H3C CR16000-M Routers

Hardware Information and Specifications

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Preface

This document describes the hardware information and specifications for the H3C CR16000-M routers, including router overview, removable module compatibility and specifications, and cables.

This preface includes the following topics about the documentation:

- Audience.
- Conventions.
- Documentation feedback.

Audience

This documentation is intended for:

- Network planners.
- Field technical support and servicing engineers.
- Network administrators working with the CR16000-M routers.

Conventions

The following information describes the conventions used in the documentation.

Command conventions

Convention	Description
Boldface	**Bold** text represents commands and keywords that you enter literally as shown.
Italic	*Italic* text represents arguments that you replace with actual values.
[ ]	Square brackets enclose syntax choices (keywords or arguments) that are optional.
{ x | y | ... }	Braces enclose a set of required syntax choices separated by vertical bars, from which you select one.
[x | y | ...]	Square brackets enclose a set of optional syntax choices separated by vertical bars, from which you select one or none.
{ x | y | ... } *	Asterisk marked braces enclose a set of required syntax choices separated by vertical bars, from which you select a minimum of one.
[x | y | ...] *	Asterisk marked square brackets enclose optional syntax choices separated by vertical bars, from which you select one choice, multiple choices, or none.
&<1-n>	The argument or keyword and argument combination before the ampersand (&) sign can be entered 1 to n times.
#	A line that starts with a pound (#) sign is comments.

GUI conventions

Convention	Description
Boldface	Window names, button names, field names, and menu items are in Boldface. For example, the **New User** window opens; click **OK**.
>	Multi-level menus are separated by angle brackets. For example, **File** > **Create** > **Folder**.

Symbols

Convention	Description
WARNING!	An alert that calls attention to important information that if not understood or followed can result in personal injury.
CAUTION:	An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.
IMPORTANT:	An alert that calls attention to essential information.
NOTE:	An alert that contains additional or supplementary information.
TIP:	An alert that provides helpful information.

Network topology icons

Convention	Description
	Represents a generic network device, such as a router, switch, or firewall.
	Represents a routing-capable device, such as a router or Layer 3 switch.
	Represents a generic switch, such as a Layer 2 or Layer 3 switch, or a router that supports Layer 2 forwarding and other Layer 2 features.
	Represents an access controller, a unified wired-WLAN module, or the access controller engine on a unified wired-WLAN switch.
	Represents an access point.
	Represents a wireless terminator unit.
	Represents a wireless terminator.
	Represents a mesh access point.
	Represents omnidirectional signals.
	Represents directional signals.
	Represents a security product, such as a firewall, UTM, multiservice security gateway, or load balancing device.
	Represents a security module, such as a firewall, load balancing, NetStream, SSL VPN, IPS, or ACG module.

Examples provided in this document

Examples in this document might use devices that differ from your device in hardware model, configuration, or software version. It is normal that the port numbers, sample output, screenshots, and other information in the examples differ from what you have on your device.

Documentation feedback

You can e-mail your comments about product documentation to info@h3c.com.

We appreciate your comments.

Contents

1 About the router

Chassis views

The chassis views are for illustration only.

The CR16000-M routers include the CR16000-M8 and CR16000-M16.

Figure1-1 CR16000-M8 front view

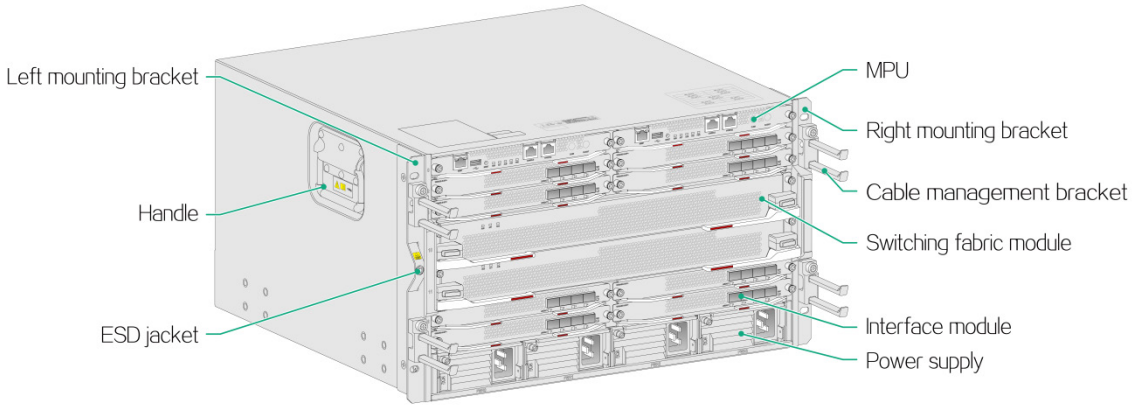


Figure1-2 CR16000-M8 rear view

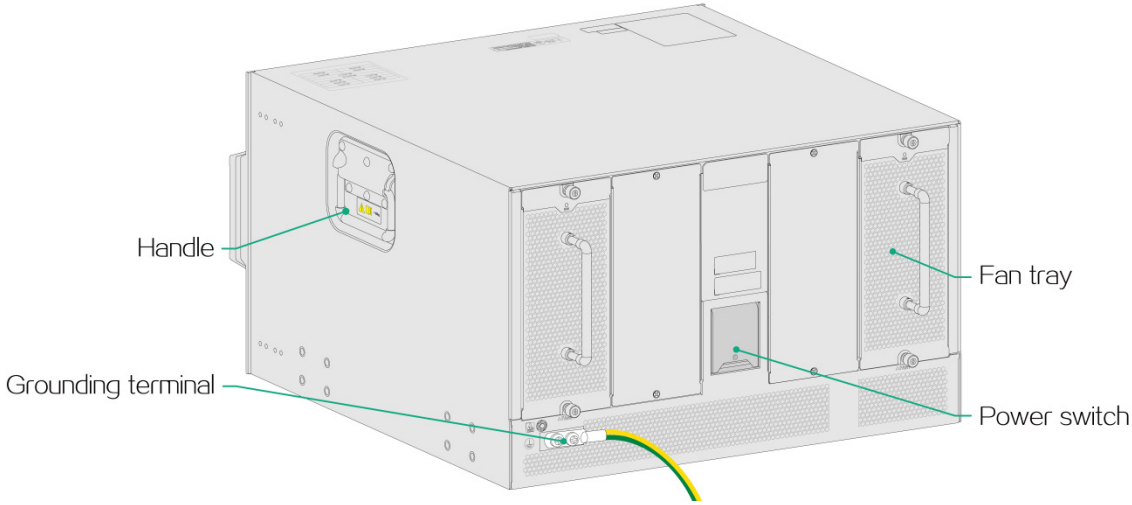


Figure1-3 CR16000-M16 front view

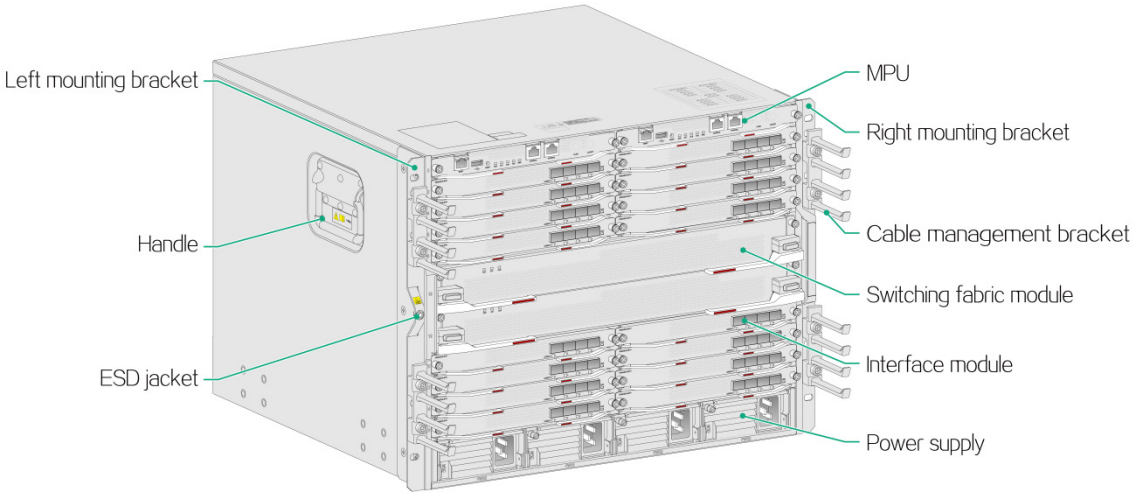
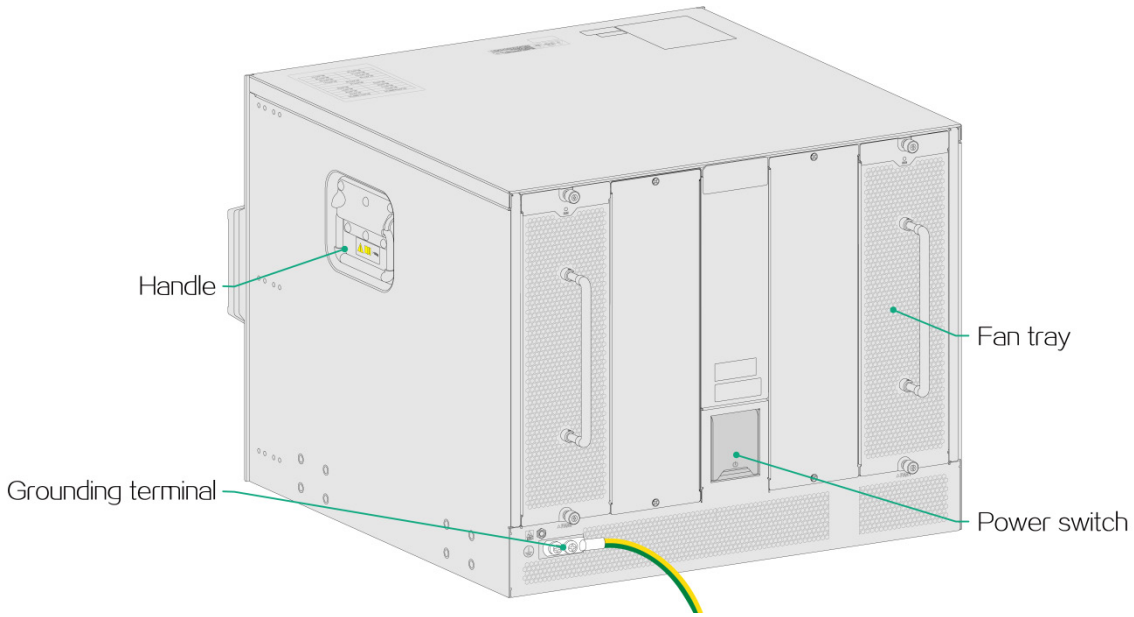


Figure1-4 CR16000-M16 rear view



Slot arrangement and interface numbering

Slot arrangement

Figure1-5 CR16000-M8 slot arrangement

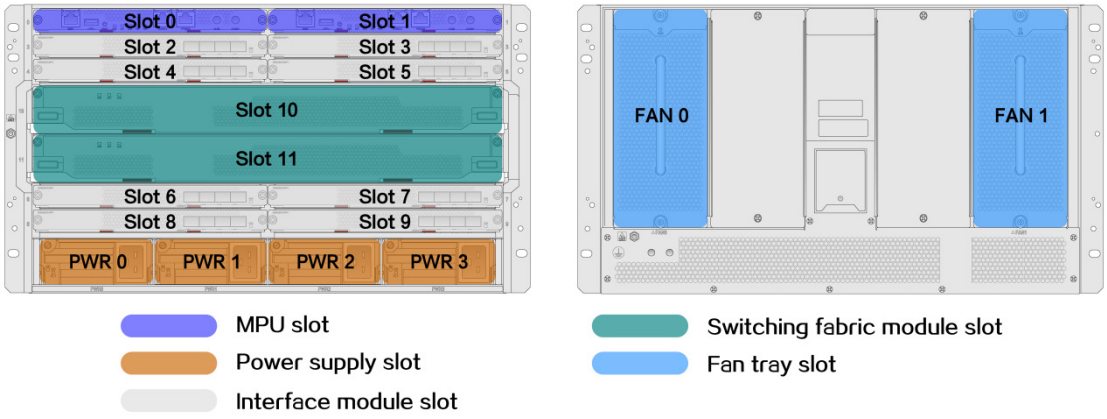
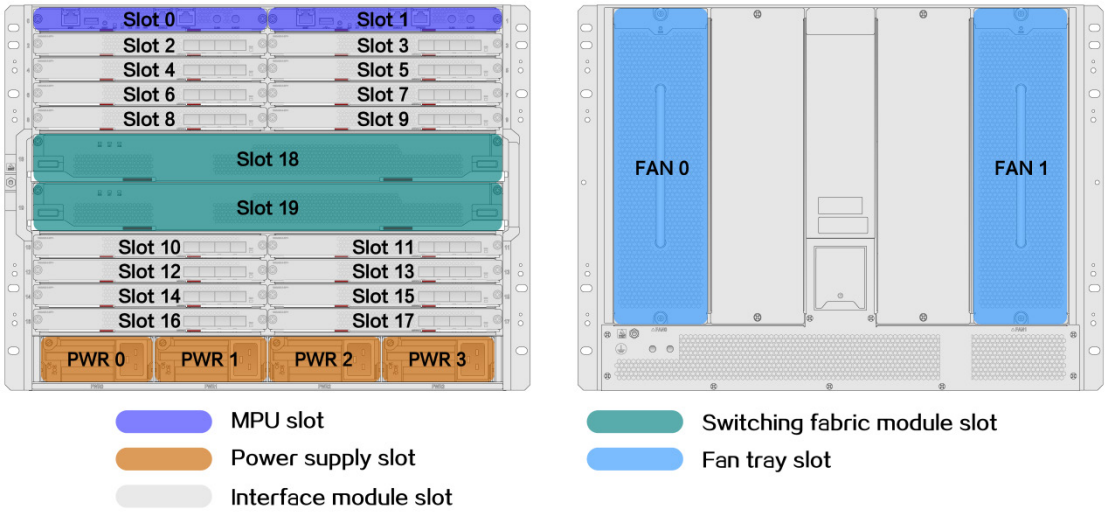


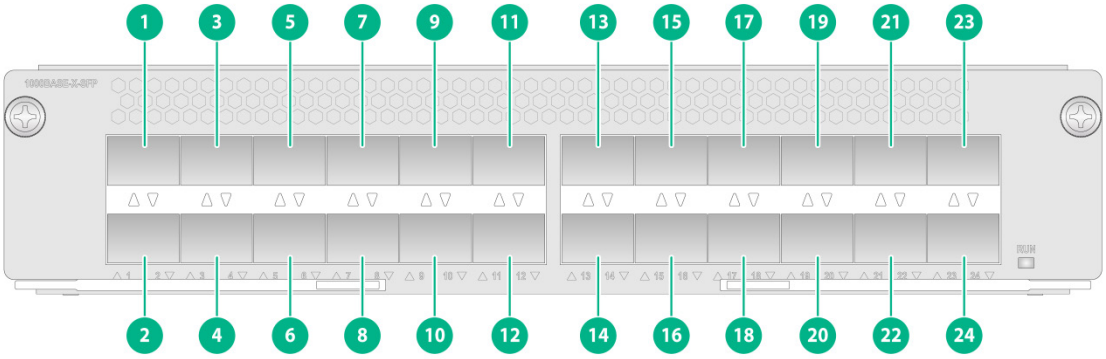
Figure1-6 CR16000-M16 slot arrangement



Interface numbering on interface modules

The interfaces on an interface module are numbered from top to down and from left to right.

