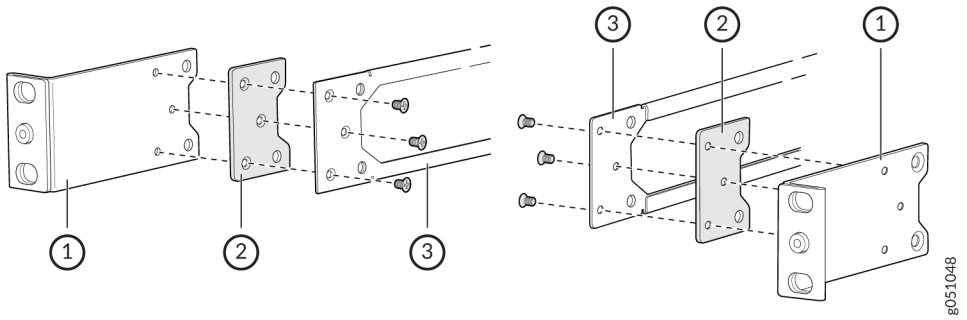


1– Front mounting bracket (you may discard for this procedure)	3– Mounting rail

2– Spacer	

4. Retain the spacer, the mounting rail, and the three flat-head Phillips machine screws for reuse in the extended mounting rail configuration,
5. Locate one of the two extension brackets provided in the rack mount kit.
6. Assemble the extended mounting rail by substituting the extension bracket for the front mounting bracket. See Figure 50 on page 154 for the order of the components.

Figure 50: Assembling the Extended Mounting Rail



1– Front extension bracket	3– Mounting rail
2– Spacer	

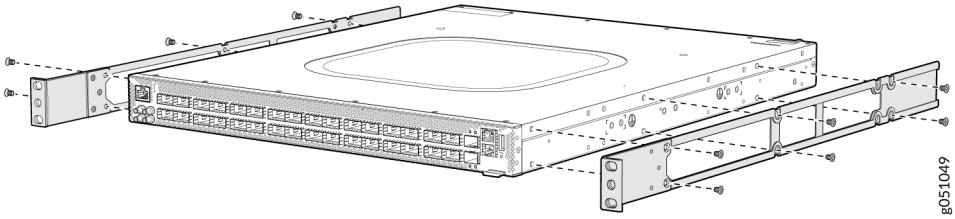
a. Align the holes in the mounting rail with the holes in the spacer and the extension bracket. The spacer is placed between the extension bracket and the mounting rail, with the mounting rail closest to the chassis,

b. Attach the extension bracket and spacer to the mounting rail using the flat-head Phillips machine screws from the original assembly. Tighten the screws using a Phillips number 2 screwdriver.

c. Repeat Step 3 through Step 6 to complete two extended mounting rails.

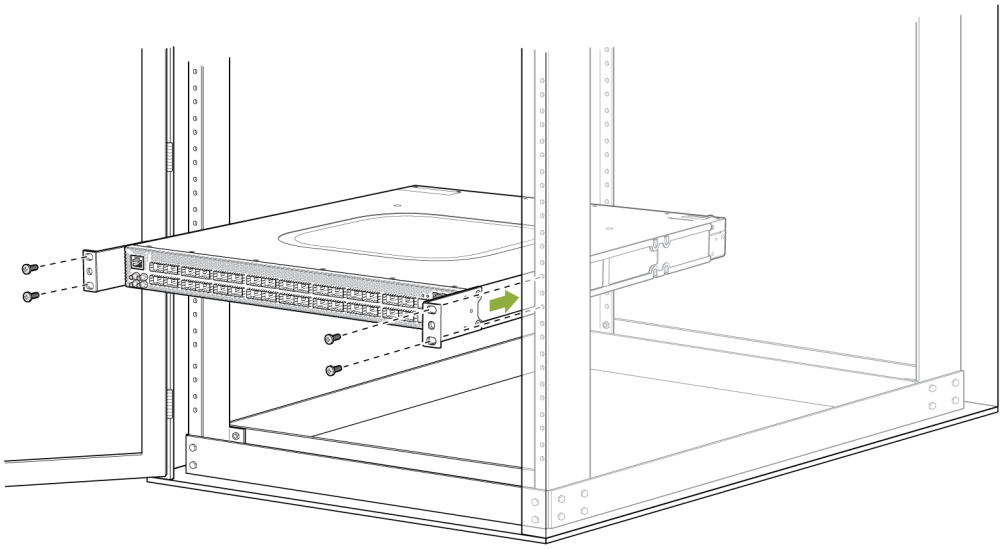
7. Align the holes in the extended mounting rail with the holes on the side of the chassis. See Figure 51 on page 155 to see the proper alignment for the QFX5220-32CD.

Figure 51: Attaching the Mounting Rails to the QFX5220-32CD



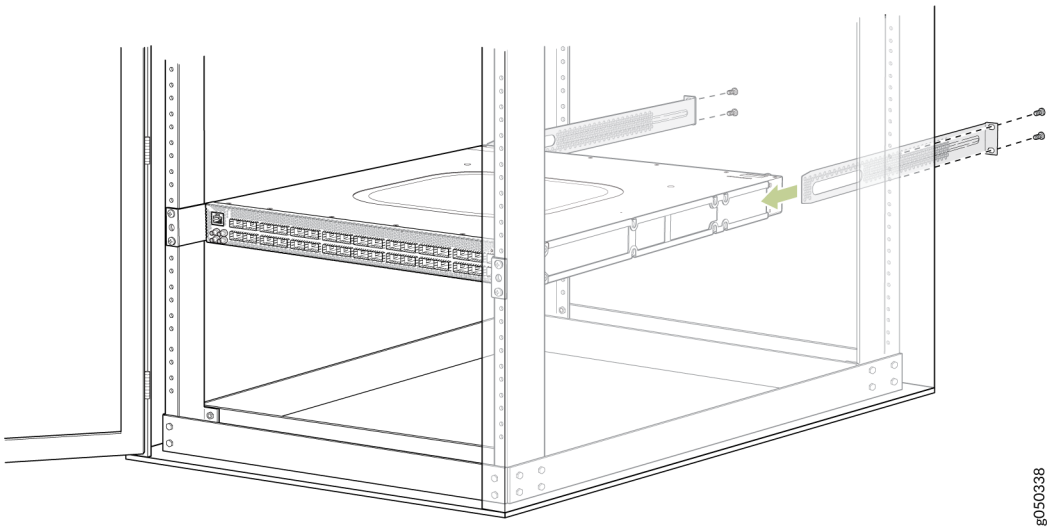
8. Attach the mounting rail to the switch using six of the M4 Flat-head mounting screws (provided). Tighten the screws using a Phillips number 2 screwdriver.
9. Repeat Step 7 and Step 8 on the opposite side of the switch.
10. Have one person grasp both sides of the switch, lift it, and position it in the rack so that the extension bracket is aligned with the rack holes.
11. 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 52 on page 155 for an example of attaching the switch and mounting assembly to the cabinet rack.

Figure 52: Attaching QFX5220-32CD to Cabinet Rack



12. Continue to support the switch while sliding the rear mounting-blades into the channel of the extended mounting-rails and securing the mounting 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 53 on page 156.

Figure 53: Sliding the Mounting Blade into the Extended Mounting Rail



13. 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.
14. We recommend that you insert dust covers in any unused ports.

Mount a QFX5220-32CD in a Rack by Using the QFX5K-4PST-RMK-E Rack Mount Kit

IN THIS SECTION

- Mount the Device by Using the QFX5K-4PST-RMK-E Rack Mount Kit On a Square Hole Rack | **157**
- Mount the Device by Using the QFX5K-4PST-RMK-E Rack Mount Kit On a Threaded Hole Rack | **161**

You can mount a QFX5220-32CD switch on a square hole or threaded hole four-post 19-in. racks using the partial tool less QFX5K-4PST-RMK-E rack mount kit which is available as a spare.

QFX5K-4PST-RMK-E rack mount kit consists of the following parts:

- A pair of front and rear mounting rails
- A pair of mounting brackets

- 16 flat head M4 x 6mm Phillips screws
- A pair of Spacers

A four-post installation evenly supports the device by all four corners.

Mount the Device by Using the QFX5K-4PST-RMK-E Rack Mount Kit On a Square Hole Rack

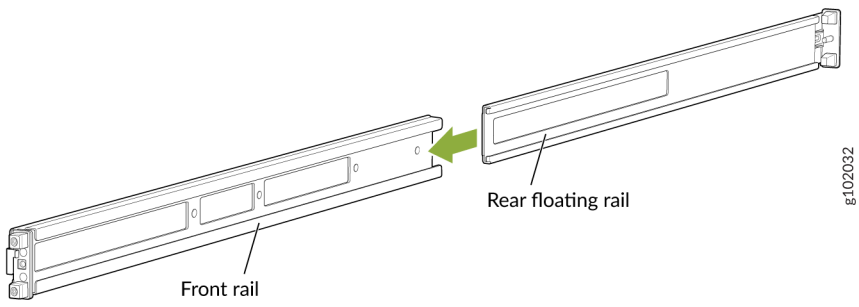
Ensure that you have the following tools and parts available:

- An ESD grounding strap—not provided.
- Number 2 Phillips (+) screwdriver—not provided
- A pair of front and rear mounting rails. These mounting rails attach to the front and rear rack posts—provided with the rack mount kit
- A pair of side mounting brackets and 16 flat head M4 x 6mm Phillips screws. These brackets attach to the device if not pre-installed—provided with the rack mount kit
- A pair of Spacers—provided with the rack mount kit

To mount the device on four posts in a rack by using the QFX5K-4PST-RMK-E rack mount kit:

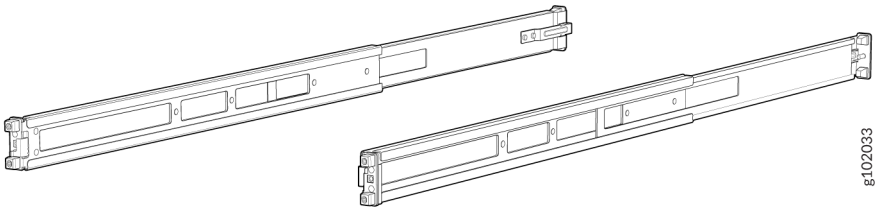
1. Wrap and fasten the ESD grounding strap to your bare wrist and an connect the other end of the strap to the ESD point on the device.
2. Assemble the mounting rails.
   a. Slide the rear floating rails into the front rails. See Figure 54 on page 157.

Figure 54: Assemble the Mounting Rails



   b. Mounting rails assembled. See Figure 55 on page 158.

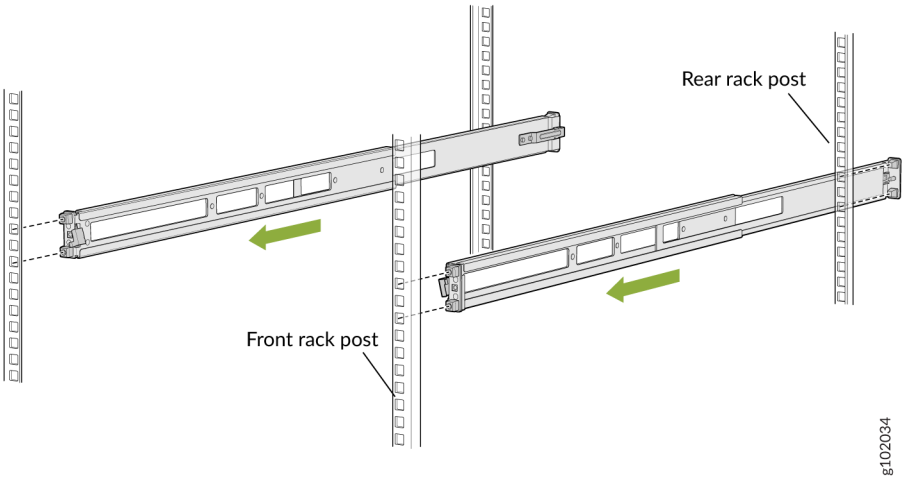
Figure 55: Front and Rear Rails Assembled



3. Attach the mounting rails to the rack.

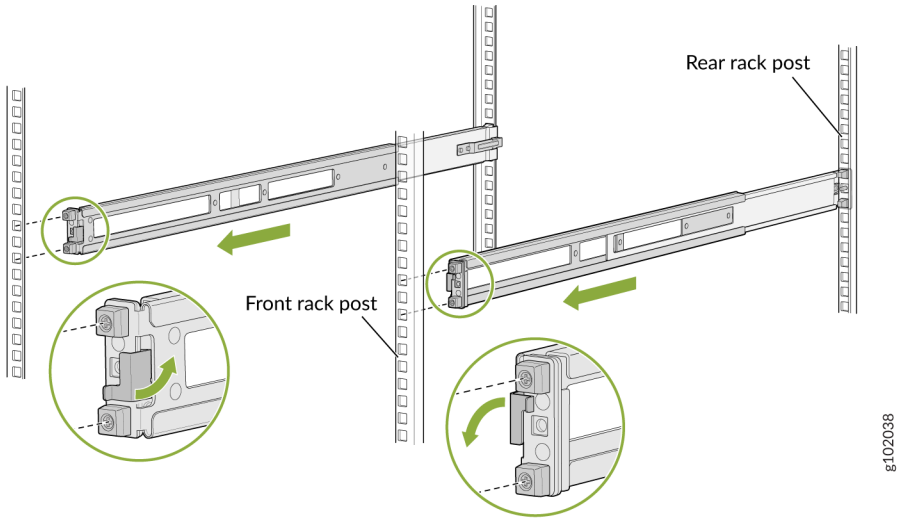
   a. Standing in front of the rack, align the guide blocks of the rear mounting rails with the rear-post holes. Pull the rear mounting rails toward the front of the rack to lock the rails in place. You will hear a click sound when the latch locks into the corresponding rack holes. See Figure 56 on page 158.

Figure 56: Install the Rear Floating Rails



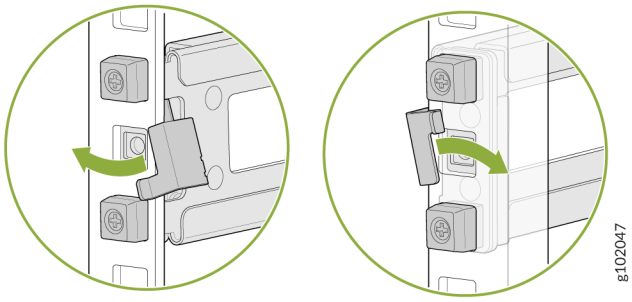
   b. Move the latch lock on the front mounting rail to open position, slide the front mounting rail, and insert the guide blocks into the front rack posts. See Figure 57 on page 159.

Figure 57: Install the Front Mounting Rails



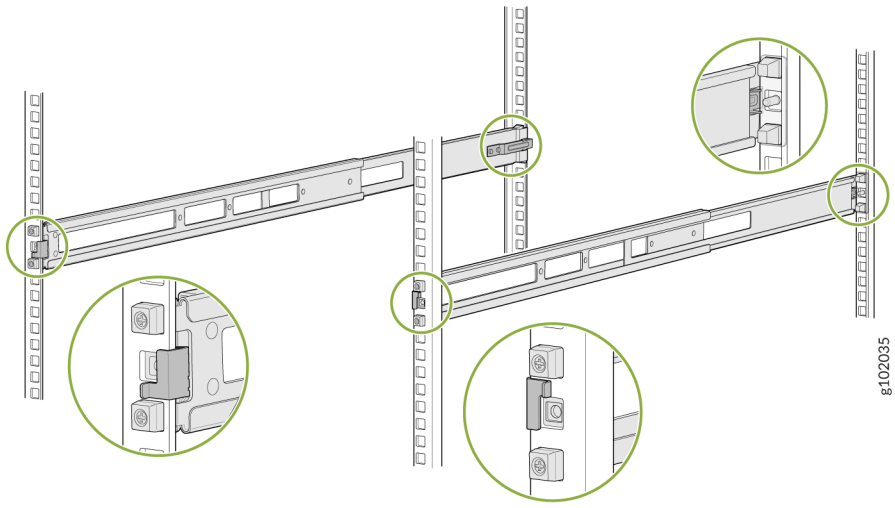
c. Push the lock latch to the locked position. See Figure 58 on page 159.

Figure 58: Front Mounting Rail's Lock Latch



d. Visually ensure that the front and rear latches are locked into place on the mountingrails. See Figure 59 on page 160.

Figure 59: Mounting Rails Installed and Locked

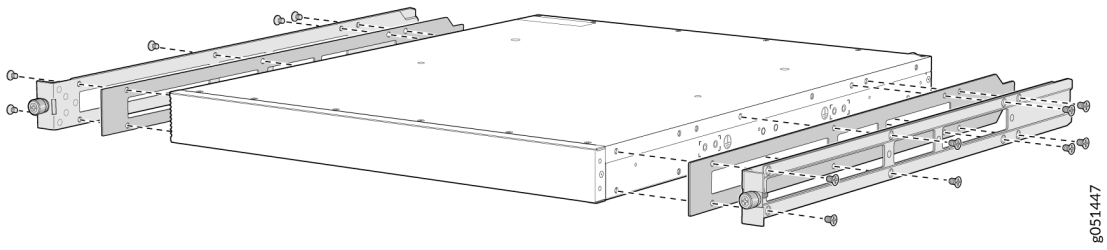


4. Attach the spacers and the mounting brackets to the device if not pre-installed. If your device already has the spacers and mounting brackets pre-installed than skip this step and move to the next step.

   a. Align the holes on the spacer and the mounting bracket with the screw holes that are on the side panel of the chassis.

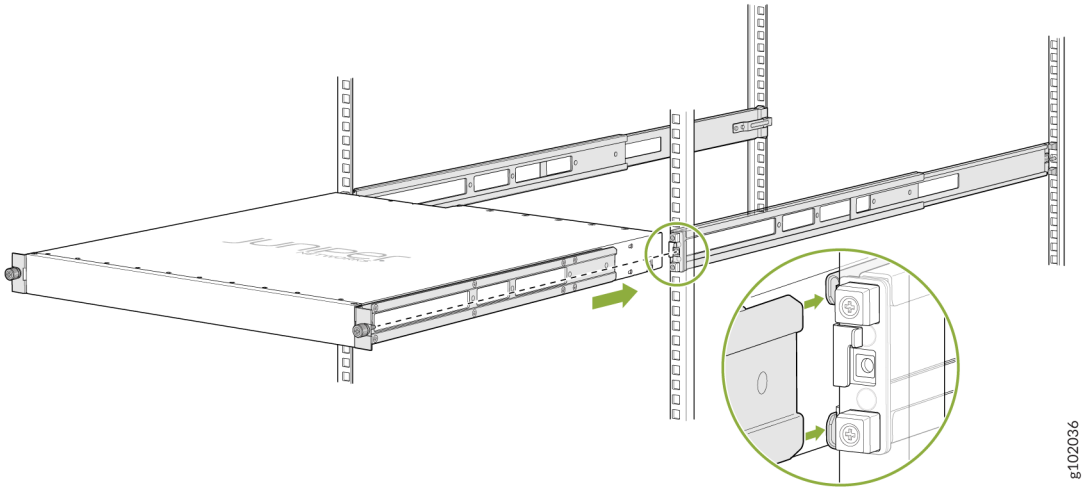
   b. Insert the flat head M4 x 6mm Phillips screws to attach the spacer and the mounting bracket into the aligned holes on the chassis (see Figure 60 on page 160). Tighten the screws.

Figure 60: Attach the Spacers and the Mounting Brackets to the Device



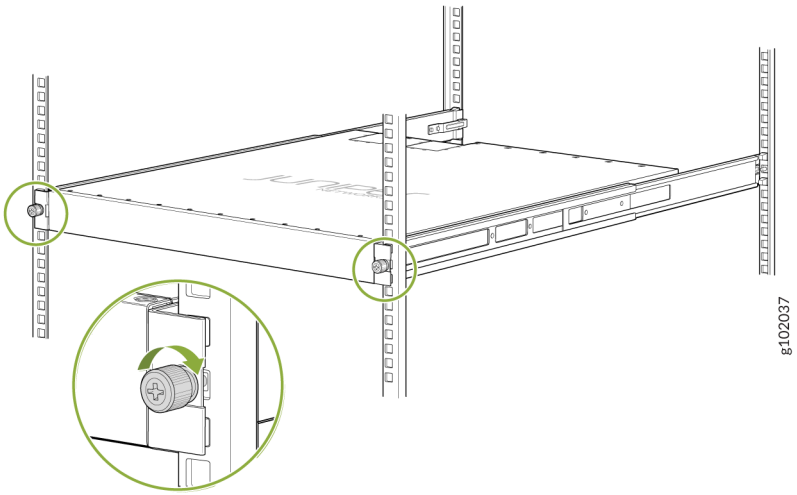
5. Position the device in such a manner that the **AIR OUT** labels on components are next to the hot aisle.
6. Lift the device and position it in the rack, aligning the side mounting brackets with the mounting rails. Slide the device into the channels of the rack mounting rails. See Figure 61 on page 161.

Figure 61: Slide the Device into the Rack



7. Tighten the two thumbscrews to secure the device. See Figure 62 on page 161.

Figure 62: Tighten Thumb Screws



Mount the Device by Using the QFX5K-4PST-RMK-E Rack Mount Kit On a Threaded Hole Rack

Ensure that you have the following tools and parts available:

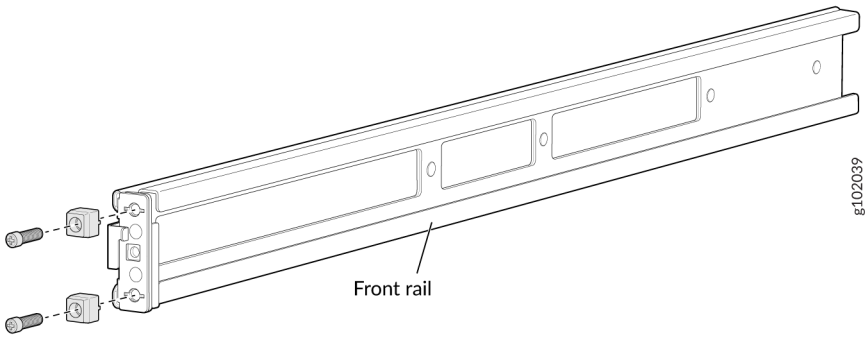
- An ESD grounding strap—not provided.
- Number 2 Phillips (+) screwdriver—not provided

- A pair of front and rear mounting rails. These mounting rails attach to the front and rear rack posts—provided with the rack mount kit
- A pair of side mounting brackets and 16 flat head M4 x 6mm Phillips screws. These brackets attach to the device if not pre-installed—provided with the rack mount kit
- A pair of Spacers—provided with the rack mount kit

To mount the device on a four-post rack with threaded holes:

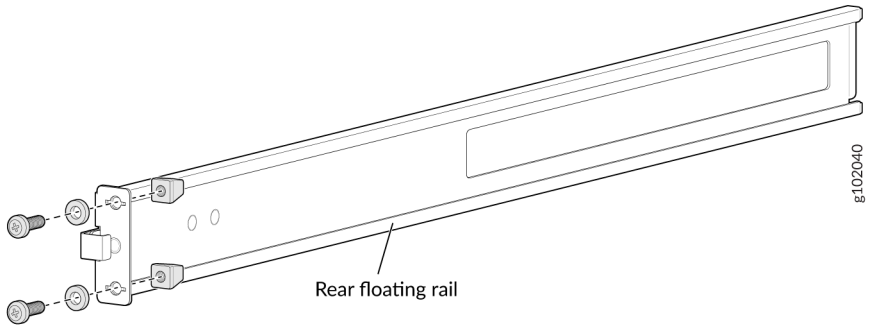
1. Wrap and fasten the ESD grounding strap to your bare wrist and connect the other end of the strap to the ESD point on the device.
2. Assemble the mounting rails.
   a. Remove the guide blocks from the front mounting rails by loosening the screws and preserve them for later use. See Figure 63 on page 162.

