

QFX5140 Hardware Guide

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QFX5140 Hardware Guide

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About This Guide

Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the QFX5140 Switch.

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

Documentation Conventions

For information about the notice icons and text and syntax conventions used in the documentation, see [Documentation Conventions](#).

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1

CHAPTER

Fast Track: Initial Installation

IN THIS CHAPTER

- [Fast Track to Rack Installation and Power | 2](#)
 - [Onboard, Configure, and Monitor QFX5140 | 9](#)
-

Fast Track to Rack Installation and Power

SUMMARY

This procedure guides you through the simplest steps to install your QFX5140 in a rack and connect it to power.

IN THIS SECTION

- [Install the QFX5140 in a Rack | 2](#)
- [Connect to Power | 7](#)



Install the QFX5140 in a Rack

You can install the Juniper Networks® QFX5140 in a four-post threaded-hole rack or a four-post square-holed rack. We'll walk you through the steps to install an AC-powered device in a four-post square-holed rack for a QFX5140 switch.

Ensure that you have the following tools and parts available:

- An electrostatic discharge (ESD) grounding strap (provided)
- A pair of front-mounting and rear-floating rails (provided with the rack-mount kit [RMK])

These mounting rails attach to the front and rear rack posts, respectively.

- A pair of chassis brackets (provided with the RMK)

You must attach these brackets to the device if the brackets are not preinstalled.



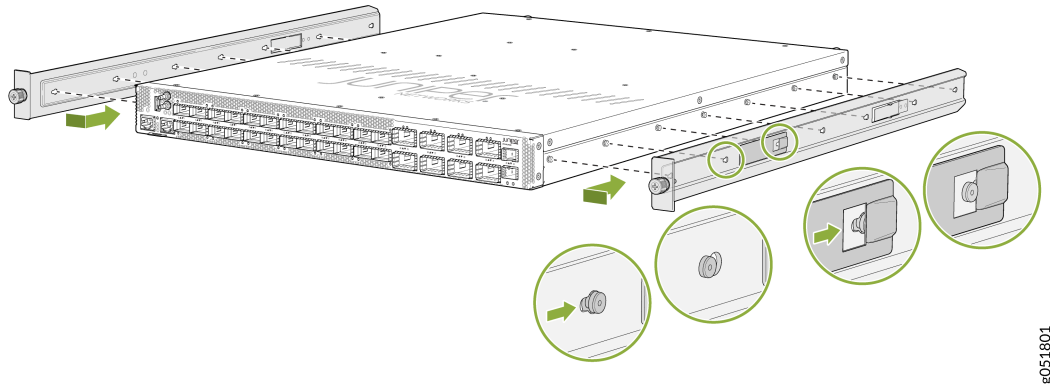
NOTE: Juniper provides the four-post rack mount kit **JNP-4P-TL-1RU-RMK** with the QFX5140. If the four-post kit is lost or damaged, you can order a replacement.

To mount the QFX5140:

1. Wrap and fasten one end of the ESD cable grounding strap around your bare wrist. Connect the other end to a site ESD point.

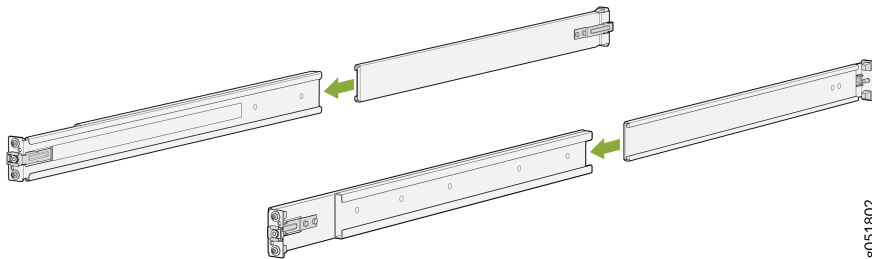
2. Attach the chassis brackets to the chassis by aligning the keyholes on the chassis brackets with the shoulder screws on the chassis. Slide the chassis brackets toward the rear of the chassis.

Figure 1: Install the Chassis Brackets



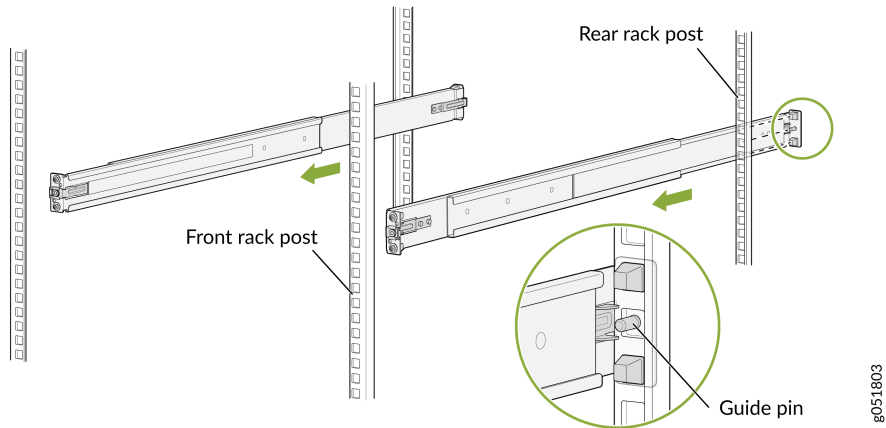
3. Assemble the mounting rails by sliding the rear-floating rails into the respective front-mounting rails.

Figure 2: Assemble the Mounting Rails



4. Install the mounting rails on the four-post rack:
 - a. Use the guide pin to align the guide blocks of the rear-floating rails with the corresponding rear post holes. Pull the rear-floating rails toward the front of the rack to lock the rails in place. You will hear a distinct click sound when the latch locks into the corresponding rack holes.

Figure 3: Secure Rear-Floating Rails



- b. Align the guide blocks of the front-mounting rails with the front post holes. Push the front-mounting rails toward the rear of the rack to lock the rails in place. You will hear a distinct click sound when the latch locks into the corresponding rack holes.

Figure 4: Secure Front-Mounting Rails

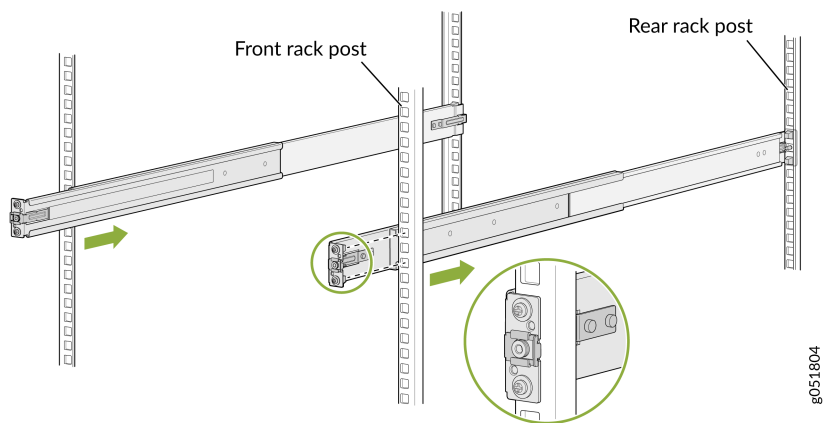
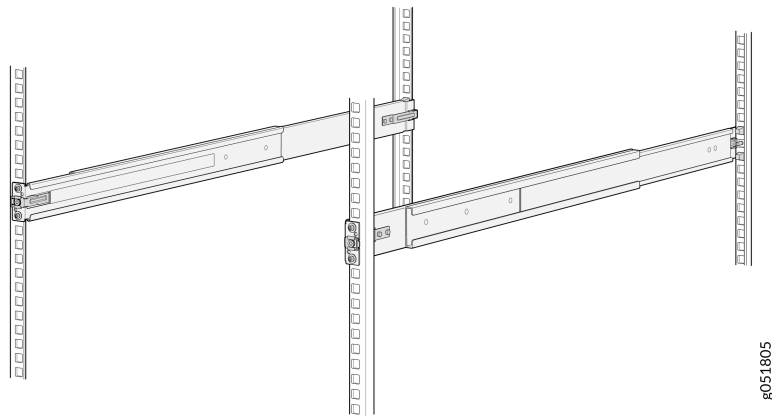


Figure 5: Both Mounting Rails Installed and Secured

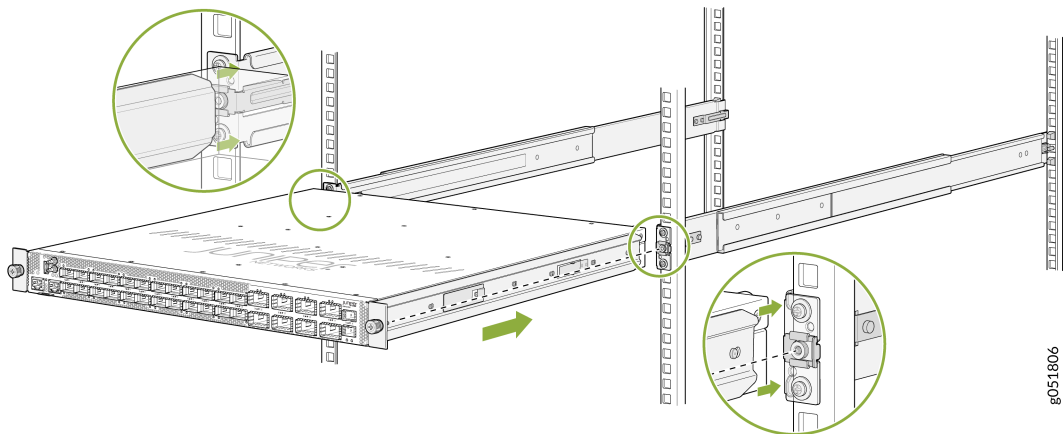


- c. Visually confirm that you have locked the front and rear latches into the mounting rails. The mounting rails should now be securely installed on the rack.
5. Lift the device and position it in the rack, aligning the chassis brackets with the mounting rails. Slide the device all the way into the channels of the mounting rails.



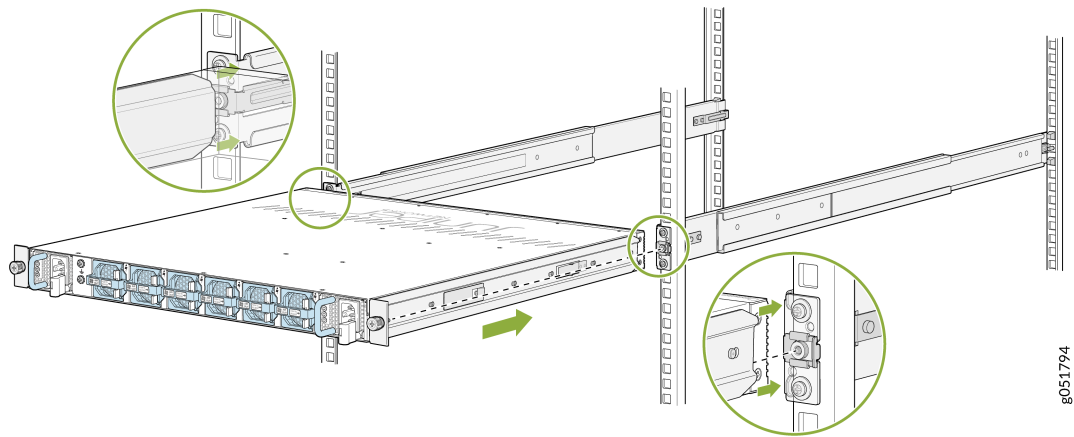
NOTE: In an airflow out (AFO) configuration, the chassis is installed with its front panel facing the front of the rack.

Figure 6: Slide the QFX5140 into the Rack (for AFO configuration)



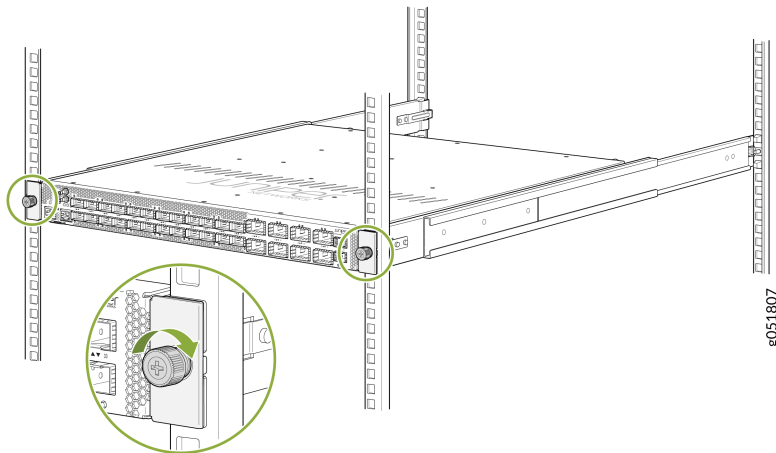
NOTE: In an airflow in (AFI) configuration, the chassis is installed with its rear panel facing the front of the rack and its front panel facing the rear. This orientation may appear unusual, but it is required for proper airflow in an AFI configuration.

Figure 7: Slide the QFX5140 in the Rack (for AFI Configuration)



6. Tighten the two thumbscrews (in a clockwise direction) to secure the device.

Figure 8: Tighten the Thumbscrews



Connect to Power

IN THIS SECTION

- [Ground the QFX5140 | 7](#)
- [Connect the Power Cord and Power On the QFX5140 | 8](#)

To connect the QFX5140 to AC power, you must perform the following tasks:

Ground the QFX5140

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the QFX5140 to an earth ground before you connect it to power.



NOTE: Before you connect the earth ground and the protective earthing terminal of the device, ensure that a licensed electrician attaches an appropriate grounding terminal to the grounding cable. Using a grounding cable with an incorrectly attached terminal can damage the device.

Before connecting the device to an earth ground, ensure that you have the following parts and tools:

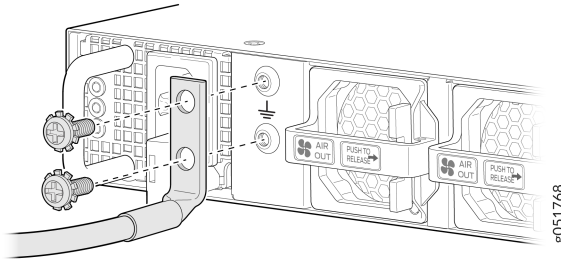
- An electrostatic discharge (ESD) grounding strap.
- A grounding cable for your device—The grounding cable must be 6 AWG (4.11 mm²) stranded wire and rated 90 °C or according to the local electrical code.
- A grounding 2-hole terminal lug for your grounding cable—The grounding terminal lug attaches to the chassis grounding point.
- A Phillips (+) screwdriver, number 2 to tighten the screw.

To ground the QFX5140:

1. Ensure that all grounding surfaces are clean and brought to a bright finish before making the grounding connections.
2. Connect the grounding cable to a proper earth ground, such as the rack in which you mount the device.
3. Using the Phillips screwdriver, remove the screws from the chassis grounding point.

Secure the terminal lug attached to the other end of the grounding cable to the chassis grounding point by using the screws that you removed from the chassis grounding point.

Figure 9: Grounding Point on the QFX5140



4. Verify that the grounding cable does not touch or block access to the device components. Make sure that the cable does not trail across the floor where people could trip over it.



NOTE: Ensure that the device is permanently connected to ground during its operation.

Connect the Power Cord and Power On the QFX5140



CAUTION: Do not mix AC and DC power supply units (PSUs) in the same chassis.

Before you begin to connect the device to AC power:

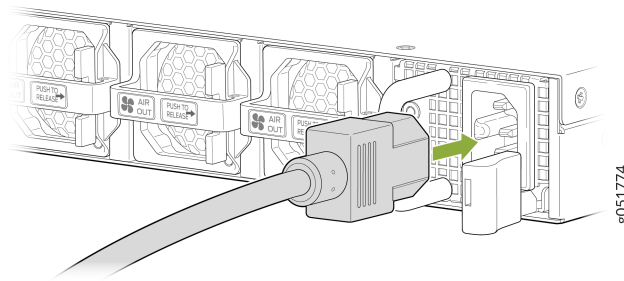
- Ensure that you have connected the chassis to an earth ground.
- Ensure that you have a power cord appropriate for your geographical location available to connect the device to AC power.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage.
- Ensure that you have an ESD grounding strap.
- If not already installed, install the PSUs in the device.

To connect the power cord and power on the device:

1. Align the AC power cable connector with the PSU inlet.
2. Insert the AC power cable.

3. Push the connector firmly into the PSU inlet until fully seated.

Figure 10: Connect Power Cord to the QFX5140 AC PSU



4. If the AC power source outlet has a power switch, set it to the off (O) position.
5. Insert the power cord plug into the AC power source outlet.



NOTE: Connect each PSU to a dedicated AC power feed and a dedicated external circuit breaker. We recommend that you use a minimum of 16 A (250 VAC), or as permitted by the local code.

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

Onboard, Configure, and Monitor QFX5140

SUMMARY

This topic provides pointers to onboard, configure, and monitor QFX5140 switches using the CLI.

You can configure and monitor a QFX5140 Switch using the Junos OS Evolved CLI.

Table 1: Configure QFX5140 Using the CLI

If You Want To	Then
Customize the basic configuration	See "Configure Junos OS Evolved on the QFX5140" on page 96.
Configure supported software features on the QFX5140	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

Device Overview

IN THIS CHAPTER

- [QFX5140 Overview | 12](#)
 - [QFX5140 Field-Replaceable Units | 16](#)
 - [QFX5140 Software Features | 16](#)
-

QFX5140 Overview

SUMMARY

Learn about the hardware features, architecture, and capabilities of the QFX5140 switch.

IN THIS SECTION

- [Meet the QFX5140 Switch | 12](#)
- [Hardware Architecture | 13](#)
- [QFX5140: Key Specifications | 14](#)
- [Benefits of the QFX5140 Switch | 14](#)
- [System Software | 15](#)
- [Component Redundancy | 15](#)
- [Field-Replaceable Units | 15](#)

Meet the QFX5140 Switch

The QFX5140-24CD80 Switch is a high-performance 1 rack-unit (U) data center switch that you can deploy as a leaf or spine device in modern IP fabric and EVPN-VXLAN architectures. The platform is based on Trident 5 ASIC and delivers high-density 400G and 800G connectivity.

The switch provides 24 ports that house QSFP112 transceivers supporting up to 400-gigabit per second (Gbps) speed and eight ports that house OSFP transceivers supporting up to 800-Gbps speed.. These ports support flexible speeds, including 25 Gbps, 50 Gbps, 100 Gbps, 200 Gbps, 400 Gbps, and 800 Gbps, with multiple breakout configurations. This flexibility makes the QFX5140 an optimal choice for high-bandwidth workloads such as cloud computing, AI/ML, and high-performance computing (HPC).

The QFX5140 platform supports advanced routing and switching features and delivers low latency, high throughput, and scalable performance for next-generation data center deployments.

Figure 11: Front View of the QFX5140 Switch

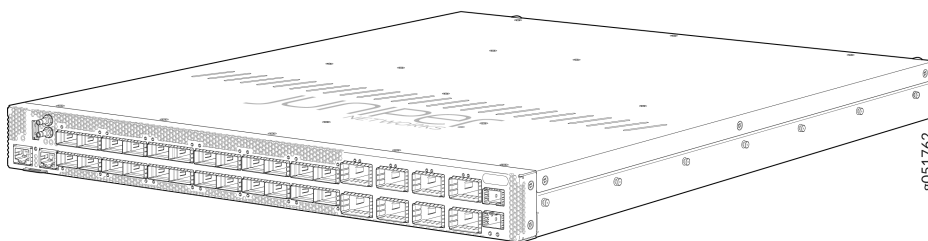


Figure 12: Rear View of the QFX5140 Switch (AC Variant)

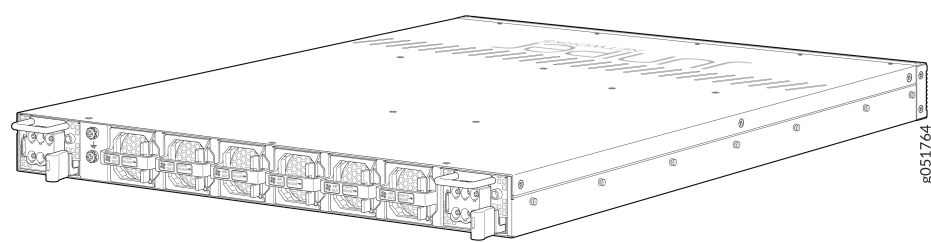


Figure 13: Rear View of the QFX5140 Switch (DC Variant)

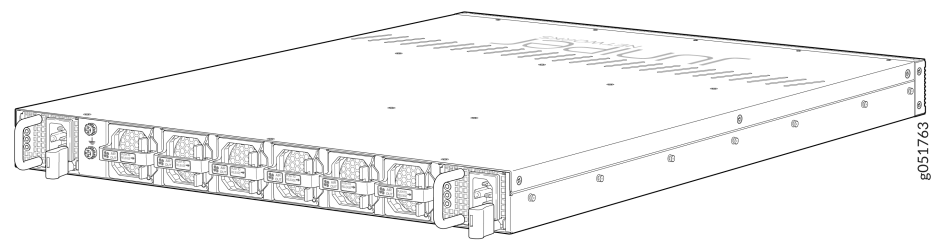
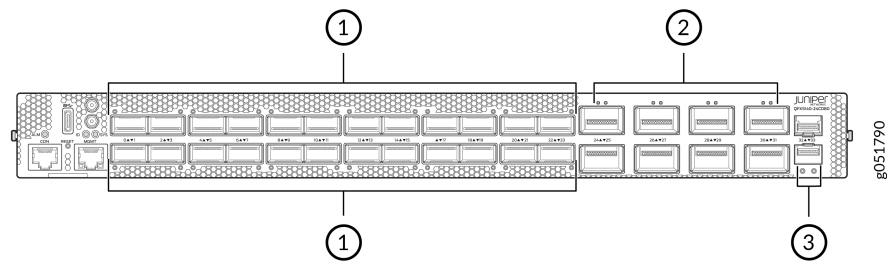


Figure 14: Front Panel Components of the QFX5140 Switch



1– QSFP112 ports [0-23]	3– Management and console interfaces
2– OSFP800 ports [24-31]	

Hardware Architecture

The QFX5140 switch architecture includes a main board with a Trident 5 ASIC, a CPU subsystem based on Intel Ice Lake-D, and modular, field-replaceable components for power and cooling.

The platform supports both front-to-back (airflow out) and back-to-front (airflow in) airflow configurations. The switch includes hot-swappable fan trays and redundant power supplies to ensure continuous operation.

QFX5140: Key Specifications

Characteristic	Description
Form factor	1 RU rack-mount
Switch ASIC	Trident 5, 16 Tbps
Ports	• 24 x QSFP112 (up to 400G) • 8 x OSFP (up to 800G) • 2 x SFP28 (10/25G)
Management interfaces	• 1 x RJ-45 management port • 1 x console port
Cooling	Hot-swappable fan trays with N+1 redundancy
Power	Dual hot-swappable PSUs (1+1 redundancy), AC and DC models
Timing	IEEE 1588 with 1PPS and 10 MHz outputs
Processor	Intel Ice Lake-D CPU with 32 GB memory

Benefits of the QFX5140 Switch

- High-density 400G and 800G connectivity in a compact 1RU form factor.
- 16 Tbps switching capacity with low-latency architecture.
- Flexible port speeds and breakout configurations.
- Support for AI/ML, cloud, and high-performance workloads.
- Operational resiliency with redundant power and cooling.

- Support for precision timing with IEEE 1588.

System Software

The QFX5140 switch runs Junos OS Evolved software. You can configure and manage the switch through the command-line interface (CLI) using the console or management interfaces.

The platform supports standard Junos OS Evolved operational and configuration capabilities, including interface configuration, monitoring, and system management.

Component Redundancy

- **Power supplies:** Two hot-swappable PSUs provide 1+1 redundancy. Use separate power sources to ensure full redundancy.
- **Cooling:** The cooling system consists of six fan modules with each fan module containing two rotors. The cooling system offers N+1 redundancy only at the rotor level. If more than one rotor of any fan module fails and is unable to keep the QFX5140 switch within desired temperature thresholds, chassis alarms occur and the QFX5140 switch shuts down.

Field-Replaceable Units

These components can be replaced without powering off the switch:

FRU	Description
Power supplies	Hot-swappable; maintain redundancy when replacing
Fan trays	Hot-swappable; required for proper cooling
Optics	Hot-pluggable

For a detailed list of features on QFX5140, see [Feature Explorer](#).

For a detailed comparison of hardware features, see [Hardware Compatibility Tool](#).