Figure1-7 Interface numbering on a MIC-GP24L-M



Interface numbering

Conventions

The interfaces on the router are numbered in the *interface-type slot/subslot/num* format.

- *interface-type*—Interface type, for example, GigabitEthernet and POS.
- *slot*—Number of the slot where the card resides, as shown by the number in Figure1-5.
- *subslot*—Number of the slot where the interface subcard resides on the interface module. The number is fixed at 0.
- *num*—Number of the interface on the interface subcard or interface module.

NOTE:

- For each port type, the number *num* starts from 1.
- The slot number, subslot number, and port number of the network management port on an MPU are all 0.

Example

The router has two MPUs installed. The management interface M-GigabitEthernet is numbered M-GigabitEthernet 0/0/0.

One MIC-XP4L-M interface module is installed in slot 3 of the router. Ten-GigabitEthernet interfaces on the interface module are numbered as following:

- Ten-GigabitEthernet 3/0/1
- Ten-GigabitEthernet 3/0/2
- Ten-GigabitEthernet 3/0/3
- Ten-GigabitEthernet 3/0/4

Technical specifications

Table1-1 Technical specifications

Item	CR16000-M8	CR16000-M16
Rack standard	19 inch	19 inch
Chassis height	6 RUs	8 RUs
Dimensions (H × W × D)	264 × 440 × 440 mm (10.39 × 17.32 × 17.32 in)	353 × 440 × 440 mm (13.90 × 17.32 × 17.32 in)
Weight (fully configured)	≤ 66 kg (145.50 lb)	≤ 81 kg (178.57 lb)
Availability	99.999%	99.999%
Heat dissipation method	Air cooling	Air cooling
Airflow direction	From front to rear	From front to rear
Total number of slots	18	26
MPU slots	2	2
Interface module slots	8	16
Switching fabric module slots	2	2
Power supply slots	4	4
Fan tray slots	2	2
Sound pressure level	• Sound pressure level in the acceptable temperature range: 64.6 dBA • Sound pressure level when the fan tray operates at full speed: 76.8 dBA	• Sound pressure level in the acceptable temperature range: 66.5 dBA • Sound pressure level when the fan tray operates at full speed: 79.7 dBA
Router weight	Chassis weight (including mounting brackets and filler panels) plus removable component weight (including cards, power supplies, fan trays, and other removable components)	
System power consumption	• Minimum system power consumption: static power consumption of all cards + minimum power consumption of all fan trays • Maximum system power consumption: dynamic power consumption of all cards + maximum power consumption of all fan trays For example, a CR16000-M8 router has two SR07MPUA3-M MPUs, two MIC-XP10L-M interface modules, one SFE-A switching fabric module, and two fan trays. The minimum power consumption of the router is 2 × 46+2 × 35 + 210 + 2 × 9 = 390 W. The maximum power consumption of the router is 2 × 53 + 2 × 50 + 280 + 2 × 95 = 676 W. For more information about the power consumption of cards, see "FRUs and compatibility matrixes."	
Heat dissipation (per hour)	0.9 × system power consumption/0.9 × 3.4121	
Temperature	• Operating: 0°C to 45°C (32°F to 113°F) • Storage: –40°C to +70°C (–40°F to +158°F)	
Restriction on the operating temperature variation	≤ 30°C/hour (86°F/hour)	

Item	CR16000-M8	CR16000-M16
rate		
Relative humidity	• Operating: 5% RH to 95% RH (noncondensing) • Storage: 5% RH to 95% RH (noncondensing)	
Altitude	≤ 5000 m (16404.20 ft)	

NOTE:

- Rack height is measured in RUs. One RU is 44.45 mm (1.75 in).
- Dimensions in the table are for the chassis only, excluding the mounting brackets, cable management brackets, cards, power supplies, and accessories.
- Heat dissipation is measured in BTU/h. 1 W equals 3.4121 BTU/h.
- The sound pressure levels are measured based on the method specified in ISO 7779 at bystander positions.
- The heat dissipation of a router depends on its power consumption. To calculate heat dissipation of the router, assume 90% power consumption is converted to heat, and the efficiency of the power supply is 90%. Heat dissipation/hour of the router is 0.9 × (total power consumption of the cards plus power consumption of the fan tray)/0.9 × 3.4121.

Contents

2 FRUs and compatibility matrixes

For compatibility between the cards and the software release, see the release notes.

For compatibility between the interface modules and transceiver modules, see the cards and transceiver modules compatibility matrixes for the device.

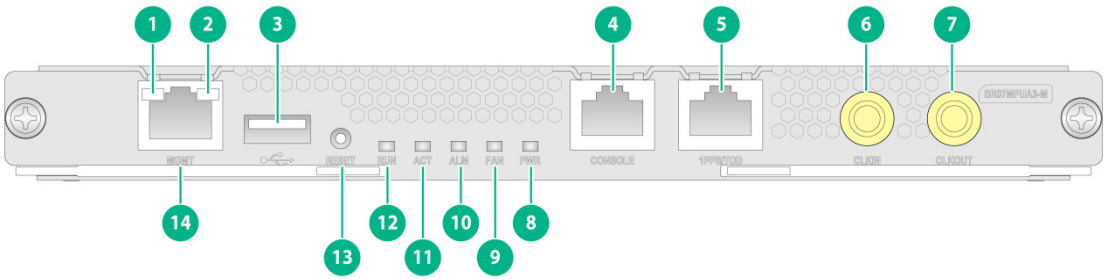
MPUs

You can install one MPU, or two MPUs for redundancy for the router. As a best practice, install two MPUs on the router. Active/standby MPU switchover is supported when the router is configured with two MPUs. The SR07MPUA3-M MPU is applicable to all CR16000-M models.

SR07MPUA3-M

View

Figure2-1 SR07MPUA3-M view



(1) Management Ethernet port LED (LINK). For the LED description, see Table2-1.	(2) Management Ethernet port LED (ACT). For the LED description, see Table2-1.
(3) USB 2.0 port	(4) Console port
(5) High-precision time synchronization port (input port by default)	(6) SMB coaxial clock input port
(7) SMB coaxial clock output port	(8) Power supply status LED. For the LED description, see Table2-2.
(9) Fan tray status LED. For the LED description, see Table2-3.	(10) MPU alarm status LED. For the LED description, see Table2-4.
(11) MPU active/standby LED. For the LED description, see Table2-5.	(12) MPU status LED. For the LED description, see Table2-6.
(13) System reset button	(14) Management Ethernet port (1000Base-T)

LEDs

Table2-1 Management Ethernet port LED description

LED mark		Description
LINK (green)	ACT (yellow)	
Steady on	Flashing	A link is present, and the port is sending or receiving data.
Steady on	Off	A link is present, but the port is not sending or receiving data.

LED mark		Description
LINK (green)	ACT (yellow)	
Off	Off	No link is present on the port.

Table2-2 Power supply status LED description

LED mark	Status	Description
PWR	Steady green	All power supplies in the chassis are operating correctly.
	Steady red	A minimum of one power supply in the chassis does not have power output, because the power supply is faulty, the power supply is not powered on, the power cable is faulty, or the external power supply system has a power outage.
	Off	The following are the possible causes: • No power supplies exist in the chassis. • No power supply in the chassis has power output, because the power supplies are faulty, the power supplies are not powered on, the power cables are faulty, or the external power supply system has a power outage.

Table2-3 Fan tray status LED description

LED mark	Status	Description
FAN	Steady green	All fan trays are operating correctly.
	Steady red	The following are the possible causes: • One or more fans in a fan tray have failed. • One or more fan trays are not installed securely.
	Off	No fan trays are powered on.

Table2-4 MPU alarm status LED description

LED mark	Status	Description
ALM	Steady on	The following are the possible causes: • The MPU is starting up. • The MPU is faulty.
	Flashing (0.25 Hz)	The MPU temperature is abnormal. The temperature has exceeded the upper warning temperature threshold or dropped below the lower temperature threshold.
	Off	The following are the possible causes: • The MPU is operating correctly. • The MPU is not powered on.

Table2-5 MPU active/standby LED description

LED mark	Status	Description
ACT	Steady on	The MPU is in active state.

LED mark	Status	Description
	Off	The following are the possible causes: • The MPU is in standby state. • The MPU has failed. To identify the failure, see the MPU status LED description.

Table2-6 MPU status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The MPU is operating correctly.
	Fast flashing (4 Hz)	The MPU is starting up.
	Steady on	The MPU is faulty.
	Off	The MPU is not powered on.

Ports

Console port

The console port can be connected to a computer for system debugging, configuration, maintenance, management, and host software loading.

Table2-7 Console port specifications

Item	Description
Connector type	RJ-45
Compliant standard	Asynchronous EIA/TIA-232
Transmission baud rate	≤ 115200 bps. The default value is 9600 bps.
Transmission medium and max transmission distance	Common asynchronous serial interface cable, with a maximum transmission distance of 15 m (49.21 ft)
Services	Connects to the serial port on a local PC running a terminal emulation program.

Management Ethernet port

You can connect a management Ethernet port to a computer for router program loading and router debugging, or a remote NMS for remote management.

Table2-8 Management Ethernet port specifications

Item	Description
Connector type	RJ-45
Port quantity	1
Transmission baud rate	1000 Mbps, full duplex
Transmission medium and max transmission distance	Category-5 or above twisted pair cable, with a transmission distance of 100 m (328.08 ft)
Services	For router software upgrade and network management

USB port

USB ports can connect multiple types of devices and provide a higher data transfer rate than common parallel interfaces and serial interfaces.

Table2-9 USB port specifications

Item	Description
Connector type	USB A
Compliant standard	USB 2.0
Services	External storage media

NOTE:

Extension cables are not supported.

SMB coaxial clock input/output port

SMB coaxial clock ports provide input or output clock references at 2.048 MHz. The MPU has two SMB coaxial clock ports. One is an input port and the other is an output port.

Table2-10 SMB coaxial clock input/output port specifications

Item	Description
Connector type	SMB coaxial
Compliant standard	GJB681
Clock frequency	2.048 MHz
Transmission medium	75-ohm coaxial cable
Services	Sends and receives 2.048 MHz clocks to synchronize the clocks of the router and other devices, such as routers and the terminals.

High-precision time synchronization port

Table2-11 High-precision time synchronization port specifications

Item	Description
Connector type	RJ-45
Compliant standard	QB-B-016-2010
Transmission baud rate	9600 bps
Transmission medium	Category-5 or above twisted pair cable
Services	You can configure the port as an input port or output port at the CLI. Synchronizes the clocks of the router and other devices, such as GPS receivers and terminals.

Technical specifications

Table2-12 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.20 kg (2.65 lb)
Maximum power consumption	53 W

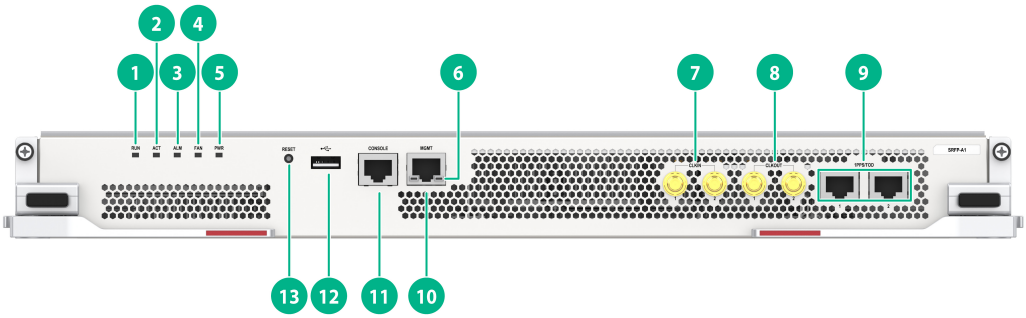
Item	Description
Power consumption (with typical configuration)	48 W
Minimum power consumption	46 W
Operating temperature	0°C to 45°C (32°F to 113°F)
SDRAM	2 × 8GB

Service routing and forwarding processing modules

SRFP-A1

View

Figure2-2 SRFP-A1 view



(1) Service routing and forwarding processing module status LED. For the LED description, see Table2-13.	(2) Service routing and forwarding processing module active/standby LED. For the LED description, see Table2-14.
(3) Service routing and forwarding processing module alarm status LED. For the LED description, see Table2-15.	(4) Fan tray status LED. For the LED description, see Table2-16.
(5) Power supply status LED. For the LED description, see Table2-17.	(6) Management Ethernet port LED (ACT). For the LED description, see Table2-18.
(7) SMB coaxial clock input ports (2 in total)	(8) SMB coaxial clock output ports (2 in total)
(9) High-precision time synchronization port (Both are input ports by default. When both ports are input ports, only port 1 takes effect.)	(10) Management Ethernet port (1000Base-T)
(11) Console port	(12) USB 2.0 port
(13) System reset button	

LEDs

Table2-13 Service routing and forwarding processing module status LED

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The service routing and forwarding processing module is operating correctly.
	Fast flashing (4 Hz)	The service routing and forwarding processing module is starting up.
	Steady on	The service routing and forwarding processing module is faulty.
	Off	The service routing and forwarding processing module is not powered on.

Table2-14 Service routing and forwarding processing module active/standby LED description

LED mark	Status	Description
ACT	Steady on	The service routing and forwarding processing module is in active state.
	Off	The following are the possible causes: • The service routing and forwarding processing module is in standby state. • The service routing and forwarding processing module has failed. To identify the failure, see the card status LED description.

Table2-15 Service routing and forwarding processing module alarm status LED description

LED mark	Status	Description
ALM	Steady on	The following are the possible causes: • The service routing and forwarding processing module is starting up. • The service routing and forwarding processing module is faulty.
	Flashing (0.25 Hz)	The service routing and forwarding processing module temperature is abnormal. The temperature has exceeded the upper warning temperature threshold or dropped below the lower temperature threshold.
	Off	The following are the possible causes: • The service routing and forwarding processing module is operating correctly. • The service routing and forwarding processing module is not powered on.

Table2-16 Fan tray status LED description

LED mark	Status	Description
FAN	Steady green	All fan trays are operating correctly.

LED mark	Status	Description
	Steady red	The following are the possible causes: • One or more fans in a fan tray have failed. • One or more fan trays are not installed securely.
	Off	No fan trays are powered on.

Table2-17 Power supply status LED description

LED mark	Status	Description
PWR	Steady green	All power supplies in the chassis are operating correctly.
	Steady red	A minimum of one power supply in the chassis does not have power output, because the power supply is faulty, the power supply is not powered on, the power cable is faulty, or the external power supply system has a power outage.
	Off	The following are the possible causes: • No power supplies exist in the chassis. • No power supply in the chassis has power output, because the power supplies are faulty, the power supplies are not powered on, the power cables are faulty, or the external power supply system has a power outage.