Figure 63: Remove Guide Blocks from Front Mounting Rail



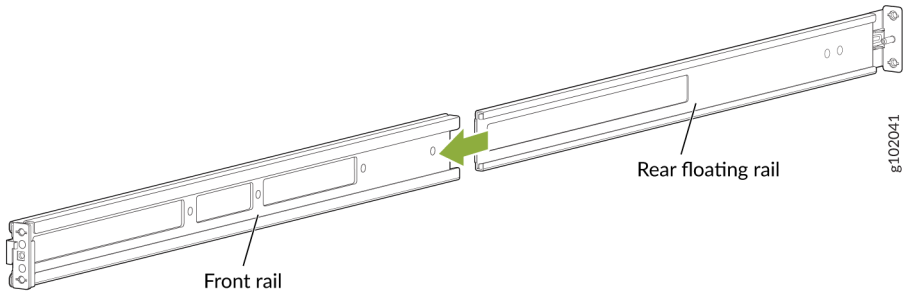
   b. Remove the guide blocks from the rear floating rails by loosening the screws and washers. Preserve the guide blocks, screws, and washers for later use. See Figure 64 on page 163

Figure 64: Remove Guide Blocks from Rear Floating Rail



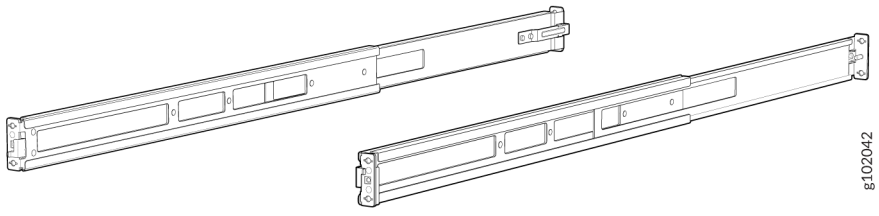
c. Slide the rear floating rails into the front mounting rails. See Figure 65 on page 163.

Figure 65: Slide Rear Floating Rail into Front Mounting Rail



d. Mounting rails assembled. See Figure 66 on page 163.

Figure 66: Front and Rear Rails Assembled

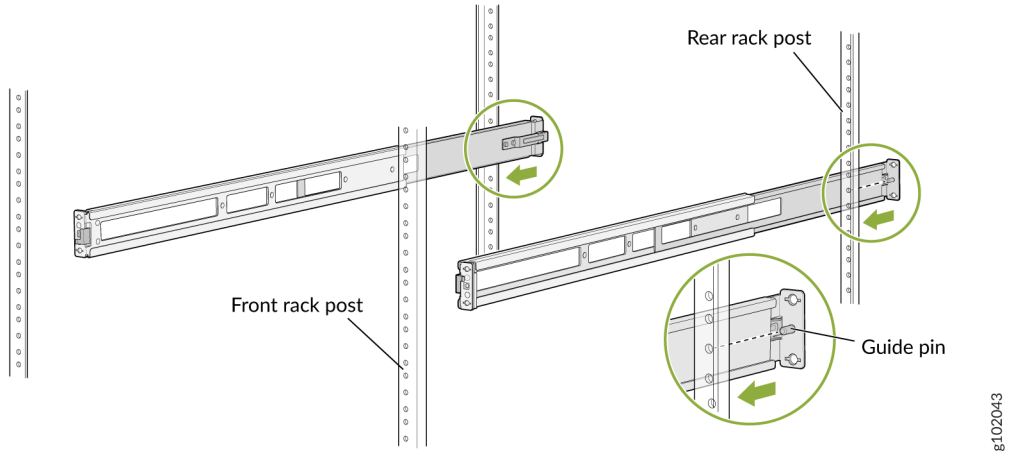


3. Attach the mounting rails to the threaded hole rack.

   a. Standing in front of the rack, align the guide blocks of the rear mounting rails with the rear-post holes. Pull the rear mounting rails toward the front of the rack to lock the rails in place. You will

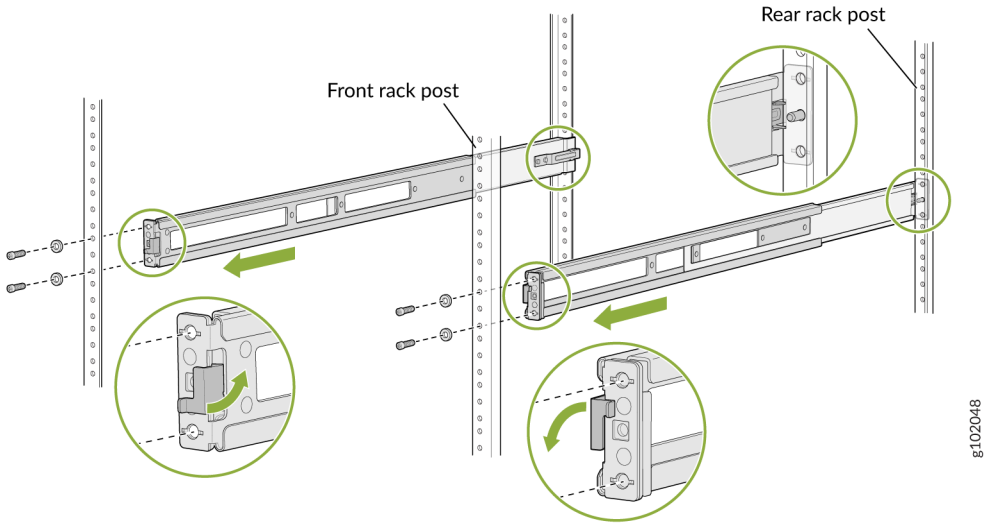
hear a click sound when the latch locks into the corresponding rack holes. See Figure 67 on page 164.

Figure 67: Install the Rear Floating Rails



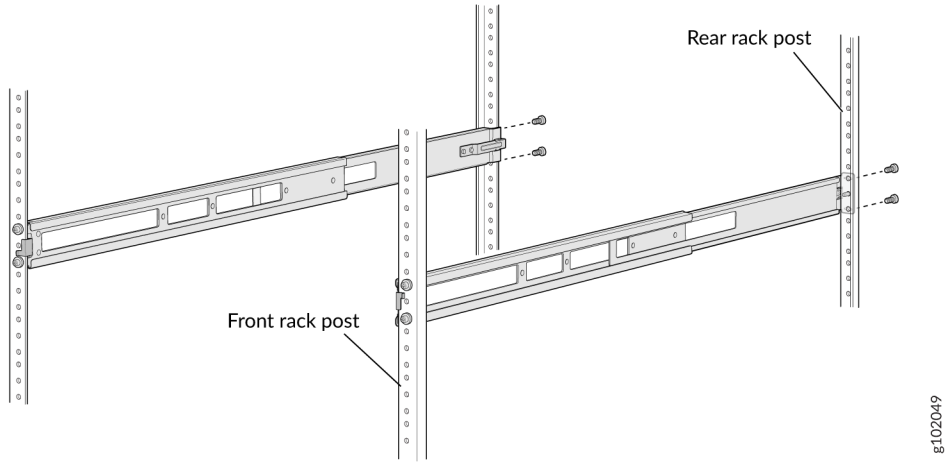
b. Move the latch lock on the front mounting rail to open position, slide the front mounting rail and position it to the front rack post. Push the lock latch to locked position and using the screws removed in step 2.a and the washers removed in step 2.b secure the front mounting rails to the front rack post. See Figure 68 on page 164.

Figure 68: Install the Front Mounting Rails



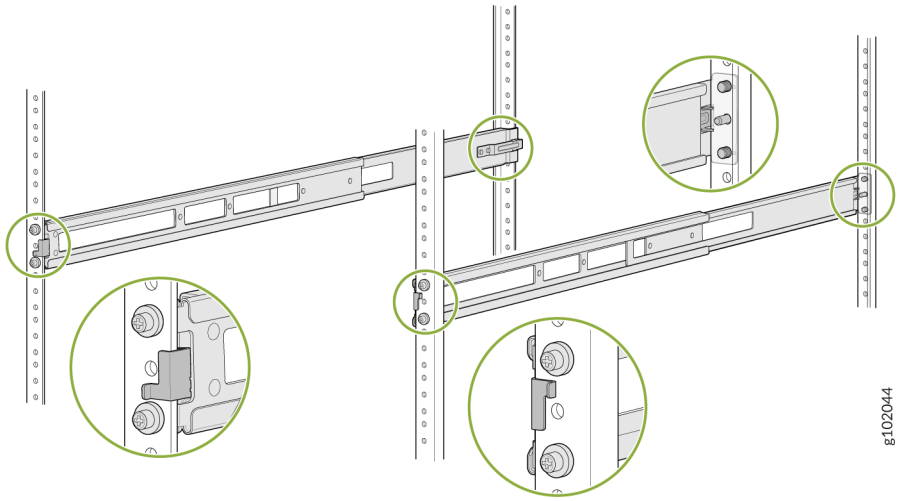
c. Secure the rear floating rail to the rear rack post by using screws (not provided) appropriate for your rack threaded size. See Figure 69 on page 165.

Figure 69: Secure the Rear Floating Rail



d. Visually ensure that the front and rear latches are locked into place on the mounting rails. See Figure 70 on page 165.

Figure 70: Mounting Rails Installed and Secured

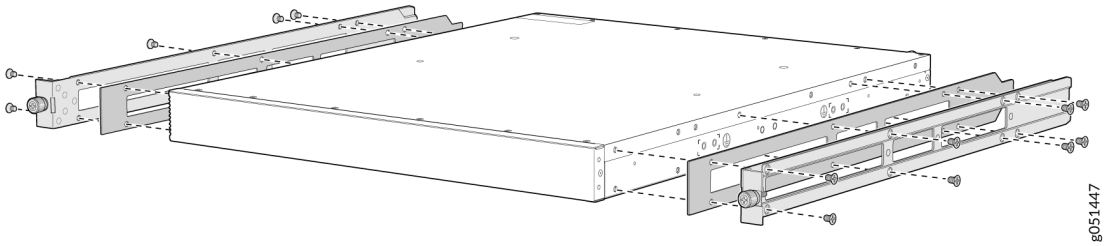


4. Attach the spacers and the mounting brackets to the device if not pre-installed. If your device already has the spacers and mounting brackets pre-installed than skip this step and move to the next step.

a. Align the holes on the spacer and the mounting bracket with the screw holes that are on the side panel of the chassis.

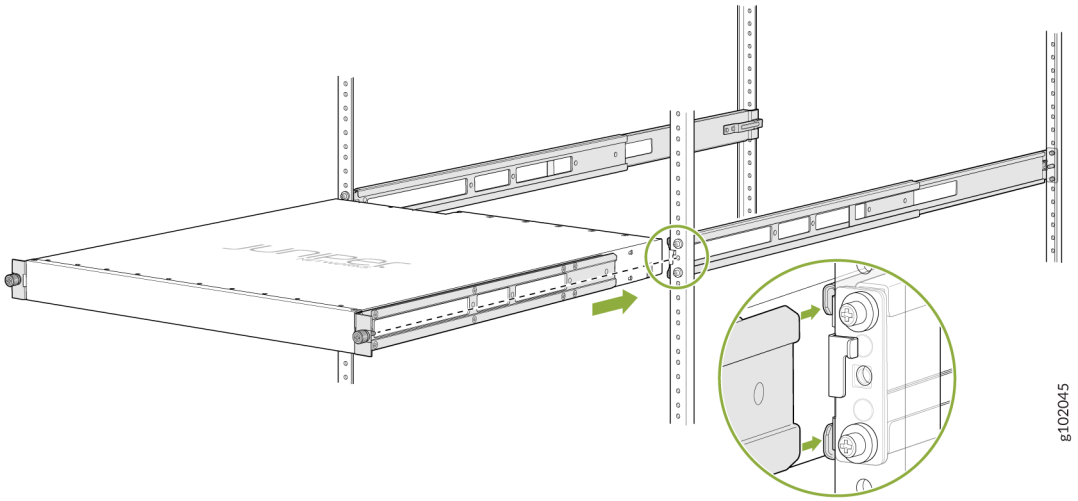
b. Insert the flat head M4 x 6mm Phillips screws to attach the spacer and the mounting bracket into the aligned holes on the chassis (see Figure 71 on page 166). Tighten the screws.

Figure 71: Attach the Spacers and the Mounting Brackets to the Device



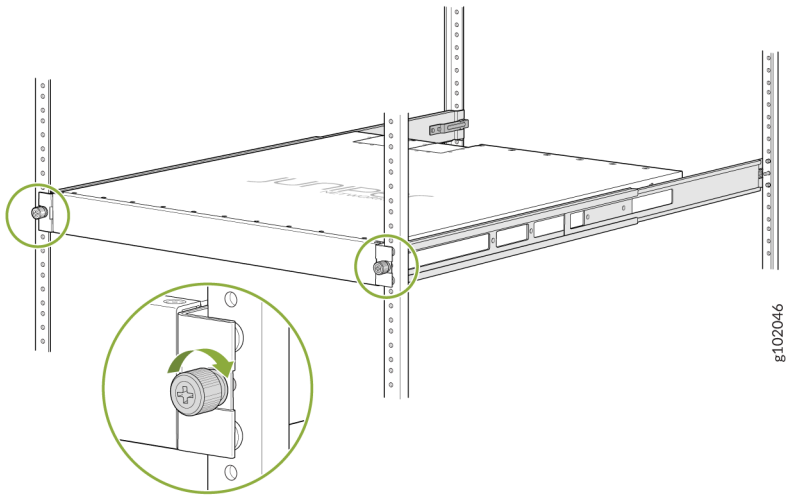
5. Position the device in such a manner that the **AIR OUT** labels on components are next to the hot aisle.
6. Lift the device and position it in the rack, aligning the side mounting brackets with the mounting rails. Slide the device into the channels of the rack mounting rails. See Figure 72 on page 166.

Figure 72: Slide the Device into the Rack



7. Tighten the two thumbscrews to secure the device. See Figure 73 on page 167.

Figure 73: Tighten the Thumb Screws



Mount a QFX5220-128C in a Four Post Rack by Using the QFX5220-4PRMK-4U Rack Mount Kit

You can mount QFX5220-128C switches only on a four-post 19-in. rack or cabinet using the rack mount kit provided with the switch. The rack mount kit can be adapted for either a four-post rack-only or a rack and cabinet installation. A four-post installation evenly supports the switch by all four corners.

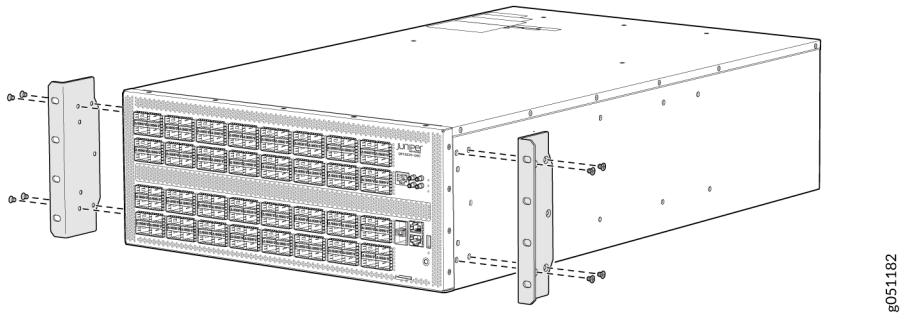
For four-post rack or cabinet installations, the QFX5220-141-EMI-DR mounting kits contains two front mounting rail assemblies and two rear mounting blades that match the front mounting rails. This configuration allows either end of the switch to be mounted flush with the rack and still be adjustable for racks with different depths.

The front and rear rack rails must be spaced between 28 in. (71.1 cm) and 36 in. (91.4 cm) front to back.

To mount the QFX5220-128C on a four-post rack using the provided rack mount 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 device 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 flange with the holes closest to the port panel. See Figure 74 on page 168.

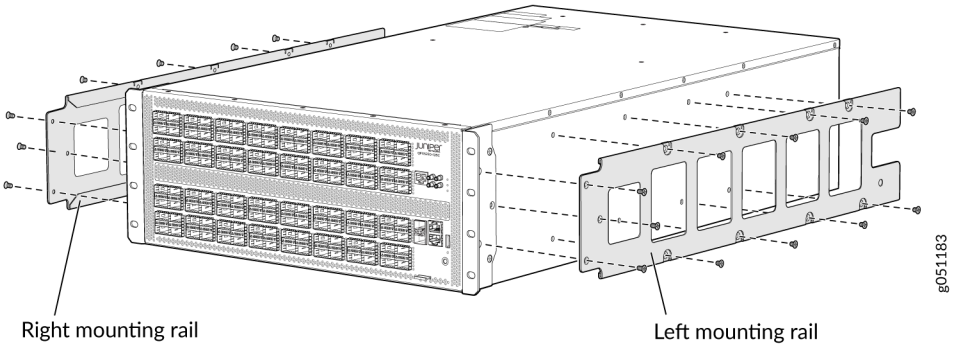
Figure 74: Attaching the Flange to the QFX5220-128C Chassis



4. Use the Phillips number 2 screwdriver to attach the flange to the chassis using two M4 x 6 mm flathead screws in the top and bottom holes. Tighten the screws.
5. Repeat Step 3 and Step 4 and attach the second flange to the opposite side of the chassis.
6. Align the holes in the left mounting rail with the holes on the side of the chassis and in the flange. See Figure 75 on page 168 to see the proper alignment for the QFX5220-128C.

> **NOTE**: There is a left mounting rail, stamped LEFT, and a right mounting rail, stamped RIGHT. The mounting rails are not interchangable.

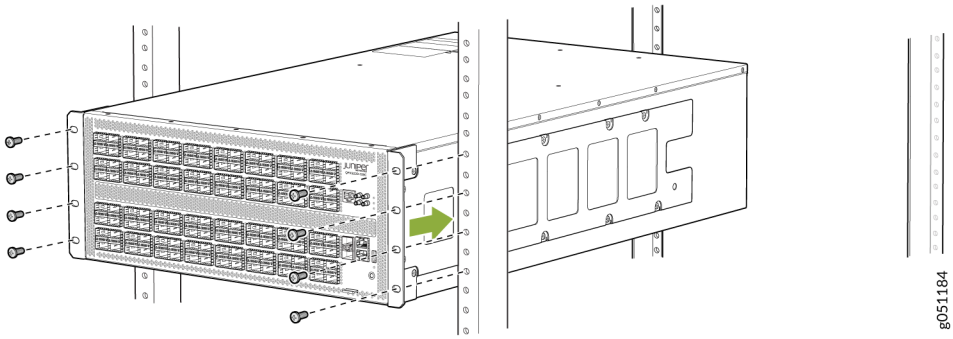
Figure 75: Attaching Mounting Rails to the QFX5220-128C Chassis



7. Use the Phillips number 2 screwdriver to attach the front of the mounting rail to the flange and chassis using three M4 x 8 mm flathead screws. These slightly longer screws are needed to attach the mounting bracket through the flange to the chassis. Tighten the screws.
8. Use eight of the shorter, M4 x 6 mm, flathead screws to complete the attachment of the mounting rail to chassis. Tighten the screws using the Phillips number 2 screwdriver.
9. Repeats Step 6 through Step 8 for the right mounting bracket on the opposite side of the switch.

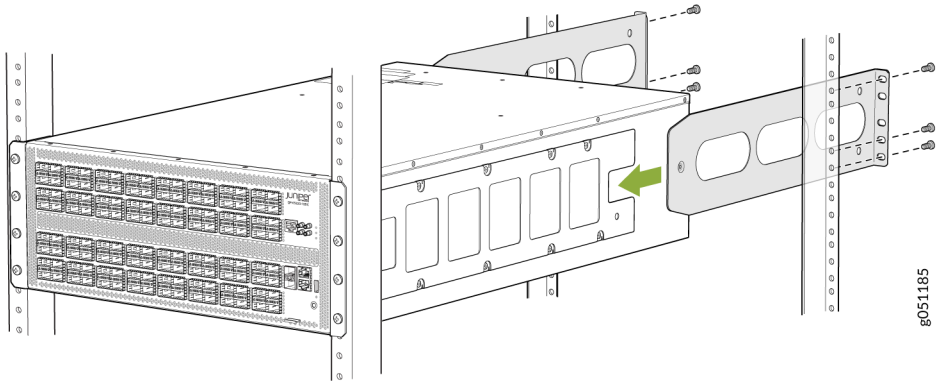
10. Use a mechanical lift or have one person grasp both sides of the switch, lift it, and position it in the rack so that the front bracket is aligned with the rack holes.
11. Have a second person secure the front of the switch to the rack using eight mounting screws (and cage nuts and washers if your rack requires them.) Tighten the screws. See Figure 76 on page 169 for an example of connecting the mounting rails and blades to a QFX5220-128C.

Figure 76: Attach QFX5220-128C to Rack



12. Continue to support the switch while sliding the two mounting blades into the two mounting rails. Secure the mounting blades to the rack using the eight remaining mounting screws (and cage nuts and washers if your rack requires them). Tighten the screws. See Figure 77 on page 169.

Figure 77: Slide Mounting Blade into Mounting Rail



13. 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.
14. We recommend that you insert dust covers in any unused ports.