QFX5140 Field-Replaceable Units

SUMMARY	IN THIS SECTION
Learn about the field-replaceable units in the QFX5140.	

Field-replaceable units (FRUs) are components that you can replace at your site. There are two types of FRUs:

- Hot-insertable and hot-removable—You can remove and replace these components without powering off the device or disrupting the device functions.
- Hot-pluggable—You can remove and replace these components without powering off the device, but the device function is interrupted until you replace the component.

Table 2: QFX5140 FRUs

FRU	Type
Power supply units	Hot-insertable and hot-removable, if redundant
Fan modules	Hot-insertable and hot-removable, if redundant
Transceivers	Hot-pluggable

QFX5140 Software Features

SUMMARY	IN THIS SECTION
This topic describes the key software features available on the QFX5140.	

For a complete list of all software features supported on the QFX5140, see [Feature Explorer](#).

Some key features are listed below:

Table 3: QFX5140 Software Features

Feature Category	Documentation
Bidirectional Forwarding Detection	High Availability User Guide
Class of service (CoS)	Traffic Management User Guide
Dynamic Host Configuration Protocol	DHCP User Guide
EVPN	Traffic Management User Guide
	Routing Policies, Firewall Filters, and Traffic Policers User Guide
	Network Management and Monitoring Guide
	Data Center EVPN-VXLAN Fabric Architecture Guide
	Multicast Protocols User Guide
Routing policies and firewall filters	Routing Policies, Firewall Filters, and Traffic Policers User Guide

3

CHAPTER

Chassis

IN THIS CHAPTER

- [QFX5140 Chassis | 19](#)
 - [QFX5140 Configurations | 23](#)
 - [QFX5140 Chassis LEDs | 24](#)
-

QFX5140 Chassis

SUMMARY

Learn about the components in the QFX5140 chassis.

IN THIS SECTION

- [QFX5140 Specifications | 19](#)
- [QFX5140 Front Panel | 20](#)
- [QFX5140 Rear Panel | 22](#)

The QFX5140 chassis is a rigid sheet-metal structure that houses all components of the device.

QFX5140 Specifications

Table 4: Physical Specifications

Specification	Value
Specification	Value
Height	1.72 in. (4.3 cm)
Width	17.28 in. (44 cm)
Depth	21.59 in. (53.59 cm)
Weight	As shipped: 24.5lb (11.1 kg) with power supplies and fans installed (AC PSU Model)

Table 5: Environmental Specifications

Specification	Value
Operating altitude	- QFX5140-24CD8O-AO: 0 ft to 6000 ft (0 m to 1829 m) at 0°C to 40°C - QFX5140-24CD8O-AI: 0 ft to 6000 ft (0 m to 1829 m) at 0°C to 35°C 0 ft (0 m) at 0°C to 40°C
Operating temperature	AC Models: 0 °C to 40 °C
Storage temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Relative humidity (operating) (noncondensing)	5% to 90%
Relative humidity (nonoperating) (noncondensing)	5% to 90%
Seismic tolerance	Designed to meet Zone 4 earthquake requirements.
Acoustic noise level	Typical: 78 dBA NOTE: Acoustic noise level for QFX5140-24CD8O-AI can exceed 78dbA (upto 83.6dBA) depending on the optics used in the system.

QFX5140 Front Panel

Figure 15 on page 21 shows the front panel components available in the QFX5140 switch.

Figure 15: QFX5140 Front Panel Components

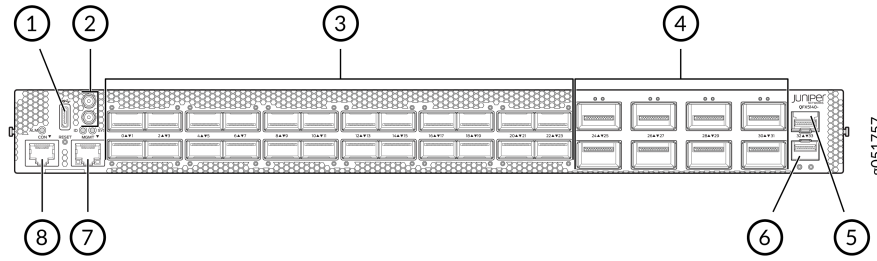


Table 6: Components on the QFX5140 Front Panel

Callout	Item	Description
1	USB port	A USB 3.0 Type A port for plugging in USB storage devices to install Junos OS Evolved manually.
2	PTP and external clock connections	A PTP (Precision Time Protocol) Grandmaster clock and external connection port acts as the highly accurate time source for a network.
3	QSFP112 ports	24 QSFP112 ports designed to handle up to 400 Gb/s
4	OSFP800 ports	8 OSFP800 ports designed to handle up to 800 Gbps.
5	SFP28 port	High-speed network interfaces used for 25-Gigabit Ethernet connectivity.
6	SFP28 port	High-speed network interfaces used for 25-Gigabit Ethernet connectivity.
7	Management port	RJ-45 Ethernet port used for out-of-band management access to the device.
8	Console port	RJ-45 serial port used for direct, local access to the device CLI for configuration and troubleshooting.

QFX5140 Rear Panel

Figure 16 on page 22 shows the rear panel components in the QFX5140 switch.

Figure 16: QFX5140 Rear Panel Components (AC Variant)

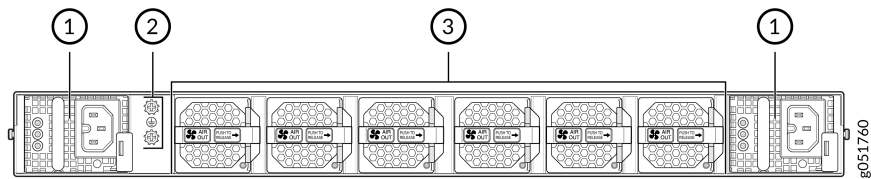


Table 7: Components on the QFX5140 Rear Panel (AC Variant)

Callout	Item	Description
1	Power supply units	Two removable AC power supply units that provide electrical power to the device. These are hot-swappable and designed for redundancy.
2	Grounding Lug / Ground Point	Used to connect the device to earth ground; protects against surges and static discharge.
3	Fan Modules	Provide airflow cooling across the chassis and maintain proper operating temperature.

Figure 17 on page 22 shows the rear panel components in the QFX5140 switch.

Figure 17: Components on the QFX5140 Rear Panel (DC Variant)

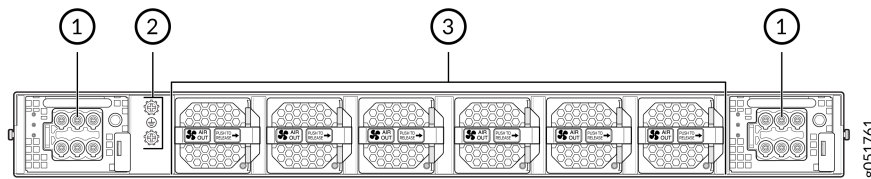


Table 8: Components on the QFX5140 Rear Panel (DC Variant)

Callout	Item	Description
1	DC Power supply units	Two 1600-W DC PSUs (1+1 redundancy)
2	Grounding Lug / Ground Point	Used to connect the device to earth ground; protects against surges and static discharge.
3	Fan Modules	Provide airflow cooling across the chassis and maintain proper operating temperature.

QFX5140 Configurations

SUMMARY

Learn about the various configurations for the QFX5140.

IN THIS SECTION

The QFX5140 is available in the following configuration:

Table 9: QFX5140 Hardware Configurations

Name	Configuration
QFX5140-24CD8O-AI	AC-powered system with 24×400G QSFP112 ports and 8×800G OSFP ports; AFI (back-to-front) cooling
QFX5140-24CD8O-AO	AC-powered system with 24×400G QSFP112 ports and 8×800G OSFP ports; AFO (front-to-back) cooling

Table 9: QFX5140 Hardware Configurations (*Continued*)

Name	Configuration
QFX5140-24CD8O-DI	DC-powered system with 24×400G QSFP112 ports and 8×800G OSFP ports; AFI (back-to-front) cooling
QFX5140-24CD8O-DO	DC-powered system with 24×400G QSFP112 ports and 8×800G OSFP ports; AFO (front-to-back) cooling
QFX514024CD8OCHAS	Chassis only without PSU and FAN
QFX5140-FANAO	Fan tray that supports front-to-back (AFO) airflow
QFX5140-FANAI	Fan tray that supports back-to-front (AFI) airflow

QFX5140 Chassis LEDs

SUMMARY

This topic describes the status LEDs for the chassis and ports on the QFX5140.

IN THIS SECTION

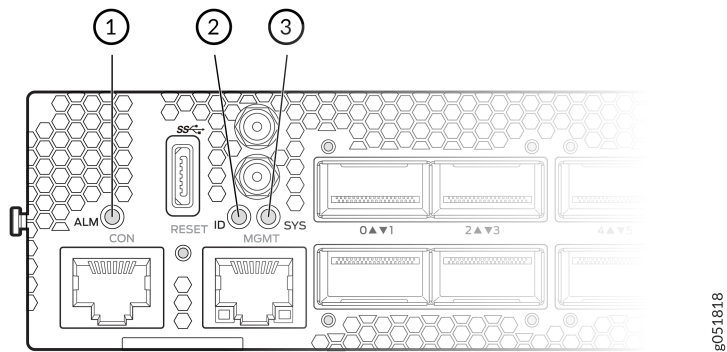
- [Chassis Status LEDs | 24](#)
- [Management Port Status LEDs | 26](#)

The LEDs on the QFX5140 indicate the status of the device and its components. You can also use the LEDs for troubleshooting.

Chassis Status LEDs

[Figure 18 on page 25](#) shows the chassis status LEDs available in the QFX5140 switch.

Figure 18: Chassis Status LEDs



Callout	Label	Descriptionr
1	ALM	Indicates alarm or fault conditions on the device.
2	ID LED (Identification LED)	Used to locate/identify the device physically (can be toggled during maintenance).
3	SYS LED (System LED)	Indicates the overall health and operating state of the switch.

Table 10: Chassis Status LED - ALM (Alarm)

LED	Color / State	Description
ALM	OFF	No alarm condition
ALM	Red (Steady)	Major alarm
ALM	Yellow (Steady)	Minor alarm
ALM	Red + Yellow (Blinking)	Both major and minor alarms present

Table 11: Chassis Status LED - SYS (System)

LED	Color / State	Description
SYS	OFF	System is powered off
SYS	Green (Slow Blink)	Default state during power-up (hardware controlled)
ALM	Green (Blinking)	System is loading software or shutting down
ALM	Green (Steady)	System is online and operating normally

Table 12: Chassis Status LED - ID (Identification)

LED	Color / State	Description
ID	Blue (Blinking)	Beacon enabled (device identification active)
ID	OFF	Beacon disabled

Management Port Status LEDs

[Figure 19 on page 27](#) shows the management port LEDs available in the QFX5140 switch.

Figure 19: Management Port Status LEDs

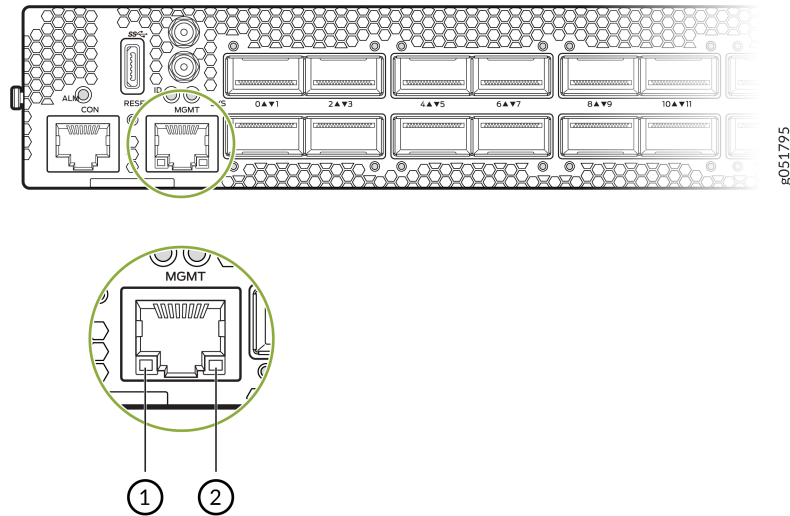


Table 13: Management Port Status LEDs

Callout	Label	LED Color	LED State	Description
1	Link LED (left side of the MGMT port)	Off	OFF	No link detected; port is down.
		Green	ON (Steady)	Port is up at 1 Gbps
		Yellow	ON (Steady)	Port is up at 10 Mbps or 100 Mbps
2	Activity LED (right side of MGMT port)	Green	Blinking	A link is established and there is link activity.
		Green	ON (Steady)	A link is established and there is no link activity.
		Off	OFF	No activity; link is down.

4

CHAPTER

Ports and Channelization

IN THIS CHAPTER

- [QFX5140 Ports and Interfaces | 29](#)
-

QFX5140 Ports and Interfaces

SUMMARY

This topic describes the ports on the QFX5140 and their corresponding Junos OS Evolved interfaces.

IN THIS SECTION

- [Network Ports on the QFX5140 | 29](#)
- [Channelization \(Port Breakout\) | 30](#)
- [QSFP112 Channelization | 30](#)
- [OSFP800 Channelization | 31](#)
- [Interface Naming on the QFX5140 | 31](#)
- [Interfaces on the QFX5140 | 32](#)

Network Ports on the QFX5140

QFX5140 provides 24 QSFP112 ports and 8 OSFP800 ports on the front panel, supporting speeds from 100G to 800G.

- Total switching capacity: **16 Tbps**
- QSFP112 ports: 100G, 200G, 400G, breakout options (2×50G, 4×50G, 4×100G, 2×200G, 25G with QSA28 adapter).
- OSFP800 ports: 100G, 400G, 800G, breakout options (2×400G, 8×100G, 4×200G).
- Two SFP28 ports support 10G and 25G.

[Table 14 on page 29](#) summarizes the port speed capability of QFX5140.

Table 14: QFX5140 Network Ports

Form Factor	Port Count	Port Number Range	Supported Speeds
QSFP112	24	0–23	100G, 200G, 400G, breakout modes
OSFP800	8	24–31	100G, 400G, 800G, breakout modes
SFP28	2	32–33	10G, 25G

See the [Port Checker Tool](#) for information on port combinations, port speeds, and channelizations supported on the QFX5140.

See the [Hardware Compatibility Tool](#) for a list of all supported optics for the QFX5140.

Channelization (Port Breakout)

QFX5140 supports flexible channelization, allowing a single physical port to operate as multiple independent logical interfaces. This capability maximizes port density and enables fine-grained bandwidth allocation.

Channelization is performed by splitting the electrical lanes of a port into independent logical channels.

QSFP112 Channelization

Each QSFP112 port supports up to 4 logical channels, depending on configuration.

Table 15: QSFP112 Channelization Modes

Mode	Logical Interfaces	Lanes per Interface	Typical Use Case
1 × 400G	1	4	Spine uplink / high-bandwidth link
2 × 200G	2	2	Balanced aggregation
4 × 100G	4	1	Server-facing or high-density deployments
4 × 50G / 2 × 50G	Up to 4	Fractional lanes	Sub-rate operation
1 × 25G (QSA28)	1	Adapted	Legacy compatibility

Behavior

- All channels share a single transceiver module
- Each channel appears as an independent interface
- Breakout requires supported optics or fan-out cables
- Lane-to-interface mapping is fixed by hardware design

OSFP800 Channelization

Each OSFP800 port supports up to **8 logical channels**, offering higher density and flexibility.

Table 16: OSFP800 Channelization Modes

Mode	Logical Interfaces	Lanes per Interface	Typical Use Case
1 × 800G	1	8	Core spine / ultra-high bandwidth
2 × 400G	2	4	Spine aggregation
4 × 200G	4	2	Scalable aggregation
8 × 100G	8	1	High-density breakout to leaf/servers

Behavior

- Supports high-bandwidth optics including ZR/ZR+
- Suitable for data center interconnect (DCI)
- All breakout channels operate independently
- Higher power and thermal requirements compared to QSFP112

Table 17: Channelization Overview

Port Type	Total Lanes	Maximum Channels	Supported Breakouts
QSFP112	4	4	4×100G, 2×200G
OSFP800	8	8	8×100G, 4×200G, 2×400G

Interface Naming on the QFX5140

The ports on the QFX5140 have interfaces associated with them in QFX5140. These interfaces follow the naming convention described below:

type-fpc/pic/port:channel

- type—et (Ethernet interfaces from 25G to 800G)

- `fpc` Fixed to 0
- `pic`: Fixed to 0
- `port` You can check the port number from the front panel of the
- `channel`
Applicable only for channelized interfaces.

Interfaces on the QFX5140

Front Panel Port Numbering

Ports are numbered sequentially across the front panel.

Table 18: Front Panel Port Numbering

Port Range	Type	Description
0–23	QSFP112	Up to 400G ports
24–31	OSFP800	Up to 800G ports
32–33	SFP28	Auxiliary ports

All ports are phy-less and directly connected to the ASIC. Logical interfaces are created dynamically based on port configuration.

Examples

- Non-channelized port:

```
et-0/0/0
```

- QSFP112 split into 4 × 100G:

```
et-0/0/0:0
et-0/0/0:1
et-0/0/0:2
et-0/0/0:3
```

- OSFP800 split into 8 × 100G:

```
et-0/0/24:0 through et-0/0/24:7
```

5

CHAPTER

Power System

IN THIS CHAPTER

- QFX5140 Power System | 34
 - Replace Power Supply Units on the QFX5140 | 40
-

QFX5140 Power System

SUMMARY

The QFX5140 power system includes AC or DC power supply units (PSUs) with related power cords and cables. The PSUs operate within certain ranges and are equipped with status indicator LEDs.

IN THIS SECTION

- [JPSU-1600W-1UACAFO | 35](#)
- [JPSU-1600W-1UACAFO LEDs | 37](#)
- [Supported AC Power Cords on the JPSU-1600W-1UACAFO | 39](#)

The QFX5140 AC and DC models use two 1600-W PSUs with support for 1+1 redundancy. The PSUs are preinstalled at the factory. The PSUs in the QFX5140 are hot-insertable and hot-removable field-replaceable units (FRUs). If one PSU fails, you can replace it without powering off or disrupting the routing function. The other PSU balances the electrical load without interruption. A fan in each PSU provides cooling. The PSUs are located at the rear of the QFX5140.



CAUTION: Avoid mixing:

- AC and DC PSUs in the same chassis.
- PSUs with different ratings in the same chassis.
- PSUs with different airflow directions in the same chassis.
- PSUs and fan modules with different airflow directions in the same chassis.

The maximum and typical power consumption of the system depends on the type of power supply.

Table 19: Power Consumption

PSU Type	Maximum System Power Consumption	Typical System Power Consumption
AC	883 W	543 W
DC	883 W	543 W

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

JPSU-1600W-1UACAFO

Figure 20 on page 35 shows the QFX 5140 rear panel with AC PSUs.

Figure 20: QFX5140 Rear Panel with AC PSUs

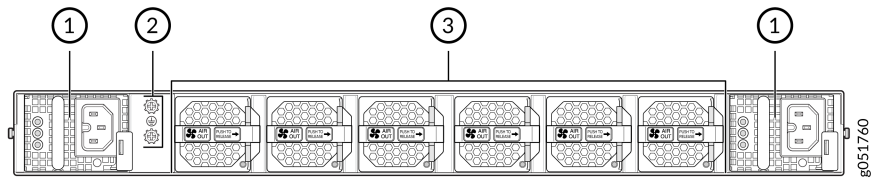


Table 20: QFX5140 Rear Panel with AC PSUs

Callout	Name
1	AC Power Supply Units
2	Grounding Point
3	Fan Modules (6 units)

Figure 21 on page 36 shows the components on the JPSU-1600W-1UACAFO.

Figure 21: JPSU-1600W-1UACAFO (Front view)

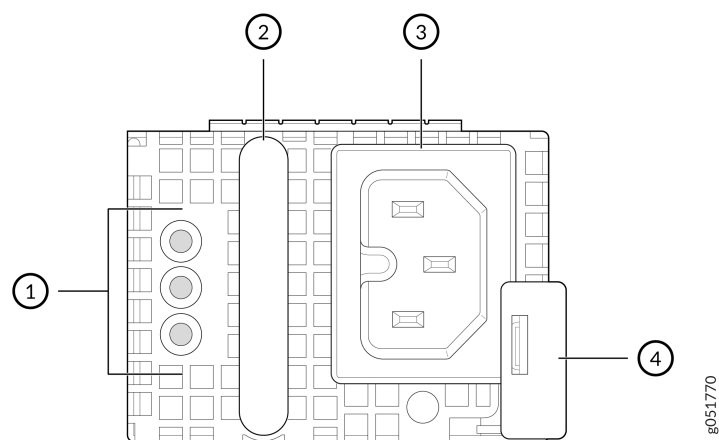
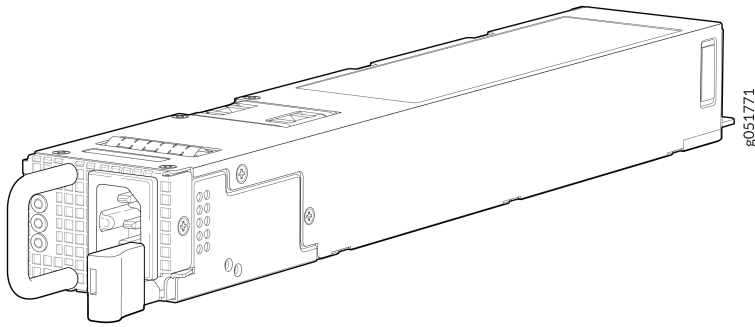


Table 21: Components on the JPSU-1600W-1UACAFO (Front view)

Callout	Name
1	Power Status LEDs
2	Handle
3	Terminal
4	Release latch

Figure 22 on page 37 shows the JPSU-1600W-1UACAFO in isometric view.

Figure 22: JPSU-1600W-1UACAFO PSU (Isometric View)



JPSU-1600W-1UACAFO LEDs

Each JPSU-1600W-1UACAFO has three status LEDs on the PSU faceplate. [Figure 23 on page 37](#) shows the LEDs available on the JPSU-1600W-1UACAFO PSU.

Figure 23: JPSU-1600W-1UACAFO LEDs

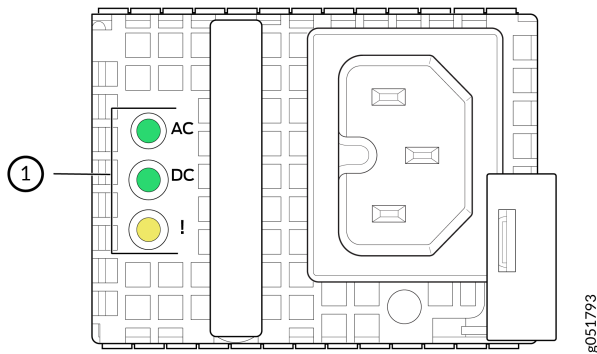


Table 22: JPSU-1600W-1UACAFO PSU AC LED

LED Name	Color	State	Description
AC Input LED	Green	ON (Steady)	AC input present
AC Input LED	-	OFF	No AC input

Table 23: JPSU-1600W-1UACAFO PSU DC LED

LED Name	Color	State	Description
DC Output LED	Green	ON (Steady)	Power Supply OK (12V output present)
DC Output LED	Green	Blinking	Standby mode
DC Output LED	-	OFF	No DC output (no AC input or PSU not operational)

Table 24: JPSU-1600W-1UACAFO PSU Fault LED

LED Name	Color	State	Description
Fault LED	Yellow (Amber)	ON (Steady)	PSU failure / Over-voltage / Over-temperature / Fan failure
Fault LED	Yellow (Amber)	Blinking	Warning condition (overload, high temp, high current, slow fan, low input voltage)
Fault LED	-	OFF	No fault condition

Table 25: Electrical Specifications

Specification	Value
Maximum power output	1600 W

Table 25: Electrical Specifications (*Continued*)

Specification	Value
AC input voltage	Operating ranges: 100 VAC through 127 VAC Typical: 120 VAC 200 VAC through 240 VAC Typical: 230 VAC
AC input line frequency	Typical: 50 Hz through 60 Hz

Supported AC Power Cords on the JPSU-1600W-1UACAFO

QFX5140 is typically shipped with standardized IEC C15 interconnect (PDU) power cords suitable for modern data centers. Country-specific cords are available where required. The plug end fits the power source outlet standard for your region; the coupler side is C15 per IEC 60320.