Table2-18 Management Ethernet port LED description

LED mark		Description
LINK (green)	ACT (yellow)	
Steady on	Flashing	A link is present, and the port is sending or receiving data.
Steady on	Off	A link is present, but the port is not sending or receiving data.
Off	Off	No link is present on the port.

Ports

Console port

The console port can be connected to a computer for system debugging, configuration, maintenance, management, and host software loading.

Table2-19 Console port specifications

Item	Description
Connector type	RJ-45
Compliant standard	Asynchronous EIA/TIA-232
Transmission baud rate	≤ 115200 bps. The default value is 9600 bps.
Transmission medium and max transmission distance	Common asynchronous serial interface cable, with a maximum transmission distance of 15 m (49.21 ft).
Services	Connects to the serial port on a local PC running a terminal emulation program.

Management Ethernet port

You can connect a management Ethernet port to a computer for router program loading and router debugging, or a remote NMS for remote management.

Table2-20 Management Ethernet port specifications

Item	Description
Connector type	RJ-45
Port quantity	1
Transmission baud rate	1000 Mbps, full duplex
Transmission medium and max transmission distance	Category-5 or above twisted pair cable, with a transmission distance of 100 m (328.08 ft)
Services	For router software upgrade and network management

USB port

USB ports can connect multiple types of devices and provide a higher data transfer rate than common parallel interfaces and serial interfaces.

Table2-21 USB port specifications

Item	Description
Connector type	USB A
Compliant standard	USB 2.0
Services	External storage media

NOTE:

Extension cables are not supported.

SMB coaxial clock input/output port

SMB coaxial clock ports provide input or output clock references at 2.048 Mbps (2.048 MHz). The service routing and forwarding processing module has four SMB coaxial clock ports. Two of them are input ports and two are output ports.

Table2-22 SMB coaxial clock input/output port specifications

Item	Description
Connector type	SMB coaxial
Compliant standard	GJB681
Transmission baud rate	2.048 Mbps
Transmission medium	75-ohm coaxial cable
Services	Sends and receives 2.048 MHz clocks and 2.048 Mbps signals to synchronize the clocks of the router and other devices, such as routers and the terminals.

High-precision time synchronization port

Table2-23 High-precision time synchronization port specifications

Item	Description
Connector type	RJ-45

Item	Description
Compliant standard	QB-B-016-2010
Transmission baud rate	9600 bps
Transmission medium	Category-5 or above twisted pair cable
Services	You can configure the port as an input port or output port at the CLI. Synchronizes the clocks of the router and other devices, such as GPS receivers and terminals.

Technical specifications

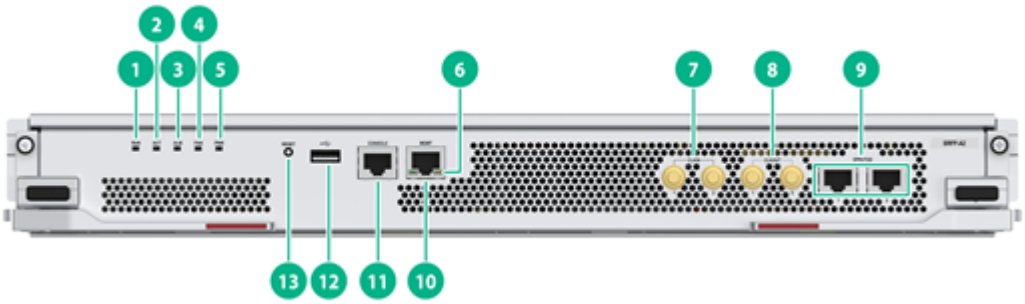
Table2-24 Technical specifications

Item	Description
Dimensions (H × W × D)	44 × 429 × 264 mm (1.73 × 16.89 × 10.39 in)
Weight	5.05 kg (11.13 lb)
Maximum power consumption	200 W
Power consumption (with typical configuration)	162 W
Minimum power consumption	131 W
Operating temperature	0°C to 45°C (32°F to 113°F)
SDRAM	2 × 8GB

SRFP-A2

View

Figure2-3 SRFP-A2 view



(1) Module running status LED. For the LED description, see Table2-25.	(2) Module active/standby LED. For the LED description, see Table2-26.
(3) Module alarm status LED. For the LED description, see Table2-27.	(4) Fan tray status LED. For the LED description, see Table2-28.
(5) Power status LED. For the LED description, see Table2-29.	(6) Management Ethernet port status LED (ACT). For the LED description, see Table2-30.

(1) Module running status LED. For the LED description, see Table2-25.	(2) Module active/standby LED. For the LED description, see Table2-26.
(7) SMB coaxial clock input ports (two in total)	(8) SMB coaxial clock output ports (two in total)
(9) High-precision time synchronization port (Both are input ports by default. When both ports are input ports, only port 1 takes effect.)	(10) Management Ethernet port (1000Base-T)
(11) CONSOLE port	(12) USB 2.0 port
(13) System reset button	

LEDs

Table2-25 Description of the module running status LED

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The module is operating correctly.
	Fast flashing (4 Hz)	The module is starting up.
	Steady on	The module is faulty.
	Off	The module is not powered on.

Table2-26 Description of the module active/standby LED

LED mark	Status	Description
ACT	Steady on	The module is in active state.
	Off	The following are the possible causes: • The module is in standby state. • The module is faulty. To identify whether the module is faulty, see the module status LED.

Table2-27 Description of the module alarm status LED

LED mark	Status	Description
ALM	Steady on	The following are the possible causes: • The module is starting up. • The module is faulty.
	Flashing (0.25 Hz)	The temperature of the module has exceeded the upper warning temperature threshold or dropped below the lower temperature threshold.
	Off	The following are the possible causes: • The module is operating correctly. • The module is not powered on.

Table2-28 Description of the fan tray status LED

LED mark	Status	Description
FAN	Steady green	The fan tray is operating correctly.
	Steady red	The following are the possible causes: • A fan in the fan tray is faulty. • The fan tray is installed incorrectly.
	Off	The fan tray is not powered on.

Table2-29 Description of the power status LED

LED mark	Status	Description
PWR	Steady green	All power supplies in the chassis are operating correctly.
	Steady red	A minimum of one power supply in the chassis does not have power output. Possible reasons include: • The power supply is faulty. • The power supply is not powered on. • The power cable is faulty. • The external power supply system has a power outage.

	Off	The following are the possible causes:
		• No power supplies exist in the chassis.
		• No power supply in the chassis has power output. Possible reasons include:
		  ○ The power supplies are faulty.
		  ○ The power supplies are not powered on.
		  ○ The power cables are faulty.
		  ○ The external power supply system has a power outage.

Table2-30 Description of the management Ethernet port status LED

LED mark		Description
LINK (green)	ACT (yellow)	
Steady on	Flashing	A link is present on the management Ethernet port, and the port is receiving or sending data.
Steady on	Off	A link is present on the management Ethernet port, but the port is not receiving or sending data.
Off	Off	No link is present on the management Ethernet port.

Ports

Console port

The console port can be connected to a computer for system debugging, configuration, maintenance, management, and host software loading.

Table2-31 Console port specifications

Item	Description
Connector type	RJ-45
Compliant standard	Asynchronous EIA/TIA-232
Port transmission rate	≤ 115200 bps (default: 9600 bps)

Item	Description
Transmission medium and max transmission distance	Common asynchronous serial interface cable, with a maximum transmission distance of 15 m (49.21 ft)
Services	Connects to the serial port on a local PC running a terminal emulation program

Management Ethernet port

You can connect a management Ethernet port to a computer for router program loading and router debugging, or a remote NMS for remote management.

Table2-32 Management Ethernet port specifications

Item	Description
Connector type	RJ-45
Port quantity	1
Transmission baud rate	1000 Mbps, full duplex
Transmission medium and max transmission distance	Category-5 or above twisted pair cable, with a transmission distance of 100 m (328.08 ft)
Services	For router software upgrade and network management

USB port

USB ports can connect multiple types of devices and provide a higher data transfer rate than common parallel interfaces and serial interfaces. USB ports support hot swapping and plug-and-play.

Table2-33 USB port specifications

Item	Description
Connector type	USB A
Compliant standard	USB 2.0
Services	External storage media

NOTE:

Extension cables are not supported.

SMB coaxial clock input/output port

SMB coaxial clock ports provide input or output clock references at 2.048 Mbps (2.048 MHz). The module has four SMB coaxial clock ports. Two of them are input ports and two are output ports.

Table2-34 SMB coaxial clock input/output port specifications

Item	Description
Connector type	SMB coaxial
Compliant standard	GJB681
Port transmission rate	2.048Mbps
Transmission medium	75-ohm coaxial cable
Services	Sends and receives 2.048 MHz clocks and 2.048 Mbps signals to synchronize the clocks of the router and other devices, such as routers and the terminals.

High-precision time synchronization port

Table2-35 High-precision time synchronization port specifications

Item	Description
Connector type	RJ-45
Compliant standard	QB-B-016-2010
Transmission baud rate	9600 bps
Transmission medium	Category 5 and above twisted pair cable
Services	You can configure the port as an input port or output port at the CLI. Synchronizes the clocks of the router and other devices, such as GPS receivers and terminals.

Technical specifications

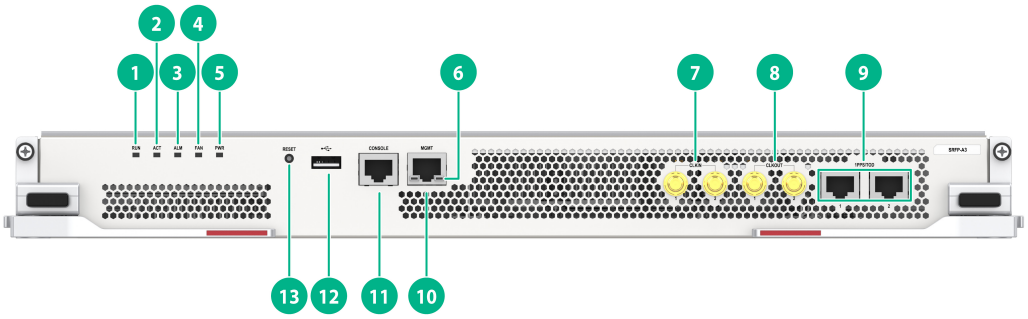
Table2-36 Technical specifications

Item	Description
Dimensions (H × W × D)	44 × 429 × 264 mm (1.73 × 16.89 × 10.39 in)
Weight	5.05 kg (11.13 lb)
Maximum power consumption	200 W
Power consumption (with typical configuration)	162 W
Minimum power consumption	131 W
Operating temperature	0°C to 45°C (32°F to 113°F)
SDRAM	2 × 8 GB

SRFP-A3

View

Figure2-4 SRFP-A3 view



(1) Service routing and forwarding processing module status LED. For the LED description, see Table2-37.	(2) Service routing and forwarding processing module active/standby LED. For the LED description, see Table2-38.
(3) Service routing and forwarding processing module alarm status LED. For the LED description,	(4) Fan tray status LED. For the LED description, see Table2-40.

see Table2-39.	
(5) Power supply status LED. For the LED description, see Table2-41.	(6) Management Ethernet port LED (ACT). For the LED description, see Table2-42.
(7) SMB coaxial clock input ports (2 in total)	(8) SMB coaxial clock output ports (2 in total)
(9) High-precision time synchronization port (Both are input ports by default. When both ports are input ports, only port 1 takes effect.)	(10) Management Ethernet port (1000Base-T)
(11) Console port	(12) USB 2.0 port
(13) System reset button	

LEDs

Table2-37 Service routing and forwarding processing module status LED

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The service routing and forwarding processing module is operating correctly.
	Fast flashing (4 Hz)	The service routing and forwarding processing module is starting up.
	Steady on	The service routing and forwarding processing module is faulty.
	Off	The service routing and forwarding processing module is not powered on.

Table2-38 Service routing and forwarding processing module active/standby LED description

LED mark	Status	Description
ACT	Steady on	The service routing and forwarding processing module is in active state.
	Off	The following are the possible causes: • The service routing and forwarding processing module is in standby state. • The service routing and forwarding processing module has failed. To identify the failure, see the card status LED description.

Table2-39 Service routing and forwarding processing module alarm status LED description

LED mark	Status	Description
ALM	Steady on	The following are the possible causes: • The service routing and forwarding processing module is starting up. • The service routing and forwarding processing module is faulty.

LED mark	Status	Description
	Flashing (0.25 Hz)	The service routing and forwarding processing module temperature is abnormal. The temperature has exceeded the upper warning temperature threshold or dropped below the lower temperature threshold.
	Off	The following are the possible causes: • The service routing and forwarding processing module is operating correctly. • The service routing and forwarding processing module is not powered on.

Table2-40 Fan tray status LED description

LED mark	Status	Description
FAN	Steady green	All fan trays are operating correctly.
	Steady red	The following are the possible causes: • One or more fans in a fan tray have failed. • One or more fan trays are not installed securely.
	Off	No fan trays are powered on.

Table2-41 Power supply status LED description

LED mark	Status	Description
PWR	Steady green	All power supplies in the chassis are operating correctly.
	Steady red	A minimum of one power supply in the chassis does not have power output, because the power supply is faulty, the power supply is not powered on, the power cable is faulty, or the external power supply system has a power outage.
	Off	The following are the possible causes: • No power supplies exist in the chassis. • No power supply in the chassis has power output, because the power supplies are faulty, the power supplies are not powered on, the power cables are faulty, or the external power supply system has a power outage.

Table2-42 Management Ethernet port LED description

LED mark		Description
LINK (green)	ACT (yellow)	
Steady on	Flashing	A link is present, and the port is sending or receiving data.
Steady on	Off	A link is present, but the port is not sending or receiving data.
Off	Off	No link is present on the port.

Ports

Console port

The console port can be connected to a computer for system debugging, configuration, maintenance, management, and host software loading.

Table2-43 Console port specifications

Item	Description
Connector type	RJ-45
Compliant standard	Asynchronous EIA/TIA-232
Transmission baud rate	≤ 115200 bps. The default value is 9600 bps.
Transmission medium and max transmission distance	Common asynchronous serial interface cable, with a maximum transmission distance of 15 m (49.21 ft)
Services	Connects to the serial port on a local PC running a terminal emulation program.

Management Ethernet port

You can connect a management Ethernet port to a computer for router program loading and router debugging, or a remote NMS for remote management.

Table2-44 Management Ethernet port specifications

Item	Description
Connector type	RJ-45
Port quantity	1
Transmission baud rate	1000 Mbps, full duplex
Transmission medium and max transmission distance	Category-5 or above twisted pair cable, with a transmission distance of 100 m (328.08 ft)
Services	For router software upgrade and network management

USB port

USB ports can connect multiple types of devices and provide a higher data transfer rate than common parallel interfaces and serial interfaces.

Table2-45 USB port specifications

Item	Description
Connector type	USB A
Compliant standard	USB 2.0
Services	External storage media

NOTE:

Extension cables are not supported.