EMI Panel Installation on QFX5220-128C

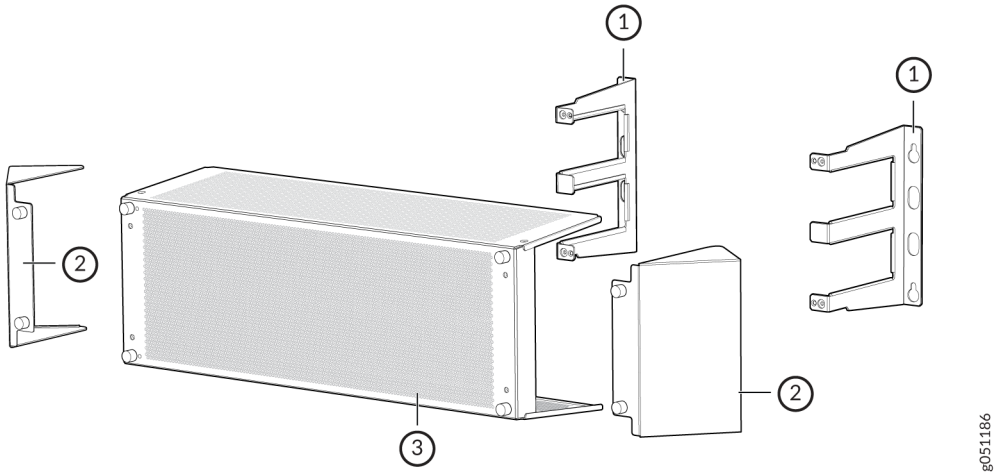
The QFX5220-128C has an EMI front panel to protect fiber optic cabling and to provide additional protection from electromagnetic interference (EMI). The five in. deepEMI panel connects directly to the rack and can be added before or after optics are installed.

NOTE: If your system uses many DACs, you might need a deeper EMI door. A 14 in. deep EMI panel is available as a spare. The extra deep EMI panel is QFX5220-141-EMI-DR.

Before you begin, see Figure 78 on page 171 and ensure you have the following tools and parts:

- A Phillips (+) screwdriver, number 2 (not provided)
- EMI panel (provided)
- Right mounting shelf (provided)
- Left mounting shelf (provided)
- Optional deflector (2 provided)

Figure 78: QFX5220-128C Components

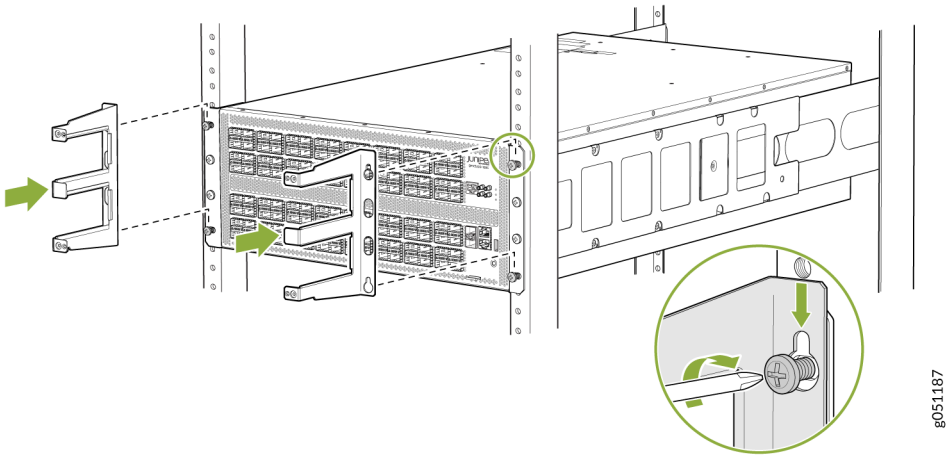


1– Right and left mounting shelf	3– EMI panel
2– Deflectors, to help contain EMI emissions coming from the front side openings	

Here's how to install the EMI front panel:

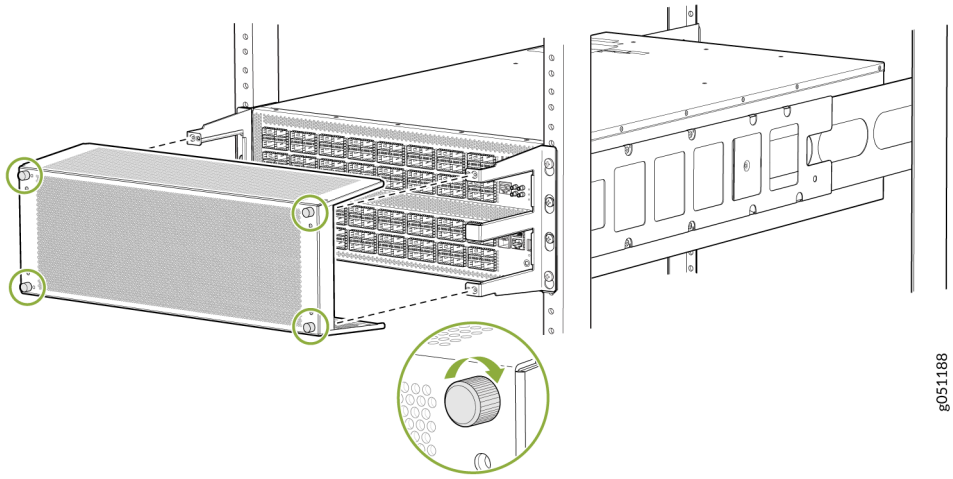
1. Use your Phillips number 2 screwdriver to loosen the front top and bottom rack mount screws on both sides of the switch. Leave the remaining rack mount screws in place.
2. Align the left mounting shelf over the rack mount screws for the left rail and slide the bracket underneath the loosen screws (see Figure 79 on page 171).

Figure 79: Install Mounting Shelves



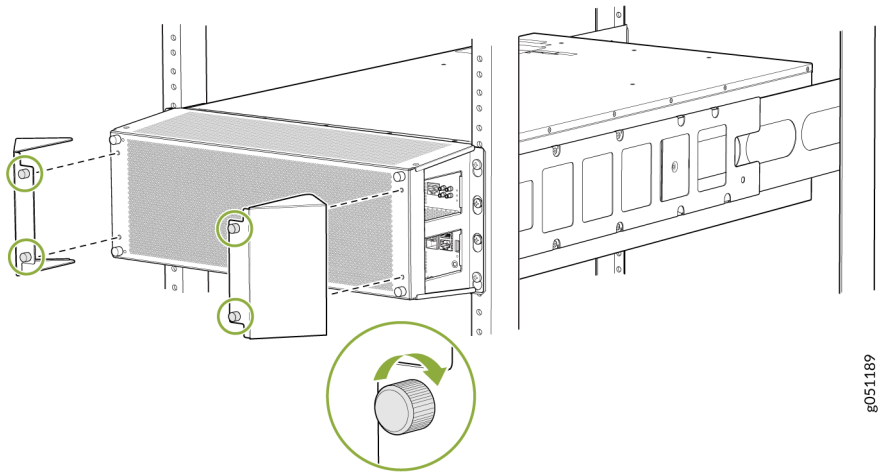
3. Tighten the top and bottom rack mount screws so that the mounting shelf is firmly attached to the rack. Repeat steps 2 and 3 for the right mounting shelf.
4. Slide the door over the mounting shelves and tighten the four captive screws using the Phillips screwdriver, see Figure 80 on page 172.

Figure 80: Install EMI Panel onto the Mounting Shelves



5. Align the two captive screws in one of the deflectors with the front holes on the EMI door. Tighten the screws with the Phillips screwdriver. Repeat on the other side. See Figure 81 on page 172.

Figure 81: Install Deflectors



RELATED DOCUMENTATION

Rack-Mounting and Cabinet-Mounting Warnings | 268

Connecting the QFX5220 to Power | 189

How to Install a ORv3-Compliant Switch with Tray Assembly (2OU) in Your ORv3 Rack

SUMMARY

Use the information in this topic to install the Open Rack V3-compliant switch with tray assembly in an ORv3 rack.

IN THIS SECTION

- Unpack the Switch-Tray Assembly | 173
- Parts Inventory (Packing List) | 174
- Install Switch-Tray Assembly in an ORv3 Rack | 175
- Uninstall the Switch-Tray Assembly from the ORv3 rack | 179
- Ground the Switch-Tray Assembly | 182

The Open Rack V3 (ORv3)-compliant switch with tray assembly (henceforth written as switch-tray assembly in this topic) features a switch that comes pre-assembled in the tray, making the installation process quick and straightforward.

WARNING: Use this ORv3-compliant tray only with the listed or certified Juniper product. Failure to comply might result in damage.

Unpack the Switch-Tray Assembly

We ship the switch-tray assembly in a cardboard carton, secured with foam packing material.

CAUTION: The switch-tray assembly has maximum protection inside the shipping carton. Do not unpack the switch until you are ready to begin installation.

To unpack the switch-tray assembly:

1. Move the shipping carton to a staging area as close to the installation site as possible. Make sure that 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 in it against the parts inventory on the label attached to the carton.
5. Pull out the packing material holding the assembly in place.
6. Verify the chassis components received against the packing list included with the switch-tray assembly.
7. Save the shipping carton and packing materials in case you need to move or ship the switch-tray assembly later.

Parts Inventory (Packing List)

The shipment includes a packing list. Check the parts you receive in the shipping carton against the items on the packing list. We ship the parts as per the configuration that you order.

If any part on the packing list is missing, contact your customer service representative or contact Juniper customer care from within the U.S. or Canada by telephone at 1-888-314-5822. For international-dial or direct-dial options in countries without toll-free numbers, see https://www.juniper.net/support/requesting-support.html.

- Parts List for QFX5220 Switch-Tray Assembly on page 174
- QFX5220 Switch-Tray Assembly: Components and Model Numbers on page 175
- Parts List for the Accessory Kit on page 175

Table 45: Parts List for QFX5220 Switch-Tray Assembly

Component	Quantity	Open Unit (OU)
Preassembled tray with switch (DC switch model)	1	2OU

Table 46: QFX5220 Switch-Tray Assembly: Components and Model Numbers

Component Type	Model Number
Preassembled tray with switch (DC switch model)	QFX522032CDDAFO-T2
DC PSU	JPSU-1600W1UDCAFO2
Fan	QFX5220-32CDFANAO2

Table 47: Parts List for the Accessory Kit

Component	Quantity
Warranty card	1
End User License Agreement (EULA)	1
Documentation roadmap card	1

Install Switch-Tray Assembly in an ORv3 Rack

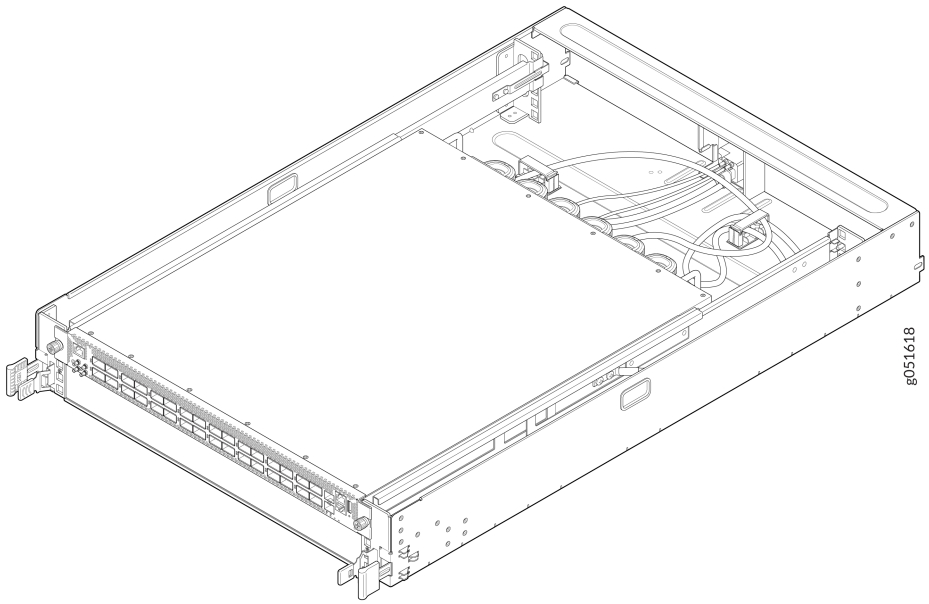
Before installing the switch-tray assembly in an ORv3 rack:

- Verify that the site meets the requirements described in the Site Preparation Checklist of the switch.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read General Safety Guidelines and Warnings, with particular attention to Chassis and Component Lifting Guidelines.

To install the switch-tray assembly in an ORv3 rack:

1. Remove the tray assembly from shipping carton.

Figure 82: Switch-Tray Assembly

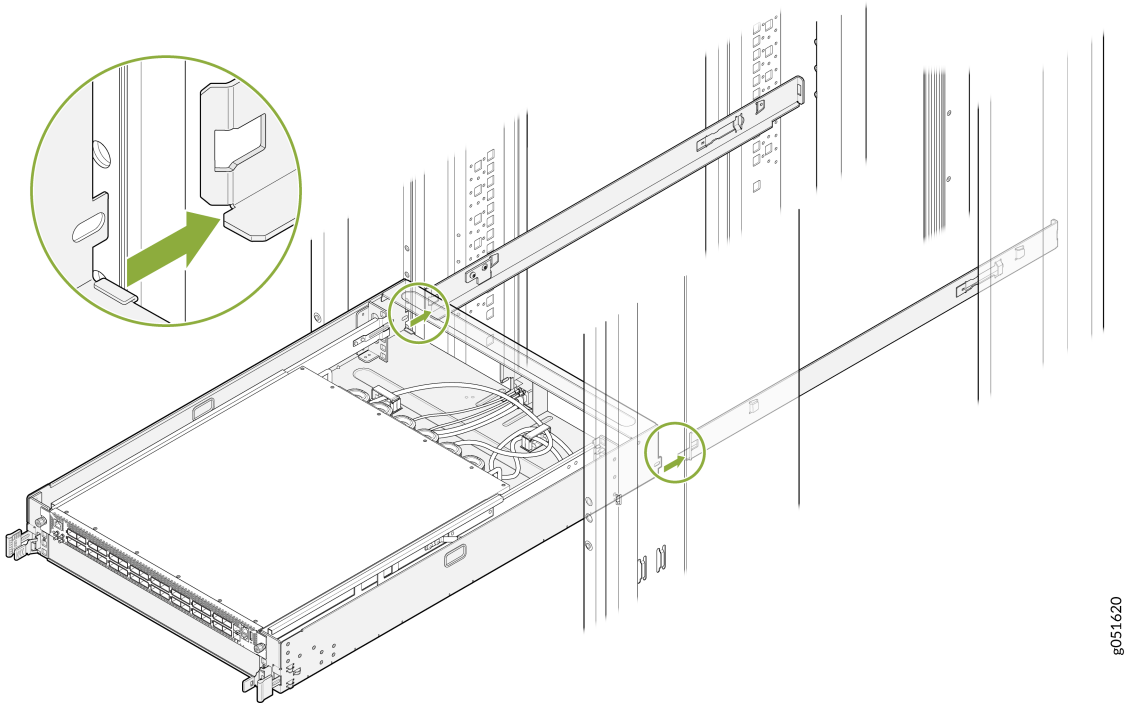


2. Place the switch-tray assembly on a flat, stable surface.
3. Align the rails and secure it in place on your ORv3 rack.

> **NOTE**: Rails are not provided with the switch-tray assembly.

4. Carefully align the switch-tray assembly with the rails in the rack.

Figure 83: Align the Switch-Tray Assembly with the rails



5. Slide the switch-tray assembly into the rack until the IT Gear Input Connector at the rear of the switch-tray assembly fully engages with the bus bar.

Figure 84: Slide the Switch-Tray Assembly into the Rack

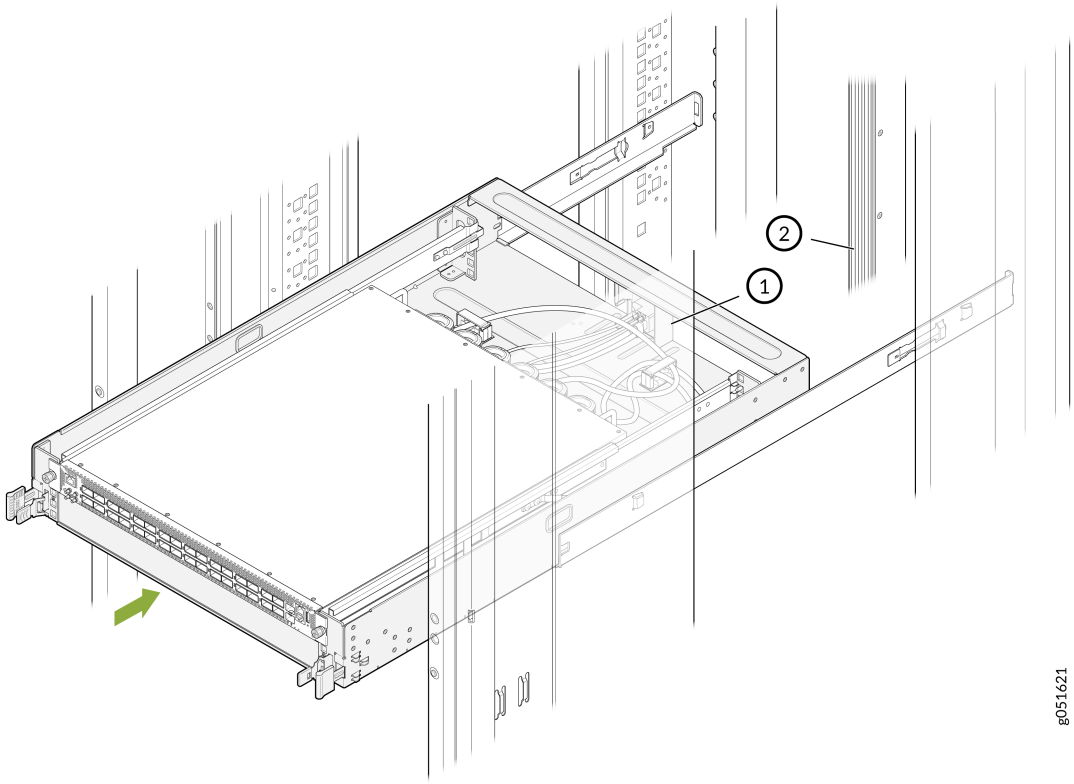


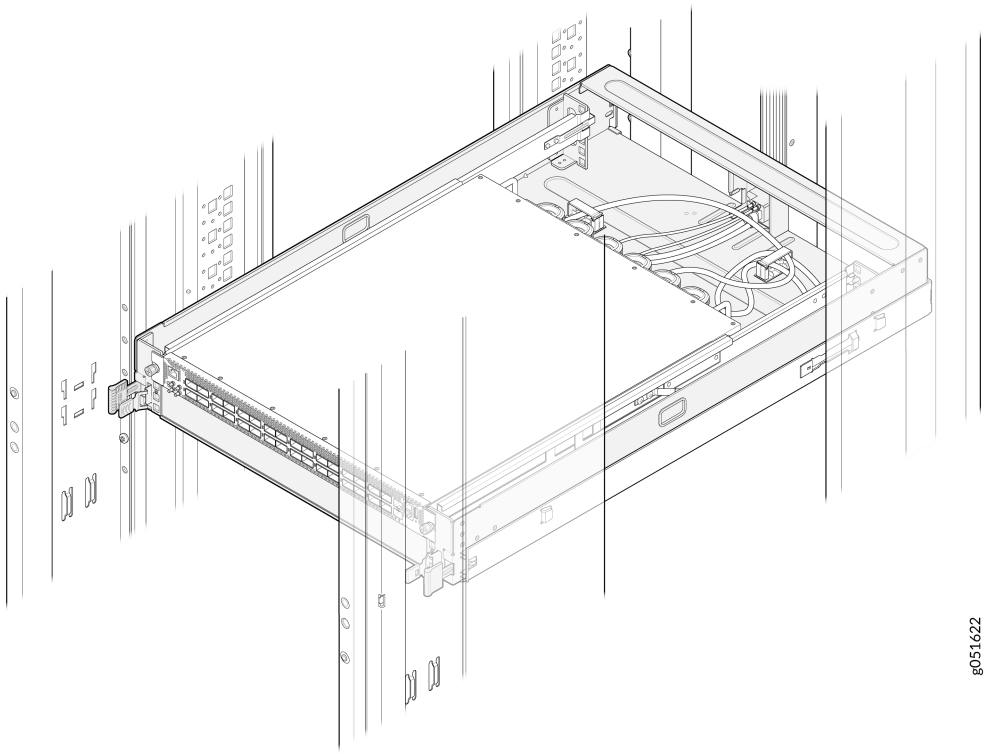
Table 48: Component Callouts

Callout	Description
1	IT Gear Input Connector
2	Bus bar

NOTE: The bus bar delivers power to the switch.

When the switch-tray assembly is fully inserted into the rack, the latch locking tabs engage with the rack's rail to secure the tray in place.

Figure 85: Fully Inserted Switch-Tray Assembly



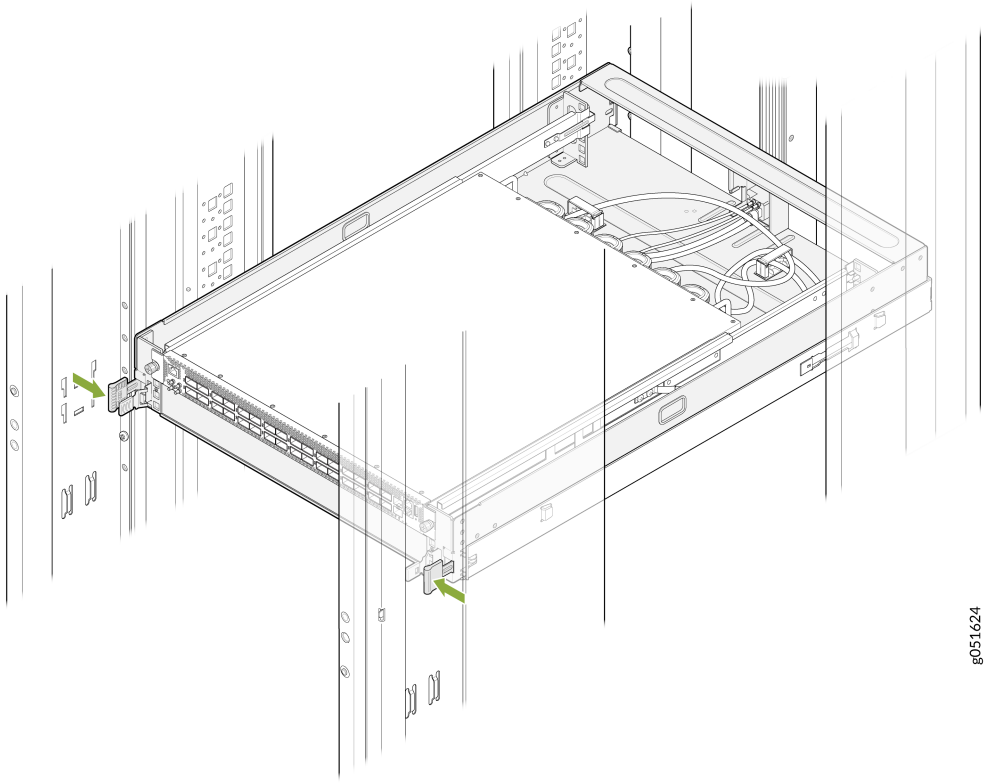
NOTE: For the switch-tray assembly installed in an ORv3 rack, you do not require an additional grounding or power configuration. The ORv3 rack infrastructure provides integrated power delivery and grounding. Ensure you install and ground the rack properly according to site standards.