Table 26: Interconnect/PDU Cables for QFX5140

Country	Specifications	Shipped Power Cable	Graphic
India	Power Cord, AC, India, C13, 10A, 250V, 2m, Straight, C14 to C15	CBL-C15-C14-IN-2M	
Taiwan	Power Cord, AC, Taiwan, C14, 10A, 250V, 2m, Straight, C14 to C15	CBL-C15-C14-TW-2M	
United States, Japan	Power Cord, AC, US, Japan, C14, 10A, 250V, 2m, Straight, C14 to C15	CBL-C15-C14-TW-2M CBL-C15-C14-US-2M	
Europe, Israel, South Africa	Power Cord, AC, Europe, Israel, South Africa, 10A, 250V, 2m, Straight, C14 to C15	CBL-C15-C14-EU-2M	

Table 26: Interconnect/PDU Cables for QFX5140 (Continued)

Country	Specifications	Shipped Power Cable	Graphic
Brazil, China, South Korea	Power Cord, AC, Brazil,China,South Korea C14,10A, 250V, 2m, Straight, C14 to C15	CBL-C15-C14-CN-2M	

Replace Power Supply Units on the QFX5140

SUMMARY

Maintaining the QFX5140 includes removing and installing the power supply units (PSUs).

IN THIS SECTION

- [Replace an AC PSU on the QFX5140 | 41](#)

The power supply units (PSUs) on the QFX5140 are hot-removable and hot-insertable field-replaceable units (FRUs) with support for 1+1 redundancy. You can remove and replace a PSU without powering off the QFX5140 or disrupting the device functions.



CAUTION: Do not mix AC and DC power supplies within the same chassis, and avoid combining AFO and AFI modules in a single system configuration.



NOTE: Per TSB #XYZ, PSU redundancy support depends on the unit's production date. Early production units support PSU redundancy only with high-line input power (200–240 VAC), while all later production units support PSU redundancy with both low-line (100–127 VAC) and high-line (200–240 VAC) AC input power.

Before you remove or install a PSU, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage.

Ensure that you have the following parts and tools:

- An ESD grounding strap
- An antistatic bag or an antistatic mat

- A replacement PSU
- A blank cover panel (in case you're not replacing the PSU)
- (For DC power supply) Philips (+) screwdriver, number 2

Replace an AC PSU on the QFX5140

IN THIS SECTION

- [Remove the JPSU-1600W-1UACAFO | 41](#)
- [Install the JPSU-1600W-1UACAFO | 42](#)

Remove the JPSU-1600W-1UACAFO

SUMMARY

This topic guides you through the steps to remove the JPSU-1600W-1UACAFO AC power supply from the QFX5140 Switch.



CAUTION: Avoid leaving the PSU slot empty for more than 30 minutes when the device is operational. For optimal airflow, all PSUs must be installed in the chassis.



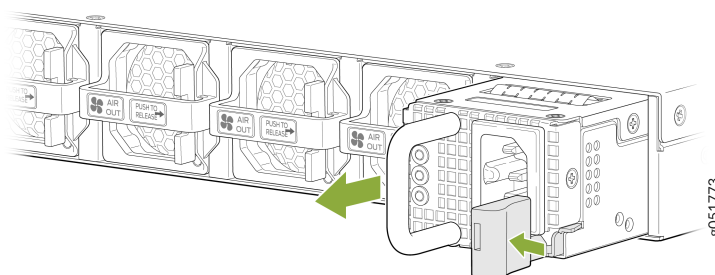
CAUTION: If you need to replace all the power supplies installed in your QFX5140, you must power off the QFX5140 before removing the power supplies.

To remove the JPSU-1600W-1UACAFO:

1. Wrap and fasten one end of the ESD cable grounding strap around your bare wrist and connect the other end to a site ESD point.
2. Place the antistatic bag or the antistatic mat on a flat, stable surface.
3. If the AC power source outlet has a power switch, set it to the off (O) position.

4. Unplug the power cord that is connected to the power source outlet.
5. Unplug the power cord from the device inlet of the PSU.
6. Press the release latch located on the right side of the PSU toward the left side (see [Figure 24 on page 42](#)).
7. Pull the PSU straight out of the chassis.

Figure 24: Remove the AC PSU



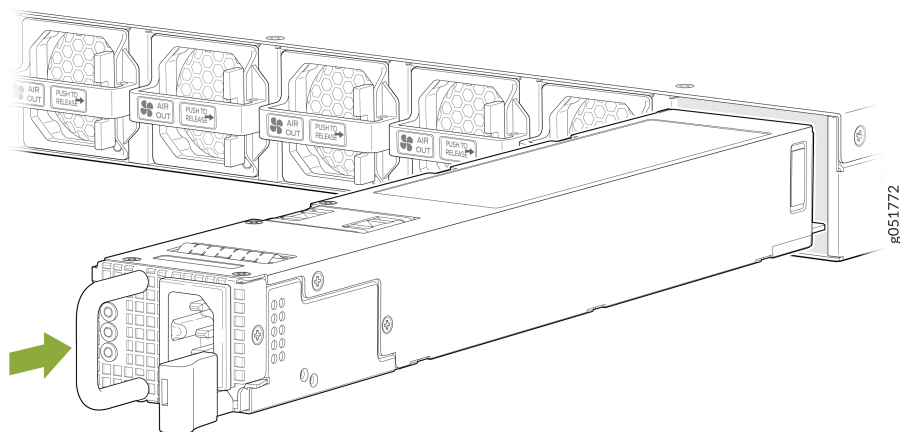
8. Place the PSU in the antistatic bag or on the antistatic mat.
9. If you are not immediately replacing the PSU, install the cover panel over the PSU slot on the chassis.

Install the JPSU-1600W-1UACAFO

To install the JPSU-1600W-1UACAFO:

1. Wrap and fasten one end of the ESD cable grounding strap around your bare wrist and connect the other end to a site ESD point.
2. If the PSU slot in the chassis has a cover panel on it, remove the cover panel. Save the cover panel for subsequent use.
3. Taking care not to touch the pins, leads, or solder connections on the PSU, remove the PSU from the bag.
4. Using both hands, place the PSU in the PSU slot on the rear panel of the router. Slide the PSU straight into the chassis until the PSU is fully seated in the chassis slot and the release latch slides into place. Ensure that the PSU faceplate is flush with the adjacent PSU faceplate. See [Figure 25 on page 43](#).

Figure 25: Install the AC PSU



5. Connect the power cord (see ["Connect the QFX5140 to Power" on page 90](#)).



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

6

CHAPTER

Cooling System

IN THIS CHAPTER

- QFX5140 Cooling System | 45
 - Replace Fans on the QFX5140 | 50
-

QFX5140 Cooling System

SUMMARY

The cooling systems on the QFX5140 work together to keep the temperature of all internal components within the acceptable range. The cooling system components in the QFX5140 include fan modules and power supply cooling systems.

IN THIS SECTION

- [QFX5140-FANAO | 48](#)

The QFX5140 Switch includes six fan modules that support N+1 redundancy at rotor level. The QFX5140 cooling system consists of six hot-swappable fan modules installed in the rear FRU panel of the chassis. Each fan module houses two 40mm x 40mm counter rotating rotors. The switch supports both airflow-in (FRU-to-port) and airflow-out (port-to-FRU) configurations.

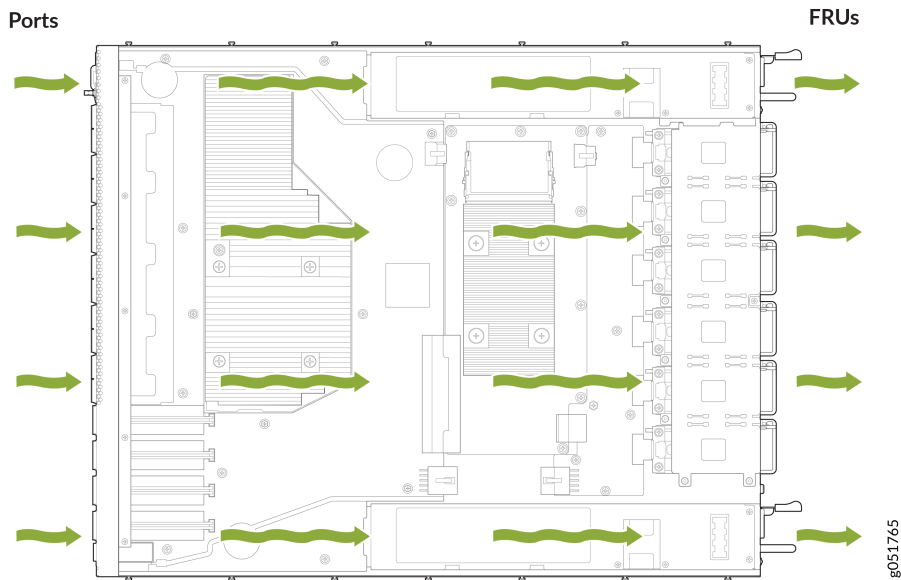
The fan modules in the QFX5140 are hot-insertable and hot-removable field-replaceable units (FRUs). You can install the fans in the fan module slots on the rear of the chassis. The fans are numbered **0** through **5** starting from the fan module closest to the grounding points on the chassis.

Airflow

The QFX5140 comes with models that support a front-to-back (**AIR OUT**) and a back-to-front (**AIR IN**) cooling system.

In a front-to-back cooling system, cool air enters through the front vents. The fan modules then exhaust hot air through the rear of the chassis. [Figure 26 on page 46](#) shows the airflow through the QFX5140 chassis that uses a front-to-back cooling system.

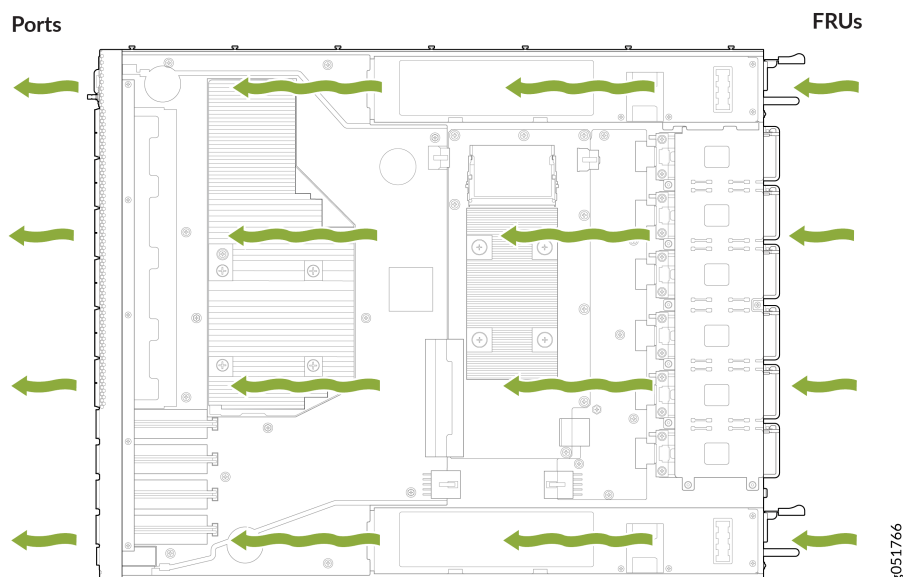
Figure 26: Airflow Through the QFX5140 Chassis that uses a front-to-back cooling system



In the QFX5140 switch models that have back-to-front airflow, the air intake to cool the chassis is through the vents on the rear panel and hot air exhausts through the vents on the front panel of the switch. a

[Figure 27 on page 47](#) shows the airflow through the QFX5140 chassis that uses a back-to-front cooling system.

Figure 27: Airflow Through the QFX5140 Chassis that uses a back-to-front cooling system



Temperature sensors in the chassis monitor the temperature within the chassis. Under normal operating conditions, the fan modules operate at a moderate speed. If a fan fails, the speed of the remaining fans is automatically adjusted to keep the temperature within the acceptable range. If the ambient temperature rises above a threshold, similarly, fan speeds are automatically adjusted to maintain the acceptable temperature range. If the ambient temperature exceeds the specified threshold and the system cannot adequately cool down, the Routing Engine shuts down the router by disabling output power from each power supply.

If one of the fans in a fan module fails, the QFX5140 Switch will raise an alarm for the fan tray slot with the failed fan. The router will however continue to operate without issues. You can leave the fan module with the failed fan in the chassis until a replacement fan module is available. When a replacement fan module is available and if the router is online, you can replace one fan module at a time. During replacement, the router will raise a major alarm for the missing fan module and continue to operate for a certain period after which the router will shut down. To avoid the router from shutting down, you must replace the fan module within this time.



CAUTION: If you remove more than one fan module while the router is online, the router will shut down within *30 seconds*.



NOTE: To avoid disturbing the airflow and cooling, don't operate the router when a fan module is removed.

Power Supply Cooling System

The power supply units (PSUs) are self-cooling with inbuilt fans. The PSUs are located at the rear of the QFX5140. A baffle directs airflow through an isolated air channel from the front of the chassis specifically to help the PSUs maintain thermal requirements.

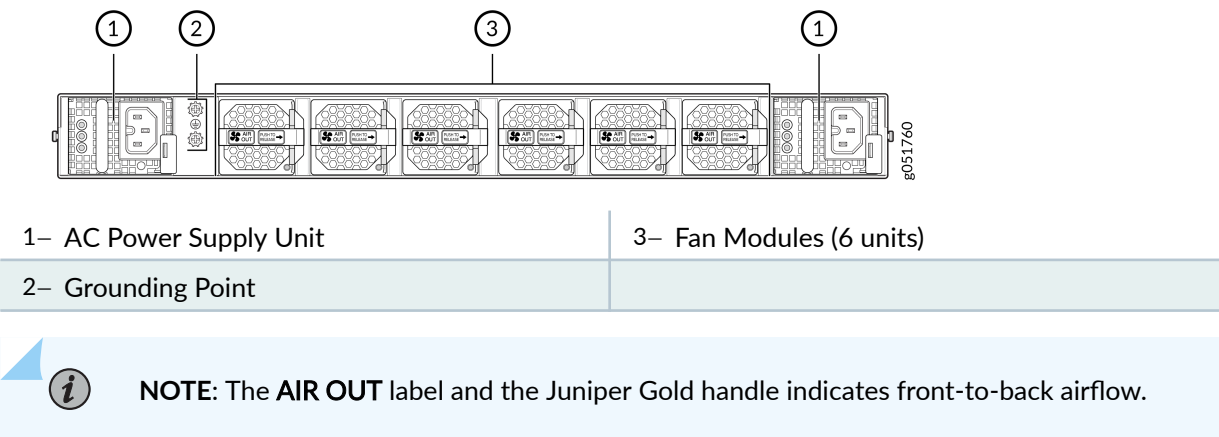
QFX5140-FANAO

IN THIS SECTION

- [QFX5140-FANAO Specifications | 48](#)
- [QFX5140-FANAO LED | 49](#)

[Figure 28 on page 48](#) shows the location of the fan modules on the back panel of the QFX5140 switch.

Figure 28: QFX5140 Rear Panel



QFX5140-FANAO Specifications

["QFX5140-FANAO Specifications" on page 48](#) shows the physical specifications of the fan module.

Table 27: QFX5140-FANAO Specifications

Specification	Value
Height	1.57 in. (4 cm)
Width	1.57 in. (4 cm)
Depth	2.20 in. (5.6 cm)
Weight	0.21 lbs (97 g)
Airflow	AFO

QFX5140-FANAO LED

You can check the status of each fan module through the `show chassis fan` or `show chassis environment` commands. You can also check the status by looking at the LED of each fan module. The LED is positioned beneath the handle of the fan module, on the right side.

Figure 29 on page 49 shows the location of the LED on the fan module.

Figure 29: QFX5140-FANAO LEDs

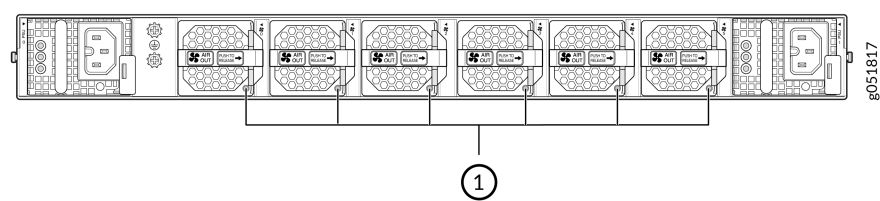


Table 28 on page 49 describes the QFX5140-FANAO LED fan module status LED.

Table 28: QFX5140-FANAO Status LED Behavior

Callout	LED Color	State	Description
1	Green	On Steadily	Fan functioning normally

Table 28: QFX5140-FANAO Status LED Behavior *(Continued)*

Callout	LED Color	State	Description
	Red	On Steadily	Fan not detected or fan not functioning

You can also get information about the fan modules using the `show chassis fan` command. Here is an example of the CLI output:

QFX5140 with Six Fan Modules

```
user@device> show chassis fan
Item                Status    Measurement
Fan Tray 0 Fan 1    OK        13650 RPM
Fan Tray 0 Fan 2    OK        12300 RPM
Fan Tray 1 Fan 1    OK        13800 RPM
Fan Tray 1 Fan 2    OK        12300 RPM
Fan Tray 2 Fan 1    OK        13650 RPM
Fan Tray 2 Fan 2    OK        12300 RPM
Fan Tray 3 Fan 1    OK        13650 RPM
Fan Tray 3 Fan 2    OK        12150 RPM
Fan Tray 4 Fan 1    OK        13800 RPM
Fan Tray 4 Fan 2    OK        12300 RPM
Fan Tray 5 Fan 1    OK        13650 RPM
Fan Tray 5 Fan 2    OK        12450 RPM
```

Replace Fans on the QFX5140

SUMMARY

A part of the QFX5140 maintenance involves removing and installing the fan modules.

IN THIS SECTION

- [Remove a Fan Module from the QFX5140 | 51](#)
- [Install a Fan Module in the QFX5140 | 52](#)

On the QFX5140, you can remove and replace up to one fan module without powering off the switch or disrupting the device functions.



CAUTION: Do not mix AFO and AFI modules in a single system configuration.

Before you remove or install a fan module, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage.

Ensure that you have the following parts and tools:

- An electrostatic discharge (ESD) grounding strap
- An antistatic bag or an antistatic mat
- A replacement fan module



CAUTION: When replacing a fan module while the switch remains operational, ensure that only one module is replaced at a time. Complete each replacement within 240 seconds at an ambient temperature of 25°C, or within 60 seconds if the ambient temperature is between 35°C and 40°C.

Remove a Fan Module from the QFX5140

IN THIS SECTION

- [Remove a QFX5140-FANAO | 51](#)

Remove a QFX5140-FANAO

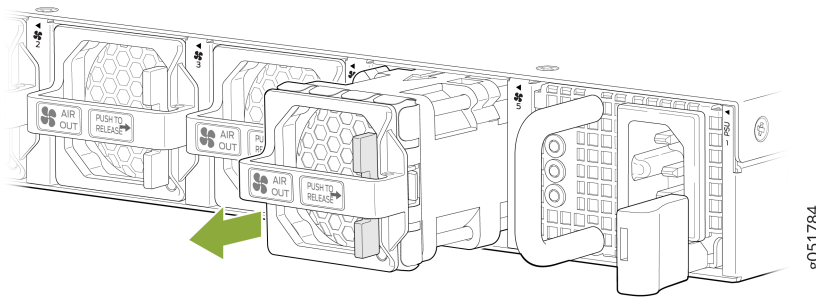
SUMMARY

This topic guides you through the steps to remove the QFX5140-FANAO fan module from the QFX5140.

To remove the QFX5140-FANAO fan module:

1. Wrap and fasten one end of the electrostatic discharge (ESD) cable grounding strap around your bare wrist and connect the other end to a site ESD point.
2. Place the antistatic bag or the antistatic mat on a flat, stable surface.
3. Firmly hold the handle on the fan module and push the release latch to the right to release the fan module from the chassis. The direction in which you must push the release latch is indicated by the **Push to Release** label on the handle. See [Figure 30 on page 52](#).

Figure 30: Remove the Fan Module



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

4. Pull firmly to slide the fan module halfway out of the chassis.
5. After ensuring that the fans in the fan module have stopped spinning, slide the fan module completely out of the chassis.
6. Place the fan module in the antistatic bag or on the antistatic mat.

Install a Fan Module in the QFX5140

IN THIS SECTION

- [Install a QFX5140-FANAO](#) | 53

Install a QFX5140-FANAO

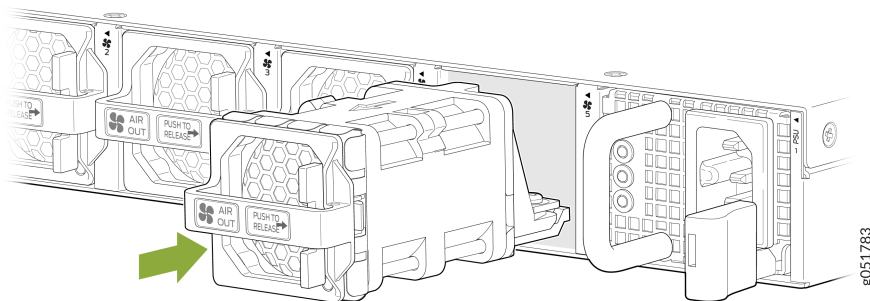
SUMMARY

This topic guides you through the steps to install the QFX5140-FANAO fan module in the QFX5140.

To install the QFX5140-FANAO fan module:

1. Wrap and fasten one end of the electrostatic discharge (ESD) cable grounding strap around your bare wrist and connect the other end to a site ESD point.
2. Remove the replacement fan module from its bag.
3. Align the fan module in the fan module slot on the rear panel of the router and slide the module in until it is fully seated. You will hear a distinct click sound when the fan module securely latches into position. See [Figure 31 on page 53](#).

Figure 31: Install the Fan Module



7

CHAPTER

Installation and Setup

IN THIS CHAPTER

- QFX5140 Installation Overview | 55
 - Unpack the QFX5140 | 55
 - Install the QFX5140 | 58
 - QFX5140 Network Cable and Transceiver Planning | 71
 - Connect the QFX5140 to the Network | 76
 - QFX5140 Management Cable Specifications and Pinouts | 80
 - Connect the QFX5140 to External Devices | 84
 - Connect the QFX5140 to Power | 90
 - Register Products—Mandatory to Validate SLAs | 95
 - Configure Junos OS Evolved on the QFX5140 | 96
-

QFX5140 Installation Overview

SUMMARY

This topic lists the steps that you need to follow to get your QFX5140 up and running.



To install and configure your QFX5140:

1. Unpack your device as described in ["Unpack the QFX5140" on page 55](#).
2. Install the device as described in ["Install the QFX5140" on page 58](#)
3. Connect cables to network devices as described in ["Connect the QFX5140 to the Network" on page 76](#)
4. Connect the QFX5140 to external devices as described in ["Connect the QFX5140 to External Devices" on page 84](#)
5. Connect the grounding cable and power supplies as described in ["Connect the QFX5140 to Power" on page 90](#). Power on the device.
6. Perform initial configuration by following the instructions in ["Configure Junos OS Evolved on the QFX5140" on page 96](#)

Unpack the QFX5140

SUMMARY

Unpack the QFX5140 by following the recommended procedure and check that you have received all the components.

IN THIS SECTION

- [Unpack the QFX5140 | 56](#)
- [Packing List for the QFX5140 | 56](#)

Unpack the QFX5140

We ship the QFX5140 in a cardboard carton, secured with foam packing material. The carton also includes an accessory box and a pointer card with links to the quick start instructions. You can use a box cutter or packing knife to slice open the tapes that seals the boxes.



CAUTION: The QFX5140 has maximum protection inside the shipping carton. Do not unpack the device until you are ready to mount it.

To unpack the device:

1. Move the shipping carton to a staging area as close to the installation site as possible. Also ensure that this area provides you with enough room to remove the device and its components.
2. Position the carton so that the arrows marked on the carton are pointing up.
3. Open the top flaps on the shipping carton.
4. Pull out the packing material holding the device in place.
5. Verify the parts received against the list.
6. Save the shipping carton and packing materials in case you need to move or ship the device later.

Packing List for the QFX5140

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>.