SMB coaxial clock input/output port

SMB coaxial clock ports provide input or output clock references at 2.048 Mbps (2.048 MHz). The service routing and forwarding processing module has four SMB coaxial clock ports. Two of them are input ports and two are output ports.

Table2-46 SMB coaxial clock input/output port specifications

Item	Description
Connector type	SMB coaxial

Item	Description
Compliant standard	GJB681
Transmission baud rate	2.048 Mbps
Transmission medium	75-ohm coaxial cable
Services	Sends and receives 2.048 MHz clocks and 2.048 Mbps signals to synchronize the clocks of the router and other devices, such as routers and the terminals.

High-precision time synchronization port

Table2-47 High-precision time synchronization port specifications

Item	Description
Connector type	RJ-45
Compliant standard	QB-B-016-2010
Transmission baud rate	9600 bps
Transmission medium	Category-5 or above twisted pair cable
Services	You can configure the port as an input port or output port at the CLI. Synchronizes the clocks of the router and other devices, such as GPS receivers and terminals.

Technical specifications

Table2-48 Technical specifications

Item	Description
Dimensions (H × W × D)	44 × 429 × 264 mm (1.73 × 16.89 × 10.39 in)
Weight	5.05 kg (11.13 lb)
Maximum power consumption	280 W
Power consumption (with typical configuration)	240 W
Minimum power consumption	210 W
Operating temperature	0°C to 45°C (32°F to 113°F)
SDRAM	2 × 8GB

Compatibility information

Table2-49 Compatibility matrix between service routing and forwarding processing modules and routers

Service routing and forwarding processing module model	CR16000-M8	CR16000-M16
SRFP-A1	√ (only in slots 10 and 11)	×
SRFP-A2	√ (only in slots 10 and 11)	×
SRFP-A3	√	√

Service routing and forwarding processing module model	CR16000-M8	CR16000-M16
	(only in slots 10 and 11)	(only in slots 18 and 19)

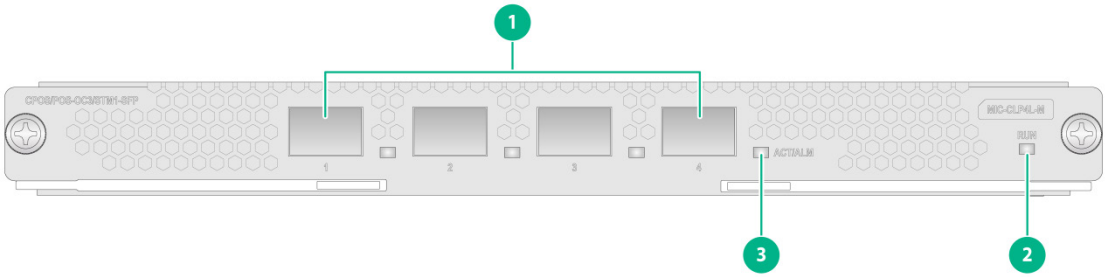
Interface modules

The router supports various interface modules that provide different types and numbers of ports.

MIC-CLP4L-M

View

Figure2-5 MIC-CLP4L-M view



(1) CPOS-OC-3/STM-1-SFP fiber ports (4 in total)	(2) Interface module status LED. For the LED description, see Table2-50.
(3) Port LED. For the LED description, see Table2-51.	

LEDs

Table2-50 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-51 Port LED description

LED mark	Status	Description
ACT/ALM	Flashing green	The port is sending or receiving data.
	Steady green	A link is present, but the port is not receiving or sending data.
	Steady red	An alarm has occurred.
	Off	No link is present on the port.

Ports

Table2-52 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-CLP4L-M	4-port OC-3/STM-1(155M) channelized POS optical interface module	LC	4	155 Mbps (OC-3c/STM-1c)

Technical specifications

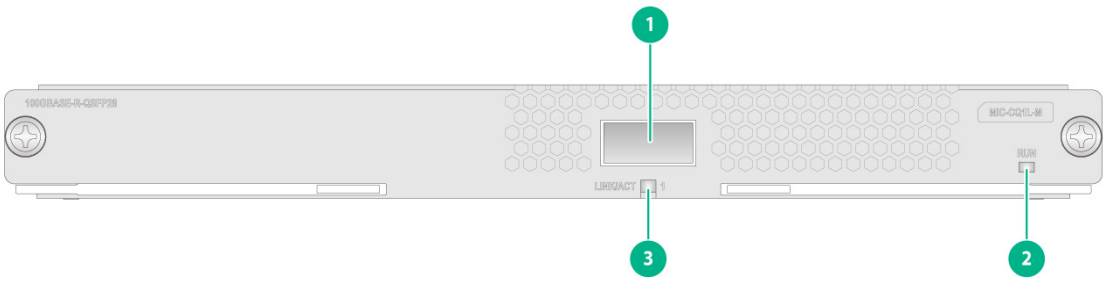
Table2-53 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	35 W
Power consumption (with typical configuration)	34 W
Minimum power consumption	32 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-CQ1L-M

View

Figure2-6 MIC-CQ1L-M view



(1) 100GBASE-R-QSFP28 fiber port (1 in total)	(2) Interface module status LED. For the LED description, see Table2-54.
(3) QSFP28 port LED. For the LED description, see Table2-55.	

LEDs

Table2-54 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.

LED mark	Status	Description
	Off	The interface module is faulty or is not powered on.

Table2-55 QSFP28 port LED description

LED mark	Status	Description
LINK/ACT	Flashing green	The QSFP28 port is sending or receiving data.
	Steady green	A link is present on the QSFP28 port.
	Off	No link is present on the QSFP28 port.

Ports

Table2-56 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-CQ1L-M	1-port 100GE optical interface module	LC	1	• 100 Gbps • 50 Gbps • 40 Gbps

Technical specifications

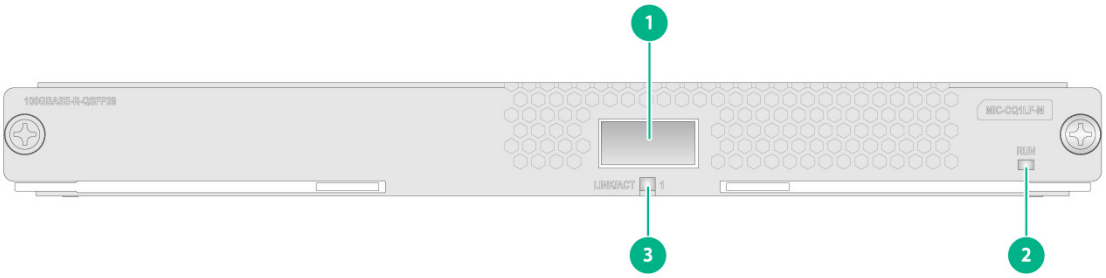
Table2-57 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.05 kg (2.31 lb)
Maximum power consumption	18 W
Power consumption (with typical configuration)	17 W
Minimum power consumption	16 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-CQ1LF-M

View

Figure2-7 MIC-CQ1LF-M view



(1) 100GBASE-R-QSFP28 fiber port (1 in total)	(2) Interface module status LED. For the LED description, see Table2-58.
(3) QSFP28 port LED. For the LED description, see Table2-59.	

LEDs

Table2-58 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-59 QSFP28 port LED description

LED mark	Status	Description
LINK/ACT	Flashing green	The QSFP28 port is sending or receiving data.
	Steady green	A link is present on the QSFP28 port.
	Off	No link is present on the QSFP28 port.

Ports

Table2-60 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-CQ1LF-M	1-port 100GE flexible optical interface module	LC	1	100 Gbps

Technical specifications

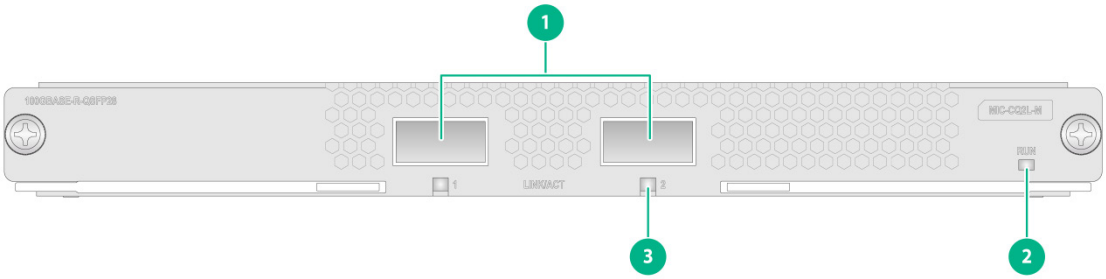
Table2-61 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	50 W
Power consumption (with typical configuration)	47 W
Minimum power consumption	38 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-CQ2L-M

View

Figure2-8 MIC-CQ2L-M view



(1) 100GBASE-R-QSFP28 fiber ports (2 in total)	(2) Interface module status LED. For the LED description, see Table2-62.
(3) QSFP28 port LED. For the LED description, see Table2-63.	

LEDs

Table2-62 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-63 QSFP28 port LED description

LED mark	Status	Description
LINK/ACT	Flashing green	The QSFP28 port is sending or receiving data.
	Steady green	A link is present on the QSFP28 port.
	Off	No link is present on the QSFP28 port.

Ports

Table2-64 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-CQ2L-M	2-port 100GE optical interface module	LC	2	• 100 Gbps • 50 Gbps • 40 Gbps

Technical specifications

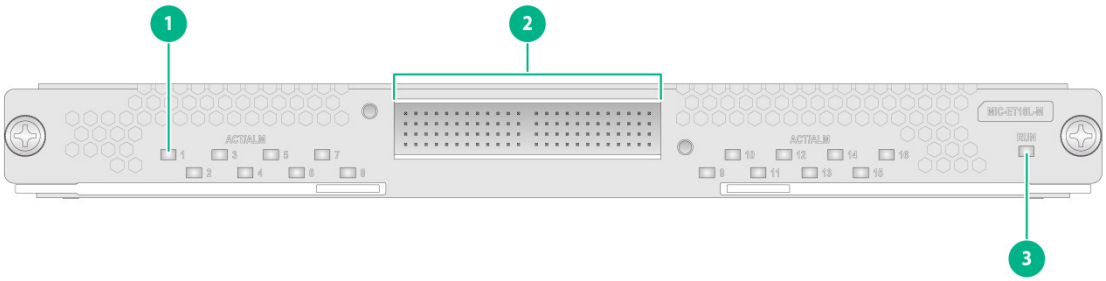
Table2-65 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	28 W
Power consumption (with typical configuration)	26.8 W
Minimum power consumption	26 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-ET16L-M

View

Figure2-9 MIC-ET16L-M view



(1) Port LED. For the LED description, see Table2-67.	(2) E1-HM96 copper ports (16 in total)
(3) Interface module status LED. For the LED description, see Table2-66.	

LEDs

Table2-66 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-67 Port LED description

LED mark	Status	Description
ACT/ALM	Flashing green	The port is sending or receiving data.

LED mark	Status	Description
	Steady green	A link is present, but the port is not receiving or sending data.
	Steady red	An alarm has occurred.
	Off	No link is present on the port.

Ports and cables

Table2-68 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-ET16L-M	16-port E1 copper interface module	HM96 male	16	2.048 Mbps (E1)

The MIC-ET16L-M interface module provides HM96 male connector with E1 port. Use different cables for conversion from HM96 to RJ-45, BNC, or SMB as needed.

Table2-69 E1 port cable types

Model	Description
SR0M7CAB1	HM96 E1 cable, 75 ohm, BNC, 3 m (9.84 ft)
SR0M7CAB2	HM96 E1 cable, 120 ohm, RJ45, 3 m (9.84 ft)
SR0M7CAB3	HM96 E1 cable, 75 ohm, SMB, 3 m (9.84 ft)

Technical specifications

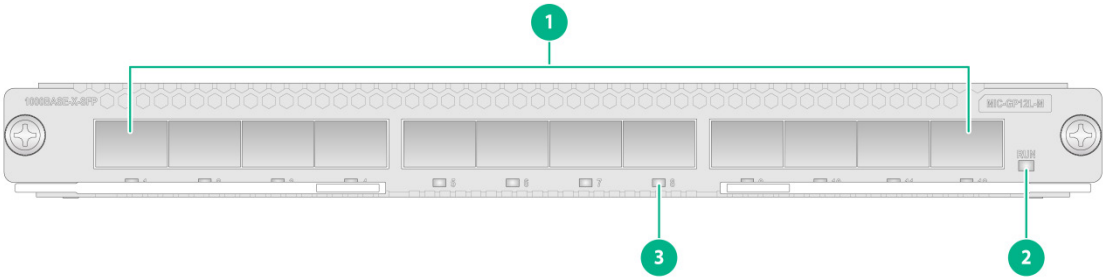
Table2-70 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	31 W
Power consumption (with typical configuration)	30.5 W
Minimum power consumption	29 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-GP12L-M

View

Figure2-10 MIC-GP12L-M view



(1) 1000BASE-X-SFP fiber ports (12 in total)	(2) Interface module status LED. For the LED description, see Table2-71.
(3) SFP port LED. For the LED description, see Table2-72.	

LEDs

Table2-71 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-72 SFP port LED description

LED	Status	Description
SFP port LED	Flashing	The SFP port is sending or receiving data.
	On	A link is present on the SFP port.
	Off	No link is present on the SFP port.

Ports

Table2-73 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-GP12L-M	12-port GE optical interface module	LC	12	• 10 Mbps • 100 Mbps • 1000 Mbps

Technical specifications

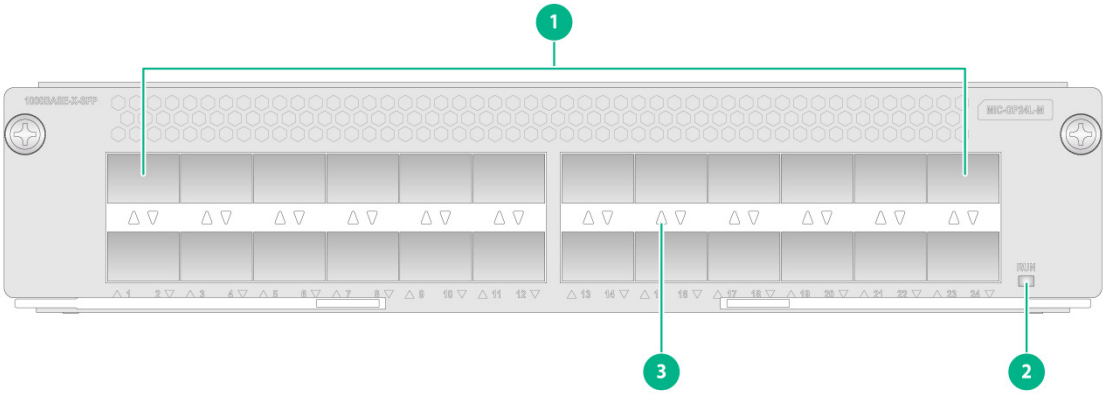
Table2-74 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.20 kg (2.65 lb)
Maximum power consumption	38 W
Power consumption (with typical configuration)	37 W
Minimum power consumption	36 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-GP24L-M

View

Figure2-11 MIC-GP24L-M view



(1) 1000BASE-X-SFP fiber ports (24 in total)	(2) Interface module status LED. For the LED description, see Table2-75.
(3) SFP port LED. For the LED description, see Table2-76.	