Uninstall the Switch-Tray Assembly from the ORv3 rack

To uninstall the switch-tray assembly from the ORv3 rack:

1. Locate the latch locking tabs on both sides of the switch-tray assembly.

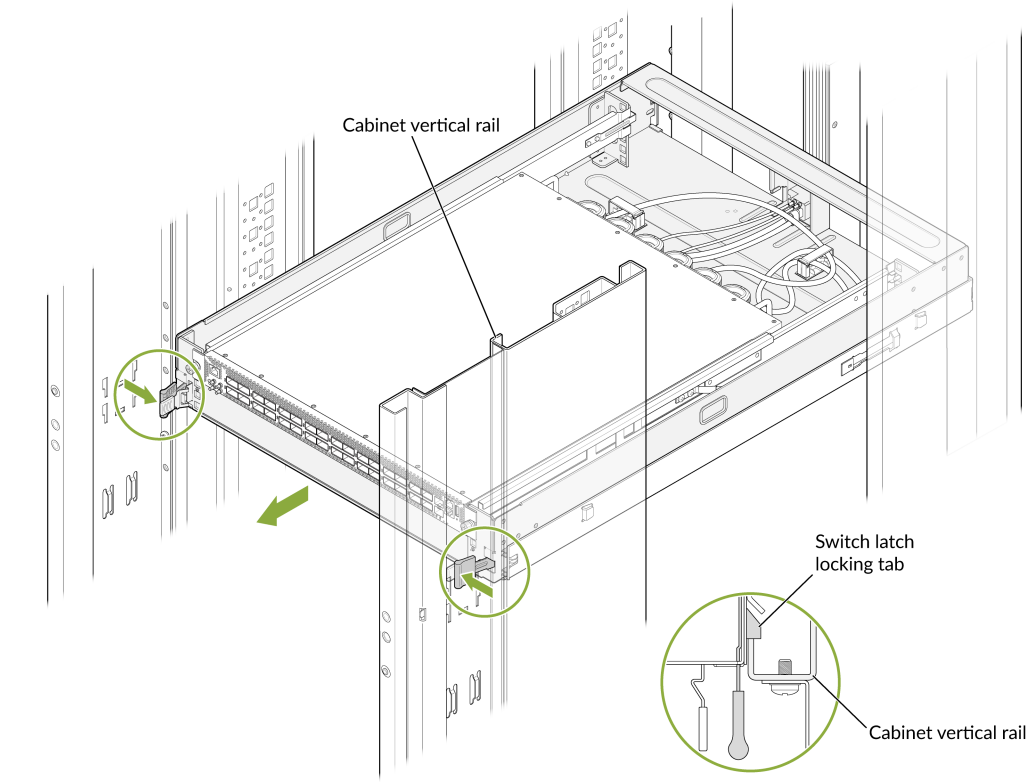
Figure 86: Locate the Latch Locking Tabs

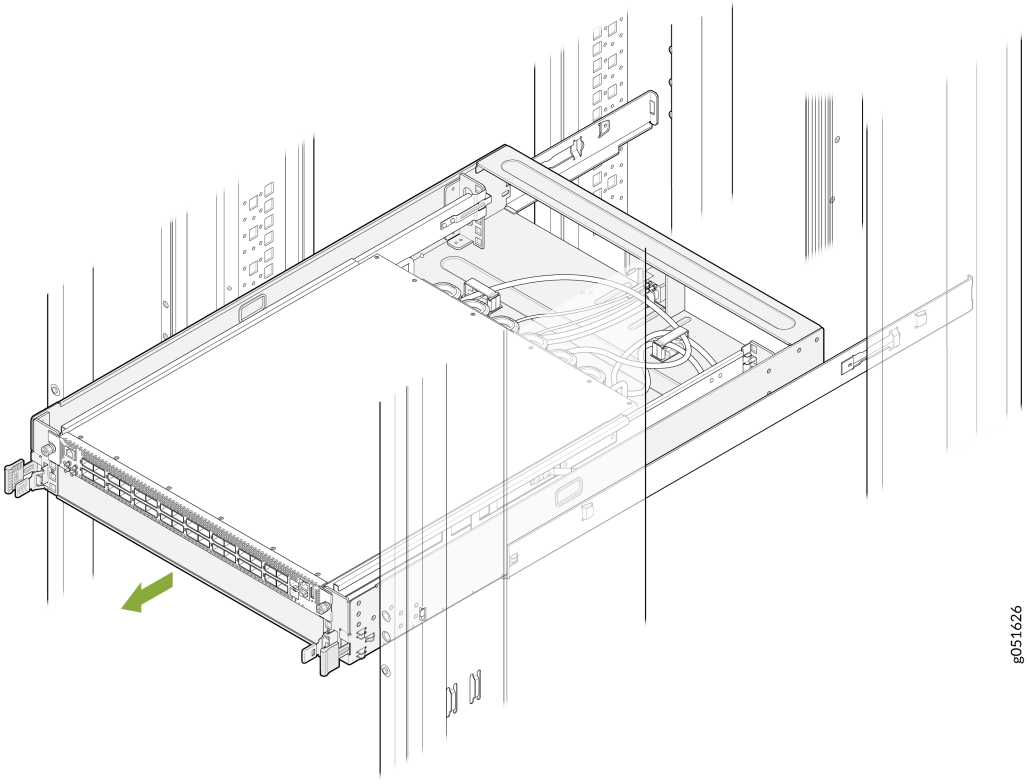


2. Push the latch locking tabs inward on both sides to release the switch-tray assembly from the rack post and gently slide the switch-tray assembly out of the ORv3 rack at same time.

> **NOTE**: Do not release the latch locking tabs before pulling the switch-tray assembly out. Both actions must be done simultaneously.

Figure 87: Slide the Switch-Tray Assembly Out





Ground the Switch-Tray Assembly

NOTE: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the ORv3 rack to the earth ground.

You don't need to make any external connections to ground the switch-tray assembly. The switch-tray assembly is connected to earth ground when you slide in the tray.

The switch-tray assembly gets earth ground protection by virtue of these features:

1. In the switch-tray assembly, the protective earthing terminal of the switch is connected to the tray using a grounding cable terminated with two–hole protective grounding lugs.
2. When the switch-tray assembly is completely inserted into the ORv3 rack, the ground contacts of the IT Gear Input Connector provide an electrically conductive path to the busbar and the rack frame.
3. The rack frame has dedicated grounding points typically located at the top of the rack. These grounding points help ground a loaded ORv3 rack.

NOTE: You do not need separate grounding for your switch-tray assembly. The ORv3 rack infrastructure includes built-in grounding. Ensure the rack grounding is implemented according to site requirements. You do not need to take additional action for the switch.

Connecting the QFX5220 to External Devices

IN THIS SECTION

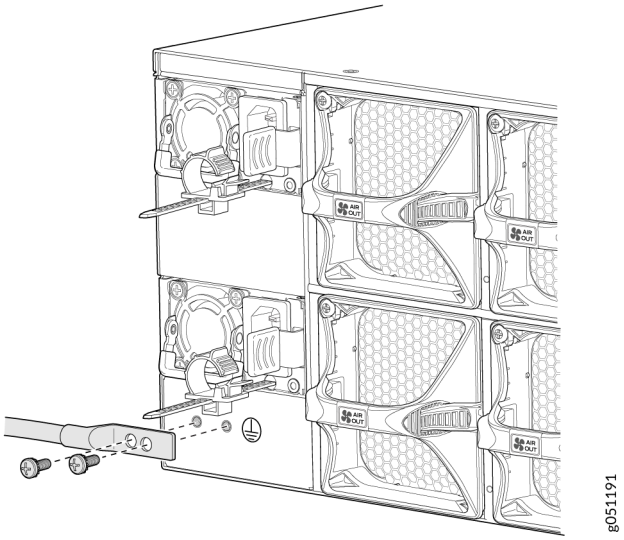
- Ground the QFX5220-128C | **183**
- Connect Power to the QFX5220-128C | **183**
- Ground the QFX5220-32CD and Connect Power | **185**
- Connect a Device to a Network for Out-of-Band Management | **187**
- Connect a Device to a Management Console Using an RJ-45 Connector | **187**

Ground the QFX5220-128C

To connect earth ground to a QFX5220-128C:

1. Use two 10-32 x 0.25 in. screws with number10 split-lock washers (not provided) to secure the grounding lug and attached cable (not provided) to the FRU panel of the chassis. The posts on the grounding lug should point to the right. See Figure 88 on page 183.

Figure 88: Connecting a Grounding Cable to a QFX5220-128C



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

Connect Power to the QFX5220-128C

The QFX5220-128C is shipped from the factory with four 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 a replacement power supply in either of the two slots next to the fan modules without powering off the switch or disrupting the switching function.

To connect AC power to a QFX5220-128C:

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

   For each power supply:

   a. Ensure the loop on the power cord retainer is open and there is enough space to insert the power cord coupler into the inlet. If the loop is closed, press the small tab on the retainer to loosen the loop.

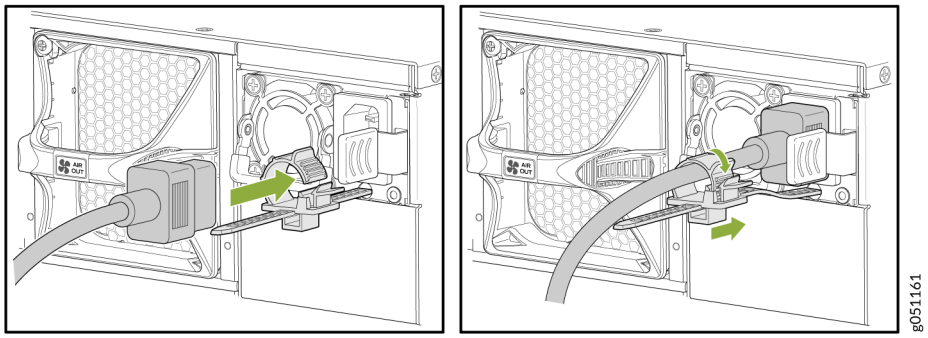
   b. Thread the power cord coupler through the power cord retainer loop.

   c. Insert the power cord coupler firmly into the AC inlet on the power supply faceplate.

   d. Slide the power cord retainer loop towards the power supply until it is snug against the base of the coupler.

   e. Press the tab on the loop and draw out the loop to enclose the power cord. See Figure 89 on page 184.

Figure 89: Attaching the Power Cord Retainer



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

4. 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.

5. Insert the power cord plug into an AC power source outlet.
6. If the AC power source outlet has a power switch, set it to the ON (|) position.
7. 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 "How to Remove a Power Supply from a QFX5220" on page 217). Do not remove the power supply until you have a replacement power supply ready: the power supplies must be installed in the switch to ensure proper airflow.

Ground the QFX5220-32CD and Connect Power

To ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements, you must connect the QFX5220 to earth ground before you connect it to power.

For installations that require a separate grounding conductor to the chassis, you must attach a protective earthing terminal bracket on the QFX5220 left front mounting bracket to connect to the earth ground. See Figure 90 on page 186.

NOTE: You must install the QFX5220 in a restricted-access location and ensure that the chassis is always properly grounded. The QFX5220 has a two-hole protective grounding terminal provided on the chassis. Under all circumstances, use this grounding connection to ground the chassis. For AC-powered systems, you must also use the grounding wire in the AC power cord along with the two-hole grounding lug connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

CAUTION: If an external ground connection is required, 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 device.

NOTE: Mount your switch in the rack or cabinet before attaching the grounding lug to the switch. See "Mount a QFX5220-32CD in a Rack or Cabinet by Using the QFX5220-32CD-4PRMK Rack Mount Kit " on page 150.

Ensure that you have the following parts and tools available:

- Grounding cable for your QFX5220 device—The grounding cable must be 14 AWG (2 mm^2), minimum 90° C wire, or as permitted by the local code.

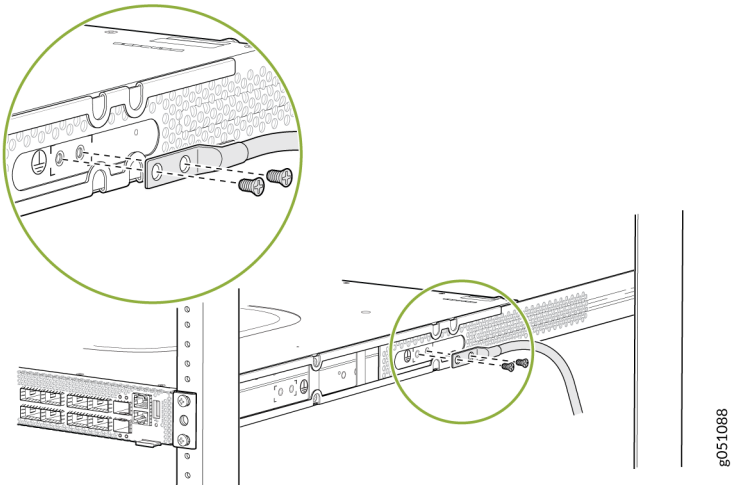
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent. The grounding lug attaches to the device chassis through the left-front mounting bracket, providing a protective earthing terminal for the device.
- Two 10-32 x 0.25 in. screws with number10 split-lock washers—Two screws are used to secure the grounding lug to the protective earthing terminal. These screws and washers are not provided.
- Number 2 screwdriver.

An AC-powered QFX5220 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 "AC Power Cord with Type C15 Coupler Specifications" on page 94.

To connect earth ground to a QFX5220-32CD:

1. Use the two 10-32 x 0.25 screws with number10 split-lock washers to secure the grounding lug and attached cable to the chassis. Attach the lug through the left mounting bracket to the chassis. See Figure 90 on page 186.

Figure 90: Connecting a Grounding Cable to a QFX5220

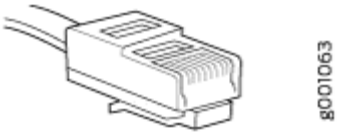


2. Connect the remaining end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
3. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people could trip over it.

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

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end.

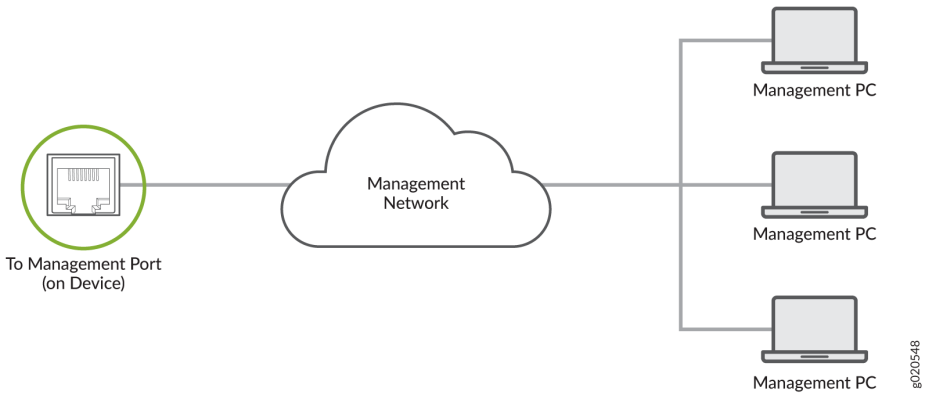
Figure 91: RJ-45 Connector on an Ethernet Cable



You can monitor and manage a network device, such as a router or a switch, 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.

To connect a device to a network for out-of-band management:

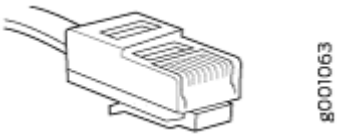
1. Connect one end of the Ethernet cable to the management port on the device.
2. Connect the other end of the Ethernet cable to the management device.



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

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end and an RJ-45-to-DB-9 serial port adapter.

Figure 92: RJ-45 Connector on an Ethernet Cable



NOTE: We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter, you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See https://ftdichip.com/drivers/vcp-drivers/ to download the driver.

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 and a USB-to-DB-9 plug adapter. You must provide the USB-to-DB-9 plug adapter.

You can configure and manage your network devices using a dedicated management channel. Each device has a console port that 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.

To connect the device to a management console:

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 93 on page 189) or management console (see Figure 94 on page 189).

Figure 93: Connect a Device to a Management Console Through a Console Server

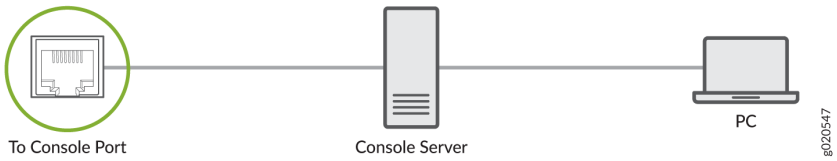


Figure 94: Connect a Device Directly to a Management Console

RELATED DOCUMENTATION

- General Safety Guidelines and Warnings | **260**
- Grounded Equipment Warning | **272**
- Connecting the QFX5220 to Power | **189**

Connecting the QFX5220 to Power

IN THIS SECTION

- Ground the QFX5220-128C | **190**
- Connect Power to the QFX5220-128C | **191**
- Ground the QFX5220-32CD and Connect Power | **192**
- Ground the QFX5220-128C | **194**
- Connect Power to the QFX5220-128C | **195**
- Ground the QFX5220-32CD and Connect Power | **196**

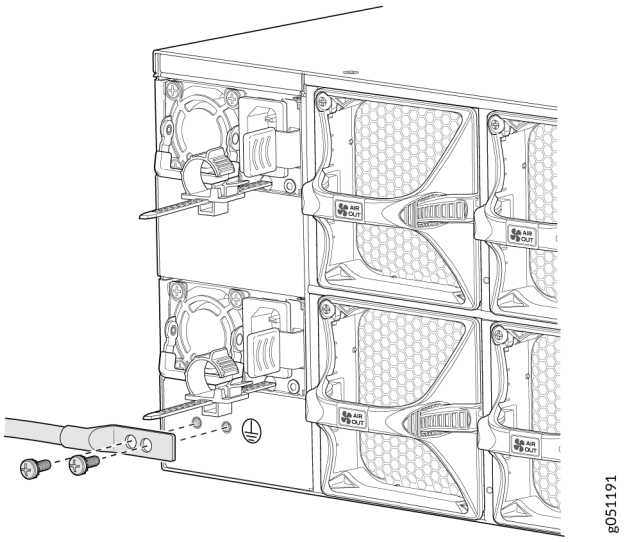
- How to Connect AC Power to a QFX5220 | **198**
- How to Connect DC Power to a QFX5220-128C | **200**
- How to Connect DC Power to a QFX5220-32CD | **203**

Ground the QFX5220-128C

To connect earth ground to a QFX5220-128C:

1. Use two 10-32 x 0.25 in. screws with number10 split-lock washers (not provided) to secure the grounding lug and attached cable (not provided) to the FRU panel of the chassis. The posts on the grounding lug should point to the right. See Figure 95 on page 190.

Figure 95: Connecting a Grounding Cable to a QFX5220-128C



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

Connect Power to the QFX5220-128C

The QFX5220-128C is shipped from the factory with four 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 a replacement power supply in either of the two slots next to the fan modules without powering off the switch or disrupting the switching function.

To connect AC power to a QFX5220-128C:

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

   For each power supply:

   a. Ensure the loop on the power cord retainer is open and there is enough space to insert the power cord coupler into the inlet. If the loop is closed, press the small tab on the retainer to loosen the loop.

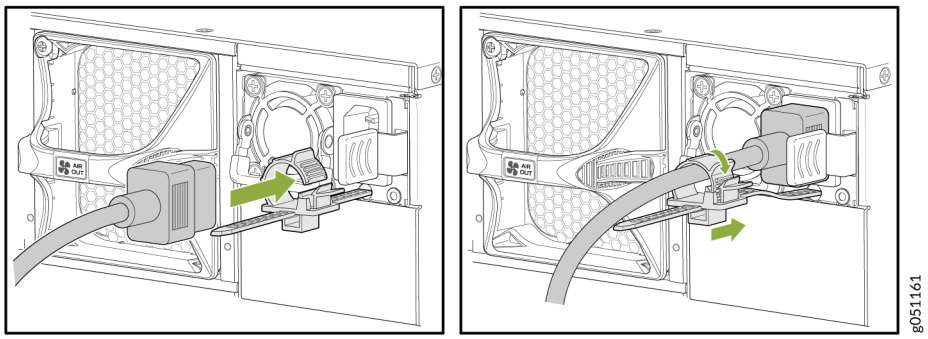
   b. Thread the power cord coupler through the power cord retainer loop.

   c. Insert the power cord coupler firmly into the AC inlet on the power supply faceplate.

   d. Slide the power cord retainer loop towards the power supply until it is snug against the base of the coupler.

   e. Press the tab on the loop and draw out the loop to enclose the power cord. See Figure 96 on page 191.

Figure 96: Attaching the Power Cord Retainer



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

4. 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.

5. Insert the power cord plug into an AC power source outlet.
6. If the AC power source outlet has a power switch, set it to the ON (|) position.
7. 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 "How to Remove a Power Supply from a QFX5220" on page 217). Do not remove the power supply until you have a replacement power supply ready: the power supplies must be installed in the switch to ensure proper airflow.

Ground the QFX5220-32CD and Connect Power

To ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements, you must connect the QFX5220 to earth ground before you connect it to power.

For installations that require a separate grounding conductor to the chassis, you must attach a protective earthing terminal bracket on the QFX5220 left front mounting bracket to connect to the earth ground. See Figure 97 on page 193.