Table 29: Parts List for the QFX5140 Base Configuration

Component	Part Number	Quantity
QFX5140 Chassis	QFX514024CD8OCHAS	1

Table 29: Parts List for the QFX5140 Base Configuration (*Continued*)

Component	Part Number	Quantity
Power supply modules (PSUs)	One of the following: - JPSU-1600W-1UACAFO - JPSU-1600W-1UACAFI	2
Fan modules	One of the following: - QFX5140-FANAO - QFX5140-FANAI	6
Accessory Kit (see Table 30 on page 57)	–	1

Table 30: Parts List for the Accessory Kit

Component	Quantity
Rack mount kit— JNP-4P-TL-1RU-RMK	1
Grounding ring terminal lug, right-angled and non-insulated	1
ESD wrist strap with cable	1
Documentation roadmap card	1

Table 31: Parts List for the Rack Mount Kit (JNP-4P-TL-1RU-RMK)

Component	Quantity
Chassis Brackets	2 (one each for left and right sides)
Front-Mounting Rails	2 (one each for left and right sides)

Table 31: Parts List for the Rack Mount Kit (JNP-4P-TL-1RU-RMK) *(Continued)*

Component	Quantity
Rear-Floating Rails	2 (one each for left and right sides)

Install the QFX5140

SUMMARY

This topic guides you through the steps to install the QFX5140 on four-post racks.

IN THIS SECTION

- [Mount the QFX5140 on a Four-Post Square-Holed Rack Using the JNP-4P-TL-1RU-RMK | 60](#)
- [Mount the QFX5140 on a Four-Post Round-Holed Rack Using the JNP-4P-TL-1RU-RMK | 65](#)

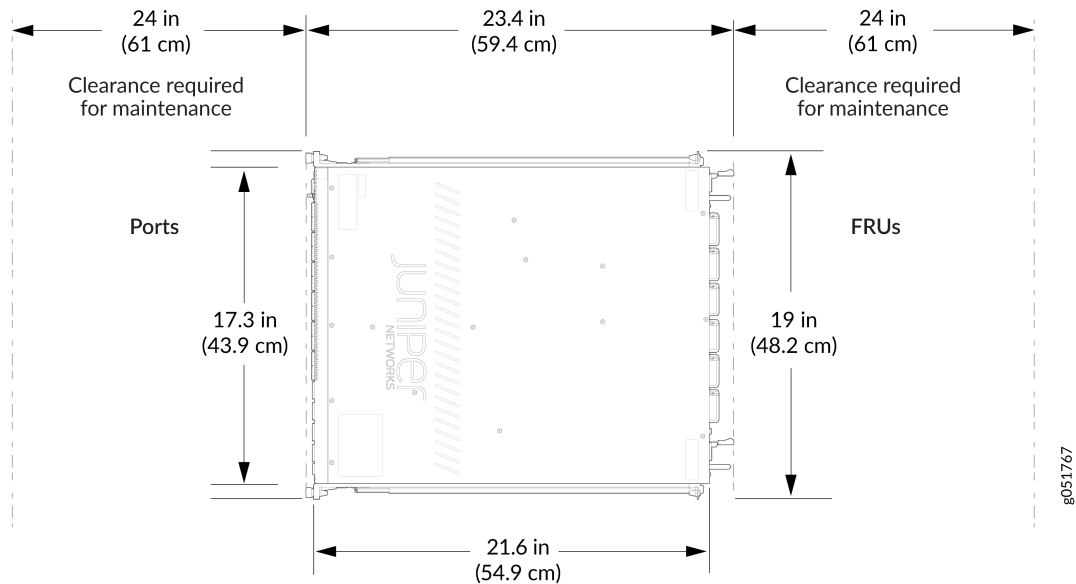
You can mount the QFX5140:

- On four posts of a 19-in. rack. A four-post rack mounting kit is included with the QFX5140 shipment.

Complete these prerequisites before you mount the device:

- Prepare the site for installation.
- Ensure that the site has adequate clearance for both airflow and hardware maintenance.

Figure 32: Clearance Requirements for QFX5140



- Unpack the device as described in ["Unpack the QFX5140" on page 55](#).
- Ensure that you have all the parts and tools available to mount the QFX5140 in a rack. See the instructions for the rack installation kit that you are using:
 - ["Mount the QFX5140 on a Four-Post Square-Holed Rack Using the JNP-4P-TL-1RU-RMK" on page 60](#)
 - ["Mount the QFX5140 on a Four-Post Round-Holed Rack Using the JNP-4P-TL-1RU RMK" on page 65](#)

**CAUTION:**

- A qualified technician must verify that the rack or cabinet is strong enough to support the device's weight before mounting the device. Have the technician also verify that the rack or cabinet has adequate support at the installation site.
- If you are installing more than one device on a rack or in a cabinet, install the first device at the bottom of the rack.



CAUTION: QFX5140 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 QFX5140 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 QFX5140. A fully loaded chassis (with an AC power supply) weighs approximately 24.5 lb (11.1 kg).



NOTE: Ensure that you support the rear of the chassis throughout the process of mounting the device on the rack.

Mount the QFX5140 on a Four-Post Square-Holed Rack Using the JNP-4P-TL-1RU-RMK

SUMMARY

Mount the QFX5140 on a four-post square-holed rack on your site by following the recommended procedure below.

Ensure that you have the following tools and parts available:

- An ESD grounding strap (provided)
- A pair of front-mounting and rear-floating rails (provided with the RMK)

These mounting rails attach to the front and rear rack posts.

- A pair of chassis brackets (provided with the RMK)

You must attach these brackets to the device if not preinstalled.

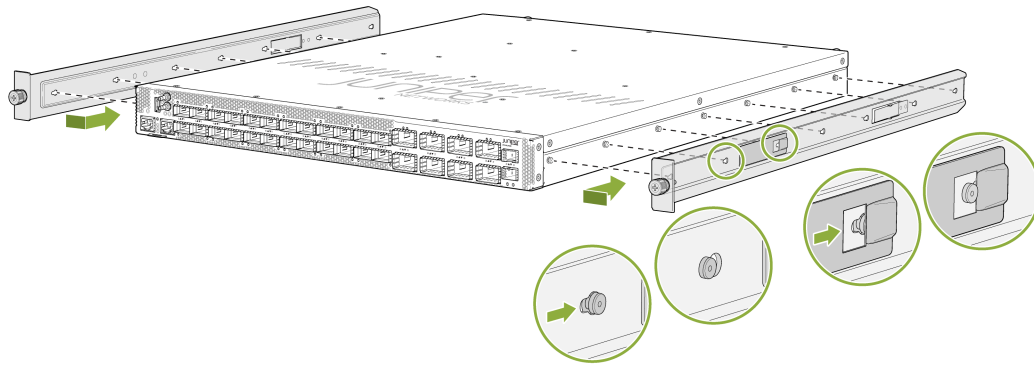


NOTE: Juniper provides the four-post rack mounting kit (JNP-4P-TL-1RU-RMK) with the QFX5140. If the four-post kit is lost or damaged, you can order a replacement.

To mount the device on four posts of a square-holed rack using the JNP-4P-TL-1RU-RMK rack mount kit:

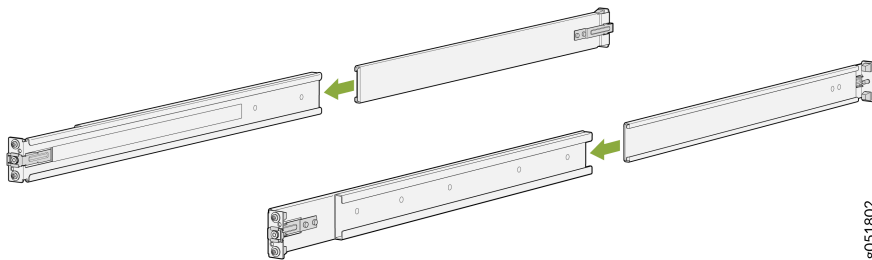
1. Wrap and fasten one end of the ESD cable grounding strap around your bare wrist. Connect the other end to a site ESD point.
2. Install the chassis bracket to the chassis by aligning the keyholes on the chassis bracket with the shoulder screws on the chassis. Slide the chassis bracket toward the rear of the chassis.

Figure 33: Install the Chassis Brackets



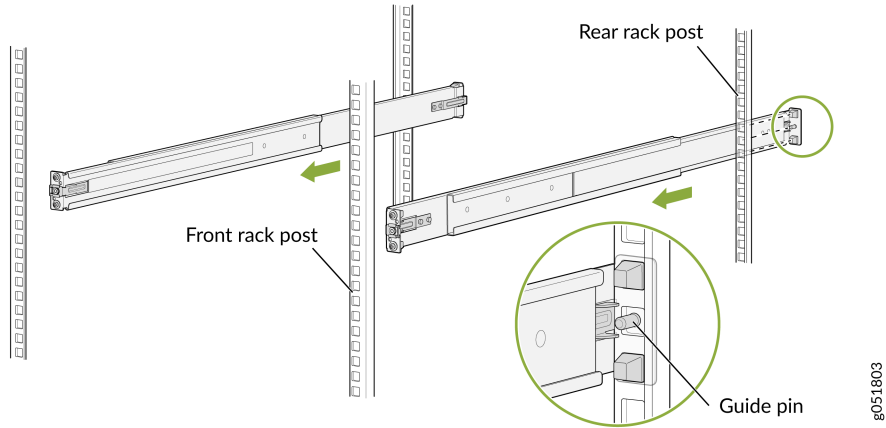
3. Assemble the mounting rails by sliding the rear-floating rails into the respective front-mounting rails.

Figure 34: Assemble the Mounting Rails



4. Install the mounting rails on the four-post rack:
 - a. Use the guide pin to align the guide blocks of the rear-floating rails with the corresponding rear post holes. Pull the rear-floating rails toward the front of the rack to lock the rail in place. You will hear a distinct click sound when the latch locks into the corresponding rack holes.

Figure 35: Secure Rear-Floating Rails



- b. Align the guide blocks of the front-mounting rails with the front post holes. Push the front-mounting rails toward the rear of the rack to lock the rails in place. You will hear a distinct click sound when the latch locks into the corresponding rack holes.

Figure 36: Secure Front-Mounting Rails

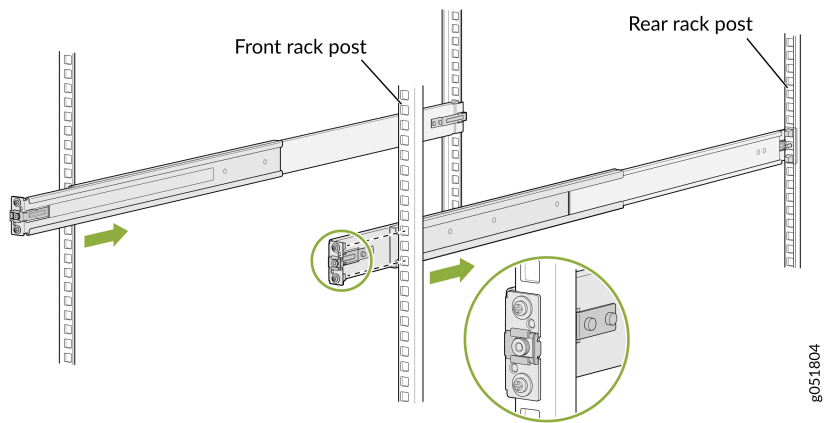
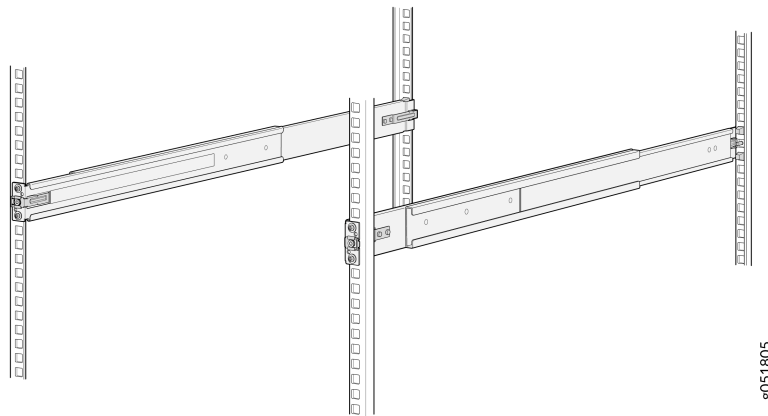


Figure 37: Both Mounting Rails Installed and Secured

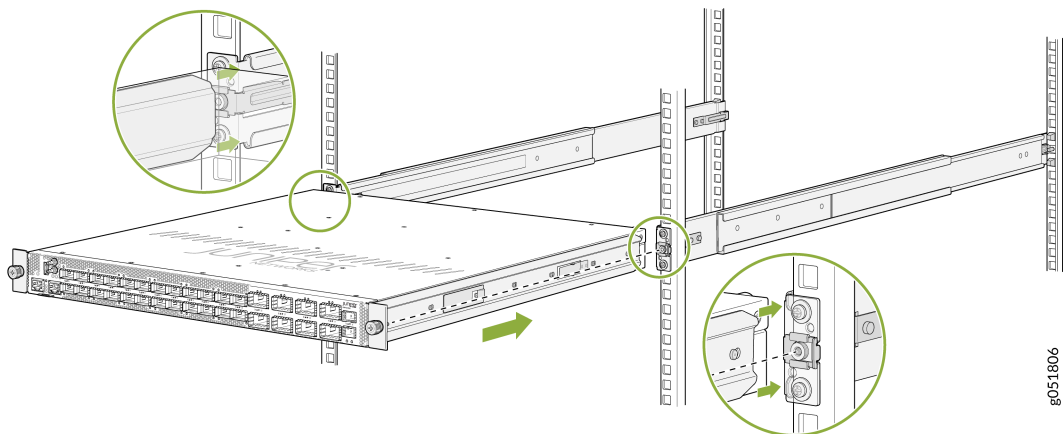


- c. Visually confirm that you have locked the front and rear latches into the mounting rails. The mounting rails should now be securely installed on the rack.
5. Lift the device and position it in the rack, aligning the chassis brackets with the mounting rails. Slide the device all the way into the channels of the rack mounting rails.



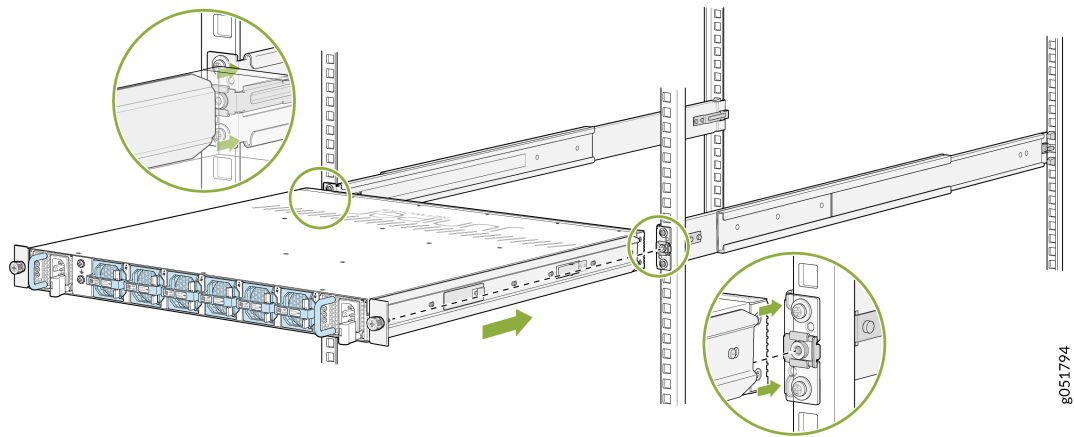
NOTE: In an AFO configuration, the chassis is installed with its front panel facing the front of the rack.

Figure 38: Slide the QFX5140 into the Rack (for AFO configuration)



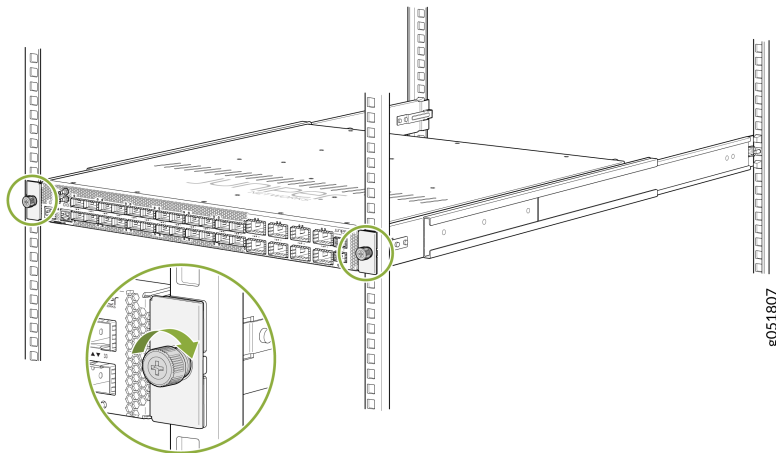
NOTE: In an AFI configuration, the chassis is installed with its rear panel facing the front of the rack and its front panel facing the rear. This orientation may appear unusual, but it is required for proper AFI airflow.

Figure 39: Slide the QFX5140 in the Rack



6. Tighten the two thumbscrews (in a clockwise direction) to secure the device.

Figure 40: Tighten the Thumbscrews



Mount the QFX5140 on a Four-Post Round-Holed Rack Using the JNP-4P-TL-1RU RMK

SUMMARY

Mount the QFX5140 on a four-post threaded-holed rack on your site by following the recommended procedure below.

Ensure that you have the following tools and parts available:

- An ESD grounding strap (provided)
- A Philips (+) screwdriver, number 2 (not provided)
- Eight screws appropriate for your rack to attach the mounting rails to the rack posts (not provided)
- A pair of front-mounting and rear-floating rails (provided with the RMK)

These mounting rails attach to the front and rear rack posts.

- A pair of chassis brackets (provided with the RMK)

You must attach these brackets to the device.

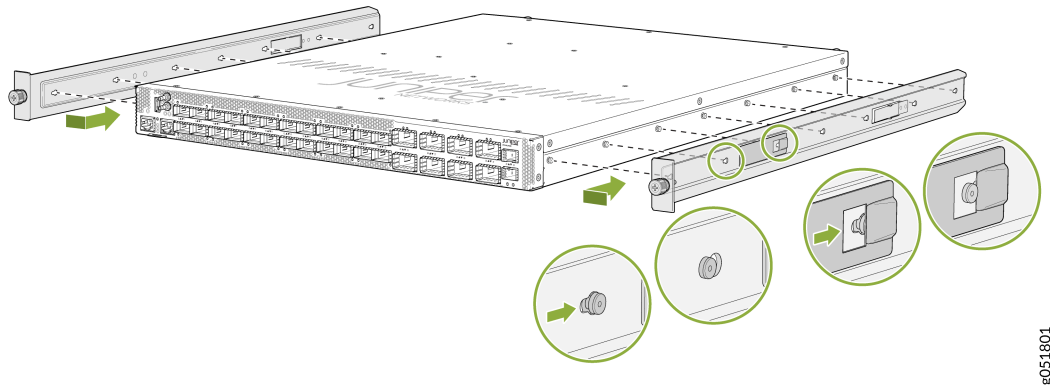


NOTE: Juniper provides the four-post rack mounting kit (JNP-4P-TL-1RU) with the QFX5140. If the four-post kit is lost or damaged, you can order a replacement.

To mount the QFX5140 on four posts of a threaded-hole rack using the JNP-4P-TL-1RU rack mount kit:

1. Review the [General Safety Guidelines and Warnings](#).
2. Wrap and fasten one end of the electrostatic discharge (ESD) cable grounding strap around your bare wrist. Connect the other end to a site ESD point.
3. Install the chassis bracket to the chassis by aligning the keyholes on the chassis bracket over the shoulder screws on the chassis. Slide the chassis bracket toward the rear of the chassis.

Figure 41: Attach the Chassis Brackets



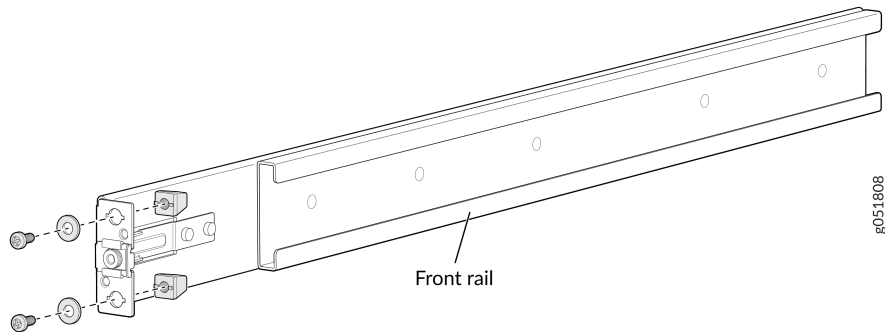
4. Assemble the mounting rails:

- a. Remove the guide blocks from the front-mounting rails by loosening the screws and washers.



TIP: Retain the guide blocks, screws, and washers for later use.

Figure 42: Remove Guide Blocks from Front-Mounting Rail

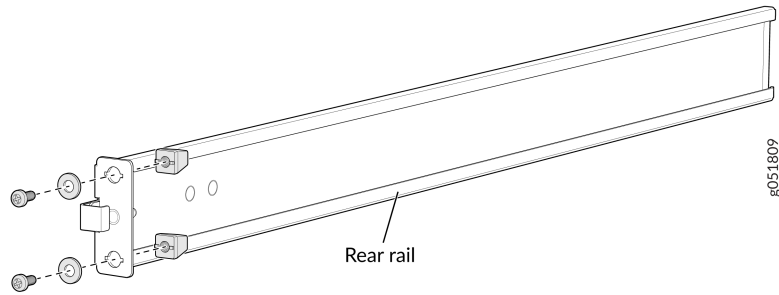


- b. Remove the guide blocks from the rear-floating rails by loosening the screws and washers.



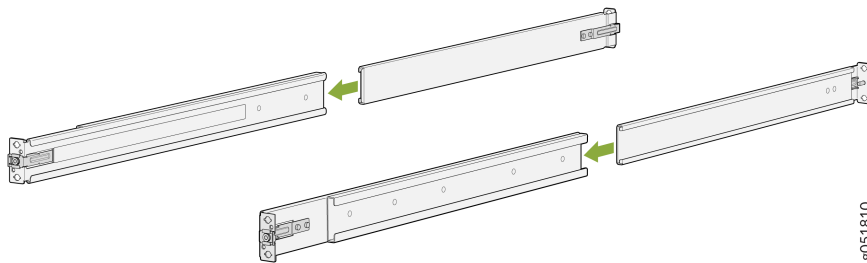
TIP: Retain the guide blocks, screws, and washers for later use.

Figure 43: Remove Guide Blocks from Rear-Floating Rail



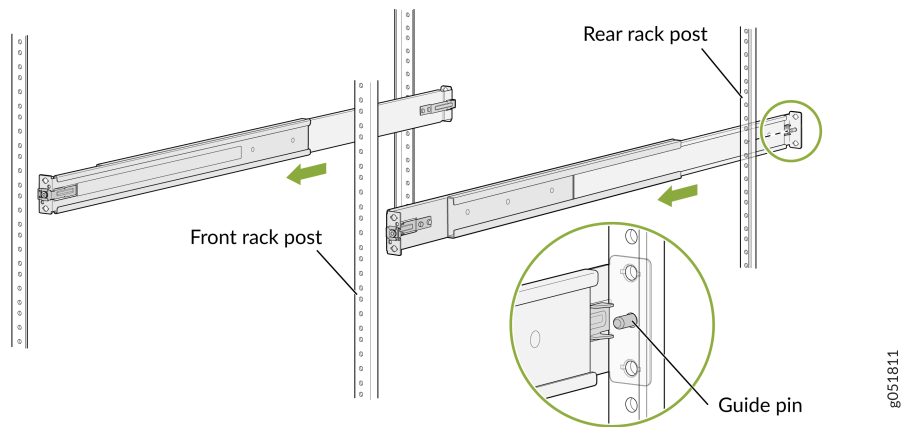
- c. Slide the rear-floating rails into the front rails.

Figure 44: Assemble the Mounting Rails



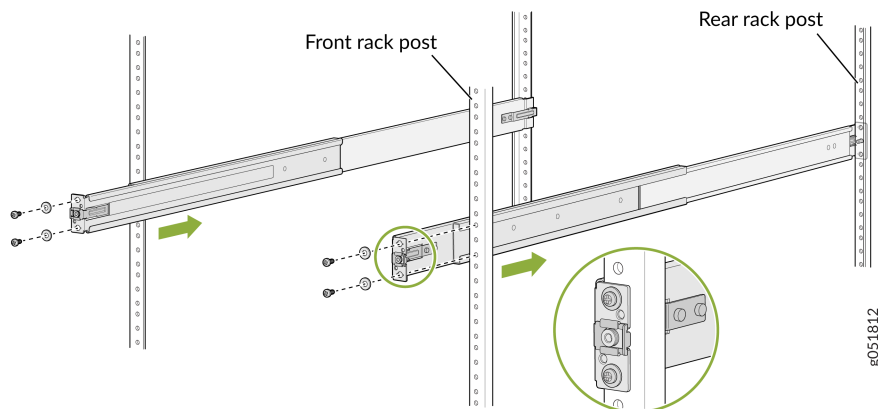
5. Install the mounting rails on the four-post rack:
 - a. Align and insert the guide pins of the rear-floating rails into the corresponding rear-post holes. Pull the rear-floating rails toward the front of the rack to lock the rails in place. You will hear a distinct click sound when each latch locks into the corresponding rack hole.