LEDs

Table2-75 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	On	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-76 SFP port LED description

LED	Status	Description
SFP port LED	Flashing	The SFP port is sending or receiving data.

LED	Status	Description
	Steady on	A link is present on the SFP port.
	Off	No link is present on the SFP port.

Ports

Table2-77 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-GP24L-M	24-port GE optical interface module	LC	24	• 10 Mbps • 100 Mbps • 1000 Mbps

Technical specifications

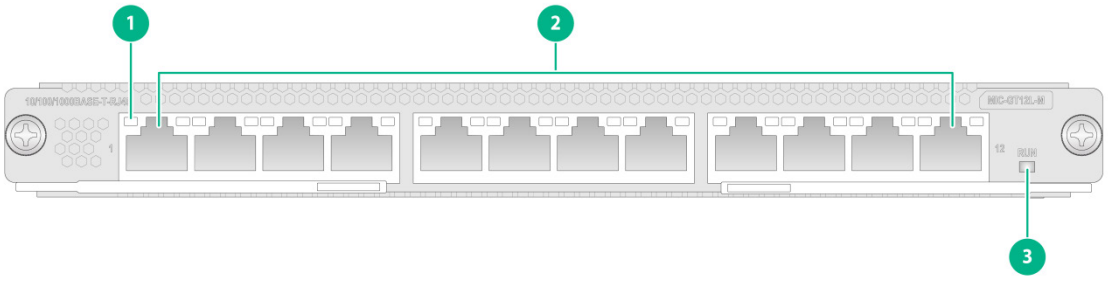
Table2-78 Technical specifications

Item	Description
Dimensions (H × W × D)	44 × 214 × 262 mm (1.73 × 8.43 × 10.32 in)
Weight	1.70 kg (3.75 lb)
Maximum power consumption	42 W
Power consumption (with typical configuration)	41.5 W
Minimum power consumption	29 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-GT12L-M

View

Figure2-12 MIC-GT12L-M view



(1) RJ-45 Ethernet port LED. For the LED description, see Table2-80.	(2) 1000BASE-X-SFP fiber ports (12 in total)
(3) Interface module status LED. For the LED description, see Table2-79.	

LEDs

Table2-79 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.

LED mark	Status	Description
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-80 RJ-45 Ethernet port LED description

LED	Status	Description
RJ-45 Ethernet port LED	Flashing	The port is sending or receiving data.
	On	A link is present on the port.
	Off	No link is present on the port.

Ports

Table2-81 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-GT12L-M	12-port GE copper interface module	RJ-45	12	• 10 Mbps • 100 Mbps • 1000 Mbps

Technical specifications

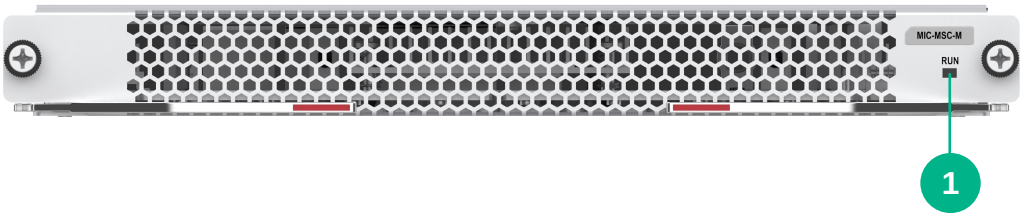
Table2-82 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.28 kg (2.82 lb)
Maximum power consumption	32 W
Power consumption (with typical configuration)	31.6 W
Minimum power consumption	30 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-MSC-M

View

Figure2-13 MIC-MSC-M view



(1) Card status LED. For the LED description, see Table2-83.

LEDs

Table2-83 Card LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Ports

Table2-84 Port specifications

Card model	Description	Connector type	Port quantity	Port transmission speed
MIC-MSC-M	Network data mutiservice processing interface module (MIC-M)	N/A	N/A	N/A

Technical specifications

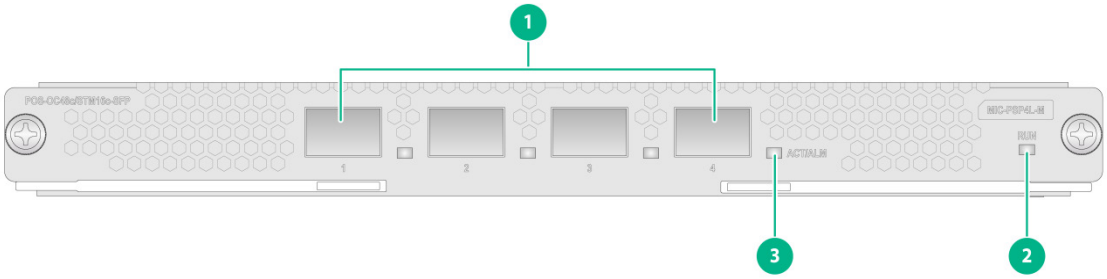
Table2-85 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.43 kg (3.15 lb)
Maximum power consumption	16 W
Power consumption (with typical configuration)	15 W
Minimum power consumption	13 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-PSP4L-M

View

Figure2-14 MIC-PSP4L-M view



(1) OC-48c/STM-16c POS fiber ports (4 in total)	(2) Interface module status LED. For the LED description, see Table2-86.
(3) Port LED. For the LED description, see Table2-87.	

LEDs

Table2-86 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-87 Port LED description

LED mark	Status	Description
ACT/ALM	Flashing green	The port is sending or receiving data.
	Steady green	A link is present, but the port is not receiving or sending data.
	Steady red	An alarm has occurred.
	Off	No link is present on the port.

Ports

Table2-88 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-PSP4L-M	4-port OC-48c/STM-16c(2.5G) POS optical interface module	LC	4	2.5 Gbps (OC-48c/STM-16c)

Technical specifications

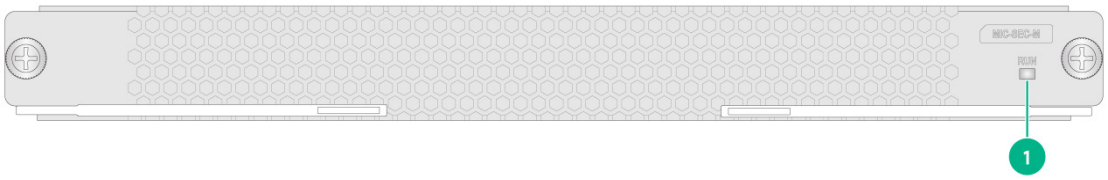
Table2-89 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	50 W
Power consumption (with typical configuration)	48 W
Minimum power consumption	40 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-SEC-M

View

Figure2-15 MIC-SEC-M view



(1) Card status LED. For the LED description, see Table2-90.

LEDs

Table2-90 Card LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Ports

Table2-91 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-SEC-M	Network data encryption service processing interface module (MIC-M)	N/A	N/A	N/A

Technical specifications

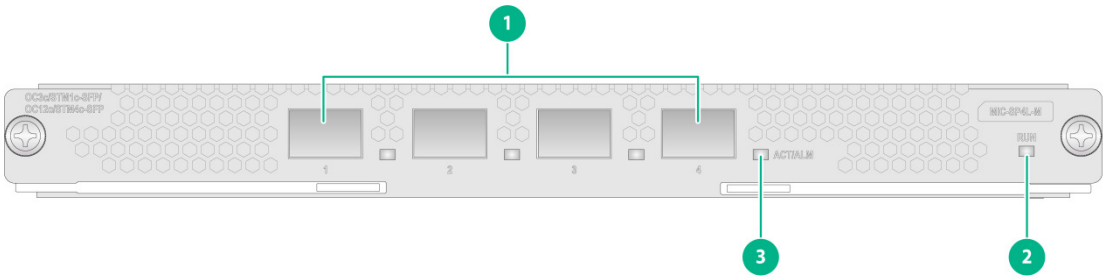
Table2-92 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	50 W
Power consumption (with typical configuration)	48 W
Minimum power consumption	40 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-SP4L-M

View

Figure2-16 MIC-SP4L-M view



(1) OC-3c/STM-1c POS/ATM fiber ports (4 in total) or OC-12c/STM-4c POS/ATM fiber port (port 1)	(2) Interface module status LED. For the LED description, see Table2-93.
(3) Port LED. For the LED description, see Table2-94.	

LEDs

Table2-93 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-94 Port LED description

LED mark	Status	Description
ACT/ALM	Flashing green	The port is sending or receiving data.

LED mark	Status	Description
	Steady green	A link is present, but the port is not receiving or sending data.
	Steady red	An alarm has occurred.
	Off	No link is present on the port.

Ports

Table2-95 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-SP4L-M	4-port OC-3c/STM-1c(155M) POS/ATM or 1-port OC-12c/STM-4c(622M) POS/ATM optical interface module (The interface module does not support switching to the ATM mode.)	LC	4	155 Mbps (OC-3c/STM-1c)
			1	622 Mbps (OC-12c/STM-4c)

Technical specifications

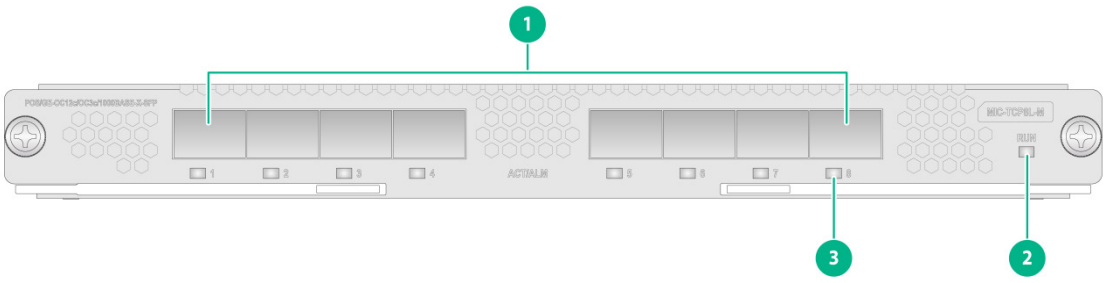
Table2-96 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	35 W
Power consumption (with typical configuration)	34 W
Minimum power consumption	32 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-TCP8L-M

View

Figure2-17 MIC-TCP8L-M view



(1) OC-3c/OC-12c POS/GE fiber ports (8 in total)	(2) Interface module status LED. For the LED description, see Table2-97.

(3) Port LED. For the LED description, see Table2-98.

LEDs

Table2-97 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-98 Port LED description

LED mark	Status	Description
ACT/ALM	Flashing green	The port is sending or receiving data.
	Steady green	A link is present, but the port is not receiving or sending data.
	Steady red	An alarm has occurred.
	Off	No link is present on the port.

Ports

Table2-99 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-TCP8L-M	8-port OC-3c/OC-12c(622M/155M) POS/GE optical interface module	LC	8	• 155 Mbps (OC-3/STM-1) • 622 Mbps (OC-12/STM-4) • 1000 Mbps

Technical specifications

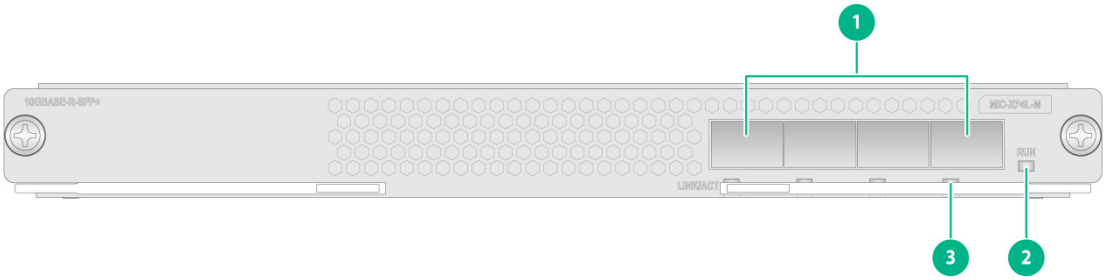
Table2-100 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	45 W
Power consumption (with typical configuration)	44 W
Minimum power consumption	43 W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-XP4L-M

View

Figure2-18 MIC-XP4L-M view



(1) 10GBASE-R/W-SFP+ fiber ports (4 in total)	(2) Interface module status LED. For the LED description, see Table2-101.
(3) SFP+ port LED. For the LED description, see Table2-102.	

LEDs

Table2-101 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-102 SFP+ port LED description

LED mark	Status	Description
LINK/ACT	Flashing	The SFP+ port is sending or receiving data.
	On	A link is present on the SFP+ port.
	Off	No link is present on the SFP+ port.

NOTE:

You can check the port speed by observing the color of the SFP+ port LED. Green indicates a speed of 10 Gbps, and yellow indicates a speed of 1000 Mbps.

Ports

Table2-103 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-XP4L-M	4-port 10GE optical interface module	LC	4	• 10 Gbps • 1000 Mbps

Technical specifications

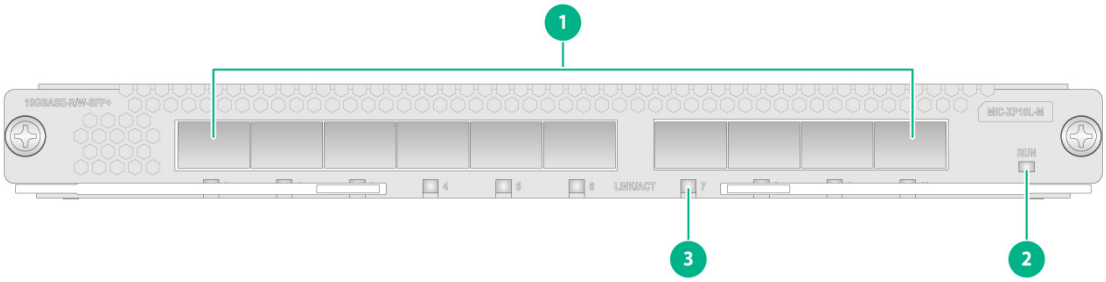
Table2-104 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	16W
Power consumption (with typical configuration)	14.4W
Minimum power consumption	14W
Operating temperature	0°C to 45°C (32°F to 113°F)

MIC-XP10L-M

View

Figure2-19 MIC-XP10L-M view



(1) 10GBASE-R/W-SFP+ fiber ports (10 in total)	(2) Interface module status LED. For the LED description, see Table2-105.
(3) SFP+ port LED. For the LED description, see Table2-106.	

LEDs

Table2-105 Interface module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The interface module is operating correctly.
	Fast flashing (4 Hz)	The interface module is loading software. If the interface module stays in this state, it indicates that software loading has failed.
	Steady on	The interface module is faulty.
	Off	The interface module is faulty or is not powered on.

Table2-106 SFP+ port LED description

LED mark	Status	Description
LINK/ACT	Flashing	The SFP+ port is sending or receiving data.
	On	A link is present on the SFP+ port.
	Off	No link is present on the SFP+ port.