NOTE: You must install the QFX5220 in a restricted-access location and ensure that the chassis is always properly grounded. The QFX5220 has a two-hole protective grounding terminal provided on the chassis. Under all circumstances, use this grounding connection to ground the chassis. For AC-powered systems, you must also use the grounding wire in the AC power cord along with the two-hole grounding lug connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

CAUTION: If an external ground connection is required, 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 device.

NOTE: Mount your switch in the rack or cabinet before attaching the grounding lug to the switch. See "Mount a QFX5220-32CD in a Rack or Cabinet by Using the QFX5220-32CD-4PRMK Rack Mount Kit " on page 150.

Ensure that you have the following parts and tools available:

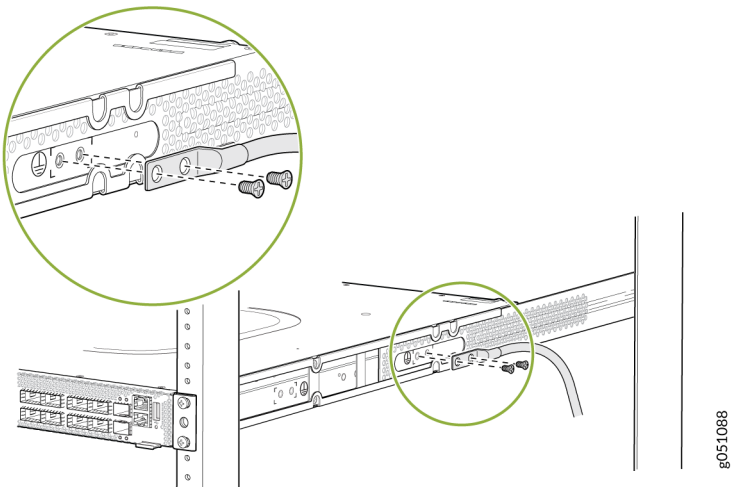
- Grounding cable for your QFX5220 device—The grounding cable must be 14 AWG (2 mm^2), minimum 90° C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent. The grounding lug attaches to the device chassis through the left-front mounting bracket, providing a protective earthing terminal for the device.
- Two 10-32 x 0.25 in. screws with number10 split-lock washers—Two screws are used to secure the grounding lug to the protective earthing terminal. These screws and washers are not provided.
- Number 2 screwdriver.

An AC-powered QFX5220 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 "AC Power Cord with Type C15 Coupler Specifications" on page 94.

To connect earth ground to a QFX5220-32CD:

1. Use the two 10-32 x 0.25 screws with number10 split-lock washers to secure the grounding lug and attached cable to the chassis. Attach the lug through the left mounting bracket to the chassis. See Figure 97 on page 193.

Figure 97: Connecting a Grounding Cable to a QFX5220



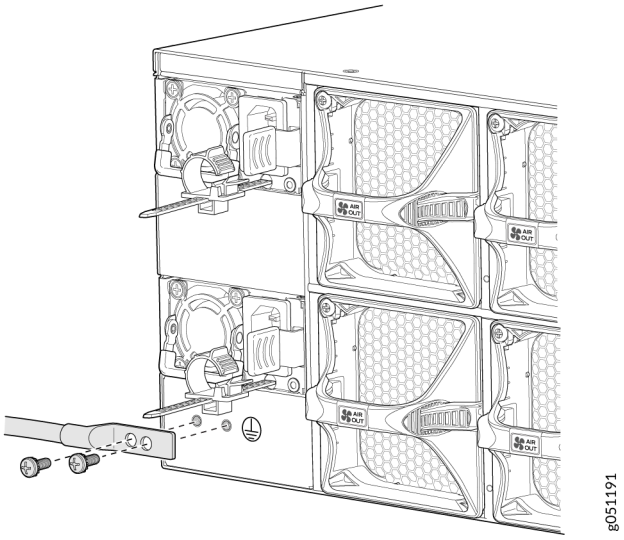
2. Connect the remaining end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
3. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people could trip over it.

Ground the QFX5220-128C

To connect earth ground to a QFX5220-128C:

1. Use two 10-32 x 0.25 in. screws with number10 split-lock washers (not provided) to secure the grounding lug and attached cable (not provided) to the FRU panel of the chassis. The posts on the grounding lug should point to the right. See Figure 95 on page 190.

Figure 98: Connecting a Grounding Cable to a QFX5220-128C



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

Connect Power to the QFX5220-128C

The QFX5220-128C is shipped from the factory with four 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 a replacement power supply in either of the two slots next to the fan modules without powering off the switch or disrupting the switching function.

To connect AC power to a QFX5220-128C:

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

   For each power supply:

   a. Ensure the loop on the power cord retainer is open and there is enough space to insert the power cord coupler into the inlet. If the loop is closed, press the small tab on the retainer to loosen the loop.

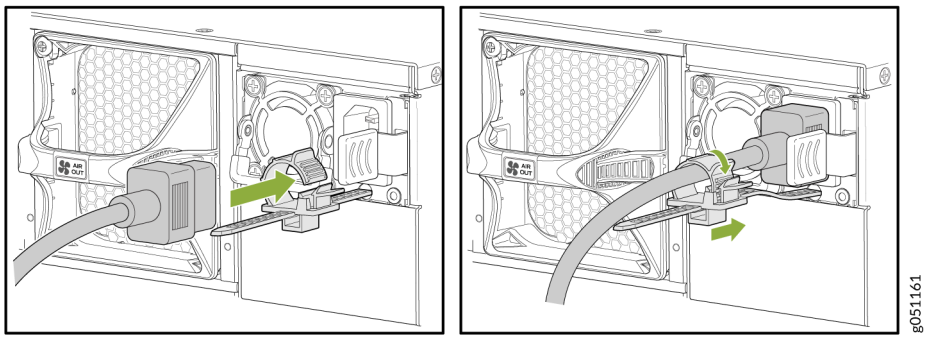
   b. Thread the power cord coupler through the power cord retainer loop.

   c. Insert the power cord coupler firmly into the AC inlet on the power supply faceplate.

   d. Slide the power cord retainer loop towards the power supply until it is snug against the base of the coupler.

   e. Press the tab on the loop and draw out the loop to enclose the power cord. See Figure 96 on page 191.

Figure 99: Attaching the Power Cord Retainer



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

4. 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.

5. Insert the power cord plug into an AC power source outlet.
6. If the AC power source outlet has a power switch, set it to the ON (|) position.
7. 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 "How to Remove a Power Supply from a QFX5220" on page 217). Do not remove the power supply until you have a replacement power supply ready: the power supplies must be installed in the switch to ensure proper airflow.

Ground the QFX5220-32CD and Connect Power

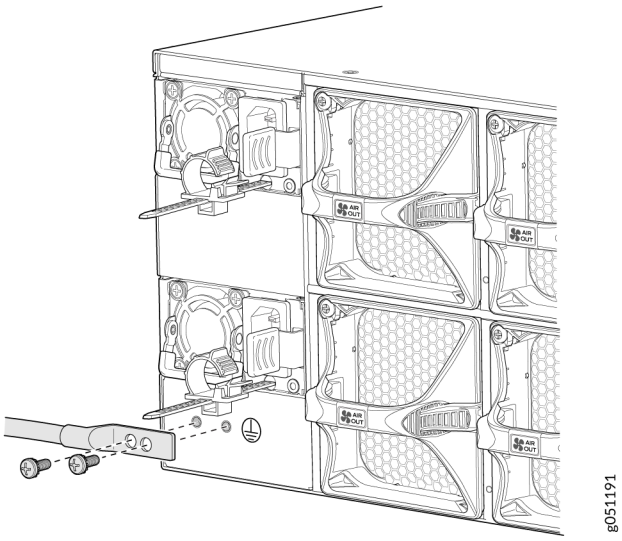
To ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements, you must connect the QFX5220 to earth ground before you connect it to power.

For installations that require a separate grounding conductor to the chassis, you must attach a protective earthing terminal bracket on the QFX5220 left front mounting bracket to connect to the earth ground. See Figure 97 on page 193.

NOTE: You must install the Juniper Product Name in a restricted–access location and ensure that the chassis is always properly grounded. Juniper Product Name have a two–hole protective grounding terminal / Single hole protective grounding terminal provided on the chassis. See the figure below for the location of the earthing terminals on QFX5220. We recommend that you use the chassis protective grounding terminal as the only method for grounding the chassis regardless of the power supply configuration. However, if additional grounding methods are available, you can also use those methods additionally. For example, you can use these additional methods: grounding wire in the power cord of an AC power supply or use the grounding terminal or lug on a DC power supply.

This system was tested to meet or exceed all applicable EMC regulatory requirements with the chassis protective grounding terminal connected correctly.

Figure 100: Connecting a Grounding Cable to a QFX5220-128C



CAUTION: If an external ground connection is required, 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 device.

NOTE: Mount your switch in the rack or cabinet before attaching the grounding lug to the switch. See "Mount a QFX5220-32CD in a Rack or Cabinet by Using the QFX5220-32CD-4PRMK Rack Mount Kit " on page 150.

Ensure that you have the following parts and tools available:

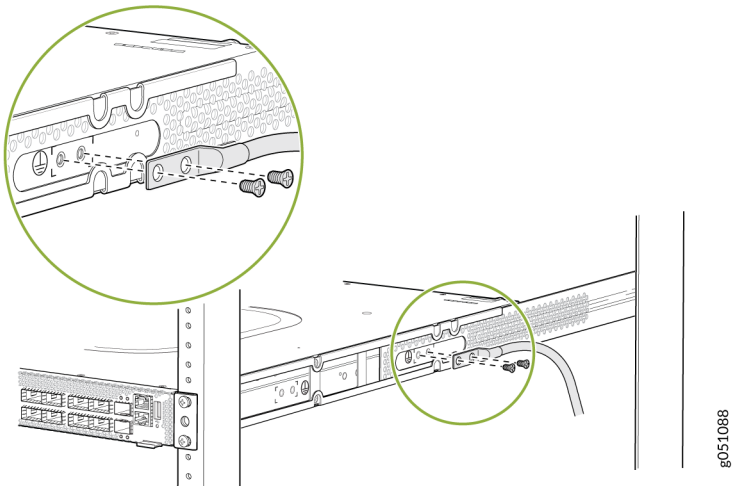
- Grounding cable for your QFX5220 device—The grounding cable must be 14 AWG (2 mm^2), minimum 90° C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent. The grounding lug attaches to the device chassis through the left-front mounting bracket, providing a protective earthing terminal for the device.
- Two 10-32 x 0.25 in. screws with number10 split-lock washers—Two screws are used to secure the grounding lug to the protective earthing terminal. These screws and washers are not provided.
- Number 2 screwdriver.

An AC-powered QFX5220 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 "AC Power Cord with Type C15 Coupler Specifications" on page 94.

To connect earth ground to a QFX5220-32CD:

1. Use the two 10-32 x 0.25 screws with number10 split-lock washers to secure the grounding lug and attached cable to the chassis. Attach the lug through the left mounting bracket to the chassis. See Figure 97 on page 193.

Figure 101: Connecting a Grounding Cable to a QFX5220



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

How to Connect AC Power to a QFX5220

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 285).
- Ensure that you have connected the switch chassis to earth ground.
- Install the power supplies in the chassis. For instructions on installing a power supply in a QFX5220, see "How to Install an AC Power Supply in a QFX5220" on page 220.

The QFX5220-32CD ships from the factory with two power supplies; the QFX5220-128C ships with four power supplies. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU). You can install a replacement power supply in the slots next to the fan modules without powering off the switch or disrupting the switching function.

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

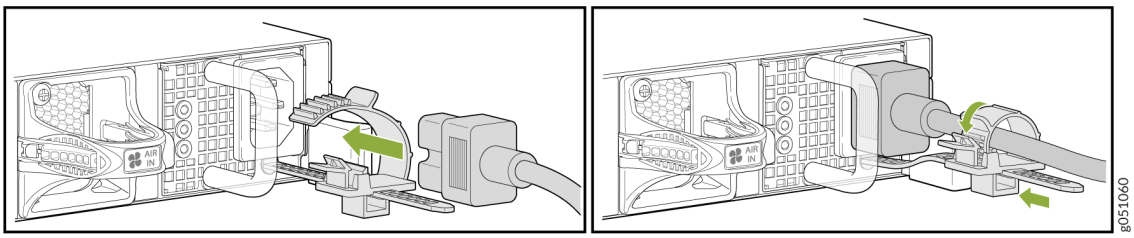
To connect AC power to a QFX5220:

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. .
3. Locate the power cords shipped with the switch; the cords have plugs appropriate for your geographical location. See "AC Power Cord with Type C15 Coupler Specifications" on page 94 or "AC Power Cord with Type C13 Coupler Specifications" on page 92.

   For each power supply:

   a. Ensure the loop on the power cord retainer is open and there is enough space to insert the power cord coupler into the inlet. If the loop is closed, press the small tab on the retainer to loosen the loop. See Figure 102 on page 199.

   Figure 102: Attaching the Power Cord Retainer

   b. Thread the power cord coupler through the power cord retainer loop.

   c. Insert the power cord coupler firmly into the AC inlet on the power supply faceplate.

   d. Slide the power cord retainer loop towards the power supply until it is snug against the base of the coupler.

   e. Press the tab on the loop and draw out the loop to enclose the power cord. See Figure 102 on page 199.

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

4. 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.

5. Insert the power cord plug into an AC power source outlet.
6. If the AC power source outlet has a power switch, set it to the ON (|) position.
7. 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 "How to Remove a Power Supply from a QFX5220" on page 217). Do not remove the power supply until you have a replacement power supply ready: the power supplies must be installed in the switch to ensure proper airflow.

How to Connect DC Power to a QFX5220-128C

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 285).
- 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).

NOTE: 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.

- Install the power supplies in the chassis. For instructions, follow the instructions in "How to Install an AC Power Supply in a QFX5220" on page 220.

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

- Ensure that you have the following parts and tools available:
  - A spare JPSU-1600W-DC-AFO for QFX5220-128C
  - ESD grounding strap
  - Slotted (–) screwdriver, 1/4-in., with a torque range between 6 lb-in (0.68 Nm) to 7 lb-in (0.79 Nm)

    CAUTION: You must use an appropriate torque-controlled tool to tighten the screws on the DC power cable connector. Do not overtighten the screws. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 10 lb-in (1.13 Nm).

  - Power cables to connect DC power to the QFX5220-128C. The DC power cables–a straight DC power cable (CBL-JNP-PWR-DSUB). See Table 24 on page 101.

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

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

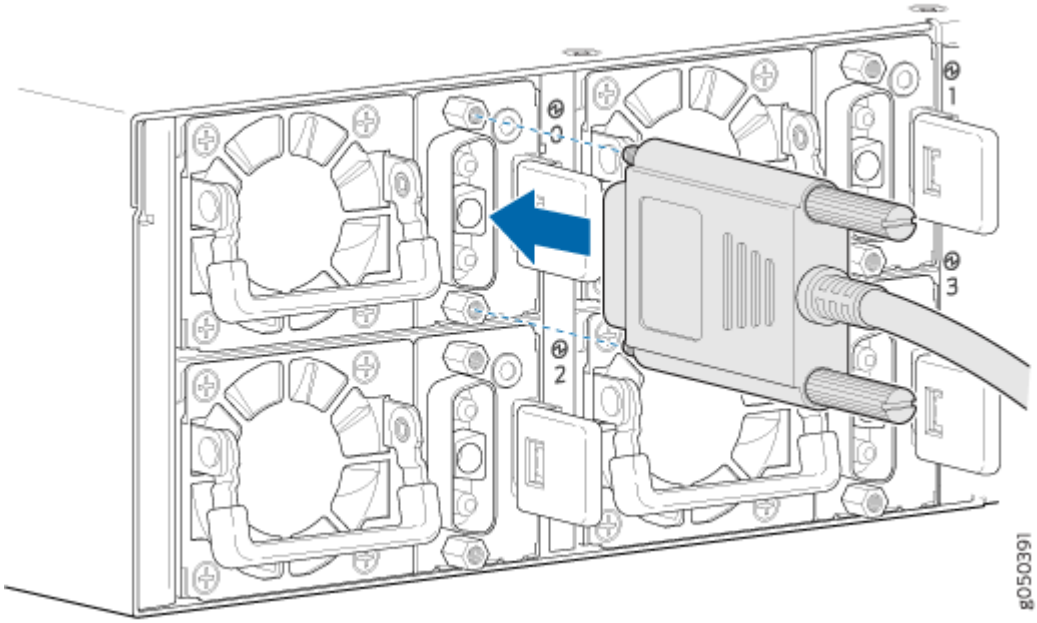
The DC power supply in a QFX5220-128C is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace it without powering off the switch or disrupting switch functions. You do, however, need to remove power from the power supply before attempting to remove the unit.

WARNING: DC-powered QFX5220-128C models are intended for installation only in a restricted access location.

To connect DC power to a QFX5220-128C:

1. To prevent damage to the equipment caused by static discharge, attach an ESD grounding strap to your bare wrist, and connect the strap to an approved site ESD grounding point.
2. Ensure that the power supplies are fully inserted in the chassis and that the latches are secure.
3. Connect the green grounding wire in each DC power cable (CBL-JNP-PWR-DSUB) to ground.
4. Connect each power supply to the power source by inserting the DC connector into the power supply. See Figure 103 on page 202 .

Figure 103: Connecting a Straight DC Power Cable to a DC Power Supply (CBL-JNP-PWR-DSUB)



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

5. Using the slotted screwdriver, tighten the screws on the power cable connector to between 6 lb-in (0.68 Nm) to 7 lb-in (0.79 Nm).

CAUTION: You must use an appropriate torque-controlled tool to tighten the screws. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 10 lb-in (1.13 Nm).

6. Repeat 4 through 5 for each power supply that you are connecting to power.
7. Close the input circuit breaker.

   We recommend that the 48 VDC facility DC source be equipped with a circuit breaker rated at 40 A (–48 VDC) minimum, or as required by local code.

NOTE: We recommend that the 48-VDC facility DC source be equipped with a circuit breaker rated at 40A (-48 VDC) minimum, or as required by local code.

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

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

   If the status LED is lit amber, remove power from the power supply, and replace the power supply (see "How to Remove a Power Supply from a QFX5220" on page 217). Do not remove the power supply until you have a replacement power supply ready. The power supplies must be installed in the QFX5220-128C to ensure proper airflow.

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

How to Connect DC Power to a QFX5220-32CD

IN THIS SECTION

- Before You Begin | 203
- Connecting DC Power to a QFX5220-32CD | 204

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 285).
- Ensure you have connected the switch chassis to earth ground (see "Ground the QFX5220-32CD and Connect Power" on page 185).

CAUTION: Before you connect power to the switch, a licensed electrician must attach a cable lug to the ground and power cables that you supply (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.

- Install the power supply in the chassis. For instructions on Installing a power supply in a QFX5220, see "How to Install an AC Power Supply in a QFX5220" on page 220.

WARNING: A DC-powered QFX5220 is intended for installation only in a restricted access location.

Ensure that you have the following parts and tools available:

- A spare JPSU-1600W-1UDCAFI or JPSU-1600W-1UDCAFO for QFX5220-32CD (not provided)
- Phillips (+) screwdriver, number 2 (not provided)
- Multimeter (not provided)

WARNING:

Connecting DC Power to a QFX5220-32CD

To connect DC power to the DC model QFX5220-32CD:

1. Attach the grounding strap to your bare wrist and to a site ESD point on the switch.
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. Install heat-shrink tubing insulation around the power cables.

   To install heat-shrink tubing:

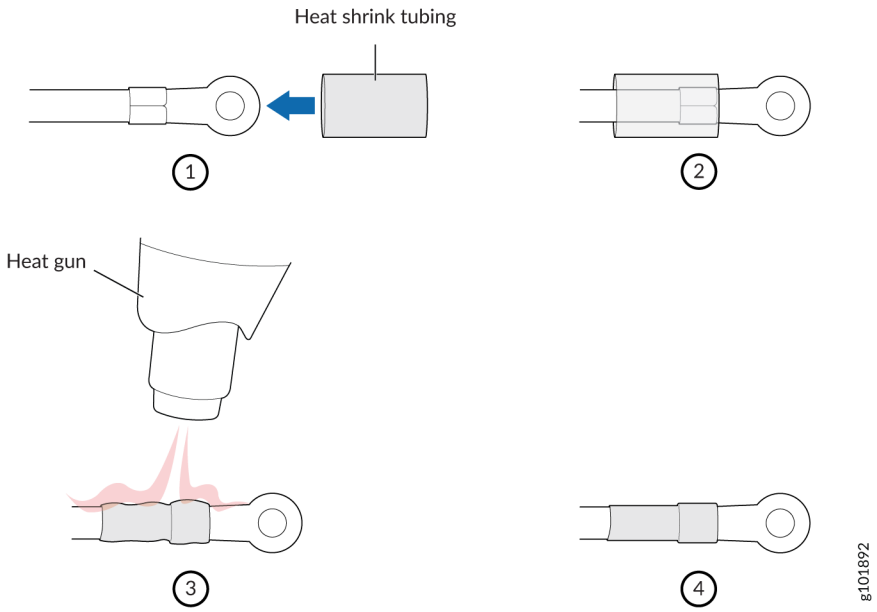
   a. Slide the tubing over the portion of the cable where it is attached to the lug barrel. Ensure that tubing covers the end of the wire and the barrel of the lug attached to it.

   b. Shrink the tubing with a heat gun. Ensure that you heat all sides of the tubing evenly so that it shrinks around the cable tightly.

   Figure 104 on page 205 shows the steps to install heat-shrink tubing.

NOTE: Do not overheat the tubing.

Figure 104: How to Install Heat-Shrink Tubing

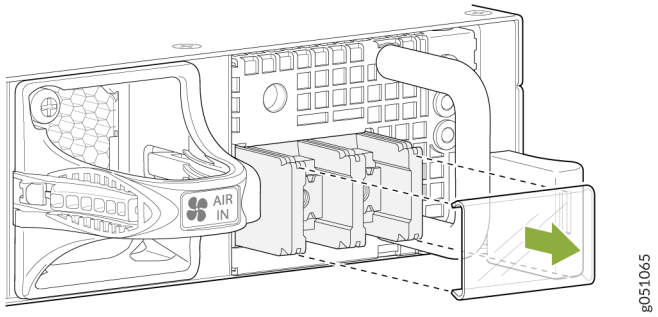


4. Ensure that the input circuit breaker is open so that the voltage across the DC power source cable leads is 0 V and that the cable leads do not become active while you are connecting DC power. The QFX5220-32CD-D should connect the power supplies to an external DC power source, or an -0% to +20% tolerance DC mains, supplied with a NRTL-approved circuit breaker rated at 40-A.

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 292 and "DC Power Electrical Safety Guidelines" on page 288.