Figure 45: Install Rear-Floating Rails



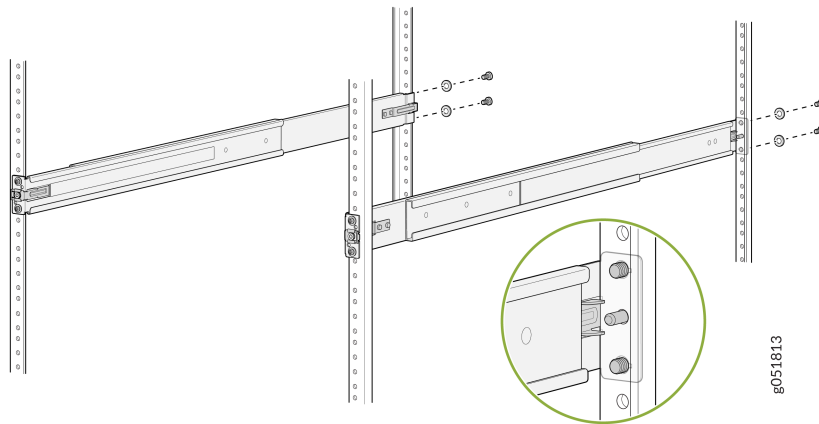
- b. Align and insert the guide pins of the front-mounting rails into the corresponding front-post holes. Push each front-mounting rail into the corresponding front-post hole toward the rear of the rack to lock the rails in place. You will hear a distinct click sound when each latch locks into the corresponding rack hole.
- c. Secure the front-mounting rails to the front rack post by using screws (not provided) appropriate for the thread size of your rack.

Figure 46: Secure the Front-Mounting Rails



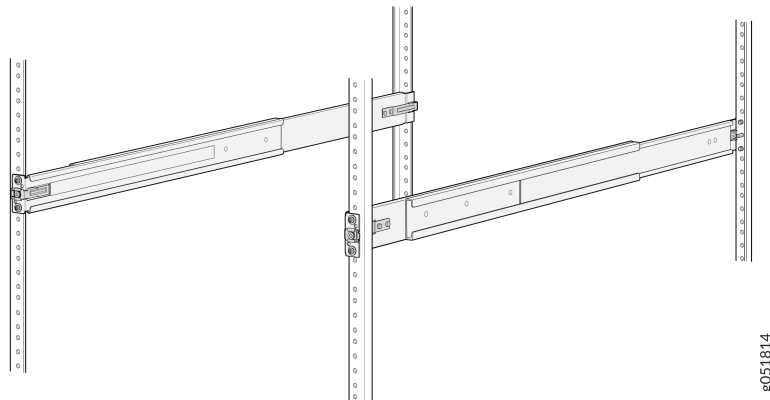
- d. Secure the rear-floating rails to the rear rack post by using screws (not provided) appropriate for the thread size of your rack.

Figure 47: Secure the Rear-Floating Rails



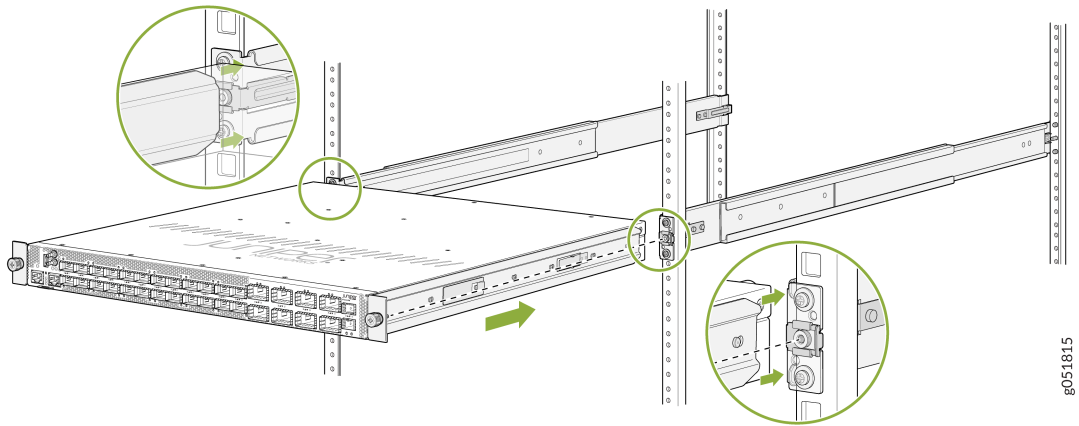
- e. Visually confirm that you have locked the front and rear latches of the mounting rails into the rack posts. The mounting rails should now be securely installed on the rack.

Figure 48: Both Mounting Rails Installed and Secured



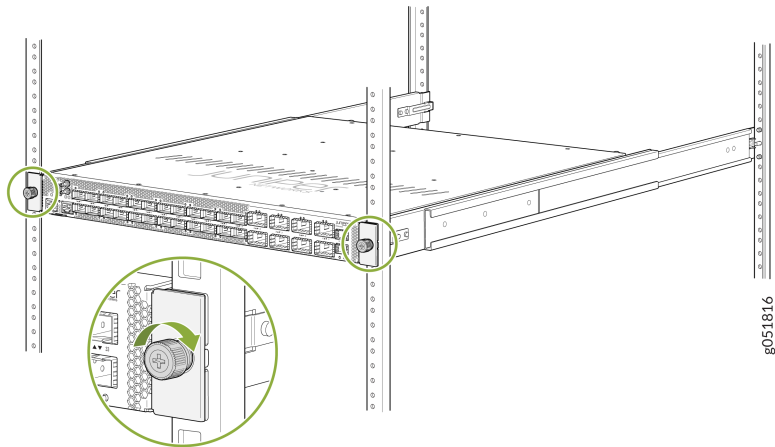
6. Lift the device and position it in the rack, aligning the chassis brackets with the mounting rails. Slide the device all the way into the channels of the mounting rails.

Figure 49: Slide the QFX5140 into the Rack



7. Tighten the two thumbscrews (in a clockwise direction) to secure the device.

Figure 50: Tighten the Thumbscrews



QFX5140 Network Cable and Transceiver Planning

IN THIS SECTION

- Determining QFX5140 Optical Interface Support | 71
- Understand QFX Series Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion | 72
- Calculate Power Budget and Power Margin for Fiber-Optic Cables | 73

Determining QFX5140 Optical Interface Support

You can find information about the optical transceivers supported on your Juniper device by using the Hardware Compatibility Tool (HCT). In addition to transceiver and connection type, optical and cable characteristics—where applicable—are documented for each transceiver. The Hardware Compatibility Tool enables you to search by product or by interface speed or type.

The list of supported transceivers for the QFX5140 is available at <https://apps.juniper.net/hct/product/#prd=QFX5140>.



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 that autonegotiation on the QFX5140 interfaces is configured appropriately for the connected device.

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

IN THIS SECTION

- [Signal Loss in Multimode and Single-Mode Fiber-Optic Cables | 72](#)
- [Attenuation and Dispersion in Fiber-Optic Cable | 73](#)

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](#) | 74

● How to Calculate Power Margin for Fiber-Optic Cables | 74

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 32 on page 75](#) 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 32: 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 32 on page 75](#). 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 32 on page 75](#). 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:

$$P_M = P_B - LL$$

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

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

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

In both 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.

Connect the QFX5140 to the Network

SUMMARY

Connecting network cables to the QFX5140 involves the following steps and safety precautions to prevent equipment damage and personal injury.

IN THIS SECTION

- [Install a Transceiver | 77](#)
- [Install a QSFP28 Transceiver | 78](#)
- [Connect a Fiber-Optic Cable | 79](#)

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: 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.



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.

Install a Transceiver

Before you install a transceiver in 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 a rubber safety cap available to cover the transceiver.

[Figure 51 on page 78](#) shows how to install a QSFP+ transceiver. The installation procedure is same for all types of transceivers except the QSFP28 transceivers.



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

To install a transceiver:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the 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. 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.

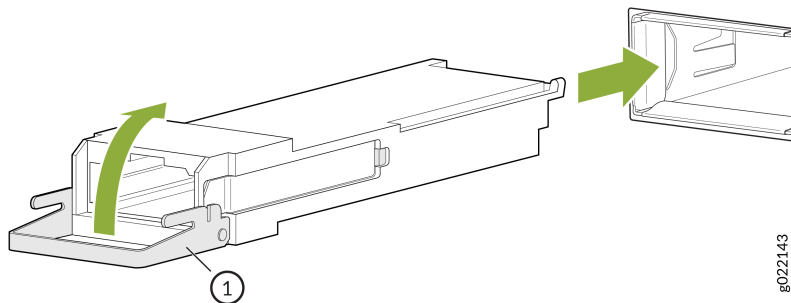
- Using both hands, carefully place the transceiver in the empty port. The connectors must face the chassis.



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

- Slide the transceiver in gently until it is fully seated. If you are installing a C form-factor pluggable (CFP) transceiver, use your fingers to tighten the captive screws on the transceiver.

Figure 51: Install a Transceiver



Install a QSFP28 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.

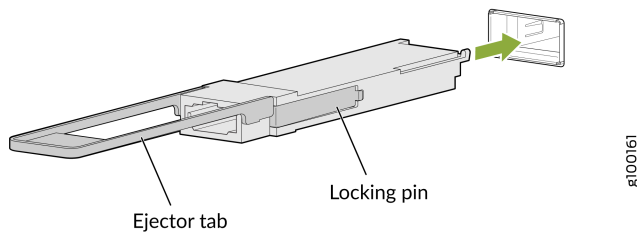


CAUTION: To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

To install a QSFP28 transceiver:

- Wrap and fasten one end of an ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
- Verify that a rubber safety cap covers the QSFP28 transceiver.
- Position the transceiver in front of the port on the device so that the QSFP28 connector faces the port.

Figure 52: Install a QSFP28 Transceiver



4. Slide the transceiver into the port until the locking pins lock in place. If there is resistance, remove the transceiver and flip it so that the connector faces the other direction.

Connect a Fiber-Optic Cable

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



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.

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

1. If the fiber-optic cable connector is covered with a rubber safety cap, remove the cap. Save the cap for subsequent use.
2. Remove the rubber safety cap from the optical transceiver. Save the cap for subsequent use.



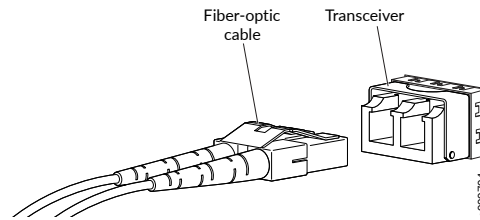
CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.



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

3. Insert the cable connector into the optical transceiver.

Figure 53: Connect a Fiber-Optic Cable to an Optical Transceiver Installed in a Device



4. Secure the cable so that it does not support its own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

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.



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.

QFX5140 Management Cable Specifications and Pinouts

IN THIS SECTION

- [QFX5140 Cable Specifications for Console and Management Connections | 81](#)
- [QFX5140 Management Port Connector Pinouts | 81](#)
- [QFX5140 Console Port Connector Pinouts | 82](#)
- [QFX5140 BITS Port Connector Pinouts | 83](#)

QFX5140 Cable Specifications for Console and Management Connections

Table 33 on page 81 provides the specifications of the cables that connect the router to a management device.

Table 33: Specifications of the Cables for Console and Management Connections

Port on the Router	Cable Specification	Maximum Length	Device Receptacle
Console (CON) port	RS-232 (EIA-232) serial cable	2.13 meters	RJ-45
Management (MGMT) port	Category 5 cable or equivalent suitable for 1000 BASE-T operation	100 meters	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.

QFX5140 Management Port Connector Pinouts

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

Table 34 on page 82 provides the pinout information of the RJ-45 management port connector.

Table 34: Pinouts of the RJ-45 Management Port Connector on the QFX5140

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

QFX5140 Console Port Connector Pinouts

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

[Table 35 on page 83](#) provides the pinout information for the RJ-45 console port 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 the router, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

Table 35: Pinouts of the Console Port Connector on the QFX5140

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

QFX5140 BITS Port Connector Pinouts

[Table 36 on page 83](#) provides the pinout information for the BITS port connector.

Table 36: Pinouts of the BITS Port Connector on the QFX5140

Pin	Signal	Description
1	RX ring	Rx_N connection
2	RX tip	Rx_P connection
3	No connection	—

Table 36: Pinouts of the BITS Port Connector on the QFX5140 *(Continued)*

Pin	Signal	Description
4	Tx ring	Tx_N connection
5	Tx tip	Tx_P connection
6	No connection	—
7	No connection	—
8	No connection	—

Connect the QFX5140 to External Devices

SUMMARY

This topic guides you on how to connect your QFX5140 to external management or timing devices.

IN THIS SECTION

- [Connect the QFX5140 to a Network for Out-of-Band Management | 85](#)
- [Connect the QFX5140 to a Management Console Using an RJ-45 Connector | 85](#)
- [Connect the QFX5140 to a Management Console Using a Mini USB-B Connector | 86](#)
- [Connect the QFX5140 to a Management Console Using a USB-C Connector | 88](#)
- [Connect the QFX5140 to External Clocking and Timing Devices | 89](#)

You can monitor and manage the QFX5140 by using a dedicated management channel. Use the management port to connect your device to the management device.

You can also connect the QFX5140 to external clocking and timing devices.

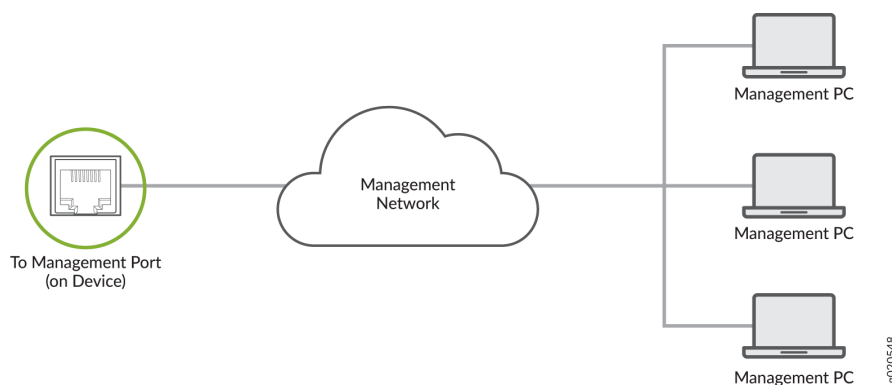
Connect the QFX5140 to a Network for Out-of-Band Management

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

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

1. Wrap and fasten one end of an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the other end of the strap to one of the ESD points on the chassis.
2. Connect one end of the Ethernet cable to the management port on the device.
3. Connect the other end of the cable to the management device.

Figure 54: Connect Your Device to a Network for Out-of-Band Management



Connect the QFX5140 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. You will also need the appropriate adapter (not provided) depending upon your console server or management console.

You can separately order the following adapters from Juniper Networks:

- 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)



NOTE: If you want to use the 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 the device to a management console:

1. Wrap and fasten one end of an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the other end of the strap to one of the ESD points on the chassis.
2. Connect one end of the Ethernet cable to the console port on the device.
3. Connect the other end of the cable to the console server or PC.

Figure 55: Connect Your Device to a Management Console Through a Console Server

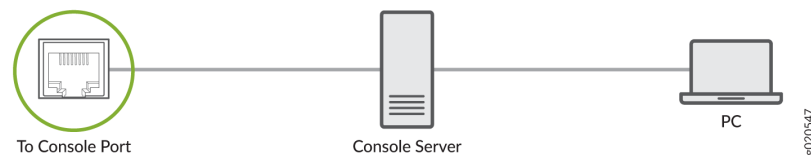


Figure 56: Connect Your Device Directly to a Management Console



Connect the QFX5140 to a Management Console Using a Mini USB-B Connector

Ensure that you have a USB cable that has a mini USB-B connector at one end and a standard USB-A connector at the other. You will also need the appropriate adapter (not provided) depending upon your console server or management console.

Ensure that the USB-to-serial driver is installed on the host machine.

By default, the RJ-45 port is the active console port. You must configure the mini USB-B console port before using it. Set the HyperTerminal properties of the console server or management console as follows:

- Baud rate—9600
- Flow control—None
- Data—8
- Parity—None
- Stop bits—1
- DCD state—Disregard

To connect the device to a management console:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. Connect the mini USB-B connector of the USB cable to the console port on the device.
3. Connect the standard USB-A connector of the cable to the console server or management console.

Figure 57: Connect Your Device to a Management Console Through a Console Server

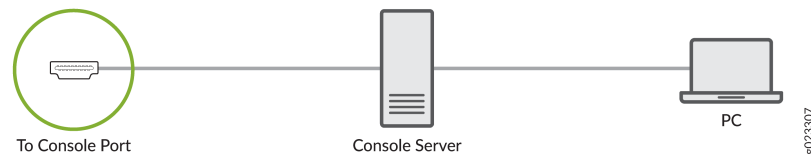
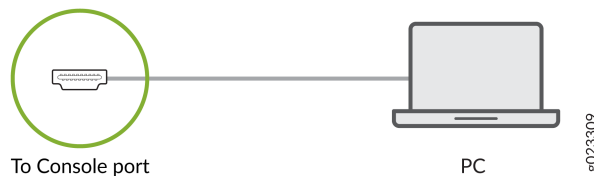


Figure 58: Connect Your Device Directly to a Management Console



4. Use the `set system ports auxiliary port-type mini-usb` command to enable logging in to the device by using the mini USB-B console port.
5. Reboot the device. The boot logs and the login prompt appear on the console connected to the mini USB-B port.

Connect the QFX5140 to a Management Console Using a USB-C Connector

Ensure that you have a USB cable that has a USB-C connector at either end. You will also need the appropriate adapter (not provided) depending upon your console server or management console.

Ensure that the USB-to-serial driver is installed on the host machine.

By default, the RJ-45 port is the active console port. You must configure the USB-C console port before using it. Set the HyperTerminal properties of the console server or management console as follows:

- Baud rate—9600
- Flow control—None
- Data—8
- Parity—None
- Stop bits—1
- DCD state—Disregard

To connect the device to a management console:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. Connect one end of the USB cable to the console port on the device.
3. Connect the other end of the cable to the console server or management console.

Figure 59: Connect Your Device to a Management Console Through a Console Server

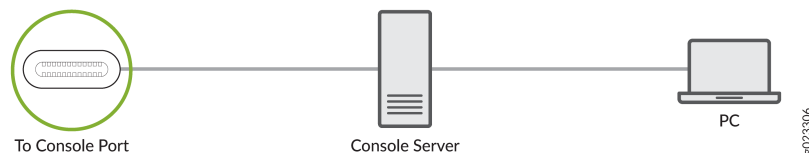
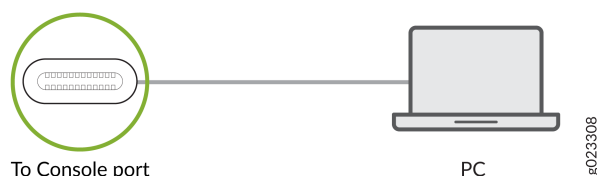


Figure 60: Connect Your Device Directly to a Management Console



4. Use the `set system ports auxiliary type ansi` command to enable logging in to the device by using the USB-C console port.
5. Use the `request system boot-console auxiliary` command to see the boot logs on the console connected to the USB-C port.
Note that only the Junos OS Evolved boot logs will be visible on the console connected to the USB-C port.
6. Reboot the device. The boot logs and the login prompt appear on the console connected to the USB-C port.

Connect the QFX5140 to External Clocking and Timing Devices

IN THIS SECTION

- [Connect 1-PPS and 10-MHz Timing Devices | 89](#)
- [Connect the QFX5140 to a Time-of-Day Device | 90](#)

Connect 1-PPS and 10-MHz Timing Devices

Your device has GPS clock ports that you can use to connect it to a 1-pulses per second (PPS) and 10-megahertz (MHz) timing device. These ports require 2x1 DIN 1.0/2.3 latching plug connectors.

You can configure your device as a timing primary device or a client device. As a timing primary device, the device receives inputs from the timing device through the input ports and sends outputs to a client device through the output ports. As a timing client device, the device receives inputs from the timing device through the input ports.

To connect your device to a 1-PPS and 10-MHz timing device:

1. If your device is a timing client device, connect one end of each 2x1 DIN 1.0/2.3 cable to each input port on your device.

If your device is a timing primary device, connect it to a client device by using the output ports.



NOTE: Ensure that you use a cable of 3 meters or less.

Ensure that the timing device supports an input or output impedance of 50 ohms and input and output voltage levels that comply with ITU G.703. The timing device inputs must be 5-volt (V) tolerant.

2. Connect the other end of each cable to each 1-PPS and 10-MHz connector on the timing device.

Connect the QFX5140 to a Time-of-Day Device

You can use the time-of-day (TOD) port on your device to connect it to a TOD timing device.

To connect your device to a TOD timing device:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis.
2. Plug one end of an RJ-45 cable into the TOD port.



NOTE: Ensure that you use a cable of 6 meters or less in length.

3. Plug the other end of the RJ-45 cable into the TOD timing device.
4. Configure the port.

Connect the QFX5140 to Power

SUMMARY

Connect the QFX5140 to power by performing the following steps. Take safety precautions to prevent equipment damage and personal injury

IN THIS SECTION

- [Ground the QFX5140 | 91](#)
- [Install Heat-Shrink Tubing on a Power Cable | 92](#)
- [Connect AC Power to the QFX5140 | 93](#)

Ground the QFX5140

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the QFX5140 to an earth ground before you connect it to power.



NOTE: Before you connect an earth ground to the protective earthing terminal of the device, ensure that a licensed electrician attaches an appropriate grounding terminal to the grounding cable. Using a grounding cable with an incorrectly attached terminal can damage the device.



NOTE: You must install the router in a restricted-access location and ensure that the chassis is always properly grounded. The router has a two-hole protective grounding 73 terminal on the rear panel. Under all circumstances, use this grounding connection to ground the chassis. For AC and HVAC/HVDC-powered systems, you must also use the grounding wire in the power cord along with the two-hole protective grounding lug connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

Before connecting the device to an earth ground, ensure that you have the following parts and tools:

- An electrostatic discharge (ESD) grounding strap (provided).
- Terminal lug (provided)—Panduit LCD6-14AF-L terminal lug or an equivalent lug are sized for 6 AWG (4.11 mm²) power source cables. The 2-hole terminal lug connects to the grounding point located at the rear panel of the QFX5140.
- Grounding cable for your device (not provided)—The grounding cable must be 6 AWG (4.11 mm²) stranded wire and rated 90 °C or according to local electrical code.
- A Phillips (+) screwdriver, number 2 to tighten the screw (not provided).

You must install heat-shrink tubing insulation around the crimped section of the power source cables and lugs.

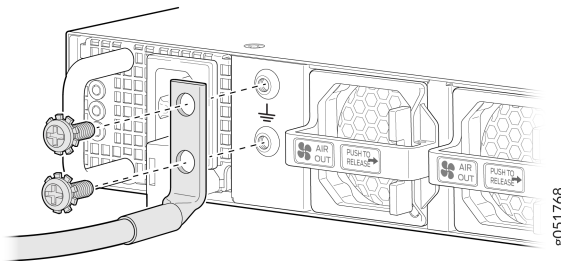
Under all circumstances, use the chassis grounding point to ground the chassis to earth ground.

To ground the QFX5140:

1. Wrap and fasten one end of the ESD grounding strap around your wrist. Connect the other end to the ESD point on the chassis.
2. Ensure that all grounding surfaces are clean and brought to a bright finish before making the grounding connections.

3. Connect the grounding cable to a proper earth ground, such as the rack in which you mount the device.
4. Using the Phillips screwdriver, remove the screws from the chassis grounding point.
5. Secure the terminal lug attached to the other end of the ground cable to the chassis grounding point. Use the screws that you removed from the chassis grounding point in the earlier step.

Figure 61: Connect the Terminal Lugs to the



6. Verify that the grounding cable does not touch or block access to the device components. Make sure that the cable does not trail across the floor where people could trip over it.



NOTE: Ensure that the device is permanently connected to ground during its operation.