NOTE:

You can check the port speed by observing the color of the SFP+ port LED. Green indicates a speed of 10 Gbps, and yellow indicates a speed of 1000 Mbps.

Ports

Table2-107 Port specifications

Interface module model	Description	Connector type	Port quantity	Port transmission speed
MIC-XP10L-M	10-port 10GE optical interface module	LC	10	• 10 Gbps • 1000 Mbps

Technical specifications

Table2-108 Technical specifications

Item	Description
Dimensions (H × W × D)	22 × 214 × 262 mm (0.87 × 8.43 × 10.32 in)
Weight	1.10 kg (2.43 lb)
Maximum power consumption	50 W
Power consumption (with typical configuration)	44 W
Minimum power consumption	35 W
Operating temperature	0°C to 45°C (32°F to 113°F)

Compatibility information

Compatibility between interface modules and routers varies by switching fabric modules or service routing and forwarding processing modules that are installed.

Table2-109 Compatibility matrix between interface modules and routers installed with SFE-A switching fabric modules

Interface module model	CR16000-M8 (SFE-A/SFE-A1/SFE-A2/SRFP-A1/SRFP-A2/SRFP-A3)
MIC-CLP4L-M	Any slots (Up to four modules)
MIC-CQ1L-M	Any slots
MIC-CQ1LF-M	Only in slots 4 and 5
MIC-CQ2L-M	Only in slots 4 and 5
MIC-ET16L-M	Any slots
MIC-GP12L-M	Any slots
MIC-GP24L-M	Only in slots 4, 5, 8, and 9
MIC-GT12L-M	Any slots

Interface module model	CR16000-M8 (SFE-A/SFE-A1/SFE-A2/SRFP-A1/SRFP-A2/SRFP-A3)
MIC-MSC-M	Any slots
MIC-PSP4L-M	Any slots
MIC-SEC-M	Any slots
MIC-SP4L-M	Any slots
MIC-TCP8L-M	Any slots
MIC-XP4L-M	Any slots
MIC-XP10L-M	Any slots

Table2-110 Compatibility matrix between interface modules and routers installed with SRFP-A1 service routing and forwarding processing modules

Interface module model	CR16000-M16 (SFE-A/SRFP-A3)	CR16000-M16 (SFE-A1/SFE-A2)
MIC-CLP4L-M	Any slots (Up to four modules)	Any slots (Up to four modules)
MIC-CQ1L-M	Only in slots 6 through 13	Only in slots 6 through 13
MIC-CQ1LF-M	Only in slots 8 and 9	Only in slots 8 and 9
MIC-CQ2L-M	Only in slots 8 and 9	Only in slots 8 and 9
MIC-ET16L-M	Any slots	Any slots
MIC-GP12L-M	Any slots	Any slots
MIC-GP24L-M	Only in slots 4, 5, 8, 9, 12, 13, 16, and 17	Only in slots 8, 9, 12, and 13
MIC-GT12L-M	Any slots	Any slots
MIC-MSC-M	Any slots	Any slots
MIC-PSP4L-M	Any slots	Any slots
MIC-SEC-M	Any slots	Any slots
MIC-SP4L-M	Any slots	Any slots
MIC-TCP8L-M	Any slots	Any slots
MIC-XP4L-M	Only in slots 2 through 13	Only in slots 6 through 13
MIC-XP10L-M	Only in slots 6 through 13	Only in slots 6 through 9

Switching fabric modules

The switching fabric modules are the core of the switching plane of the router.

You can add one switching fabric module or remove the unused switching fabric module without powering off the router. The operation does not affect transmission of interface modules or service continuity.

SFE-A

View

Figure2-20 SFE-A view

(1) Switching fabric module status LED. For the LED description, see Table2-111.	(2) Switching fabric module active/standby LED. For the LED description, see Table2-112.
(3) Switching fabric module alarm status LED. For the LED description, see Table2-113.	

LEDs

Table2-111 Switching fabric module status LED description

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The switching fabric module is operating correctly.
	Fast flashing (4 Hz)	The switching fabric module is loading software. If the switching fabric module stays in this state, it indicates that software loading has failed.
	Steady on	The switching fabric module is faulty.
	Off	The switching fabric module is faulty or is not powered on.

Table2-112 Switching fabric module active/standby LED description

LED mark	Status	Description
ACT	Steady on	The switching fabric module is in active state.
	Off	The following are the possible causes: • The switching fabric module is in standby state. • The switching fabric module is not powered on.

Table2-113 Switching fabric module alarm status LED description

LED mark	Status	Description
ALM	On	An alarm has occurred.
	Flashing (0.25 Hz)	The switching fabric module temperature is abnormal. The temperature has exceeded the upper warning temperature threshold or dropped below the lower temperature threshold.
	Off	The following are the possible causes: • The switching fabric module is operating correctly. • The switching fabric module is not powered on.

Technical specifications

Table2-114 Technical specifications

Item	Description
Dimensions (H × W × D)	44 × 429 × 264 mm (1.73 × 16.89 × 10.39 in)
Weight	5.05 kg (11.13 lb)
Maximum power consumption	280 W
Power consumption (with typical configuration)	240 W
Minimum power consumption	210 W
Operating temperature	0°C to 45°C (32°F to 113°F)

SFE-A1

View

Figure2-21 SFE-A1 view

(1) Switching fabric module status LED. For the LED description, see Table2-115.	(2) Switching fabric module active/standby LED. For the LED description, see Table2-116.
(3) Switching fabric module alarm status LED. For the LED description, see Table2-117.	

LEDs

Table2-115 Description of the switching fabric module status LED

LED mark	Status	Description
RUN	Flashing (0.5 Hz)	The switching fabric module is operating correctly.
	Fast flashing (4 Hz)	The switching fabric module is loading software. If the module stays in this state, it indicates that software loading has failed.
	Steady on	The switching fabric module is faulty.
	Off	The switching fabric module is faulty or is not powered on.

Table2-116 Description of the switching fabric module active/standby LED

LED mark	Status	Description
ACT	Steady on	The switching fabric module is in active state.
	Off	The following are the possible causes: • The switching fabric module is in standby state. • The switching fabric module is not powered on.

Table2-117 Description of the switching fabric module alarm status LED

LED mark	Status	Description
ALM	On	An alarm is present on the switching fabric module.
	Flashing (0.25 Hz)	The temperature of the switching fabric module has exceeded the upper warning temperature threshold or dropped below the lower temperature threshold.
	Off	The following are the possible causes: • The switching fabric module is operating correctly. • The switching fabric module is not powered on.

Technical specifications

Table2-118 Technical specifications

Item	Description
Dimensions (H × W × D)	44 × 429 × 264 mm (1.73 × 16.89 × 10.39 in)
Weight	5.05 kg (11.13 lb)
Maximum power consumption	200 W
Power consumption (with typical configuration)	162 W
Minimum power consumption	131 W
Operating temperature	0°C to 45°C (32°F to 113°F)

SFE-A2

View

Figure2-22 SFE-A2 view

(1) Switching fabric module status LED. For the LED description, see Table2-119.	(2) Switching fabric module active/standby LED. For the LED description, see Table2-120.
(3) Switching fabric module alarm status LED. For the LED description, see Table2-121.	

Status

Table2-119 Description of the switching fabric module status LED

LED mark	State	Description
RUN	Flashing (0.5 Hz)	The switching fabric module is operating correctly.
	Fast flashing (4 Hz)	The switching fabric module is loading software. If the module stays in this state, it indicates that software loading has failed.
	Steady on	The switching fabric module is faulty.
	Off	The switching fabric module is faulty or is not powered on.

Table2-120 Description of the switching fabric module active/standby LED

LED mark	Status	Description
ACT	Steady on	The switching fabric module is in active state.
	Off	The following are the possible causes: • The switching fabric module is in standby state. • The switching fabric module is not powered on.

Table2-121 Description of the switching fabric module alarm status LED

LED mark	Status	Description
ALM	On	An alarm is present on the switching fabric module.
	Flashing (0.25 Hz)	The temperature of the switching fabric module has exceeded the upper warning temperature threshold or dropped below the lower temperature threshold.
	Off	The following are the possible causes: • The switching fabric module is operating correctly. • The switching fabric module is not powered on.

Technical specifications

Table2-122 Technical specifications

Item	Description
Dimensions (H × W × D)	44 × 429 × 264 mm (1.73 × 16.89 × 10.39 in)
Weight	5.05 kg (11.13 lb)
Maximum power consumption	200 W
Power consumption (with typical configuration)	162 W
Minimum power consumption	131 W
Operating temperature	0°C to 45°C (32°F to 113°F)

Power supplies

The router supports the PSR1200B-12A, PSR1200B-12A1-F, PSR2500-12A, PSR2400-12D, PSR2400-D, and PSR2500B-12AHD-F power supplies.

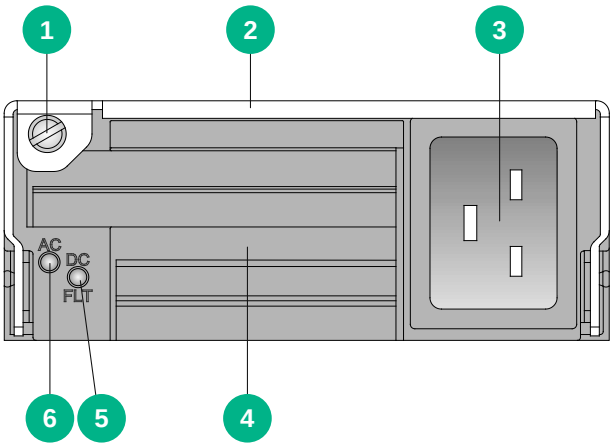
As a best practice, make sure the rated current of a single circuit breaker is not less than 1.2 times the maximum input current of the power supply.

You can select a certain number of power supplies according to the power supply conditions at the installation site and actual power consumption of your router. Make sure the total maximum output power of the installed power supplies is greater than the system power consumption. As a best practice, reserve 20% of the maximum output power.

PSR1200B-12A

View

Figure2-23 PSR1200B-12A power supply view



(1) Captive screw	(2) Power supply handle
(3) Power input receptacle	(4) Air inlet vent
(5) Power output status LED	(6) Power input status LED

LEDs

Table2-123 PSR1200B-12A LED description

LED mark	Status	Description
AC	Steady green	The power supply system is operating correctly.
	Off	No power input.
		The input voltage is too low and the power supply has entered self-protection state.
DC	Steady green	Power output of the power supply system is normal.
	Steady red	Power output of the power supply system is abnormal. The power supply has an output short circuit, output overcurrent, output overvoltage, input undervoltage, or remote shutdown alarm and has entered self-protection state.
	Steady amber	An overtemperature alarm was triggered and the power supply has entered self-protection state.

Technical specifications

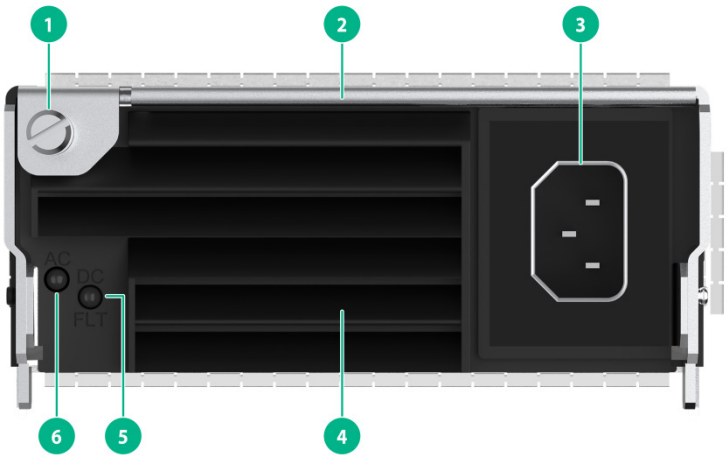
Table2-124 Technical specifications

Item	Description
Dimensions (H × W × D)	41 × 102 × 410 mm (1.61 × 4.02 × 16.14 in)
Weight	2.27 kg (5.00 lb)
Inputs	1
Rated input voltage	100 VAC to 240 VAC @ 50 Hz or 60 Hz
Input voltage range	90 VAC to 290 VAC
Maximum input current	16 A
Rated output voltage	12 VDC
Rated output current	100 A
Rated output power	1200 W
Front-level circuit breaker/fuse	≥ 20 A
Heat dissipation	Built-in fans
Power cable	Standard C19 cable (3*1.5mm²)

PSR1200B-12A1-F

View

Figure2-24 PSR1200B-12A1-F power supply view



(1) Captive screw	(2) Power supply handle
(3) Power input receptacle	(4) Air inlet vent
(5) Power output status LED	(6) Power input status LED

LEDs

Table2-125 PSR1200B-12A1-F LED description

LED mark	Status	Description
AC	Steady green	The power supply system is operating correctly.
	Off	No power input.
		The input voltage is too low and the power supply has entered self-protection state.
DC	Steady green	Power output of the power supply system is normal.
	Steady red	Power output of the power supply system is abnormal. The power supply has an output short circuit, output overcurrent, output overvoltage, input undervoltage, or remote shutdown alarm and has entered self-protection state.
	Steady amber	An overtemperature alarm was triggered and the power supply has entered self-protection state.

Technical specifications

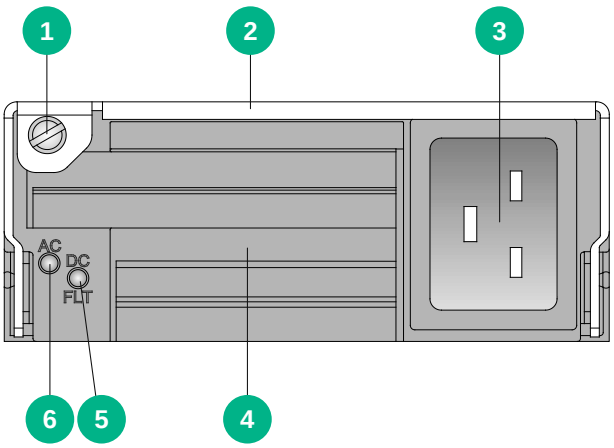
Table2-126 Technical specifications

Item	Description
Dimensions (H × W × D)	41 × 102 × 410 mm (1.61 × 4.02 × 16.14 in)
Weight	2.27 kg (5.00 lb)
Inputs	1
Rated input voltage	• 200 VAC to 240 VAC @ 50 Hz or 60 Hz • 240 VDC
Input voltage range	• 180 VAC to 264 VAC • 192 VDC to 320 VDC
Maximum input current	10 A
Rated output voltage	12 VDC
Rated output current	100 A
Rated output power	1200 W
Front-level circuit breaker/fuse	≥ 20 A
Heat dissipation	Built-in fans
Power cable	Standard C13 cable (3*1.0mm²)

PSR2500-12A

View

Figure2-25 PSR2500-12A power supply view



(1) Captive screw	(2) Power supply handle
(3) Power input receptacle	(4) Air inlet vent
(5) Power output status LED	(6) Power input status LED

LEDs

Table2-127 PSR2500-12A LED description

LED mark	Status	Description
AC	Steady green	The power supply system is operating correctly.
	Off	No power input.
		The input voltage is too low and the power supply has entered self-protection state.
DC	Steady green	Power output of the power supply system is normal.
	Steady red	Power output of the power supply system is abnormal. The power supply has an output short circuit, output overcurrent, output overvoltage, input undervoltage, or remote shutdown alarm and has entered self-protection state.
	Steady amber	An overtemperature alarm was triggered and the power supply has entered self-protection state.