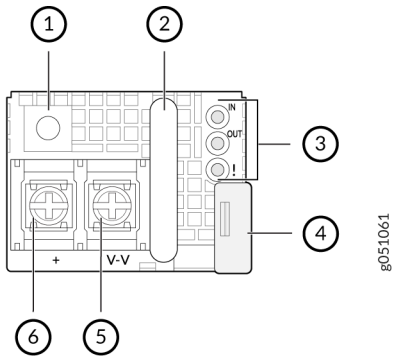
5. Ensure that the power supplies are fully inserted in the chassis.
6. Remove the terminal block cover. The terminal block cover is a piece of clear plastic that snaps into place over the terminal block (see Figure 105 on page 206).

Figure 105: Removing Terminal Block Cover



7. Remove the screws on the terminals using the screwdriver. Save the screws. See Figure 106 on page 206.

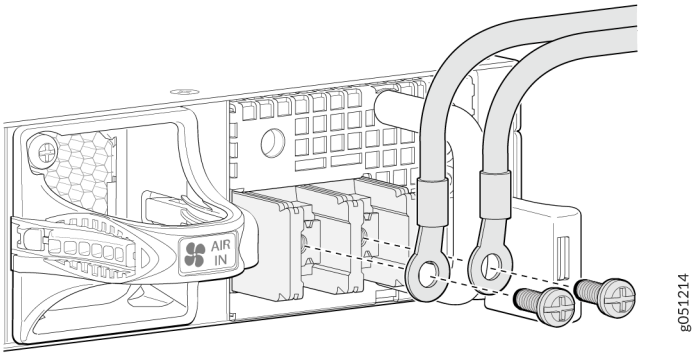
Figure 106: QFX5220-32CD Faceplate



1– Not used	4– Release latch
2– Handle	5– V– terminal
3– LEDs	6– V+ terminal

8. 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 107 on page 207).

Figure 107: Securing Ring Lugs to the Terminals on the QFX5220-32CD DC Power Supply



The QFX5220-32CD 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 the QFX5220-32CD; 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.

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.

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

9. Replace the terminal block cover.
10. 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.

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

RELATED DOCUMENTATION

QFX5220 Power System | 87

Register Products—Mandatory to Validate SLAs

Juniper Networks auto registers newly purchased products based on the end customer information provided at the point of sale. Registering products and changes to products activates your hardware replacement service-level agreements (SLAs).

> **CAUTION**: Update the installation base data if any installation base data is added or changed or if the installation base is moved. Juniper Networks is not responsible for customers not meeting the hardware replacement service-level agreement (SLA) for products that do not have registered serial numbers or accurate installation base data.
>
> To know more about how to register your product and update your installation base, see Juniper Networks Product Registration and Install Base Management.

Performing the Initial Software Configuration for QFX5220 Switches

Before you begin connecting and configuring a QFX5220, 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

You must perform the initial configuration of the QFX5220 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*.

NOTE: We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See, https://ftdichip.com/drivers/vcp-drivers/ to download the driver.

To connect and configure the switch from the console:

1. Connect the console port to a laptop or PC using an RJ-45 cable and RJ-45 to DB-9 adapter. The console (**CON**) port is located on the top right corner of the port panel.
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 IP address and prefix length for the switch management interface.

```
[edit]
root@# set interfaces re0:mgmt-0 unit 0 family inet address address/prefix-length
```

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

NOTE: On the QFX5220-32CD, the management port `re0:mgmt-0` is the bottom RJ-45 port on the right side of the port panel and is labeled **MGMT**.

8. Create the mgmt_junos routing instance and configure the static routes to remote prefixes with access to the management port.

```
[edit]
root@# set routing-instances mgmt_junos routing-options static route 0/0 next-hop
destination-ip
```

9. Enable the management instance.

```
[edit]
root@# set system management-instance
```

10. Enable Telnet service.

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

> **NOTE**: When Telnet is enabled, you cannot log in to a QFX5220 switch through Telnet using root credentials. Root login is allowed only for SSH access.

11. Enable SSH service for root login.

```
[edit]
root@# set system services ssh root-login allow
```

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

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

RELATED DOCUMENTATION

QFX5220 Installation Overview | 144

5

CHAPTER

Maintaining Components

IN THIS CHAPTER

- Maintaining QFX5220 Cooling System | **213**
- Maintaining the QFX5220 Power System | **217**
- Maintaining Transceivers and Fiber Optic Cables on a QFX5220 | **223**
- Powering Off a QFX5220 | **231**
- Removing the EMI Panel from QFX5220-128C | **233**

Maintaining QFX5220 Cooling System

IN THIS SECTION

- How to Remove a Fan Module from a QFX5220 | 213
- How to Remove a Fan Module in a QFX5220 | 215

The fan modules in QFX5220 are hot-removable and hot-insertable field-replaceable units (FRUs): you can remove and replace one of them without powering off the switch or disrupting switching function.

CAUTION: To ensure proper airflow, keep a failed fan module in place until you have a replacement fan module at hand. Do not run the device with an open fan tray slot for an extended amount of time.

How to Remove a Fan Module from a QFX5220

Before you remove a fan module from a QFX5220, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 285).

Ensure that you have the following parts and tools available to remove a fan module from a QFX5220:

- ESD grounding strap
- Antistatic bag or an antistatic mat

To remove a fan module from a QFX5220 (see Figure 108 on page 214 for QFX5220-32CD and Figure 109 on page 214 for QFX5220-128C):

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. Loosen the locking screw (3 or 4 turns) using a Phillips number 2 screwdriver..
4. Grasp the handle on the fan module and squeeze the outside of the handle to release the module.

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

5. Pull firmly to slide the fan module halfway out of the chassis.
6. When the fan 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 108: Removing a Fan Module from a QFX5220-CD

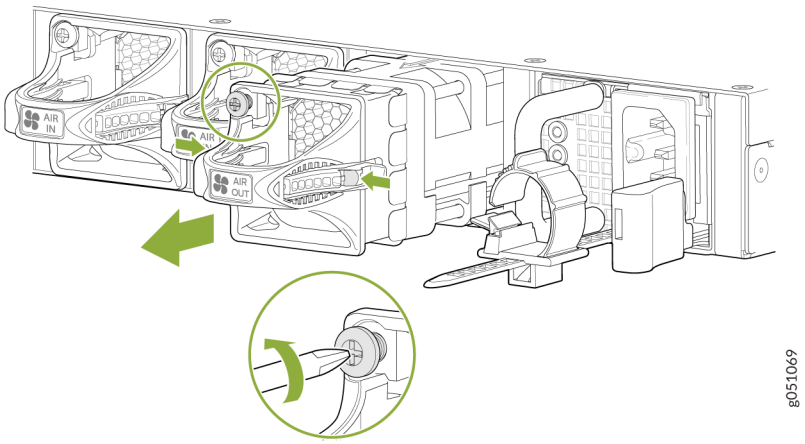
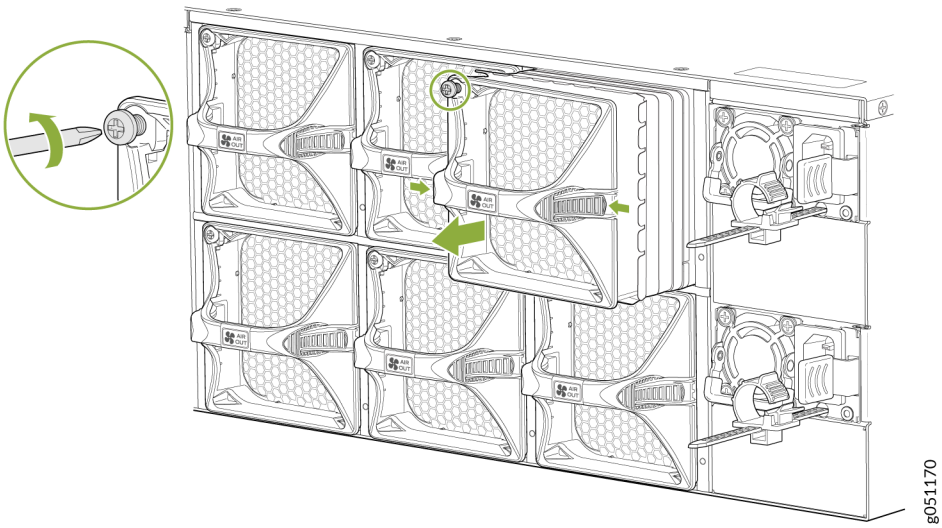


Figure 109: Removing a Fan Module from a QFX5220-128C



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.

How to Remove a Fan Module in a QFX5220

Before you install a fan module in a QFX5220, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 285).

The fan modules in a QFX5220 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: To ensure proper airflow, keep a failed fan module in place until you have a replacement fan module at hand. Do not run the device with an open fan tray slot for an extended amount of time.

NOTE: The fan module provides FRU-to-port or port-to-FRU airflow depending on the switch product variant you purchase.

To install a fan module in a QFX5220 (see Figure 110 on page 216 and Figure 111 on page 216):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Take care not to touch the connectors as you 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.

Figure 110: Installing a Fan Module in a QFX5220-32CD

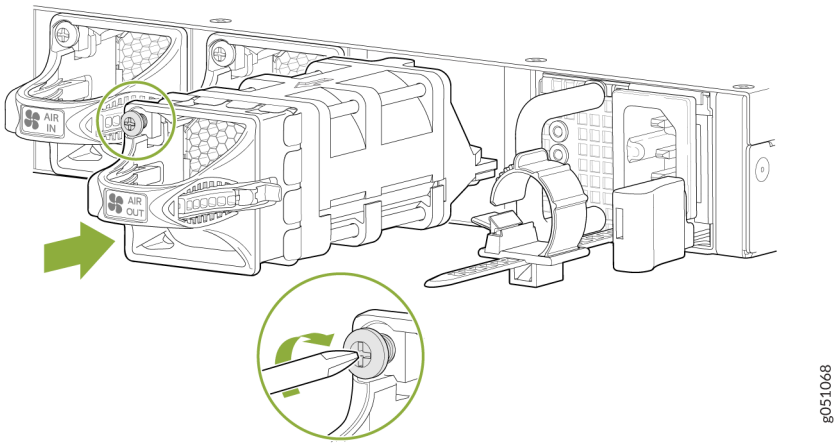
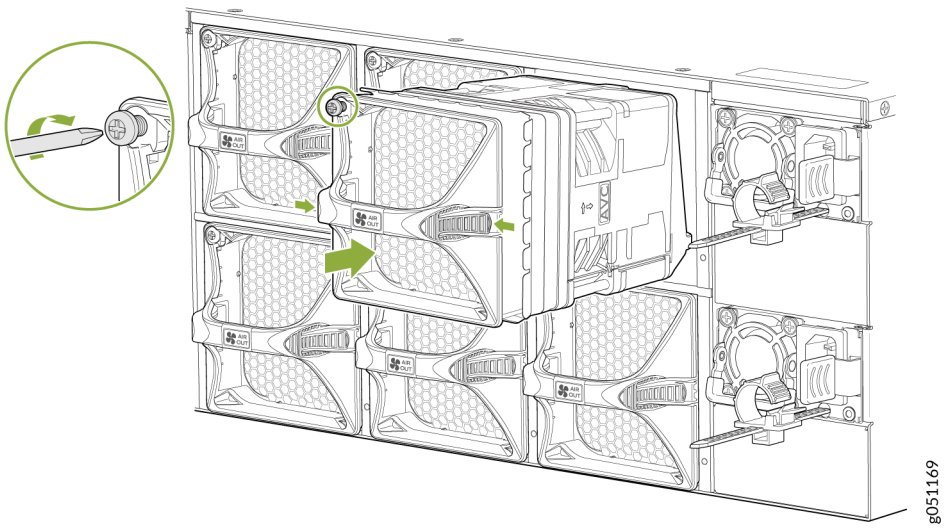


Figure 111: Installing a Fan Module in a QFX5220-128C



CAUTION: Damage can occur if you attempt to install a fan module into a chassis with a different airflow direction. Compare the switch product variant 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 QFX5220 product variant that supports the same airflow type. See"QFX5220 Power System" on page 87 for more information.

4. Use a Phillips number 2 screwdriver to tighten the locking screw.

RELATED DOCUMENTATION

QFX5220 Power System | 87

QFX5220 Management Panel | 70

Maintaining the QFX5220 Power System

IN THIS SECTION

- How to Remove a Power Supply from a QFX5220 | 217
- How to Install an AC Power Supply in a QFX5220 | 220

A QFX5220 power supply module (PSM) is a hot-removable and hot-insertable field-replaceable unit (FRU). You can install replacement power supplies without powering off the switch or disrupting the switching function.

How to Remove a Power Supply from a QFX5220

Before you remove a power supply from a QFX5220, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 285).

Figure 112: Removing an AC Power Supply from QFX5220-128C

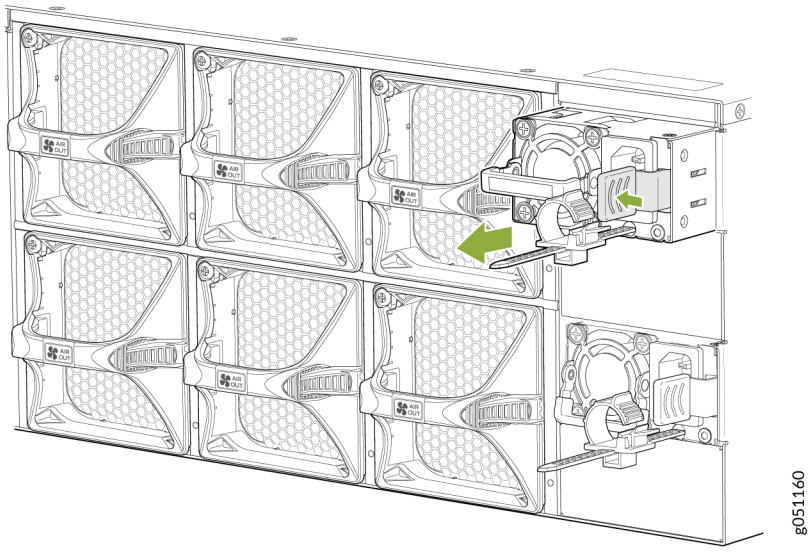
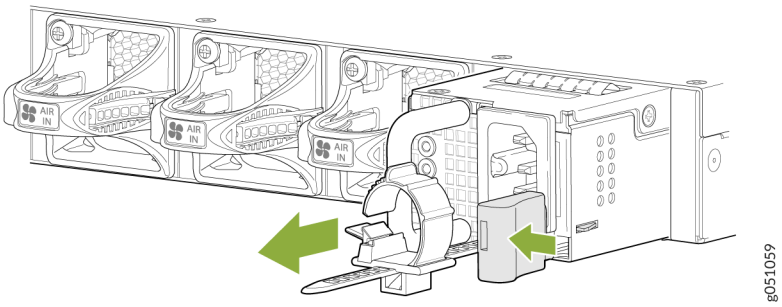


Figure 113: Removing an AC Power Supply from QFX5220-32CD



Ensure that you have the following parts and tools available to remove a power supply from a QFX5220:

- ESD grounding strap
- Antistatic bag or an antistatic mat

The QFX5220-32CD is shipped from the factory with two power supplies, while the QFX5220-128C is shipped with four power supplies. See Figure 112 on page 218 and Figure 113 on page 218.

To remove a power supply from a QFX5220 (see Figure 114 on page 220):

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 QFX5220, you need to power off the switch before removing the power supply. See "Powering Off a QFX5220" on page 231.

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
     - QFX5220-128C
       a. Use a Phillips screwdriver to detach the grounding cable.
       b. Loosen the thumb screws for the power cord.
       c. Gently pull out the socket end of the power plug connected to the power supply faceplate.
     - QFX5220-32CD.

       a. Remove the screws that secure the ring lugs to the terminals using the screwdriver.
       b. Replace the screws to each terminal and tighten the screws using the screwdriver.
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. See Figure 114 on page 220 and Figure 115 on page 220.

Figure 114: Removing a DC Power Supply from a QFX5220-32CD

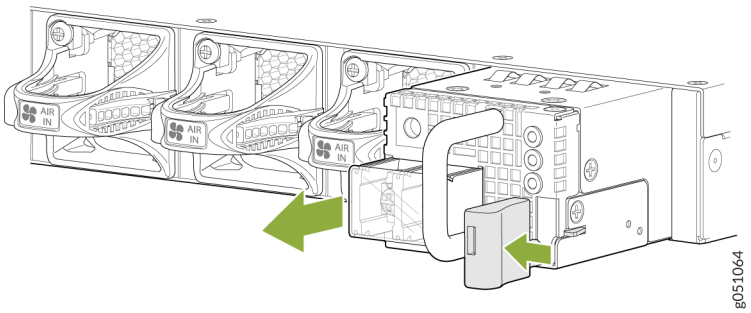
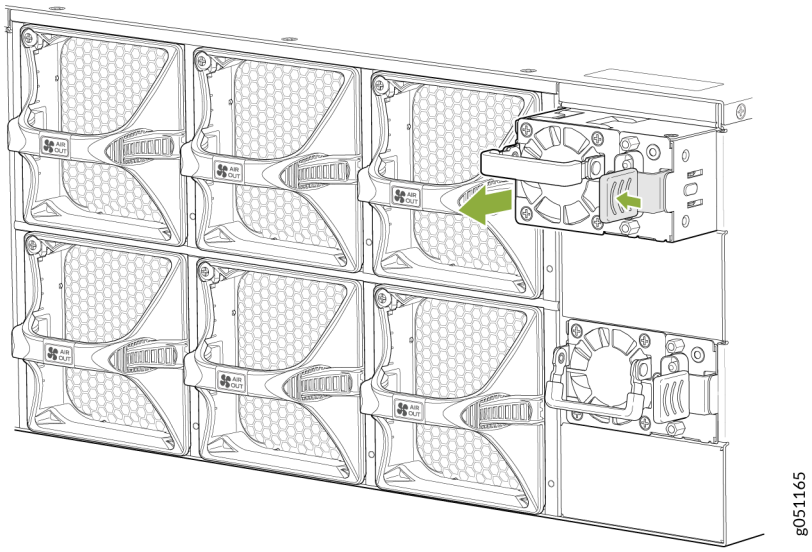


Figure 115: Removing a DC Power Supply from a QFX5220-128C



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.
9. Replace with another power supply module.

How to Install an AC Power Supply in a QFX5220

- Before you install a power supply in a QFX5220, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 285).

- 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"QFX5220 Cooling System" on page 77 for more information.

To install a power supply in a QFX5220 (see Figure 116 on page 221):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Take care not to touch power supply components, pins, leads, or solder connections as you 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. If the power supply has a protective plastic wrap, peel and remove the plastic wrap from all four sides of the power supply.
4. 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. See Figure 116 on page 221 and Figure 117 on page 222.

Figure 116: Installing a QFX5220-32CD AC Power Supply

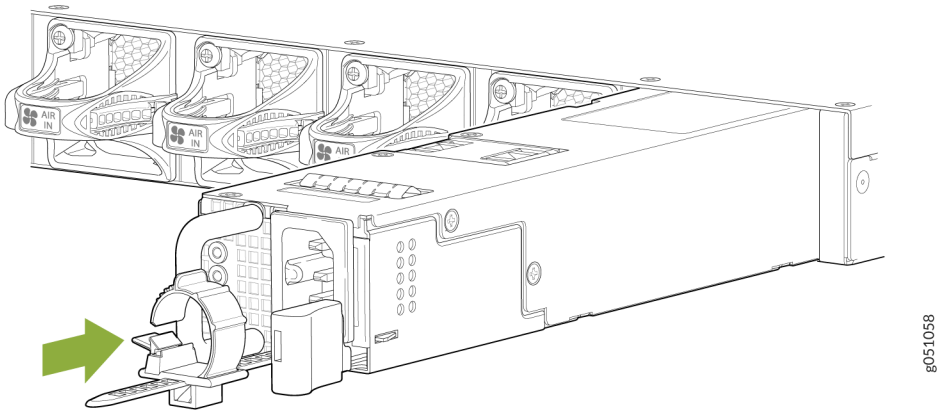
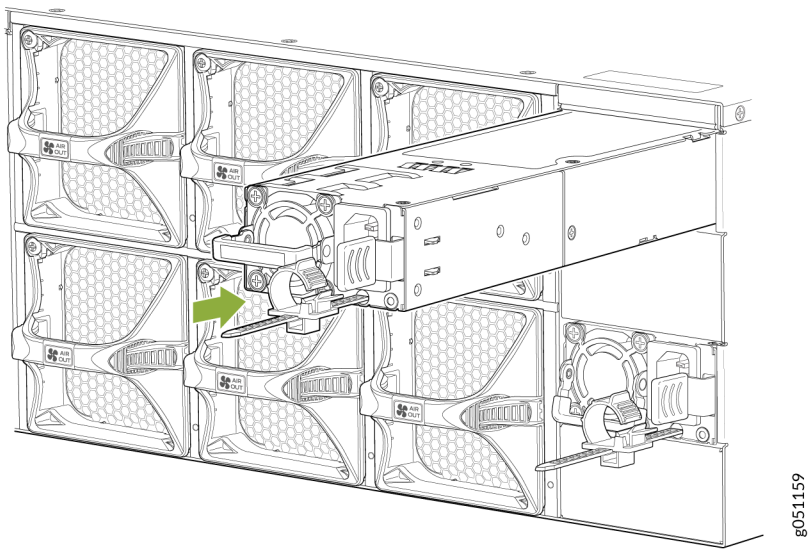


Figure 117: Installing a QFX5220-128C AC Power Supply



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

QFX5220 Power System | **87**

Connecting the QFX5220 to Power | **189**

Maintaining Transceivers and Fiber Optic Cables on a QFX5220

IN THIS SECTION

- Remove a Transceiver | 223
- Install a Transceiver | 225
- Disconnect a Fiber-Optic Cable | 228
- Connect a Fiber-Optic Cable | 229
- How to Handle Fiber-Optic Cables | 230

Remove a Transceiver

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).

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

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace the transceivers 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.

Figure 118 on page 225 shows how to remove a quad small form-factor pluggable plus (QSFP+) transceiver. The procedure is the same for all types of transceivers except the QSFP28 and C form-factor pluggable (CFP) transceivers.

To remove a transceiver from a device:

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

> **LASER 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.

> **LASER 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 protects your eyes from 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). 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.
6. To remove an SFP56-DD, SFP, SFP+, XFP, a QSFP+, or QSFP56-DD transceiver:
   a. Using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.