Install Heat-Shrink Tubing on a Power Cable

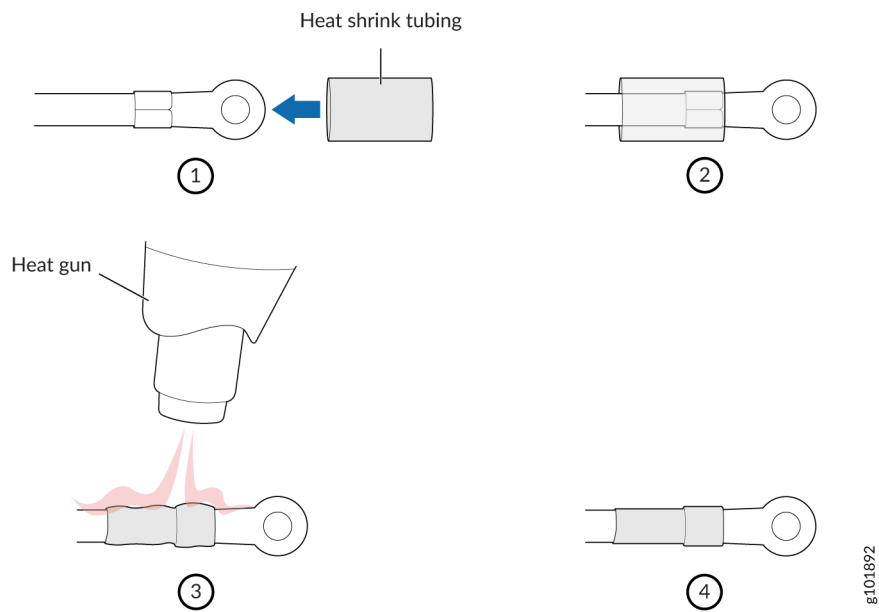
To install heat-shrink tubing insulation around the power cables:

1. 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.
2. 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.



CAUTION: Do not overheat the tubing.

Figure 62: Install Heat-Shrink Tubing



Connect AC Power to the QFX5140

IN THIS SECTION

- [Connect the QFX5140-24CD8O-AO to Power | 94](#)

Power supply units (PSUs) in the QFX5140 are hot-removable and hot-insertable field-replaceable units (FRUs) with support for 1+1 redundancy. You can remove and replace a redundant PSU without powering off the QFX5140 or disrupting the device functions.



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

Before you begin to connect AC power to the device:

- Ensure that you have connected the chassis to an earth ground.

- Ensure that you have a power cord appropriate for your geographical location available to connect AC power to the device.
- Ensure that you familiarize yourself with [AC Power Electrical Safety Guidelines](#) and [Action to Take After an Electrical Accident](#).
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage.
- Ensure that you have an ESD grounding strap.
- If not already installed, install the PSUs in the device.

Connect the QFX5140-24CD8O-AO to Power

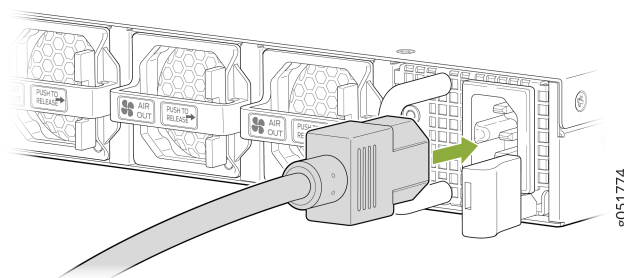
SUMMARY

This topic guides you through the steps to connect the QFX5140-24CD8O-AO to power.

To connect the QFX5140-24CD8O-AO to power:

1. Wrap and fasten one end of the ESD cable grounding strap around your bare wrist. Connect the other end to a site ESD point.
2. Ensure the PSU is properly seated in the chassis. Verify that the PSU matches the required AC or DC type.
3. Locate the AC power cords shipped with the QFX5140.
4. Hold the AC power cord with the connector oriented correctly toward the PSU inlet. Ensure the connector pins line up with the PSU socket.
5. Firmly push the power cord plug straight into the PSU input receptacle until it is fully seated. Ensure that the retention latch (shown in green) locks into place to prevent accidental removal.

Figure 63: Connect power cord to the QFX5140 AC PSU



6. If the AC power source outlet has a power switch, set it to the off (O) position.
7. Insert the power cord plug into the AC power source outlet or PDU.



NOTE: Connect each PSU to a dedicated AC power feed and a dedicated external circuit breaker. We recommend that you use a circuit breaker rated at a minimum of 16 A (250 VAC), or as permitted by the local code.

8. If the AC power source outlet has a power switch, set it to the on (I) position.

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](#).

Configure Junos OS Evolved on the QFX5140

SUMMARY

This topic guides you through the initial configuration of your QFX5140 by using the Junos OS Evolved CLI.

IN THIS SECTION

- [Access the CLI on the QFX5140 | 96](#)
- [Configure Root Authentication and Management Interface from the CLI | 97](#)

The QFX5140 is shipped with the Junos OS Evolved preinstalled and ready to be configured when the switch is powered on. Two solid-state drives (SSDs) store the boot image to provide redundancy. If the primary disk fails, Junos OS Evolved boots from the secondary disk.

A USB storage device can be inserted into the USB slot in the front panel of the chassis. The switch also has two M.2-based solid-state drives (SSDs) that act as the primary boot devices (**nvme0n1** and **nvme1n1**). When the switch boots, it first attempts to load the Junos OS Evolved image from the USB flash memory drive if it detects this drive. If the attempt fails because the USB flash drive is missing or for some other reason, the switch tries the primary boot device and then the secondary boot device.

You can use the Junos OS Evolved command line interface (CLI) to perform the initial configuration.

Access the CLI on the QFX5140

To access the CLI on your device:

1. Verify that the device is powered on.
2. Connect the management device to the serial console port.
3. Start your asynchronous terminal emulation application (such as Microsoft Windows HyperTerminal) and select the appropriate COM port to use (for example, COM1).
4. Configure the serial port settings with the following values:
 - Baud rate—9600
 - Parity—N
 - Data bits—8
 - Stop bits—1
 - Flow control—none

5. Power on the device. You can start performing initial software configuration on the device after the device is up.



NOTE: After you complete the initial configuration, you can connect your device to a network for out-of-band management.

Configure Root Authentication and Management Interface from the CLI

The QFX5140 switch ships with factory-default settings that enable zero-touch provisioning (ZTP). These settings load as soon as you power on the switch. In this case, as we configure the switch manually, we disable ZTP during the initial configuration.

When you don't use ZTP, you must perform the initial configuration of a QFX5140 switch through the console port (**CONSOLE**) using the Junos OS Evolved command-line interface (CLI).

Gather the following information before configuring the device:

- switch's host and domain name
- IP address and subnet mask for the management and loopback interfaces
- IP address of a default gateway for the management network
- IP address of a DNS server
- Root user's password

To configure root authentication and the management interface:



NOTE: This procedure connects the switch to the network but does not enable it to forward traffic. For complete information about enabling the switch to forward traffic, including examples, see the Junos OS Evolved configuration guides.

1. Start the CLI.

```
root@:~ # cli
root>
```

2. Enter configuration mode.

```
cli> configure
[edit]
root#
```

3. Set the root authentication password by entering either a plain text password, an encrypted password, or an SSH public key string (ECDSA, ED25519, or RSA).

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

or

```
[edit]
root# set system root-authentication encrypted-password encrypted-password
```

or

```
[edit]
root# set system root-authentication (ssh-ecdsa | ssh-ed25519 | ssh-rsa) public-key
```

4. Remove factory default configuration statements that relate to ZTP. After you commit these initial changes, the ZTP process is stopped and the related console messages are no longer displayed.

```
[edit]
root@# delete system commit
root@# delete chassis auto-image-upgrade
root@# delete interfaces re0:mgmt-0
```

5. Configure the IP address and prefix length for the switch's management Ethernet interface (fxp0). You also configure an IPv4 address on the loopback interface in this step. Having a routable IP

address on the loopback interface is a best practice and is generally needed later, when you configure routing protocols.

```
[edit]
root# set interfaces re0:mgmt-0 unit 0 family inet address address/prefix-length
root# set interfaces lo0 unit 0 family inet address address/32
```

6. Perform an initial commit to activate the modified configuration.

```
[edit]
root# commit
commit complete
[edit]
root#
```

7. Configure the switch's host name. If the name includes spaces, enclose the name in quotation marks (" ").

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

8. Configure the switch's domain name.

```
[edit]
root# set system domain-name domain-name
```

9. Configure the IP address of a DNS server.

```
[edit]
root@# set system name-server address
```

10. Configure one or more static routes to remote subnets that have access to the management subnet. Without static routing, access to the management port is limited to devices attached to the management subnet. For more information about static routes, see [Configure Static Routes](#).

In our example, we define a single default static route to provide management network reachability to all possible remote destinations.

```
[edit]
root# set routing-options static route 0.0.0.0/0 next-hop destination-IP retain no-
readvertise
```

11. Configure the IP address of a backup switch. The backup switch is used only while the routing protocol is not running. The primary use of the backup switch is to provide routing capability for the management port on the backup Routing Engine. This is because the backup Routing-Engine does not run the routing protocol daemon (rpd).

In most cases, the IP address of the backup switch is the same as the next-hop IP address used for the management network's static routes. We configure a default route to provide the backup Routing Engine with reachability to all possible remote destinations.

```
[edit]
root# set system backup-switch address
root# set system backup-switch destination 0.0.0.0/0
```

12. Configure remote access for the root user over SSH. By default the root user can log in only through the console port. The root-login allow statement permits remote login for the root user.

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

13. (Optional) Verify if the configuration is correct.

```
[edit]
root# show
system {
    host-name host-name;
    root-authentication {
        authentication-method (encrypted-password | public-key);
    }
    services {
        ssh {
            root-login allow;
        }
    }
    domain-name domain-name;
```

```

    backup-switch address destination 0.0.0.0/0;

    name-server {
        address;
    }
}
interfaces {
    re0:mgmt-0 {
        unit 0 {
            family inet {
                address address/prefix-length;
            }
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address address/32;
            }
        }
    }
}
routing-options {
    static {
        route 0.0.0.0/0 next-hop destination-IP;
    }
}

```

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

```

[edit]
root# commit
commit complete

[edit]
root@host-name#

```

15. When you've finished configuring the switch, exit configuration mode.

```

[edit]
root@host-name# exit
Exiting configuration mode

```

```
root@host-name>
```

The initial configuration is now complete. At this point, you should be able to remotely access the device as the root user through SSH.

8

CHAPTER

Maintenance

IN THIS CHAPTER

- Routine Maintenance Guidelines for the QFX5140 Switch | **104**
 - Maintain the QFX5140 Transceivers and Fiber-Optic Cables | **104**
 - Replace Direct Attach Cables | **110**
 - Replace Breakout Cables | **116**
 - Replace Active Optical Cables | **121**
-

Routine Maintenance Guidelines for the QFX5140 Switch

To maintain optimum device performance, follow these preventive maintenance guidelines:

- Inspect the installation site for moisture, loose wires or cables, and excessive dust.
- Ensure that the airflow is unobstructed around the device and into the air intake vents.
- Check status LEDs on the front panel of the device.

Maintain the QFX5140 Transceivers and Fiber-Optic Cables

IN THIS SECTION

- [Remove a Transceiver | 104](#)
- [Install a Transceiver | 107](#)
- [Disconnect a Fiber-Optic Patch Cable | 107](#)
- [Disconnect a Fiber-Optic Patch Cable | 108](#)
- [Connect a Fiber-Optic Cable | 108](#)
- [How to Handle Fiber-Optic Patch Cables | 109](#)

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.

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.

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. 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.



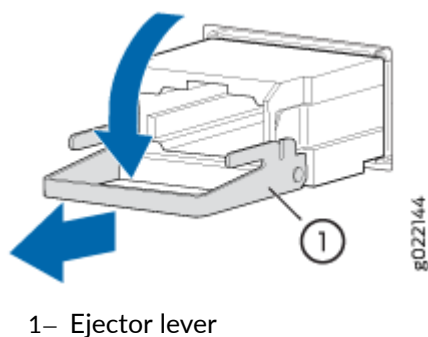
CAUTION: Before removing the transceiver, make sure that you open the ejector lever completely until you hear it click. This precaution prevents damage to the transceiver.

- 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 64: Remove a QSFP+ Transceiver



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

You can install a transceiver in an empty slot on the QFX5140.

Disconnect a Fiber-Optic Patch Cable

Before you disconnect a fiber-optic patch cable from an optical transceiver, ensure that you have taken the necessary precautions for safe handling of lasers.

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 patch cable connector

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

To disconnect a fiber-optic patch 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 patch cables. Fiber-optic transceivers and fiber-optic patch cables connected to transceivers emit laser light that can damage your eyes.

2. Carefully unplug the fiber-optic patch 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 patch cable connector with the rubber safety cap.

Disconnect a Fiber-Optic Patch Cable

Before you disconnect a fiber-optic patch 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 patch cable connector

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

To disconnect a fiber-optic patch 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 patch cables. Fiber-optic transceivers and fiber-optic patch cables connected to transceivers emit laser light that can damage your eyes.

2. Carefully unplug the fiber-optic patch 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 patch cable connector with the rubber safety cap.

Connect a Fiber-Optic Cable

You can connect fiber-optic cables to optical transceivers installed on the QFX5140.

How to Handle Fiber-Optic Patch Cables

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

Follow these guidelines when handling fiber-optic patch cables:

- When you unplug a fiber-optic patch cable from a transceiver, place rubber safety caps over the transceiver and on the end of the cable.
- Anchor fiber-optic patch cables to prevent stress on the connectors. When attaching a fiber-optic patch cable to a transceiver, secure the fiber-optic patch cable so that it does not support its own weight as it hangs to the floor. Never let a fiber-optic patch cable hang free from the connector.
- Avoid bending the fiber-optic patch cables beyond their minimum bend radius. Bending fiber-optic patch 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 patch 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 patch 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 patch 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.

Replace Direct Attach Cables

SUMMARY

IN THIS SECTION

- [Disconnect a Direct Attach Cable | 110](#)
- [Connect a Direct Attach Cable | 113](#)

A direct attach cable has a transceiver preattached to each end.

Disconnect a Direct Attach Cable

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat to store the cable, if you are disconnecting the cable from both the ports it is connected to
- Rubber safety caps to cover the ports on the device, or a replacement cable
- Rubber safety caps to cover the transceivers at the ends of the cable
- An electrostatic discharge (ESD) grounding strap—not provided

To disconnect a direct attach cable:

1. Disable the port to which the cable is connected by issuing the following command:

```
[edit interfaces]
user@device# set interface-name disable
```

2. Place the antistatic bag or antistatic mat on a flat, stable surface if you are disconnecting the cable from both the ports it is connected to.
3. 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.
4. Label the cable so that you can reconnect it correctly.

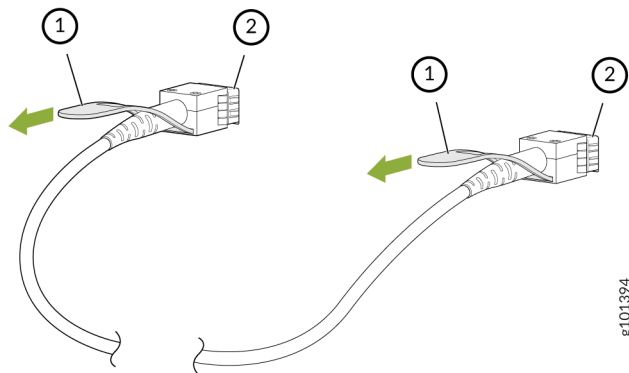
CAUTION: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

CAUTION: Do not bend the 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.

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

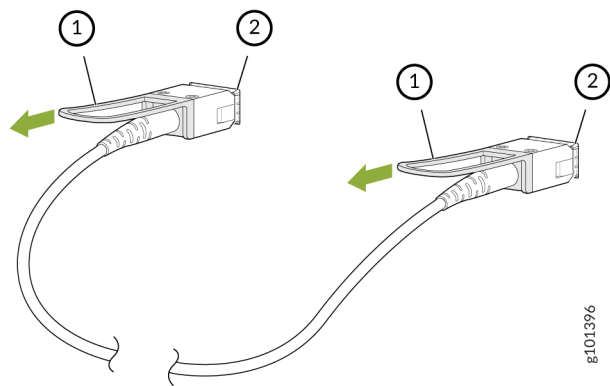
5. By using your fingers, pull the tab on the transceiver attached to the cable to disengage it.

Figure 65: Disconnect an SFP28 or SFP+ Direct Attach Cable



Callout	Item
1	Tab to pull the transceiver
2	Port on the device

Figure 66: Disconnect a QSFP-DD Direct Attach Cable



Callout	Item
1	Tab to pull the transceiver
2	Port on the device

6. Grasp the transceiver and gently slide it approximately 0.5 in. (1.3 cm) straight out of the port.



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

- 7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
- 8. Cover the transceiver with a rubber safety cap.
- 9. If you are disconnecting the cable from both the ports it is connected to, place the cable in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

The procedure to disconnect other types of direct attach cables, other than direct attach breakout cables, is the same as the procedure described in this topic.

Connect a Direct Attach Cable



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

Ensure that you have an ESD grounding strap (not provided).



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

We recommend that you use only cables 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.

To connect a direct attach cable:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Remove the cable from its bag.
3. If the transceiver attached to the cable is covered with a rubber safety cap, remove the cap. Save the cap.

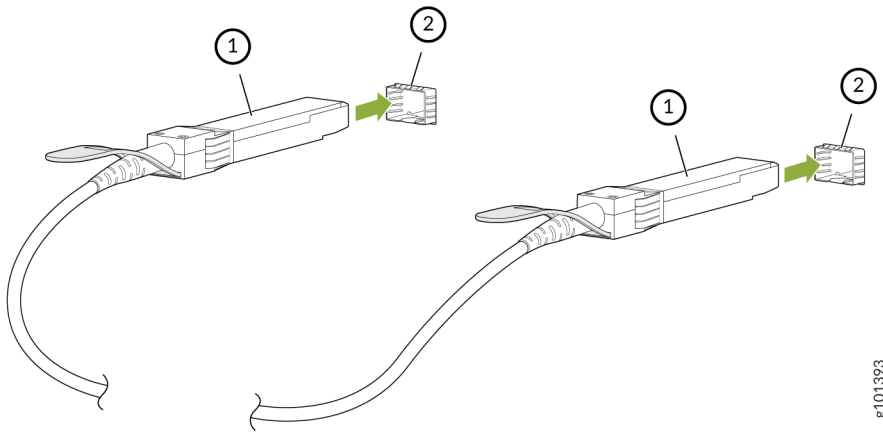
CAUTION: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

4. If the port on the device is covered with a rubber safety cap, remove the cap. Save the cap. If you are hot-swapping a cable, wait for at least 10 seconds after removing the cable from the port before installing a new cable.

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 cable unusable.

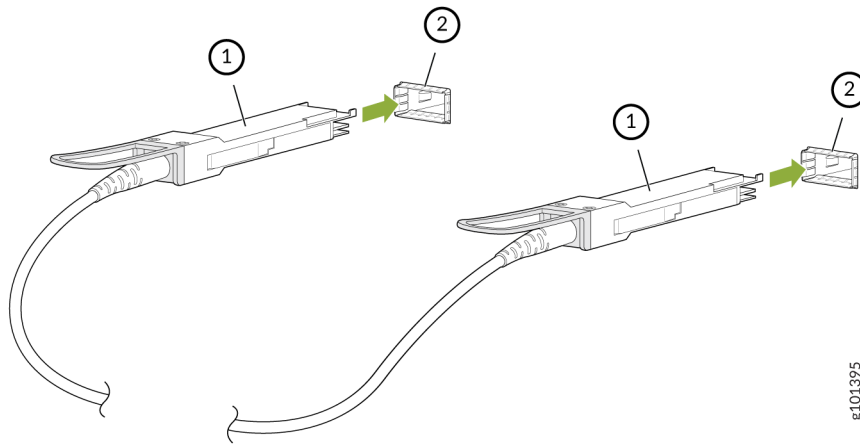
5. By using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. Slide the transceiver in gently until it is fully seated.

Figure 67: Connect an SFP28 or SFP+ Direct Attach Cable



Callout	Item
1	Transceiver
2	Port on the device

Figure 68: Connect a QSFP-DD Direct Attach Cable



Callout	Item
1	Transceiver
2	Port on the device

6. Repeat Step 5 for the other port to which the cable must be connected.
7. Secure the cable so that it does not support its own weight as it hangs to the floor. 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. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Do not bend the 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.



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

The procedure to connect other types of direct attach cables, other than direct attach breakout cables, is the same as the procedure described in this topic.

Replace Breakout Cables

IN THIS SECTION

- [Disconnect a Breakout Cable | 116](#)
- [Connect a Breakout Cable | 118](#)

Breakout cables have one transceiver preattached to one end and two or more transceivers preattached to the other end. You can use the cables to channelize a port and increase the number of interfaces. For example, you can channelize the QSFP28 ports on the rear panel of EX4400 switches by connecting breakout cables and by using CLI configuration when those ports are configured as network ports.

Disconnect a Breakout Cable

Before you disconnect a breakout cable from a device, ensure that you have taken the necessary precautions for safe handling of laser (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 to store the cable, if you are disconnecting the cable from all the ports it is connected to
- Rubber safety caps to cover the ports on the device, or a replacement cable
- Rubber safety caps to cover the transceivers at the ends of the cable
- An electrostatic discharge (ESD) grounding strap—not provided

To disconnect a breakout cable:

1. Disable the port to which the cable is connected by issuing the following command:

```
[edit interfaces]  
user@device# set interface-name disable
```

2. Place the antistatic bag or antistatic mat on a flat, stable surface if you are disconnecting the cable from all the devices it is connected to.

- 3. 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.
- 4. Label the cable so that you can reconnect it correctly.



CAUTION: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.



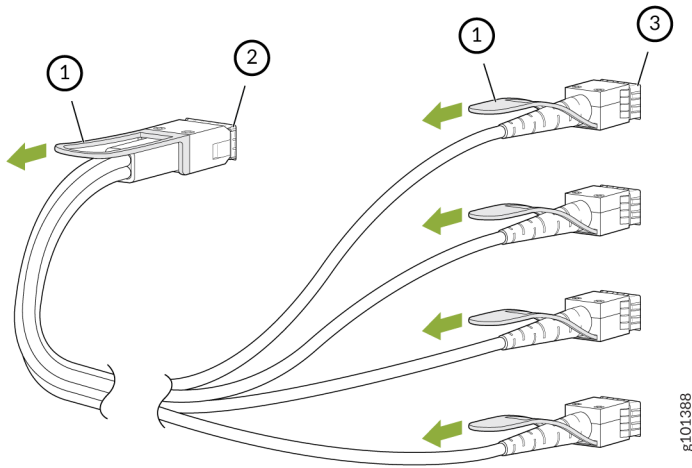
CAUTION: Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.



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

- 5. By using your fingers, pull the tab on the transceiver attached to the cable to disengage it.

Figure 69: Disconnect a Breakout Cable



g101388

Callout	Item
1	Tab to pull the transceiver

(Continued)

Callout	Item
2	Channelized port on a device
3	Port at the other end

6. Grasp the transceiver and gently slide it approximately 0.5 in. (1.3 cm) straight out of the port.



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

7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Cover the transceiver with a rubber safety cap.
9. Secure the cable so that it does not support its own weight as it hangs to the floor. If there is a cable management system, arrange the cable in the cable management system to prevent it from dislodging or developing stress points. 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.
10. If you are disconnecting the cable from all the devices it is connected to, place the cable in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

The procedure to disconnect other types of breakout cables is the same as the procedure described in this topic.

Connect a Breakout Cable

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.

Before you connect a breakout cable to a device, ensure that you have taken the necessary precautions for safe handling of laser (see [Laser and LED Safety Guidelines and Warnings](#)).



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

Ensure that you have an electrostatic discharge (ESD) grounding strap (not provided).



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

To connect a breakout cable:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Remove the cable from its bag.