Technical specifications

Table2-128 Technical specifications

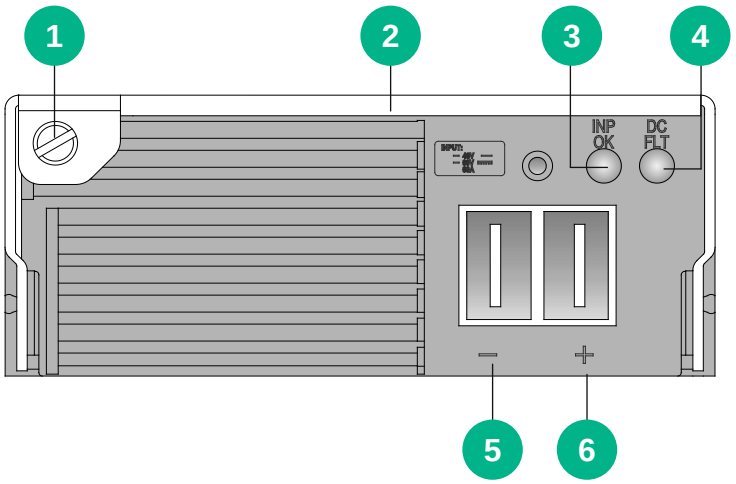
Item	Description
Dimensions (H × W × D)	41 × 102 × 410 mm (1.61 × 4.02 × 16.14 in)
Weight	2.50 kg (5.51 lb)
Inputs	1
Rated input voltage	• 100 VAC to 240 VAC @ 50 Hz or 60 Hz • 240 VDC

Item	Description
Input voltage range	90 VAC to 264 VAC 190 VDC to 290 VDC
Maximum input current	16 A
Rated output voltage	12 VDC
Rated output current	• 100 A (100 VAC to 180 VAC input) • 208 A (180 VAC to 240 VAC or 240 VDC input)
Rated output power	• 1200 W (100 VAC to 180 VAC input) • 2500 W (180 VAC to 240 VAC or 240 VDC input)
Front-level circuit breaker/fuse	≥ 20 A
Heat dissipation	Built-in fans
Power cable	Standard C19 cable (3*1.5mm²)

PSR2400-12D

View

Figure2-26 PSR2400-12D power supply view



(1) Captive screw	(2) Power supply handle
(3) Power input status LED	(4) Power output status LED
(5) DC input negative terminal (–)	(6) DC input positive terminal (+)

LEDs

Table2-129 PSR2400-12D LED description

LED mark	Status	Description
INP OK	Steady green	The power supply system is operating correctly.
	Off	No power input.
		The input voltage is too low and the power supply has entered self-protection state.

LED mark	Status	Description
DC/FLT	Steady green	Power output of the power supply system is normal.
	Steady red	Power output of the power supply system is abnormal. The power supply has an output short circuit, output overcurrent, output overvoltage, input undervoltage, or remote shutdown alarm and has entered self-protection state.
	Steady amber	An overtemperature alarm was triggered and the power supply has entered self-protection state.

Technical specifications

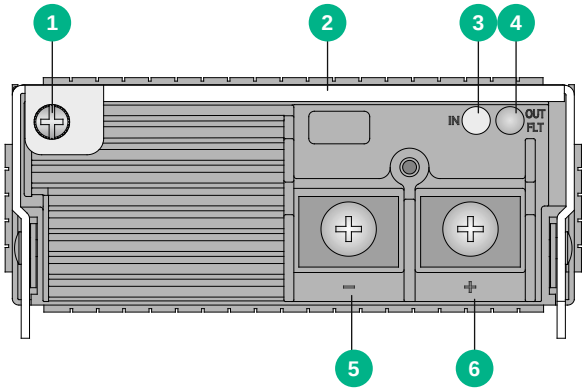
Table2-130 Technical specifications

Item	Description
Dimensions (H × W × D)	41 × 102 × 410 mm (1.61 × 4.02 × 16.14 in)
Weight	2.40 kg (5.29 lb)
Inputs	1
Rated input voltage	–48 VDC to –60 VDC
Input voltage range	–36 V to –72 V
Maximum input current	78 A
Rated output voltage	12 VDC
Rated output current	200 A
Rated output power	2400 W
Front-level circuit breaker/fuse	≥ 100 A
Heat dissipation	Built-in fans
Power cable	PWC01 2P cable

PSR2400-D

View

Figure2-27 PSR2400-D power supply view



(1) Captive screw	(2) Power supply handle
(3) Power input status LED	(4) Power output status LED
(5) DC input negative terminal (–)	(6) DC input positive terminal (+)

LEDs

Table2-131 PSR2400-D LED description

LED mark	Status	Description
INP OK	Steady green	The power supply system is operating correctly.
	Off	No power input.
		The input voltage is too low and the power supply has entered self-protection state.
DC/FLT	Steady green	Power output of the power supply system is normal.
	Steady red	Power output of the power supply system is abnormal. The power supply has an output short circuit, output overcurrent, output overvoltage, input undervoltage, or remote shutdown alarm and has entered self-protection state.
	Steady amber	An overtemperature alarm was triggered and the power supply has entered self-protection state.

Technical specifications

Table2-132 Technical specifications

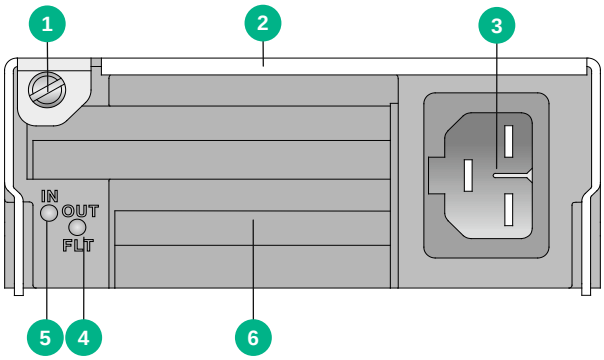
Item	Description
Dimensions (H × W × D)	41 × 102 × 410 mm (1.61 × 4.02 × 16.14 in)
Weight	2.40 kg (5.29 lb)
Inputs	1
Rated input voltage	–48 VDC to –60 VDC
Input voltage range	–36 V to –72 V
Maximum input	78 A

Item	Description
current	
Rated output voltage	12 VDC
Rated output current	200 A
Rated output power	2400 W
Front-level circuit breaker/fuse	≥ 100 A
Heat dissipation	Built-in fans
Power cable	ST M5 cable

PSR2500B-12AHD-F

View

Figure2-28 PSR2500B-12AHD-F power supply view



(1) Captive screw	(2) Power supply handle
(3) Power input receptacle	(4) Power output status LED
(5) Power input status LED	(6) Air inlet vent

LEDs

Table2-133 PSR2500B-12AHD-F LED description

LED mark	Status	Description
IN	Steady green	The power supply system is operating correctly.
	Off	No power input.
		The input voltage is too low and the power supply has entered self-protection state.
OUT	Steady green	Power output of the power supply system is normal.
	Steady red	Power output of the power supply system is abnormal. The power supply has an output short circuit, output overcurrent, output overvoltage, input undervoltage, or remote shutdown alarm and has entered self-protection state.
	Steady amber	An overtemperature alarm was triggered and the power supply has entered self-protection state.

Technical specifications

Table2-134 Technical specifications

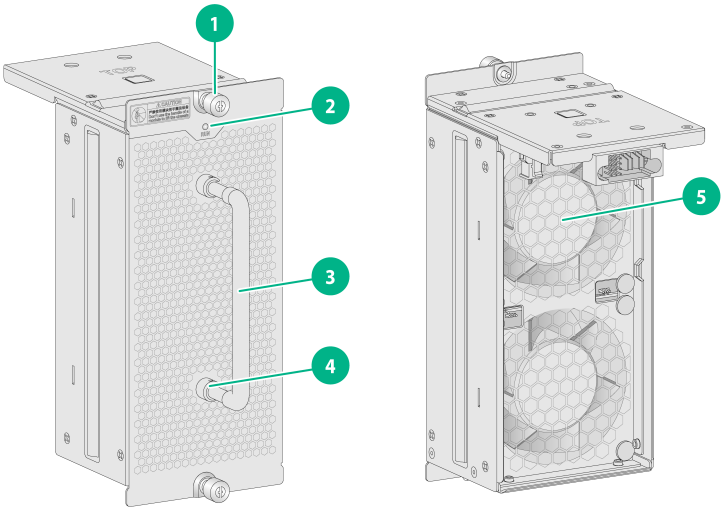
Item	Description
Dimensions (H × W × D)	41 × 102 × 410 mm (1.61 × 4.02 × 16.14 in)
Weight	2.75 kg (6.06 lb)
Inputs	1
Rated input voltage	• 100 VAC to 240 VAC @ 50 Hz or 60 Hz • 240 VDC to 380 VDC
Input voltage range	90 VAC to 290 VAC 180 VDC to 400 VDC
Maximum input current	16 A
Rated output voltage	12 VDC
Rated output current	• 100 A (90 VAC to 180 VAC input) • 208 A (180 VAC to 290 VAC or 180 VDC to 400 VDC input)
Rated output power	• 1200 W (90 VAC to 180 VAC input) • 2500 W (180 VAC to 290 VAC or 180 VDC to 400 VDC input)
Front-level circuit breaker/fuse	≥ 20A
Heat dissipation	Built-in fans
Power cable	Standard HVDCB cable (3*1.5mm²)

Fan trays

FAN-80B-2-A

View

Figure2-29 FAN-80B-2-A fan tray view



(1) Captive screw	(2) Status LED
(3) Fan tray handle	(4) Fan tray handle pivot
(5) Fan	

LEDs

Table2-135 Fan tray LED description

LED mark	Status	Description
RUN	Steady green	The fan tray is operating correctly.
	Steady red	The following are the possible causes: • One or more fans in the fan tray have failed. • The fan tray is not installed securely.
	Off	The fan tray is not powered on.

Technical specifications

Table2-136 Technical specifications

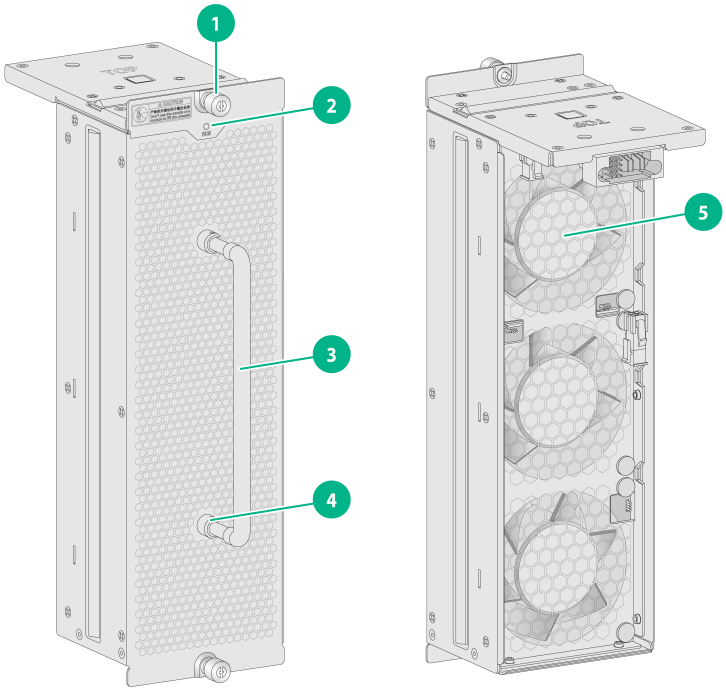
Item	Description
Dimensions (H × W × D)	200 × 86 × 120 mm (7.87 × 3.39 × 4.72 in)
Weight	0.95 kg (2.09 lb)
Maximum power consumption	95 W
Power consumption (with typical	36 W

Item	Description
configuration)	
Minimum power consumption	9 W
Number of fans	2
Fan diameter	80 mm (3.15 in)
Max fan speed	15200 RPM
Maximum air flow rate	260 CFM (7.36 m^3/min)

FAN-80B-3-A

View

Figure2-30 FAN-80B-3-A fan tray view



(1) Captive screw	(2) Status LED
(3) Fan tray handle	(4) Fan tray handle pivot
(5) Fan	

LEDs

Table2-137 Fan tray LED description

LED mark	LED	Description
RUN	Steady green	The fan tray is operating correctly.

LED mark	LED	Description
	Steady red	The following are the possible causes: • One or more fans in the fan tray have failed. • The fan tray is not installed securely.
	Off	The fan tray is not powered on.

Technical specifications

Table2-138 Technical specifications

Item	Description
Dimensions (H × W × D)	289 × 86 × 120 mm (11.38 × 3.39 × 4.72 in)
Weight	1.30 kg (2.87 lb)
Maximum power consumption	140 W
Power consumption (with typical configuration)	45 W
Minimum power consumption	12 W
Number of fans	3
Fan diameter	80 mm (3.15 in)
Max fan speed	15200 RPM
Maximum air flow rate	390 CFM (11.04 m^3/min)

Configuration restrictions and guidelines

The router came with two fan trays installed. To replace a fan tray, make sure the new fan tray is compatible with the router.

Compatibility information

Table2-139 Compatibility matrix between fan trays and routers

Fan tray	Compatible router model
FAN-80B-2-A	CR16000-M8
FAN-80B-3-A	CR16000-M16

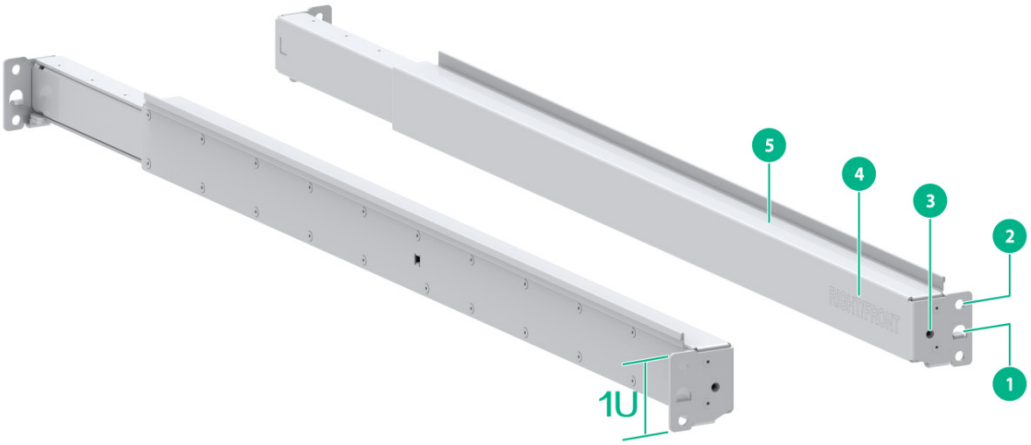
Slide rails

Before rack-mounting the router, install slide rails on the rack.