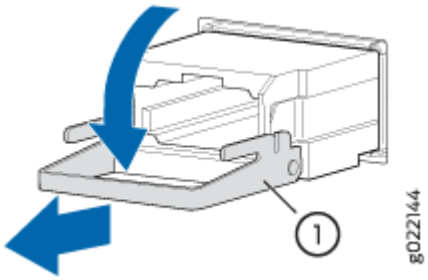
      Note that QSFP-DD and SFP-DD transceivers don't have ejector levers, instead they have a pull tab which can be used to unlock and remove the transceiver.

      > **CAUTION**: Before removing the transceiver, make sure that you open the ejector lever completely until you hear it click. This precaution 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 118: Remove a QSFP+ Transceiver



1– Ejector lever

To remove a CFP transceiver:

a. Using your fingers, loosen the screws on the transceiver.

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. 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

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).

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

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace the transceivers 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: The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party optical modules or cables. Your JTAC engineer will likely request that you check the third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

Figure 119 on page 228 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 or to the ESD point on the device.
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.

LASER 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 protects your eyes from accidental exposure to laser light.

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

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

6. Slide the transceiver in gently until it is fully seated. If you are installing a CFP transceiver, use your fingers to tighten the captive screws on the transceiver.
7. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.

LASER 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 protects your eyes from accidental exposure to laser light.

8. 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 toward 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.

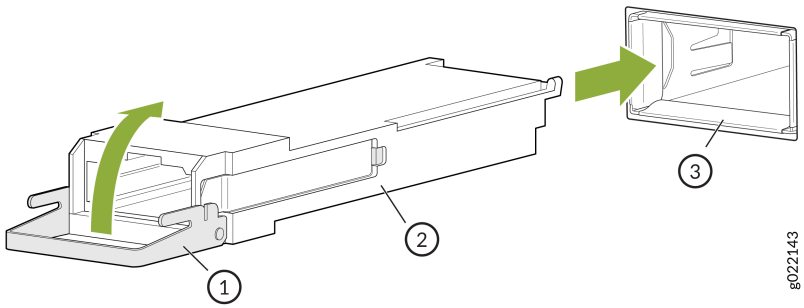
CAUTION: Avoid bending the fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

NOTE: When you install SFP-DD transceivers, push it hard until you hear a click sound. Use a long nose plier to pull the SFP-DD transceiver connected on the top and bottom rows of the chassis where the pull tabs face each other.

NOTE: Make sure to use a dust cap to cover ports that are unused.

NOTE: While using Finisar AOC SFP+ optical module with the QFX5130-48C switch, you may need to pull the module upwards to pull out the module smoothly from the cage.

Figure 119: Install a Transceiver



1– Ejector lever	3– Port
2– Transceiver	

Disconnect a Fiber-Optic Cable

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.

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

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

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
```

LASER 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.

LASER 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 protects your eyes from accidental exposure to laser light.

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

Connect a Fiber-Optic Cable

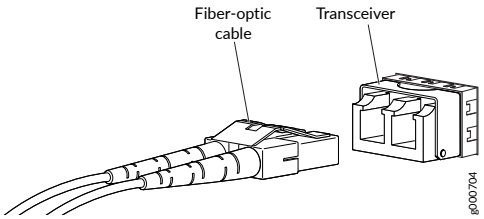
Before you connect a fiber-optic cable to an optical transceiver installed in a device, take the necessary precautions for safe handling of lasers (see Laser and LED Safety Guidelines and Warnings).

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

LASER 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.



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.

Follow these guidelines when handling 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 attaching a fiber-optic cable to a transceiver, 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 the 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. To prevent damage from overuse, attach a short fiber extension to the optical equipment. The short fiber extension absorbs wear and tear due to frequent plugging and unplugging. It is easier and more cost-efficient to replace the short fiber extension than to replace 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

QFX5220 Network Cable and Transceiver Planning | 121

Powering Off a QFX5220

Before you remove the power cord to power off a QFX5220:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 285.
- Ensure that you do not need to forward traffic through the switch.

NOTE: Use the following procedure to turn off power on a QFX5220 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 QFX5220 switch:

1. Connect to the switch using one of the following methods:
   - Connect a management device to the console (**CON**) port on a QFX5220. 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 187.

- You can shut down the QFX5220 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 187.

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

   For QFX5220 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
```

   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.
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 QFX5220 to Power | 189

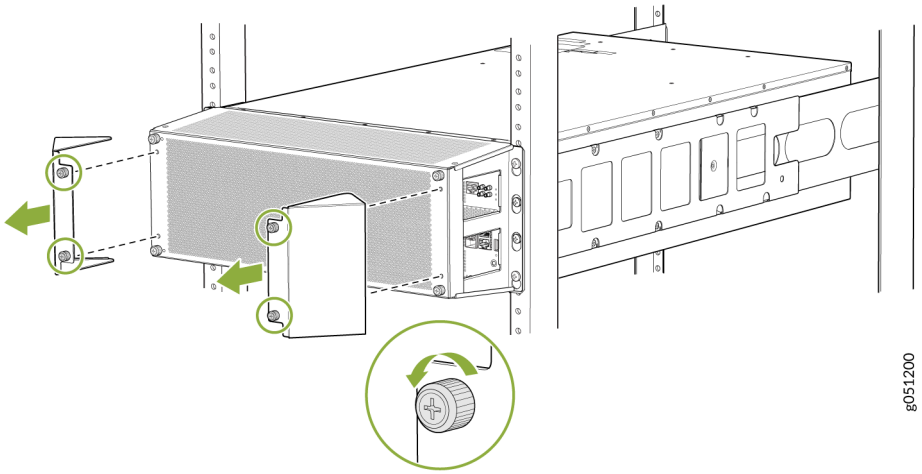
Removing the EMI Panel from QFX5220-128C

Use this procedure to remove the EMI panel from the QFX5220-128C when returning the switch to Juniper Networks or when packing your device for storage.

Before you begin, ensure you have a Phillips (+) number 2 screwdriver.

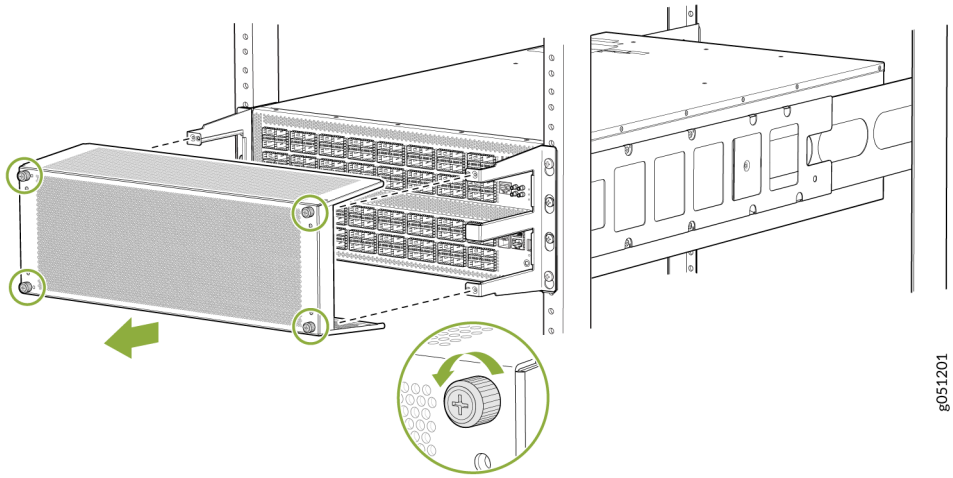
1. Loosen the four captive screws on the two deflectors using the Phillips screwdriver. See Figure 120 on page 233.

Figure 120: Remove Deflectors



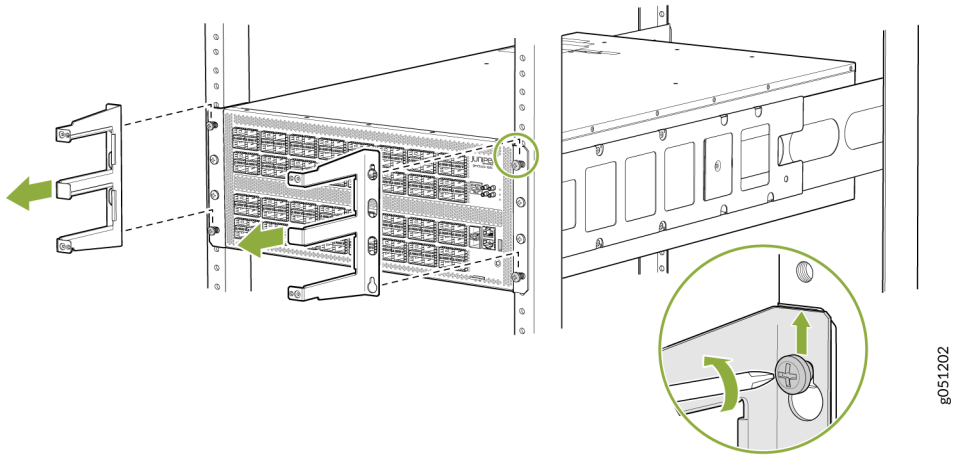
2. Use your hand to support a deflector and continue to unscrew until the deflector separates from the EMI panel. Set aside and repeat with the second deflector.
3. Loosen the four captive screws on the EMI panel using the Phillips screwdriver.
4. Gently pull the EMI panel straight out to detach from the mounting shelf. See Figure 121 on page 234.

Figure 121: Remove EMI Panel from the Mounting Shelves



5. Loosen the top and bottom rack mount screws using the Phillips screwdriver so that the mounting shelf can easily slide up.
6. Slide the mounting bracket up and out to release from the rack mount screws.

Figure 122: Remove the Mounting Shelf



7. Tighten the four rack mount screws using the Phillips screwdriver.
8. Pack the EMI components for storage.

CHAPTER 6

Troubleshooting Hardware

IN THIS CHAPTER

- Troubleshooting the QFX5220 | **236**

Troubleshooting the QFX5220

IN THIS SECTION

- QFX5220 Troubleshooting Resources Overview | 236
- QFX5220 Alarm Messages Overview | 237
- Chassis Alarm Messages | 238
- Configuration Changes Leading to Unexpected QFX5220 Behavior | 240
- How to Troubleshoot QFX5220-128C Port Configuration Problems | 242
- How to Troubleshoot QFX5220-128C Channelization Problems | 243

QFX5220 Troubleshooting Resources Overview

To troubleshoot a QFX5220 problem, you can use:

- Junos OS 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.

- Alarms and LEDs on the network ports, management panel, and components

  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 QFX5220. For more information, see "QFX5220 Management Panel" on page 70.

- 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.

QFX5220 Alarm Messages Overview

When a QFX5220 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 system alarms` operational CLI command.

```
user@host> show system alarms
2 alarms currently active
Alarm time               Class  Description
2019-01-22 16:32:54 PST  Major  PEM 1 Absent
2019-01-22 16:31:04 PST  Minor  Host 0 Disk 2 Labelled incorrectly
```

For thermal problems, the `show chassis temperature-thresholds` CLI command shows the cutoff temperatures for each level of alarm:

```
user@host> show chassis temperature-thresholds
                                 Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                                (degrees C)     (degrees C)     (degrees C)
(degrees C)
Item                           Normal  High    Normal  Bad fan  Normal  Bad fan     Normal
Routing Engine 0 CPU Temperature     75    79       90       90       95       95        101
FPC 0 Sensor TopMiddle               51    56       67       67       77       77         87
FPC 0 Sensor TopFrontLeft            46    51       62       62       72       72         82
FPC 0 Sensor TopBack                 54    59       70       70       80       80         90
FPC 0 Sensor BottomBack              51    56       67       67       77       77         87
FPC 0 Sensor CPUTopLeft              46    51       62       62       72       72         82
FPC 0 Sensor CPUBottomMiddle         54    59       70       70       80       80         90
FPC 0 Sensor CPUTopBackRight         46    51       62       62       72       72         82
FPC 0 Sensor TH3 Max Reading         87    94      107      107      110      110        122
```

It is also helpful to calculate the percentage of fan RPM, or *duty cycle*, use the following in root:

```
root@re0.~#i2cget -y -f 13 0x66 0x11
0x07
```

In this example, the system returned the hexadecimal value `0x07`. Convert that value to decimal, which is 7 in this example. Then use this formula to get the duty cycle:

```
Duty cycle = (value returned + 1)*6.25%
```

In this example, duty cycle = (7 +1)*6.25 = 50%

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 QFX5220 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 49 on page 238. 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 49 on page 238 describes the chassis alarm messages on QFX5220.

Junos OS Evolved systems, such as QFX5220, are based on a new alarm infrastructure, not all power supplies and fan alarms are supported. Table 49 on page 238 shows these alarms.

Table 49: Chassis Alarm Messages for QFX5220

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.

Table 49: Chassis Alarm Messages for QFX5220 *(Continued)*

Component	Alarm Type	CLI Message	Recommended Action
		sensor-location Temp Sensor Too Hot	Check the 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.
	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.
		sensor-location Temp Sensor Too Warm	Check the 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.
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.

Table 49: Chassis Alarm Messages for QFX5220 *(Continued)*

Component	Alarm Type	CLI Message	Recommended Action
	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:
Routing Engine	Major (red)	`RE` *`RE number`* `/var partition is full`	File storage is at capacity. Reduce unnecessary files to free space.
	Minor (yellow)	`RE` *`RE number`* `/var partition is high`	File storage is reaching capacity. Reduce unnecessary files to free space.
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.

Configuration Changes Leading to Unexpected QFX5220 Behavior

Port and channelization configuration procedures vary by release and can be the cause of unexpected port or switch behavior on QFX5220 switches. Ensure you are using the correct configuration and channelization procedures for your release. See Table 50 on page 241.

Table 50: Release Dependant Port Configuration Changes

Model	Junos OS Evolved Release	Behavior
QFX5220-32C	19.1R1-EVO up to 20.1R1-EVO	If a single port is misconfigured, only the port that is misconfigured does not link.
	20.1R1-EVO and later	If a single port is misconfigured, all ports return to default mode for the PIC. In the case of the QFX5220-32C, ports **0** to **31** default to 400 GbE and ports **32** and **33** default to 10 GbE. For example, suppose you had several ports with QSFP28 optics, manually configured for 100 GbE in ports **0**-**31**. Later, you configured SFP+ port **33** also for 100 GbE. The software would allow the commit of the configuration, but the ports with the QSFP28 optics would default to 400 GbE , link would be down, and the SFP+ ports would default to 10 Gbps speed and the link would also be down.
QFX5220-128C	19.2R1-EVO up to 20.1R1-EVO	If a single port is misconfigured, only the port that is misconfigured does not link.
	20.1R1-EVO and later	If a single port is misconfigured, all ports return to default mode for the PIC. In the case of the QFX5220-128C, ports **0** to **127** default to 100 GbE and ports **128** and **129** default to 10 GbE. For example, suppose you had several even numbered ports with QSFP+ optics, manually configured for 100 GbE in ports **0**-**31**. Later, you configured SFP+ port **33** also for 40 GbE. The software would allow the commit of the configuration, but the ports with the QSFP+ optics would default to 100 GbE, link would be down, and the SFP+ ports would default to 10 Gbps speed and the link would also be down.
QFX5220-128C	19.2R1-EVO up to 20.2R1-EVO	You can configure any even-numbered QSFP28 port 40 Gbps speed. The system configures the next (odd) port as unused.
	20.2R1-EVO and later	You can configure all 128 QSFP28 ports for 40 Gbps speed.

How to Troubleshoot QFX5220-128C Port Configuration Problems

IN THIS SECTION

- Problem | 242

Problem

Description

For Junos OS Evolved releases up to 20.2R1, if you try to configure an even port as 40 Gbps, or if you don't follow the steps in the procedure in order, the link won't come up. If you see the error message below in */var/log/messages* the error is likely due to misconfiguration:

```
June 4 08:50:59 re0 evo-pfemand[5127]: [Error] BrcmPlusIf: In RTM mode only one 40G port is
allowed 8 cable Type 125
```

You can correct the configuration by following these steps:

1. Delete the port speed configuration and commit the configuration:

   ```
   # delete chassis fpc 0 pic 0 port port-number speed 40g
   # commit
   ```

2. Delete the unused port configuration and commit the configuration:

   ```
   # delete chassis fpc 0 pic 0 port port-number+1 unused
   # commit
   ```

3. Verify the desired port can be configured as 40 Gbps (see Table 8 on page 27) and perform the steps described in "Port Configurations" on page 26.

How to Troubleshoot QFX5220-128C Channelization Problems

IN THIS SECTION

- Problem | 243

Problem

Description

If you try to configure an ineligible port as channelized, or if you don't follow the steps in the procedure in order, the link won't come up, or only one sub-port interface is created. For example, in the output below from `show chassis interfaces`, there is only one sub-port created on et-0/0/20:

```
...
et-0/0/20:0             up    down.  # Only channel 0 is created. Channels 1-3 are not created.
et-0/0/21               up    up
et-0/0/22               up    up
et-0/0/23               up    down

...
```

The configuration can be corrected by following these steps:

1. Block the three ports following the misconfigured channelized port as unused, and commit the configuration if this step was not performed during the original configuration.

```
# set chassis fpc 0 pic 0 port port-number+1 unused
# set chassis fpc 0 pic 0 port port-number+2 unused
# set chassis fpc 0 pic 0 port port-number+3 unused
# commit
```

2. Delete the channelization configuration and commit the configuration:

```
# delete chassis fpc 0 pic 0 port port-number speed port-speed number-of-sub-ports 4
# commit
```

3. Delete the unused port configuration from the three ports folling the channelized port and commit the configuration:

```
# delete chassis fpc 0 pic 0 port port-number+1 unused
# delete chassis fpc 0 pic 0 port port-number+2 unused
# delete chassis fpc 0 pic 0 port port-number+3 unused
# commit
```

4. Verify the desired port can be configured as channelized, see Table 8 on page 27 and perform the steps described in "4 x 25 Gbps Port Channelization" on page 43.

RELATED DOCUMENTATION

Contact Customer Support

Definitions of Safety Warning Levels | **261**

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

CHAPTER 7

Contacting Customer Support and Returning the Chassis or Components

IN THIS CHAPTER

- Contact Customer Support to Obtain a Return Material Authorization | 246
- Returning the QFX5220 Chassis or Components | 247

Contact Customer Support to Obtain a Return Material Authorization

If you need to return a device or hardware component to Juniper Networks for repair or replacement, obtain an RMA number from JTAC. You must obtain an RMA number before you attempt to return the component.

After locating the serial number of the device or hardware component you want to return, open a service request with the 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 QFX5220 Chassis or Components

IN THIS SECTION

- Locating the Serial Number on a QFX5220 Device or Component | 247
- Removing the Solid-State Drives for RMA | 252
- How to Return a Hardware Component to Juniper Networks, Inc. | 254
- Guidelines for Packing Hardware Components for Shipment | 255
- Packing a QFX5220 Device or Component for Shipping | 256

Locating the Serial Number on a QFX5220 Device or Component

IN THIS SECTION

- Listing the Chassis and Component Details Using the CLI | 248
- Locating the Chassis Serial Number ID Label on a QFX5220 | 249
- Locating the Serial Number ID Labels on FRU Components | 250