CAUTION: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

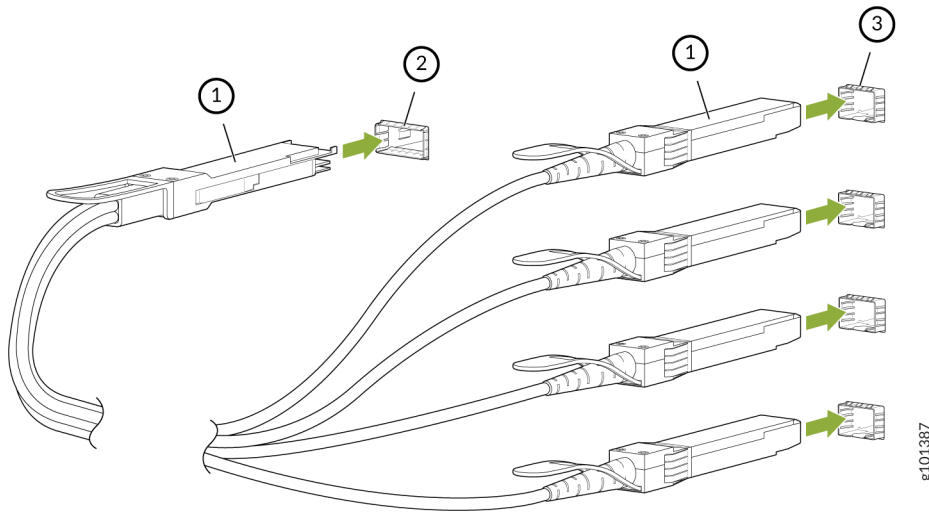
3. If the transceiver attached to the cable is covered with a rubber safety cap, remove the cap. Save the cap.
4. If the port on the device is covered with a rubber safety cap, remove the cap. Save the cap. If you are hot-swapping a cable, wait for at least 10 seconds after removing the cable from the port before installing a new cable.



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 cable unusable.

5. By using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. Slide the transceiver in gently until it is fully seated.

Figure 70: Connect a Breakout Cable



Callout	Item
1	Tab to pull the transceiver
2	Channelized port on a device
3	Ports at the other end

6. Repeat Step 5 for all ports to which the cable must be connected.
7. Secure the cable so that it does not support its own weight as it hangs to the floor. 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. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



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

The procedure to connect other types of breakout cables is the same as the procedure described in this topic.

Replace Active Optical Cables

SUMMARY

IN THIS SECTION

- [Disconnect an Active Optical Cable | 121](#)
- [Connect an Active Optical Cable | 124](#)

An active optical cable (AOC) is an optical fiber cable that has a transceiver preattached to each end.

Disconnect an Active Optical Cable

Before you disconnect an active optical cable (AOC) from a device, ensure that you have taken the necessary precautions for safe handling of laser (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 to store the cable, if you are disconnecting the cable from all the ports it is connected to
- Rubber safety caps to cover the ports on the device, or a replacement cable
- Rubber safety caps to cover the transceivers at the ends of the cable
- An electrostatic discharge (ESD) grounding strap—not provided

To disconnect an active optical cable:

1. Disable the port to which the cable is connected by issuing the following command:

```
[edit interfaces]
user@device# set interface-name disable
```

2. Place the antistatic bag or antistatic mat on a flat, stable surface if you are disconnecting the cable from both the ports it is connected to.
3. 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.
4. Label the cable so that you can reconnect it correctly.

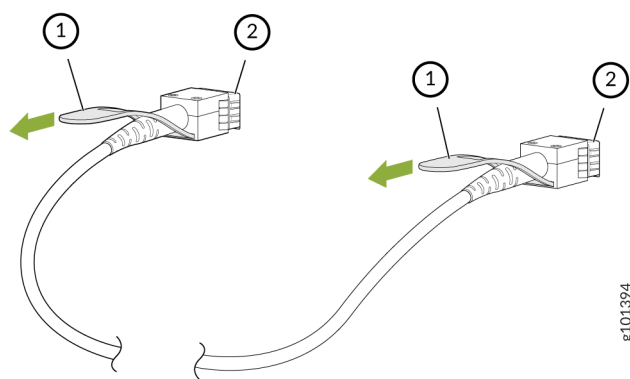
CAUTION: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

CAUTION: Do not bend the 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.

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

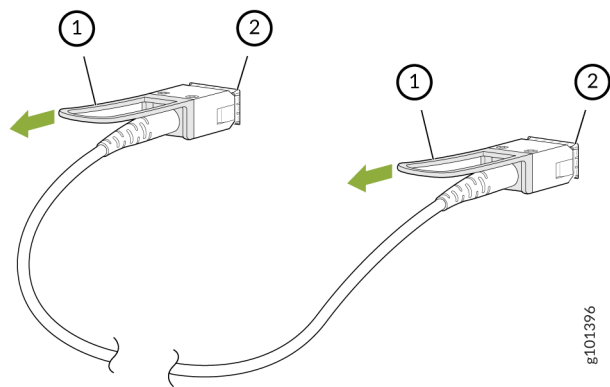
5. By using your fingers, pull the tab on the transceiver attached to the cable to disengage it.

Figure 71: Disconnect an SFP28 or SFP+ Active Optical Cable



Callout	Item
1	Tab to pull the transceiver
2	Port on the device

Figure 72: Disconnect a QSFP28 or QSFP+ Active Optical Cable



Callout	Item
1	Tab to pull the transceiver
2	Port on the device

6. Grasp the transceiver and gently slide it approximately 0.5 in. (1.3 cm) straight out of the port.

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

- 7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
- 8. Cover the transceiver with a rubber safety cap.
- 9. If you are disconnecting the cable from both the ports it is connected to, place the cable in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

The procedure to disconnect other types of AOCs, other than direct attach AOCs, is the same as the procedure described in this topic.

Connect an Active Optical Cable

Before you connect an AOC to a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [Laser and LED Safety Guidelines and Warnings](#)).



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

Ensure that you have an ESD grounding strap (not provided).



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

We recommend that you use only cables 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.

To connect an active optical cable:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Remove the cable from its bag.

3. If the transceiver attached to the cable is covered with a rubber safety cap, remove the cap. Save the cap.

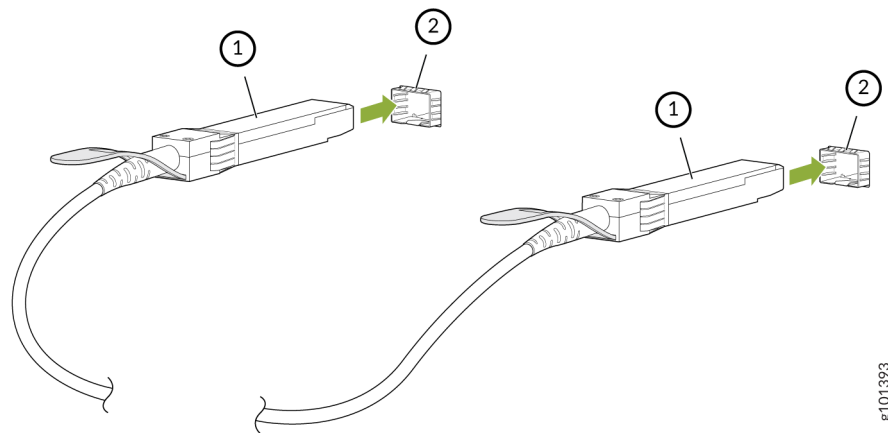
CAUTION: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

4. If the port on the device is covered with a rubber safety cap, remove the cap. Save the cap. If you are hot-swapping a cable, wait for at least 10 seconds after removing the cable from the port before installing a new cable.

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 cable unusable.

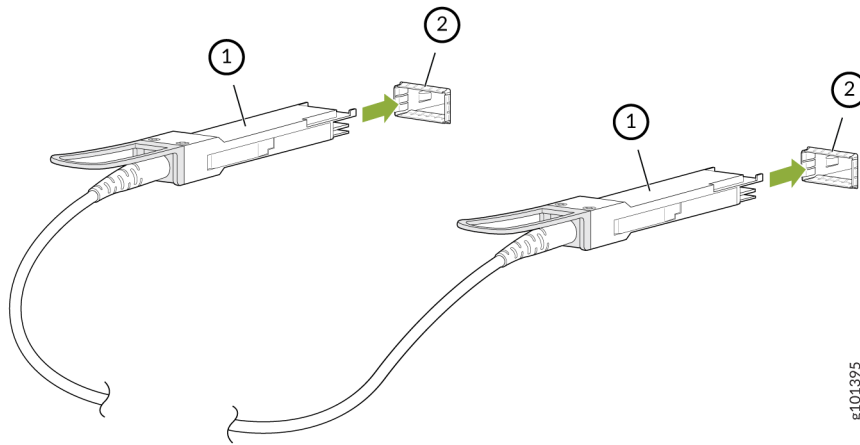
5. By using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. Slide the transceiver in gently until it is fully seated.

Figure 73: Connect an SFP28 or SFP+ Active Optical Cable



Callout	Item
1	Transceiver
2	Port on the device

Figure 74: Connect a QSFP28 or QSFP+ Active Optical Cable



Callout	Item
1	Transceiver
2	Port on the device

6. Repeat Step 5 for the other port to which the cable must be connected.
7. Secure the cable so that it does not support its own weight as it hangs to the floor. 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. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Do not bend the 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.



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

The procedure to connect other types of AOCs, other than direct attach AOCs, is the same as the procedure described in this topic.

9

CHAPTER

Site Planning, Preparation, and Specifications

IN THIS CHAPTER

- QFX5140 Site Preparation Checklist | 128
 - QFX5140 Site Guidelines and Requirements | 129
 - QFX5140 Network Cable and Transceiver Planning | 135
 - QFX5140 Management Cable Specifications and Pinouts | 140
-

QFX5140 Site Preparation Checklist

The checklist summarizes the tasks you need to perform when preparing a site for a QFX5140 installation.

Table 37: 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.	"QFX5140 Environmental Requirements and Specifications" on page 130		
Power			
Measure the distance between external power sources and the switch installation site.	—		
Calculate the power consumption and requirements.			
Rack or Cabinet			
Verify that your rack or cabinet meets the minimum requirements for installing the switch.	• "QFX5140 Rack Requirements" on page 133 • "QFX5140 Cabinet Requirements" on page 133 • "Determining QFX5140 Optical Interface Support" on page 71		
Plan rack or cabinet location, including required space clearances.	"QFX5140 Clearance Requirements for Airflow and Hardware Maintenance" on page 132		

Table 37: Site Preparation Checklist (Continued)

Item or Task	For More Information	Performed By	Date
Secure the rack or cabinet to the floor and building structure.	-		
Cables			
Acquire cables and connectors:	"Determining QFX5140 Optical Interface Support" on page 71		
• Determine the number of cables needed based on your planned configuration. • Review maximum supported distances and select cable lengths accordingly.			
Plan the cable routing and management.	—		

QFX5140 Site Guidelines and Requirements

IN THIS SECTION

- [QFX5140 Environmental Requirements and Specifications | 130](#)
- [General Site Guidelines | 131](#)
- [QFX5140 Grounding Cable and Lug Specifications | 131](#)
- [QFX5140 Clearance Requirements for Airflow and Hardware Maintenance | 132](#)
- [QFX5140 Rack Requirements | 133](#)
- [QFX5140 Cabinet Requirements | 133](#)
- [Site Electrical Wiring Guidelines | 133](#)

QFX5140 Environmental Requirements and Specifications

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

Follow these environmental guidelines:

- Keep the installation site as dust-free as possible. Dust can clog air intake vents and reduce cooling efficiency.
- Ensure adequate ambient airflow. Restricted airflow or elevated intake temperatures can cause the switch to overheat and trigger protective shutdown.

Table 38 on page 130 lists the supported environmental tolerances.

Table 38: Environmental Tolerances for QFX5140

Description	Tolerance
Altitude	• QFX5140-24CD8O-AO (AFO): No performance degradation upto 6000ft (1829 m) at 0°C through 40°C. • QFX5140-24CD8O-AI (AFI): • No performance degradation up to 6000 ft (1829 m) at 0°C to 35°C • No performance degradation at 0 ft (0 m) at 0°C to 40°C
Operating temperature	32°F through 104°F (0°C through 40°C)
Storage temperature	-40°F through 158°F (-40°C through 70°C)
Relative humidity	5% through 90%, noncondensing
Seismic	Tested as per GR 63 ZONE 4.

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.

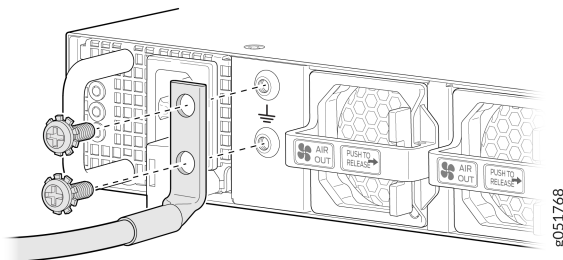
QFX5140 Grounding Cable and Lug Specifications

For installations requiring a separate grounding conductor, the switch must be properly grounded before power is connected to meet safety and electromagnetic interference (EMI) requirements.



NOTE: Always use the chassis grounding terminal to ground the switch. For AC systems, use the grounding conductor in the power cord in addition to the chassis grounding terminal.

Figure 75: Connecting a Grounding Cable to a QFX5140





WARNING: The QFX5140 is pluggable Type A equipment installed in a restricted-access location and must be permanently connected to earth ground.



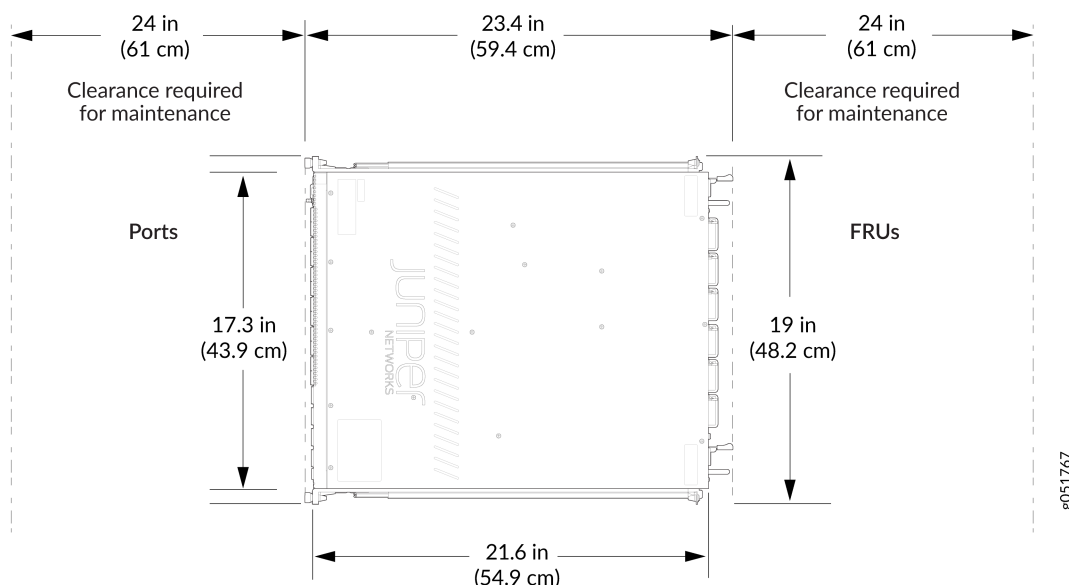
CAUTION: A licensed electrician must attach a cable lug to the grounding cable before installation. An incorrectly attached lug can damage the switch.

- Use a two-hole grounding lug equivalent to Panduit LCD10-10A-L (not provided).
- Use a minimum 14-AWG (2 mm²), 60°C grounding cable, or as required by local code.

QFX5140 Clearance Requirements for Airflow and Hardware Maintenance

Provide sufficient clearance around the switch to ensure proper airflow and allow service personnel to replace hardware components.

Figure 76: Clearance Requirements for QFX5140



- Leave at least 24 in. (61 cm) of clearance at the front and rear of the chassis.
- Align airflow direction with the data center hot-aisle and cold-aisle layout.

- Ensure exhaust air from adjacent equipment does not enter the intake vents.

QFX5140 Rack Requirements

QFX5140 switches are designed for installation in four-post racks.

Table 39: Rack Requirements for QFX5140

Requirement	Guidelines
Rack type	Four-post rack with 1-U (1.75 in. / 4.45 cm) hole spacing.
Rail spacing	Front-to-rear rail spacing between 23.6 in. and 36 in. (60 cm to 91.4 cm).
Structural support	Rack must support the full weight of the switch with power supplies and fans installed.

QFX5140 Cabinet Requirements

The switch can be installed in a cabinet that contains a four-post 19-in. rack.

Table 40: Cabinet Requirements for QFX5140

Requirement	Guidelines
Depth	Minimum cabinet depth of 36 in. (91.4 cm) recommended.
Airflow	Ensure adequate ventilation to prevent hot air recirculation and overheating.

Site Electrical Wiring Guidelines

[Table 41 on page 134](#) 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 41: 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.
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.

QFX5140 Network Cable and Transceiver Planning

IN THIS SECTION

- Determining QFX5140 Optical Interface Support | 135
- Understand QFX Series Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion | 136
- Calculate Power Budget and Power Margin for Fiber-Optic Cables | 137

Determining QFX5140 Optical Interface Support

You can find information about the optical transceivers supported on your Juniper device by using the Hardware Compatibility Tool (HCT). In addition to transceiver and connection type, optical and cable characteristics—where applicable—are documented for each transceiver. The Hardware Compatibility Tool enables you to search by product or by interface speed or type.

The list of supported transceivers for the QFX5140 is available at <https://apps.juniper.net/hct/product/#prd=QFX5140>.



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 that autonegotiation on the QFX5140 interfaces is configured appropriately for the connected device.

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

IN THIS SECTION

- [Signal Loss in Multimode and Single-Mode Fiber-Optic Cables | 136](#)
- [Attenuation and Dispersion in Fiber-Optic Cable | 137](#)

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](#) | 138

● [How to Calculate Power Margin for Fiber-Optic Cables](#) | 138

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 32 on page 75](#) 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 42: 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 32 on page 75](#). 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 32 on page 75](#). 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:

$$P_M = P_B - LL$$

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

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

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

In both 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.

QFX5140 Management Cable Specifications and Pinouts

IN THIS SECTION

- [Cable Specifications for Console and Management Connections for the QFX Series | 140](#)
- [RJ-45 Management Port Connector Pinout Information | 141](#)
- [Console Port Connector Pinouts for the QFX Series | 142](#)
- [QSFP-DD Port Connector Pinout Information | 143](#)
- [QSFP+, QSFP28, and QSFP56 Port Connector Pinout Information | 149](#)
- [SFP, SFP+, and SFP28 Port Connector Pinout Information | 152](#)
- [USB Port Specifications for the QFX Series | 153](#)

Cable Specifications for Console and Management Connections for the QFX Series

[Table 43 on page 141](#) 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 43: 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 44 on page 141](#) provides the pinout information for the RJ-45 connector for the management port on Juniper Networks devices.

Table 44: RJ-45 Management Port Connector Pinout Information

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1

Table 44: RJ-45 Management Port Connector Pinout Information (*Continued*)

Pin	Signal	Description
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 45 on page 143 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 45: 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 46 on page 144 provides the pinout mapping for quad SFP double-density (QSFP-DD) port connectors.

Table 46: 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
14	RX3p	Receiver non-inverted data output
15	RX3n	Receiver inverted data output

Table 46: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
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
29	VCC TX	+3.3 V power supply transmitter
30	VCC1	+3.3 V power supply

Table 46: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
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
44	TX8p	Transmitter non-inverted data input
45	GND	Ground

Table 46: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
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
59	RX6n	Receiver inverted data output
60	RX6p	Receiver non-inverted data output

Table 46: QSFP-DD Network Port Pinout Mapping (*Continued*)

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

Table 46: QSFP-DD Network Port Pinout Mapping *(Continued)*

Pin	Symbol	Description
76	GND	Ground

QSFP+, QSFP28, and QSFP56 Port Connector Pinout Information

[Table 47 on page 149](#) provides the pinout mapping for the quad small-form factor pluggable (QSFP) connectors QSFP+, QSFP28, and QSFP56.

Table 47: QSFP+, QSFP28, and QSFP56 Port Connector 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	LPMode_Reset	Low power mode reset

Table 47: QSFP+, QSFP28, and QSFP56 Port Connector Pinout Mappng (*Continued*)

Pin	Symbol	Description
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
23	GND	Ground
24	RX4n	Receiver inverted data output

Table 47: QSFP+, QSFP28, and QSFP56 Port Connector Pinout Mappng (*Continued*)

Pin	Symbol	Description
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
38	GND	Ground

SFP, SFP+, and SFP28 Port Connector Pinout Information

Table 48 on page 152 provides the pinout mapping for small-form factor pluggable (SFP) connectors, SFP+ connectors, and SFP28 connectors.

Table 48: 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
10	VeeR	Receiver ground
11	VeeR	Receiver ground
12	RD-	Receiver inverted DATA out
13	RD+	Receiver non-inverted DATA out

Table 48: SFP, SFP+, and SFP28 Port Connector Pinout Mapping (*Continued*)

Pin	Symbol	Description
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

[Connect the QFX5140 to External Devices](#) | 84

10

CHAPTER

Troubleshooting and Support

IN THIS CHAPTER

- QFX5140 Hardware and CLI Terminology Mapping | **156**
 - Troubleshoot the QFX5140 | **156**
 - Contact Customer Support and Return the Chassis or Components | **159**
-

QFX5140 Hardware and CLI Terminology Mapping

Table 49: Junos OS Evolved CLI Equivalents of Terms Used in QFX5140 Documentation

Hardware Item (as displayed in the CLI)	Description	Value (as displayed in the CLI)	Item in Documentation	Additional Information
Chassis			Device chassis	"QFX5140 Chassis" on page 19
Xcvr n	Abbreviated name of transceiver	<i>n</i> is a value equivalent to the number of the port in which the transceiver is installed.	Optical transceiver	Hardware Compatibility Tool

Troubleshoot the QFX5140

SUMMARY

This topic contains some common troubleshooting resources for the QFX5140 and a list of alarms and how to fix them.

IN THIS SECTION

- [Troubleshooting Resources for QFX5140 | 156](#)
- [Alarm Types and Alarm Severity | 157](#)
- [Use the RESET Button | 159](#)

Troubleshooting Resources for QFX5140

Use the messages on the status panel on the front panel and LEDs on the components to identify alarm conditions and the JunOS OS Evolved CLI to troubleshoot the device. You can also contact the Juniper Networks® Technical Assistance Center (JTAC) for support.

- **Status panel**—When the device detects an alarm condition, it is displayed on the status panel.
- **LEDs**—When the device detects an alarm condition, the alarm LED on an interface glows red or yellow.
- **CLI**—The CLI is the primary tool for controlling and troubleshooting hardware, Junos OS Evolved, and network connectivity. CLI command outputs display information about network connectivity, which Junos OS Evolved derives from the ping and traceroute utilities. You can use the CLI to see more information about alarm conditions.

For information about using the CLI to troubleshoot Junos OS Evolved, see the appropriate Junos OS Evolved configuration guide.

- **JTAC**—If you need assistance during troubleshooting, you can contact the Juniper Networks Technical Assistance Center (JTAC) by using the Web or by telephone. If you encounter software problems, or problems with hardware components not discussed in this guide, contact JTAC.

Alarm Types and Alarm Severity

IN THIS SECTION

- [Alarm Types | 158](#)
- [Alarm Severity | 158](#)

Table 50: Alarm Terms

Term	Definition
Alarm	A signal alerting you to conditions that might prevent normal operation. On a device, the alarm signal is the red system LED that is lit on the front of the chassis.
Alarm condition	A failure event that triggers an alarm.
Alarm severity	The seriousness of the alarm. The level of severity can be either major or minor.

Alarm Types

Table 51: Alarm Types

Term	Definition
Chassis alarms	A predefined alarm triggered by a physical condition in the device such as a power supply failure or excessive component temperature.
Interface alarms	An alarm that you configure to alert you when an interface link is down. The alarm applies to Ethernet, Fibre Channel, and management Ethernet interfaces. You can set the alarm as major or minor for a specific link-down condition or have the condition ignored.
System alarms	A predefined alarm that might be triggered by a missing rescue configuration, failure to install a license for a licensed software feature, or high disk usage. You can configure system alarms to appear automatically in the J-Web interface display or CLI display.

Alarm Severity

Table 52: Alarm Severity

Term	Definition
Major (red)	Indicates a critical situation on the router that has resulted from one of the following conditions and that requires immediate action: • One or more hardware components have failed. • One or more hardware components have exceeded temperature thresholds. • An alarm condition configured on an interface has triggered a critical warning.
Minor (amber or blinking red)	Indicates a noncritical condition in the router that, if left unchecked, might cause an interruption in service or degradation in performance. A minor alarm condition requires monitoring or maintenance. For example, a missing rescue configuration generates a minor system alarm.

Use the RESET Button

If a configuration fails or you lose management access to the router because of a configuration change, you can use the **RESET** button to restore the device.

The RESET button on the QFX5140 is recessed to prevent it from being pressed accidentally. To press the RESET button, insert a small probe (such as a straightened paper clip) into the pinhole above the RESET label on the front panel.

- Press the RESET button momentarily to reboot the device.
- Press and hold the RESET button for approximately 10 seconds to reboot the device and enter the BIOS reset mode.