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 this 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 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 QFX5220 switch and components and their serial numbers, use the `show chassis hardware` CLI operational mode command. The following examples shows the output for the QFX5220-32CD model.

```
user@device> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                               XC0218460016      QFX5220-32CD
PSM 0            REV 02   740-085431   1ED78440594       JPSU-1600W-AC-AFO
Routing Engine 0          BUILTIN      BUILTIN           RE-QFX5220-32CD
CB 0             REV 02   650-086244   XC0218460016      QFX5220-32CD
FPC 0                     BUILTIN      BUILTIN           QFX5220-32CD
  PIC 0                   BUILTIN      BUILTIN           32X400G-QSFP-DD
    Xcvr 10      REV 01   720-088939   1J1C48A340921     QSFP56-DD-400G-CR8-
CU-2
                                .5M
    Xcvr 16      REV 01   720-088939   1J1C48A340925     QSFP56-DD-400G-CR8-
CU-2
                                .5M
    Xcvr 18      REV 01   720-088939   1J1C48A340920     QSFP56-DD-400G-CR8-
CU-2
                                .5M
    Xcvr 22      REV 01   720-088939   1J1C48A340935     QSFP56-DD-400G-CR8-
CU-2
                                .5M
    Xcvr 26      REV 01   720-087756   1J1C45A337038     QSFP56-DD-400G-CR8-
CU-1
                                M
    Xcvr 27      REV 01   720-087756   1J1C45A337016     QSFP56-DD-400G-CR8-
CU-1
                                M
    Xcvr 28      REV 01   720-088939   1J1C48A340917     QSFP56-DD-400G-CR8-
CU-2
                                .5M
    Xcvr 30      REV 01   720-088939   1J1C48A340931     QSFP56-DD-400G-CR8-CU-2.5M
```

```
Fan Tray 0                                        QFX5220-32CD Fan Tray, Front to Back
Airflow - AFO
Fan Tray 1                                        QFX5220-32CD Fan Tray, Front to Back
Airflow - AFO
Fan Tray 2                                        QFX5220-32CD Fan Tray, Front to Back
Airflow - AFO
Fan Tray 3                                        QFX5220-32CD Fan Tray, Front to Back
Airflow - AFO
Fan Tray 4                                        QFX5220-32CD Fan Tray, Front to Back
Airflow - AFO
Fan Tray 5                                        QFX5220-32CD Fan Tray, Front to Back
Airflow - AFO
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 QFX5220

You can find the chassis serial number in either the `show chassis hardware` command output or physically on a pull-out tab located on the right side of the QFX5220 port panel. For an example of where to find the serial number ID on the chassis, see Figure 123 on page 249 for the QFX5220-32CD and Figure 124 on page 250 for the QFX5220-128C.

Figure 123: Location of the Serial Number ID Label on a QFX5220-32CD Switch

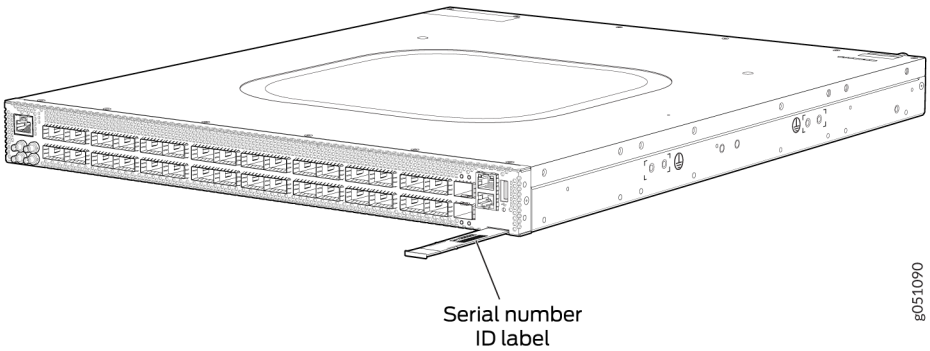
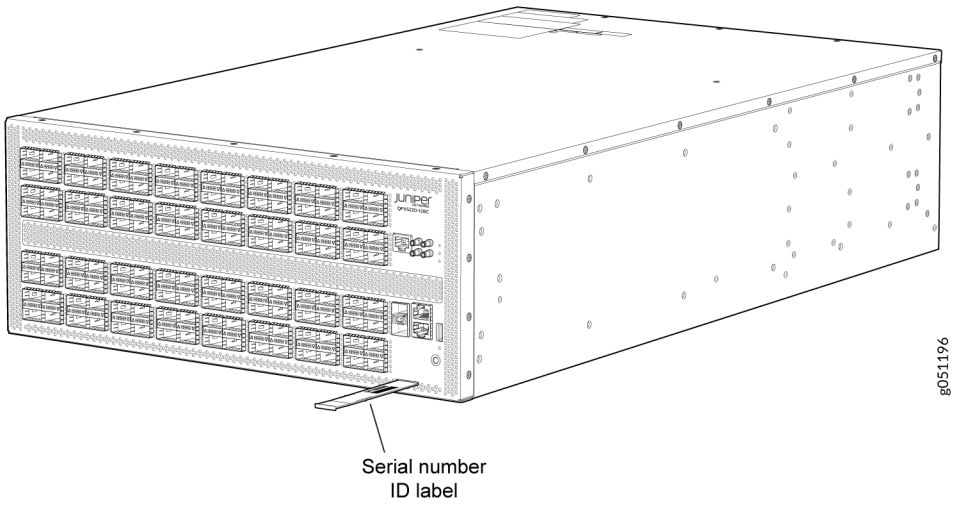


Figure 124: Location of the Serial Number ID Label on a QFX5220-128C Switch

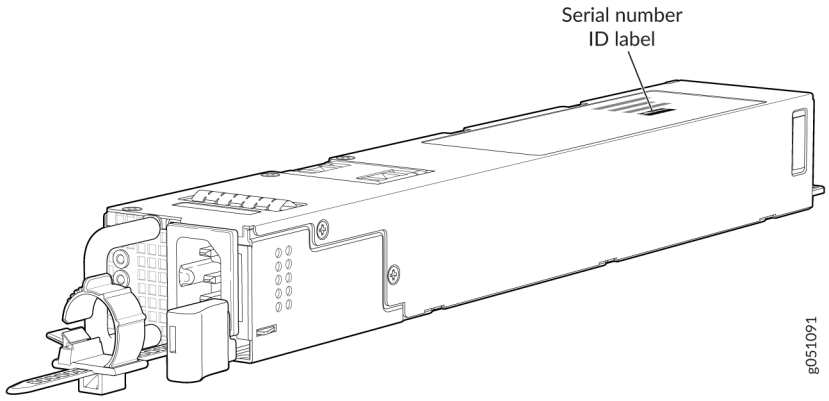


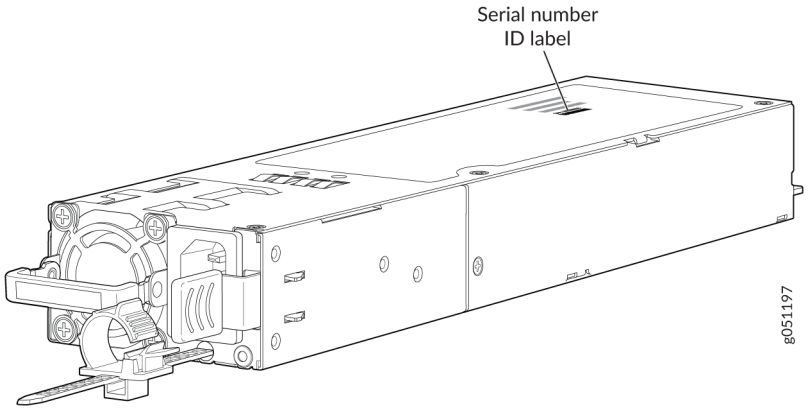
Locating the Serial Number ID Labels on FRU Components

The power supplies and fan modules installed in a QFX5220 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.

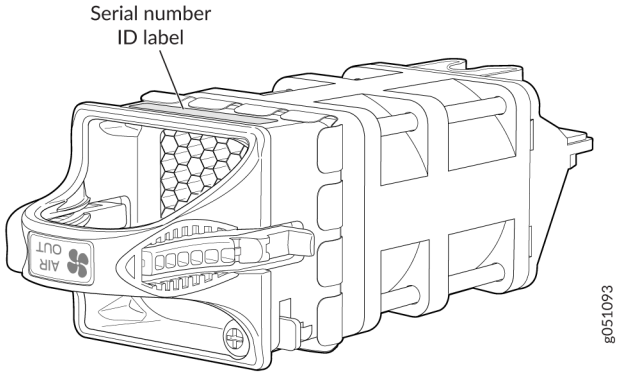
Figure 125: Serial Number ID Label on a QFX5220-32CD AC Power Supply

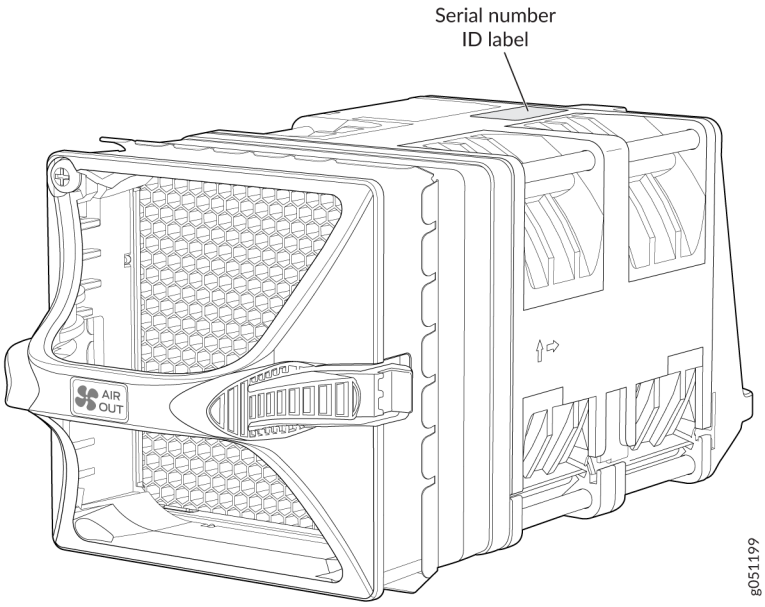




- Fan module—The serial number ID label is on the bottom of the fan module.

Figure 126: Serial Number ID Label on a QFX5220-32CD Fan Module





Removing the Solid-State Drives for RMA

The QFX5220 models have two solid-state drives (SSDs) that store the software images, system logs, and the configuration files. Before returning a chassis to Juniper Networks as part of a Return Merchandise Authorization (RMA), you have the option of removing the SSDs and disposing them according to your own company's security procedures. Before you begin this procedure, ensure you have the following tools:

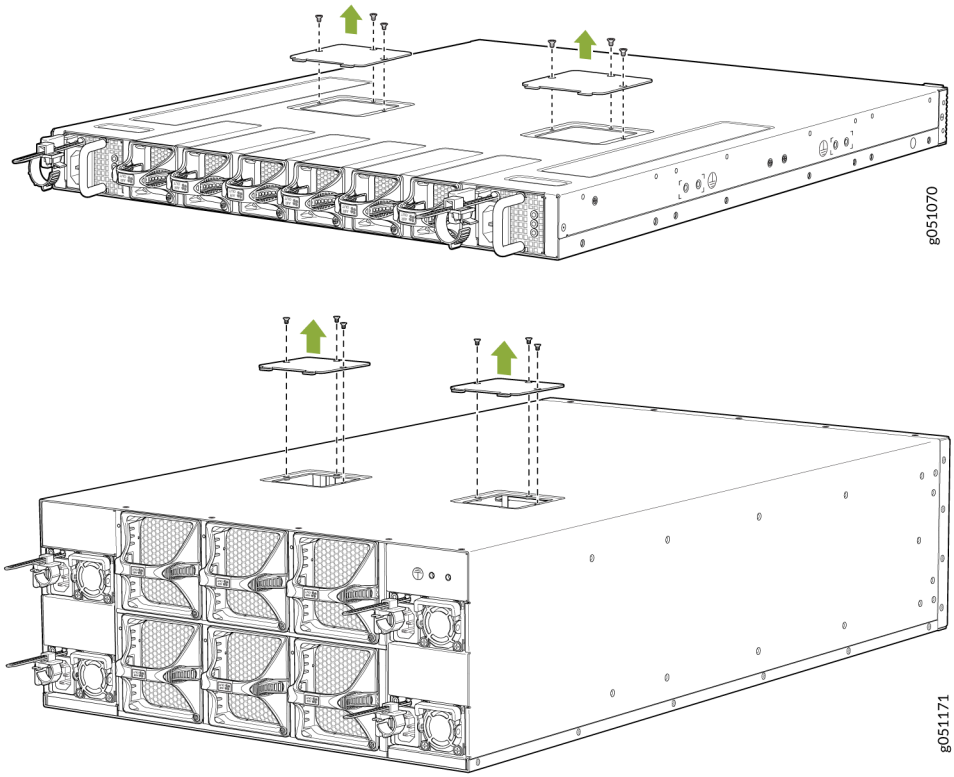
- ESD grounding strip (not provided)
- Number 2 Phillips screwdriver

Use this optional procedure to remove the drives from the QFX5220 after the device has shutdown and you've removed it from the rack or cabinet. The SSD doors are located on the top of QFX5220-32CD and on the bottom of the QFX5220-128C.

1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. Place the device on a firm surface such as a workbench or a table with the SSD doors facing up.
3. For the QFX5220-32CD–Use the number 2 Phillips screwdriver to remove the three flat-head screws from each door on the top of the device. See Figure 127 on page 253.

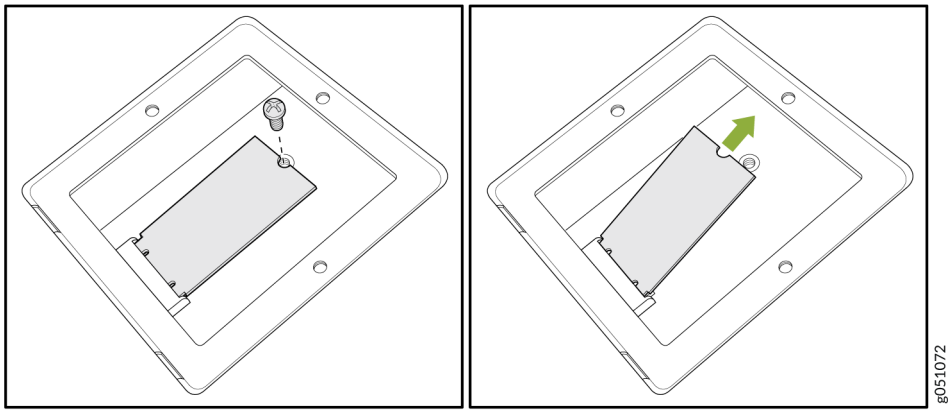
   For the QFX5220-128C–Turn the switch over to show the bottom panel of the switch. Use the number 2 Phillips screwdriver to remove the three flat-head screws from each door.

Figure 127: Remove the Screws on the SSD Doors



4. Remove the doors and set aside with the screws.
5. Use the Phillips screwdriver to remove the screw on one of the SSDs and set it aside.

Figure 128: Removing the Screw and Lifting the SDD Out



6. Lift the end furthest from the connector and remove from the cavity. Repeat Step 5 and Step 6.

7. Replace the screws and hand-tighten the screws using the Phillips screwdriver.
8. Replace the SSD doors and the six flat-head screws.

Figure 129: Replace the Screws on the SSD Doors of the QFX5220-32CD

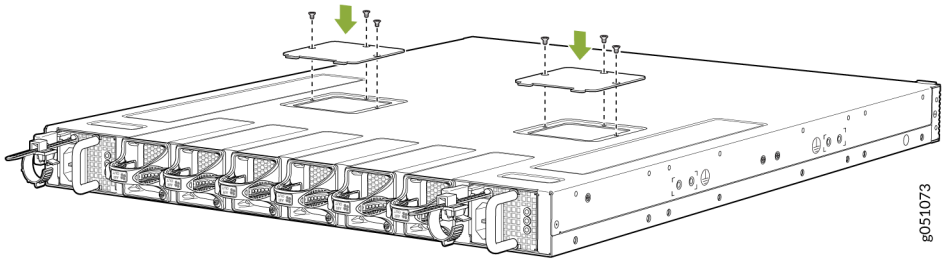
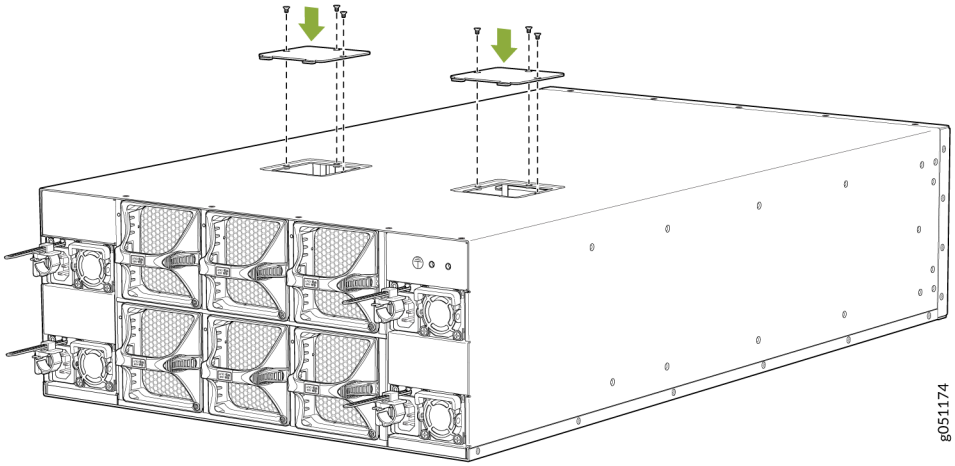


Figure 130: Replace the Screws on the SSD Doors of the QFX5220-128C



9. Hand tighten the screws using the number 2 Phillips screwdriver.
10. Dispose of the SSDs according to your site security procedures.

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

If a hardware component fails, you need to 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 QFX5220 Device or Component for Shipping

IN THIS SECTION

- Packing a QFX5220 Switch for Shipping | 256
- Packing QFX5220 Components for Shipping | 257

If you are returning a QFX5220 or one of its components to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you pack a QFX5220 or component:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 285.
- 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 "Contact Customer Support to Obtain a Return Material Authorization" on page 246.

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:

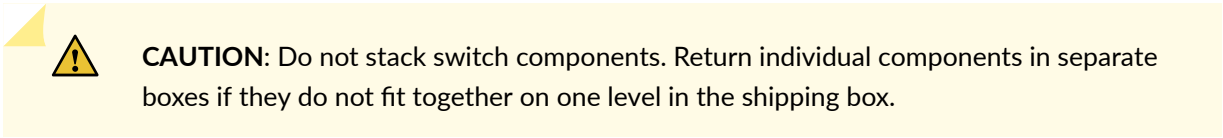
Packing a QFX5220 Switch for Shipping

To pack a QFX5220 for shipping:

1. Power down the switch and remove the power cables. See "Powering Off a QFX5220" on page 231.

2. Remove the cables that connect the QFX5220 to all external devices.
3. QFX5220-128C only–Remove the EMI door (see).
4. Remove all field-replaceable units (FRUs) from the switch.
5. Have one person support the weight of the switch while another person unscrews and removes the mounting screws.
6. Remove the switch from the rack or cabinet (see "QFX5220 Installation Safety Guidelines" on page 145) and place the switch in a large antistatic bag.
7. Place the switch in the shipping carton.
8. Place the packing foam on top of and around the switch.
9. If you are returning accessories or FRUs with the switch, pack them as instructed in "Packing QFX5220 Components for Shipping" on page 257.
10. Replace the accessory box on top of the packing foam.
11. Close the top of the cardboard shipping box and seal it with packing tape.
12. Write the RMA number on the exterior of the box to ensure proper tracking.

Packing QFX5220 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 QFX5220 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 a Return Material Authorization | 246

8
CHAPTER

Safety and Compliance Information

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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 for 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.

LASER 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 familiarize yourself 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 THIS SECTION

- Fire Suppression | 264
- Fire Suppression Equipment | 264

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.

QFX5220 Installation Safety Guidelines

Observe the following guidelines for lifting and moving a QFX5220:

CAUTION: If you are installing the QFX5220 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 QFX5220, read the guidelines in "QFX5220 Site Preparation Checklist" on page 108 to verify that the intended site meets the specified power, environmental, and clearance requirements.
- Before lifting or moving the QFX5220, 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.

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:

- Install the device in a rack that is secured to the building structure.
- Mount the device 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

- General Laser Safety Guidelines | **274**
- Class 1 Laser Product Warning | **274**
- Class 1 LED Product Warning | **275**
- Laser Beam Warning | **275**

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 IEC/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.

LASER 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

LASER 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

LASER 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

LASER 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

LASER 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

- Battery Handling Warning | **277**
- Jewelry Removal Warning | **279**
- Lightning Activity Warning | **280**
- Operating Temperature Warning | **281**
- Product Disposal Warning | **282**

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 (Network Equipment-Building System) 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 you clean grounding surface and give them a bright finish before making grounding connections.
- 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, and 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 131 on page 286) 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).

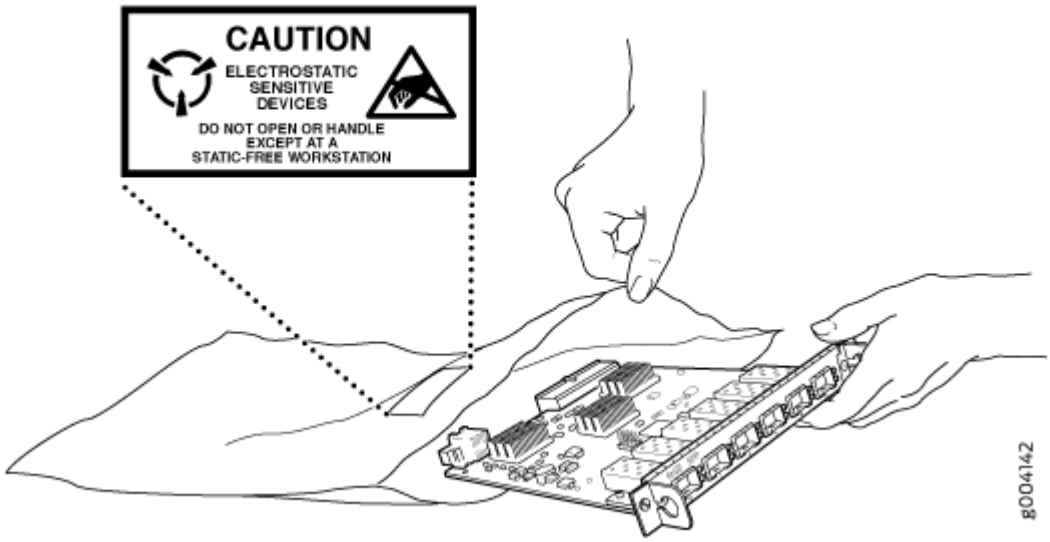
- When handling any component that is subject to ESD damage and that is removed from the device, make sure the equipment end of your ESD wrist strap is attached to the ESD point on the chassis.

  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 131 on page 286). If you are returning a component, place it in an antistatic bag before packing it.

Figure 131: 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。

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

- Agency Approvals for the QFX Series | **297**

See the following topics for agency and compliance information:

Agency Approvals for the QFX Series

IN THIS SECTION

- Compliance Statement for Argentina | 298

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

Compliance Statement for Argentina

EQUIPO DE USO IDÓNEO.

RELATED DOCUMENTATION

> *General Safety Guidelines and Warnings*

Statements of Volatility for Juniper Network Devices

A *statement of volatility (SoV)*—sometimes known as *letter of volatility (LoV)*—identifies the volatile and non-volatile storage components in Juniper Networks devices, and describes how to remove non-volatile storage components from the device.

NOTE: Individual FRUs do not have separate SoV or LoV documents. They are covered in the SoV or LoV of the Juniper Networks device in which they are installed.

NOTE: Statements of volatility are not available for all Juniper Networks devices.

CTP Series:

- CTP150
- CTP2000

EX Series:

- EX2200 and EX2200-C
- EX2300-24P, EX2300-24T, and EX2300-24T-DC
- EX2300-48P and EX2300-48T
- EX2300-C
- EX3300
- EX3400-24P, EX3400-24T, EX3400-24T-DC
- EX3400-48P, EX3400-48T, EX3400-48T-AFI
- EX4200
- EX4300
- EX4300-48MP
- EX4400
    1. EX4400-24T
    2. EX4400-24P
    3. EX4400-24MP
    4. EX4400-48T
    5. EX4400-48P
    6. EX4400-48MP

7. EX4400-48F

- EX4500
- EX4550
- EX4600
- EX8200
- EX9251
- EX9253
- XRE200 External Routing Engine

LN Series:

- LN1000–CC

MX Series:

- M7i
- M7i Compact Forwarding Engine Board (CFEB)
- M40e and M10i
- M320
- MX5, MX10, MX40, and MX80
- MX104
- MX204
- MX304
- MX240, MX480, and MX960
- MX10003
- RE-A-2000 Route Engine
- RE-S-X6-64G Routing Engine

NFX Series:

- NFX250

QFX Series:

- QFX3008-I
- QFX3100
- QFX3500
- QFX3600
- QFX5100-24Q
- QFX5100-48S
- QFX5100-48T
- QFX5110-32Q
- QFX5110-48S
- QFX5120
    1. QFX5120-32C
    2. QFX5120-48T
    3. QFX5120-48Y
    4. QFX5120-48YM
- QFX5200
- QFX5200-32C
- QFX10008 and QFX10016

SRX Series:

- SRX100
- SRX110
- SRX210B
- SRX210H-POE
- SRX210H-P-MGW
- SRX220
- SRX240H
- SRX240H-POE

- SRX300
- SRX320
- SRX340 and SRX345
- SRX380
- SRX550
- SRX650
- SRX1400
- SRX1500
- SRX3400 and SRX3600
- SRX4200
- SRX4600
- SRX5400, SRX5600, and SRX5800
- SRX-MP-1SERIAL
- SSG-520M

T Series:

- RE-A-2000 Route Engine