Contact Customer Support and Return the Chassis or Components

SUMMARY

If you need to return a hardware component to Juniper Networks, Inc., you need a Return Material Authorization (RMA) number and the equipment serial number. Contact the Juniper Networks Technical Assistance Center (JTAC) to generate an RMA number. You may also need to locate the chassis or component details using the CLI or by referring to equipment labels. You then pack and ship the component.

IN THIS SECTION

- [Contact Customer Support | 159](#)
- [Return a Hardware Component to Juniper Networks | 160](#)
- [Locate the Serial Number of the QFX5140 or its Components | 161](#)
- [Remove the Solid State Drives for RMA on the QFX5140 | 163](#)
- [Request a Return Material Authorization | 166](#)
- [Guidelines for Packing and Shipping Hardware Components | 167](#)

Contact Customer Support

You can contact JTAC 24 hours a day, seven days a week.

Chat	Use the Ask me icon at the bottom right of the Support page. Don't see the Chat icon? Read this.
Web	Juniper Support Portal Government Support Portal
Telephone	U.S. and Canada (Toll-free): 1-888-314-JTAC (5822) Outside the US or Canada, use the relevant country number listed on the regional tabs listed on the Contact Support page. Federal Government Support: 1-833-900-1454



NOTE: We do not support opening new cases through e-mail. Please use one of the above options to contact JTAC.

Return a Hardware Component to Juniper Networks

If a hardware component fails, contact Juniper Networks to obtain an RMA number. We use this number to track the returned material at the factory and to return the repaired or new components to you, as needed.



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

To return a defective hardware component:

1. Determine the part number and the serial number of the defective component.
2. Obtain an RMA number from JTAC.
3. Pack the component for shipment.

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

Locate the Serial Number of the QFX5140 or its Components

IN THIS SECTION

- [List the QFX5140 Chassis and Component Details Using the CLI | 161](#)
- [Locate the Chassis Serial Number ID Label on QFX5140 | 161](#)
- [Locate the Serial Number ID Labels on FRUs | 162](#)

If the device is operational and you can access the CLI, you can list serial numbers for the device and for some components with a CLI command. If you don't have access to the CLI, or if the serial number for the component doesn't appear in the command output, you can physically locate the serial number ID label on the device or component.



NOTE: If you want to find the serial number ID label on a component, you need to remove the component from the device chassis.

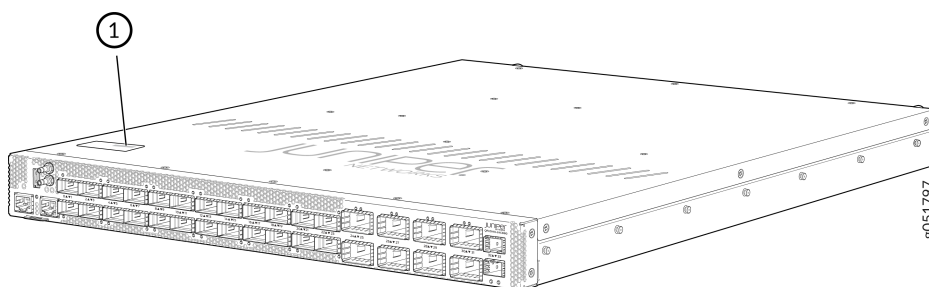
List the QFX5140 Chassis and Component Details Using the CLI

To list the device and device components and their serial numbers, enter the `show chassis hardware` command on the CLI.

Locate the Chassis Serial Number ID Label on QFX5140

You can find the chassis serial number for the QFX5140 on a label on the top panel.

Figure 77: Location of the Serial Number Label

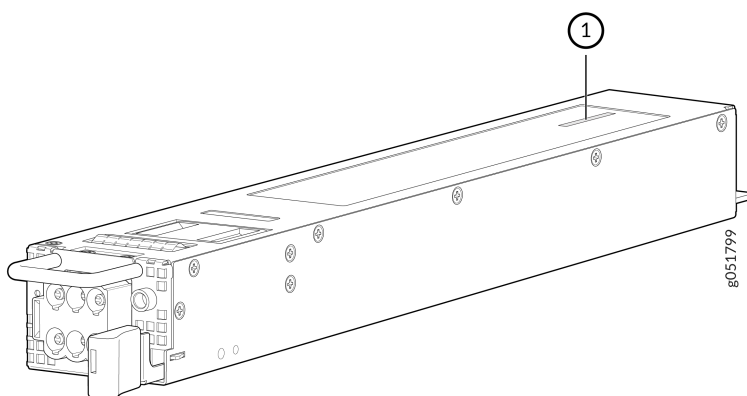


Locate the Serial Number ID Labels on FRUs

The power supplies and fan modules installed in the QFX5140 are field-replaceable units (FRUs). You must remove a FRU from the router chassis to see the FRU serial number ID label.

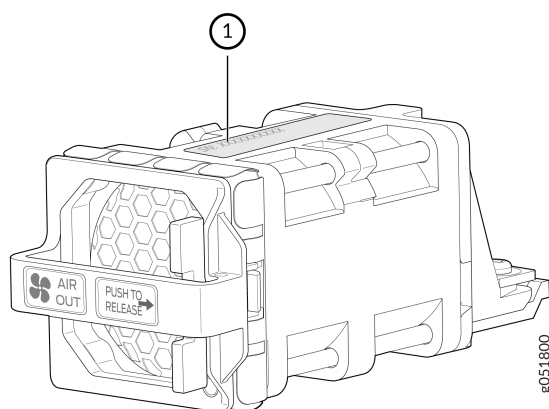
- Power supplies—The serial number ID label is located on top of the AC power supplies for the QFX5140.

Figure 78: Serial Number ID Label on QFX5140 AC PSU



- Fan module—The serial number ID label is located on top of the fan module for a QFX5140.

Figure 79: Serial Number ID Label on QFX5140 Fan Module



1– Serial number ID label

Remove the Solid State Drives for RMA on the QFX5140

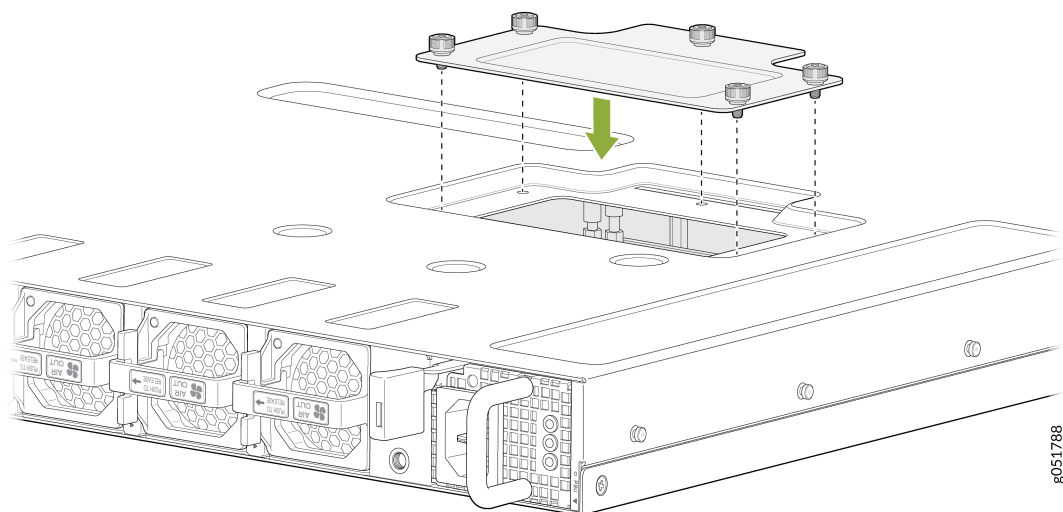
The QFX5140 has two solid-state drives (SSDs) stacked on top of each other that store the software images, system logs, and the configuration files. Before returning a chassis to Juniper Networks as part of a Return Material Authorization (RMA), you have the option to remove the SSDs and secure or dispose them according to your own company's security policies.

Before you begin this procedure, ensure you have a Philips (+) screwdriver, number 2.

Use this optional procedure to remove the SSDs from the QFX5140 after the device has shut down and you've removed it from the rack. The single SSD door is located on top of the device.

1. Ensure that the device is placed on a firm surface such as a workbench or a table with the SSD door facing up.
2. Use the Philips screwdriver to remove the two flat-head screws from the SSD door on top of the device. Set the screws aside in a safe place.

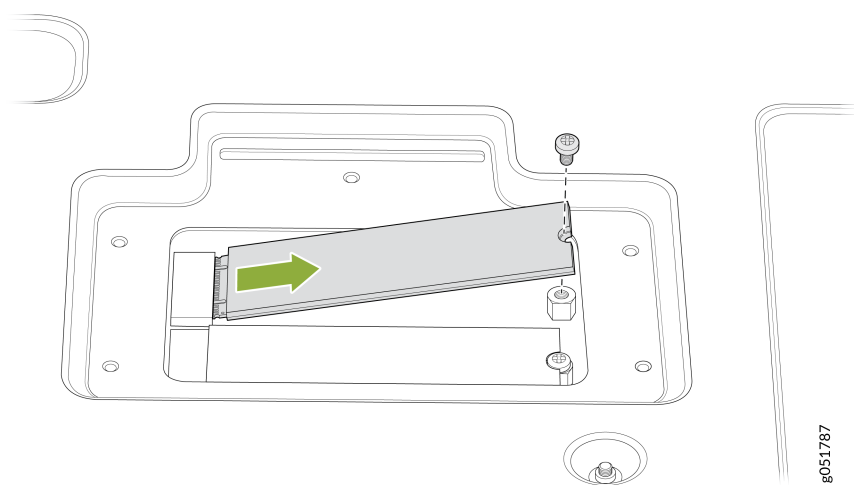
Figure 80: Remove Screws from SSD Door on QFX5140



3. Remove the top SSD using the following procedure:

- a. Use the Philips screwdriver to remove the screw on the top SSD. Set the screw aside in a safe place.
- b. Lift the top SSD at the end that is furthest from the connector and remove from the cavity.

Figure 81: Remove the Screw and Lift the Top SSD Out of QFX5140

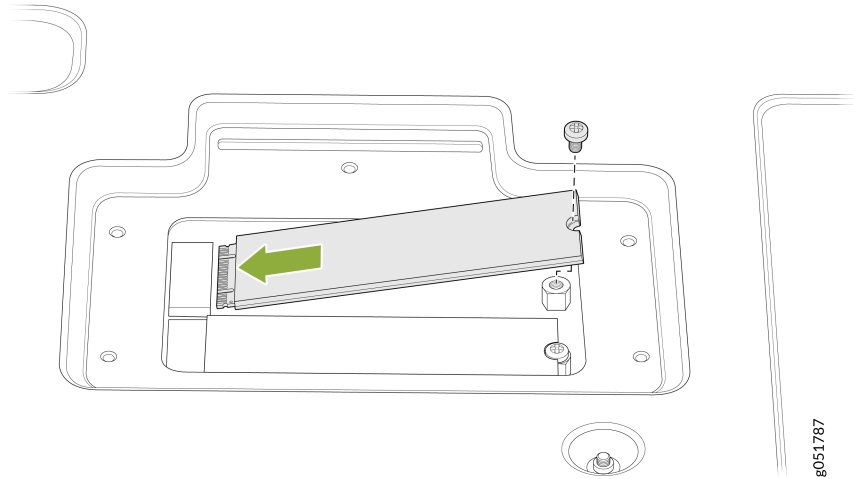


1– Remove the screw

2– Lift the top SSD

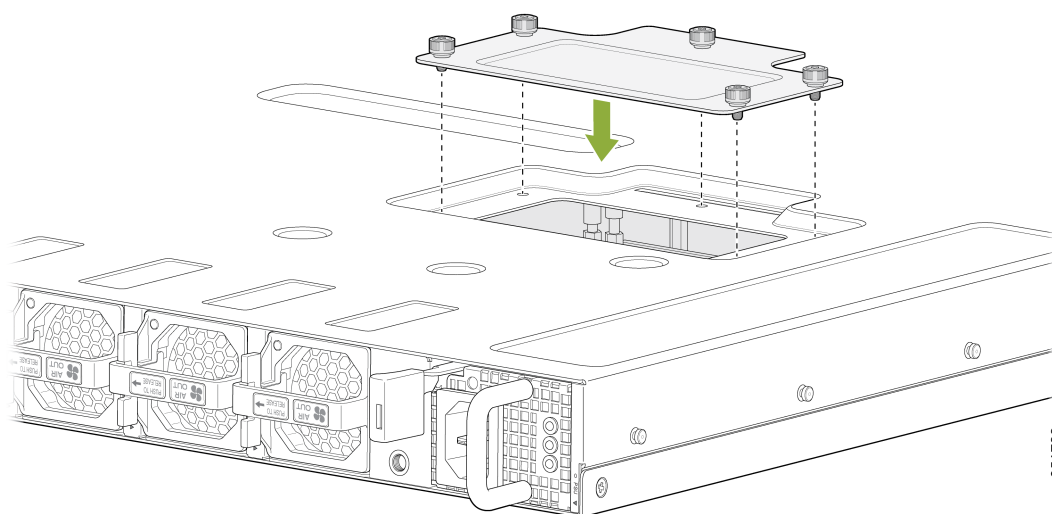
4. Replace and tighten the standoff screw.
5. Replace the screw for the top SSD and tighten the screw using the Philips screwdriver.

Figure 82: Tighten the screw and replace the SSD



6. Replace the SSD door and tighten the two flat-head screws using the Philips screwdriver to secure the SSD door to the chassis.
7. Tighten the two flat-head screws using the Philips screwdriver.

Figure 83: Replace the Screws on the SSD Door on QFX5140



8. Secure or dispose the SSDs according to your site's security policies.

Request a Return Material Authorization

If you are returning a device or hardware component to Juniper Networks for repair or replacement, obtain an RMA number from JTAC.

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

- Your existing service request number, if you have one
- Serial number of the device or component
- Your name, organization name, telephone number, fax number, and shipping address
- Details of the failure or problem
- Type of activity you were performing on the device when the problem occurred
- Configuration data displayed by one or more `show` commands

You can contact JTAC using the [Support](#) page or by telephone.

If you're contacting JTAC by telephone:

- To report a new incident, press the star (*) key to be routed to the next available support engineer.

- To enquire about an existing case, enter your 12-digit service request number followed by the pound (#) key.

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

Guidelines for Packing and Shipping Hardware Components

To pack and ship individual components:

- When you return the chassis or components, make sure to adequately protect them with packing materials. Pack them properly to prevent the pieces from moving around the carton.
- Use the original shipping materials, if they are available.
- Place the individual components in antistatic bags.
- Write the RMA number on the exterior of the box to ensure proper tracking.

11

CHAPTER

Safety and Compliance Information

IN THIS CHAPTER

- QFX5140 Safety | **169**
 - Agency Approvals and Compliance Statements for QFX5140 | **170**
-

QFX5140 Safety

IN THIS SECTION

- [Safety Information | 169](#)
- [Safety Information | 169](#)
- [Warning Statement for Shielded Intra-Building Criteria | 169](#)
- [Warning Statement for Unshielded Intra-Building Criteria | 169](#)

Safety Information

Safety Information

The [Juniper Networks Safety Guide](#) provides general safety information and guidelines for all Juniper Networks products. Follow the guidelines provided in the guide to reduce the likelihood of personal injury, equipment damage, and damage to surrounding areas.

Along with the information provided in the Juniper Networks Safety Guide, you must read and understand the QFX5140 specific safety information provided in this hardware guide.

Warning Statement for Shielded Intra-Building Criteria



WARNING: The intra-building port(s) of the equipment or subassembly must use shielded intra-building cabling or wiring that is grounded at both ends.

Warning Statement for Unshielded Intra-Building Criteria



WARNING: Certain ports of a device are designed for use as intra-building (within-the-building) interfaces only (Type 2 or Type 4 ports as described in *GR-1089-CORE*) and require isolation from the exposed outside plant (OSP) cabling. To comply with NEBS requirements and protect against lightning surges and commercial power disturbances, the intra-building ports must not be metallically connected to interfaces that connect to

the OSP or its wiring. The intra-building ports on the device are suitable for connection to intra-building or unexposed wiring or cabling only. The addition of primary protectors is not sufficient protection for connecting these interfaces metalically to OSP wiring.

Agency Approvals and Compliance Statements for QFX5140

IN THIS SECTION

- [Agency Approvals | 170](#)
- [Compliance Statements | 175](#)

Agency Approvals

IN THIS SECTION

- [Safety | 170](#)
- [Electromagnetic Compatibility \(EMC\) | 171](#)
- [Energy Efficiency Requirements | 172](#)
- [Environmental | 173](#)

The QFX5140 is designed to comply with the following standards:

Safety

Safety Requirements for Chassis

- IEC 62368-1:2014 (All country deviations): 2nd Edition: CB Scheme

- IEC 62368-1:2018 (All country deviations): 3rd Edition: CB Scheme
- IEC 62368-1:2023 (All country deviations): 4th Edition: CB Scheme
- EN 62368-1:2014+A11:2017, EN IEC 62368-1:2020+A11:2020
- EN 62368-1:2024/A11:2024
- BS EN 62368-1:2014+A11:2017, BS EN IEC 62368-1:2020+A11:2020
- BS EN 62368-1:2024/A11:2024
- UL 62368-1:2025 (4th Edition)
- CSA C22.2 No. 62368-1:2025 (4th Edition)
- UL 60950-1:2007
- CAN/CSA C22.2 No. 60950-1-07+ A1:2011+A2:2014

Safety Requirements for Optics

- CFR, Title 21, Chapter 1, Subchapter J, Part 1040
- REDR c 1370 OR CAN/CSA-E 60825-1 Part 1
- IEC 60825-1
- IEC 60825-2
- IEC/UL/CSA 62368-1

Electromagnetic Compatibility (EMC)

EMC Requirements (Global)

- FCC 47 CFR Part 15
- ICES-003/ICES-GEN
- BS EN 55032
- BS EN 55035
- EN 300 386 V1.6.1
- EN 300 386 V2.2.1

- BS EN 300 386
- EN 55032
- CISPR 32
- EN 55035
- CISPR 35
- IEC/EN 61000 Series
- IEC/EN 61000-3-2
- IEC/EN 61000-3-3
- AS/NZS CISPR 32
- VCCI-CISPR 32
- BSMI CNS 15936
- KS C 9835 (Old KN 35)
- KS C 9832 (Old KN 32)
- KS C 9610
- BS EN 61000 Series

Customer-Specific EMC Requirements

- GR-1089-Core, Issue 8
- Juniper Inductive GND (IGS)

Energy Efficiency Requirements

- AT&T TEER (ATIS-06000015.03.2016)
- ECR 3.0.1
- ETSI ES 203 136 V1.2.1
- Verizon TEEER (VZ.TPR.9205 Issue 7)

Environmental

Environmental Requirements for Chassis

- Operating Temperature:
 - 0° C to 40° C @ 6000 ft
- Storage Temperature: -40° to 70° C
- Relative Humidity (Operating): 5 to 90% non-condensing

Environmental Product Regulations, Legislations, Directives and International Standards

Regulations:

- EC No. 1907/2006 – Regulation concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) 18 December 2006.
 - Annex XVII
 - SVHC
- EU 2019/1021 – Of the European Parliament and the council of 20 June 2019 on Persistent Organic Pollutants (EU POPs).
- Commission Regulation (EU) 2024/1834 of 3 July 2024 - Ecodesign requirements for the placing on the market or putting into service of fans with an electric input power between 125 W and 500 kW (≥ 125 W and ≤ 500 kW) at their best efficiency point, including where they are integrated into other products.

Legislations:

- TSCA – The Toxic Substance Control Act authorizes the EPA (Environmental Protection Agency) to regulate and screen all chemical producer or imported into the US to prevent unreasonable risks to health and the environment.
 - 6(h) PBT
 - 8(a)(7) PFAS
- PFAS Reporting Requirements in Canada Under the Section 71 of the Canadian Environmental Protection Act, 1999 (CEPA)
- California Prop 65 – The Safe Drinking Water and Toxic Enforcement Act of 1986.

Directives:

- The EU RoHS Directive 2011/65/EU amended by (EU) 2015/863.
- China RoHS - GB/T 26572-2011 – Must comply with the Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products
 - China RoHS Certificates as per SJ/T 11364-2014 for all ordered AVL parts.
- Taiwan RoHS - CNS 15663 Guidance to reduction of the restricted chemical substances in electrical and electronic equipment (EEE) and its amendments.
- Korea RoHS - The Act for Resource Recycling of Electrical and Electronic Equipment and Vehicles and its amendments.
- UAE RoHS - Cabinet Decision No 10 of 2017 issued by The Emirates Authority for Standardization and Metrology ('ESMA') and its amendments.
- India RoHS - E-Waste (Management) Rules, 2022
- Directive 2002/96/EC of the European Parliament and of Council of 4 July 2012 on waste electrical and electronic equipment (WEEE).
- IATA DGR (Dangerous Good Regulation / Battery) – Guidelines and regulations to ensure the safe and standardized transportation of dangerous goods by air.

Compliance to EU Battery Directive 2023/1542

For all batteries used, the documents below must be collected.

- Battery MSDS
- EN IEC 60086
- UL 1642
- UN/DOT 38.3

International Standards:

- IEC 62474 DSL (Declarable Substance List)
- IEC 62474 RSL (Reference Substance List)
- IPC 1752 Class 6 or 1752A Class D required for all AVL parts ordered.

Compliance Statements

IN THIS SECTION

- [Compliance Statement for Argentina | 175](#)
- [Compliance Statements for Data Center | 175](#)
- [Compliance Statements for EMC Requirements | 175](#)
- [Compliance Statements for Environmental Requirements | 177](#)

Compliance Statement for Argentina

EQUIPO DE USO IDÓNEO.

Compliance Statements for Data Center

- The equipment is suitable for installation as part of the Common Bonding Network (CBN).
- The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
- The battery return connection is to be treated as an isolated DC return (that is, DC-I), as defined in GR-1089-CORE.
- You must provision a readily accessible device outside of the equipment to disconnect power. The device must also be rated based on local electrical code practice.

Compliance Statements for EMC Requirements

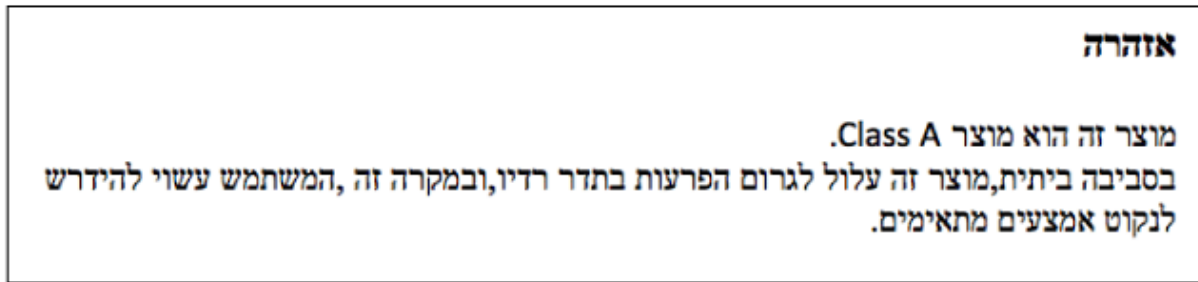
Canada

CAN ICES-3 (A)/NMB-3(A)

European Community

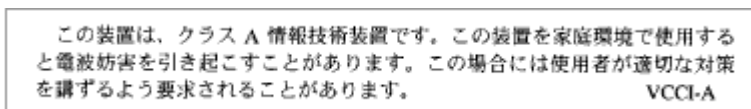
This is a Class A product. In a domestic environment, this product might cause radio interference in which case the user might be required to take adequate measures.

Israel



Translation from Hebrew—Warning: This product is Class A. In residential environments, the product might cause radio interference, and in such a situation, the user might be required to take adequate measures.

Japan



The preceding translates as follows:

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this product is used near a radio or television receiver in a domestic environment, it might cause radio interference. Install and use the equipment according to the instruction manual. VCCI-A.

Korea

이 기기는 업무용(A급) 전자파적합기기로서 판
매자 또는 사용자는 이 점을 주의하시기 바라
며, 가정외의 지역에서 사용하는 것을 목적으로
합니다.

Korean Class A Warning

g040913

The preceding translates as follows:

This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home.

Taiwan

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Chinese Class A warning

0600018

The preceding translates as follows:

This is Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United States

The hardware equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Compliance Statements for Environmental Requirements

Batteries in this product are not based on mercury, lead, or cadmium substances. The batteries used in this product are in compliance with EU Directives 91/157/EEC, 93/86/EEC, and 98/101/EEC. The product documentation includes instructional information about the proper method of reclamation and recycling.