LSXM1BSR

Views

Figure2-31 LSXM1BSR slide rail view



(1) Positioning tongue	(2) Slide rail installation hole
(3) Front plate installation hole	(4) Sign
(5) Guide rail	

Figure2-32 Front plate

(1) Installation hole

Technical specifications

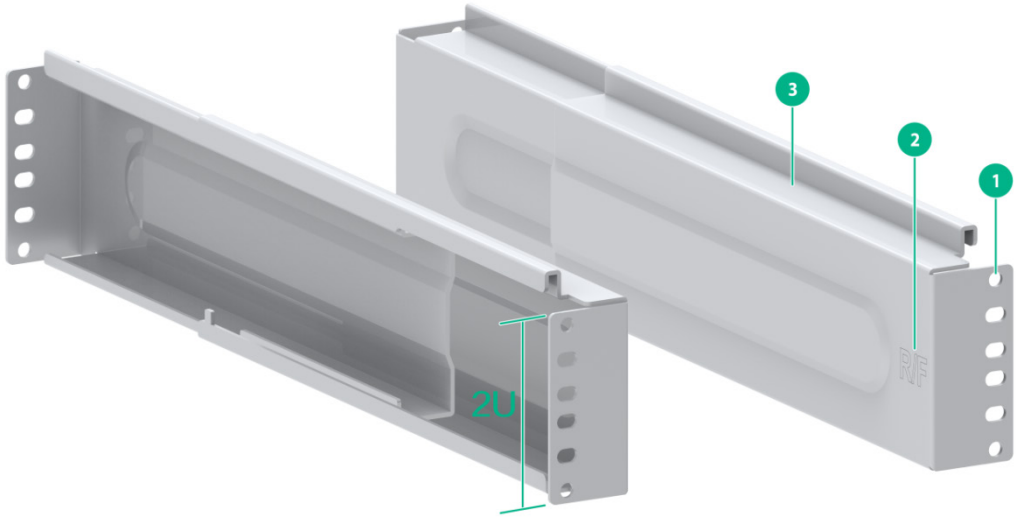
Table2-140 Technical specifications

Item	Description
Maximum loading capacity	650 kg (1432.98 lb)
Adjustment range	630 to 900 mm (24.80 to 35.43 in)
Occupied rack space	1 RU

LSTM1KSGD0

Views

Figure2-33 LSTM1KSGD0 slide rail view



(1) Installation hole	(2) Sign
(3) Guide rail	

Technical specifications

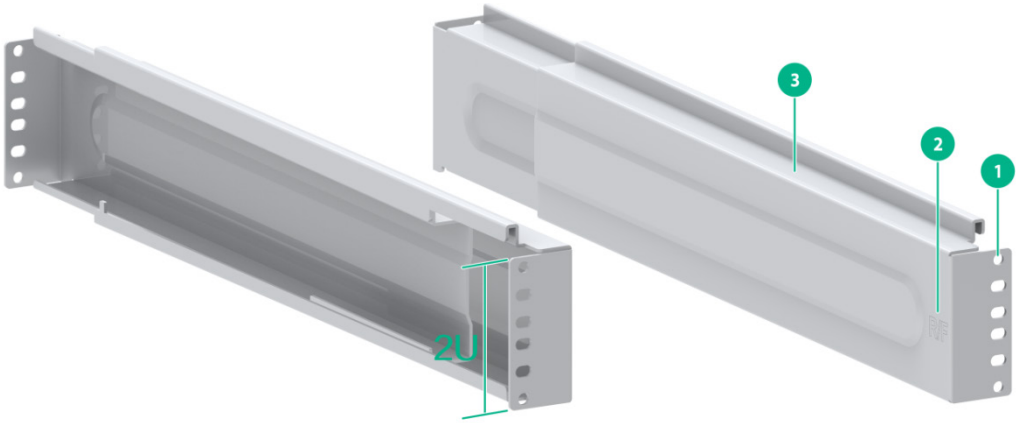
Table2-141 Technical specifications

Item	Description
Maximum loading capacity	280 kg (617.28 lb)
Adjustment range	300 to 500 mm (11.81 to 19.69 in)
Occupied rack space	2 RUs

LSTM2KSGD0

Views

Figure2-34 LSTM2KSGD0 slide rail view



(1) Installation hole	(2) Sign

(3) Guide rail

Technical specifications

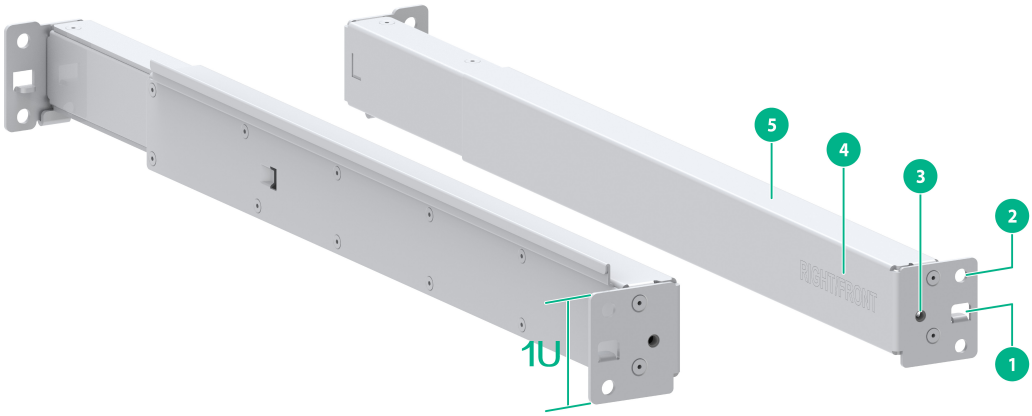
Table2-142 Technical specifications

Item	Description
Maximum loading capacity	400 kg (881.83 lb)
Adjustment range	500 to 800 mm (19.69 to 31.50 in)
Occupied rack space	2 RUs

RL-1U-A

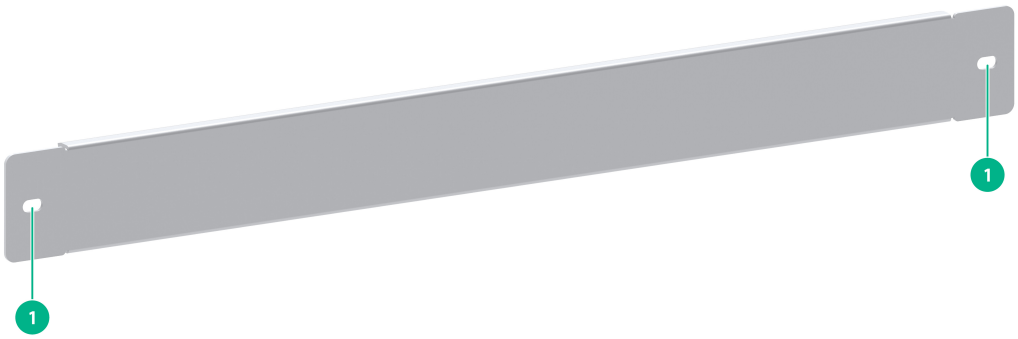
Views

Figure2-35 RL-1U-A slide rail view



(1) Positioning tongue	(2) Slide rail installation hole
(3) Front plate installation hole	(4) Sign
(5) Guide rail	

Figure2-36 Front plate



(1) Installation hole

Technical specifications

Table2-143 Technical specifications

Item	Description
Maximum loading capacity	200 kg (440.92 lb)
Adjustment range	380 to 630 mm (14.96 to 24.80 in)
Occupied rack space	1 RU

Configuration restrictions and guidelines

Select slide rails for the router based on the chassis weight.

Compatibility information

Table2-144 Chassis weights and applicable slide rails

Model	Chassis weight (fully configured)	Applicable slide rails
CR16000-M8	66 kg (145.50 lb)	LSXM1BSR LSTM1KSGD0 LSTM2KSGD0 RL-1U-A
CR16000-M16	81 kg (178.57 lb)	LSXM1BSR LSTM1KSGD0 LSTM2KSGD0 RL-1U-A

DC power cords

DC power cords are used for connecting the DC power supplies of a CR16000-M router to the external DC power supply system. For more information, see DC power cord in "Cables."

AC power cords

AC power cords are used for connecting the AC power supplies of a CR16000-M router to the external AC power supply system. For more information, see AC power cord in "Cables."

Contents

3 Cables

This chapter describes cables used for connecting network ports.

Table3-1 Cable description

Cable	Ports connected	Application	Reference
Console cable	Console port at the device end and 9-pin serial port at the other end	Connects the console port of the router to the console terminal.	Console cable
DC power cord	Power input interface at the device end and power stud at the other end	Connects a power supply to the power source	DC power cord
AC power cord	Power input interface at the device end and AC power receptacle at the other end	Connects a power supply to the power receptacle	AC power cord
Grounding cable	Grounding point at the device end and the grounding stud at the other end	Grounds the device	Grounding cable
Clock cable	Clock interfaces	Transmits clock signals	Clock cable
Ethernet twisted pair cable	RJ-45 Ethernet ports	Connects RJ-45 Ethernet ports to transmit data.	Ethernet twisted pair cable
Optical fiber	QSFP28/SFP+/SFP ports	Connects the fiber ports to transmit data.	Optical fiber
E1 cable	E1-HM96 Ethernet copper ports	Connects E1-HM96 Ethernet copper ports to transmit data.	E1 cable

Console cable

A Console cable connects the console port on a device and the serial port on a terminal.

Figure3-1 Console cable

Table3-2 Console cable specifications

Item	Description
RJ-45 connector	RJ-45 Connector-Registered Jack-8PIN-8bit-Shielded-Connector
DB-9 connector	Cable Connector-D Connector-9PIN-Female Socket

Item	Description
Cable model	Twisted-Pair Cable-UL2464-0.32mm-28AWG-2P-PANTONE WARM GRAY 1U-Only For OEM
Cores	4
Flame retardant grade	VW-1
Length	3 m (9.84 ft)

The console cable has an 8-core crimped RJ-45 connector for connecting to the console port of the router, and a DB-9 connector for connecting to the 9-core serial port of the terminal.

Figure3-2 shows the console cable and Table3-3 shows its pinouts.

Figure3-2 Console cable connecting the serial port and the console port

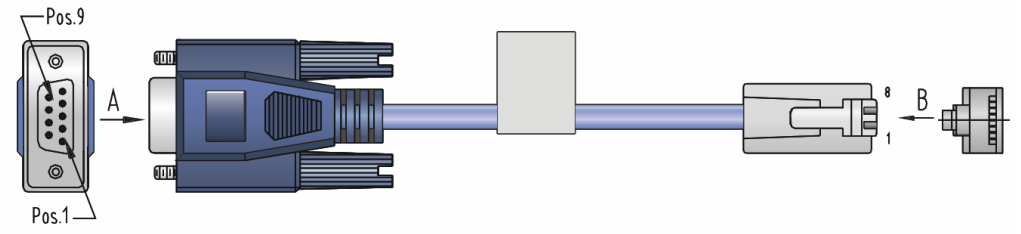


Table3-3 Pinouts for the console cable connecting the serial port and the console port

RJ-45 pin	Signal	DB-9 pin	Signal
1	RTS	8	CTS
2	DTR	6	DSR
3	TXD	2	RXD
4	CD	5	SG
5	GND	5	SG
6	RXD	3	TXD
7	DSR	4	DTR
8	CTS	7	RTS

DC power cord

A DC power cord connects a DC power supply to an external DC power source. Power cords supported by the PSR2400-12D, PSR2400-D, and PSR2500B-12AHD-F power supplies are as shown in Table3-4.

Table3-4 Compatible power cords

Item	Power cord code	Cable length	Wire diameter	Remarks	Description
DC power cord	0404A0E1	3 m (9.84 ft)	6 AWG	Black and blue power cord (ring terminal included)	Used for the PSR2400-12D power supply on the CR16000-M
DC power	0404A0E2	15 m (49.21 ft)	6 AWG	Black and blue	

Item	Power cord code	Cable length	Wire diameter	Remarks	Description
cord				power cord (ring terminal included)	
DC power cord	0404A1M5	20 m (65.62 ft)	4 AWG	Blue and red power cord (ring terminal included)	Used for the PSR2400-D power supply on the CR16000-M
DC power cord	0404A1M6	15 m (49.21 ft)	4 AWG	Blue and red power cord (ring terminal included)	
DC power cord	0404A1M7	10 m (32.81 ft)	6 AWG	Blue and red power cord (ring terminal included)	
DC power cord	0404A1MD	30 m (98.43 ft)	4 AWG	Blue and red power cord (ring terminal included)	
High-voltage DC power cord	0404A0RL	3 m (9.84 ft)	3*2.5 mm^2	Black power cord (ring terminal included)	Used for the PSR2500B-12AHD-F power supply on the CR16000-M

Figure3-3 PSR2400-12D DC power cord (black and blue cable as an example)

Figure3-4 Ring terminal

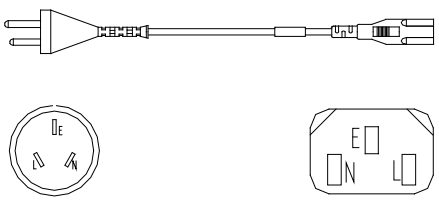
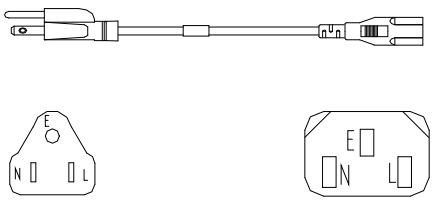
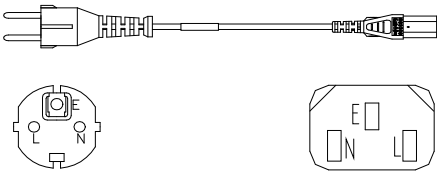
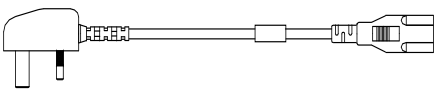
Figure3-5 PSR2400-D DC power cords

AC power cord

An AC power cord connects an AC power supply to an external AC power source.

- The power of a power supply has requirements on the current-carrying capacity of the AC power cord. Select an appropriate AC power cord based on the actual requirements.
- Available power plugs vary by country or region. Select the AC power cord that meets the requirements of the plug standard.
- AC power supplies of the CR16000-M require 16A or 10A AC power cords. For power plugs required by different countries or regions, see Table3-5 and Table3-6.

Table3-5 10A AC power cords

Code	Description	Power cord appearance (User side plug-Device side plug)
04041104	AC Power cord,3.0m,3*1.0mm^2,Black,GB1002P(3P)STM250V10A,227 IEC 53(RVV),C13C(3P)STF250V10A,CCC	
04020728	AC Power cord,3.0m,3*1.3mm^2,Black,NEMA5-15P(3P)STM125V13A,SJT,C13C(3P)STF125V13A,UL	
04041056	AC Power cord,3.0m,3*1.0mm^2,Black,CEE7-VIIP(3P)STM250V16A,H05VV-F,C13C(3P)STF250V10A,EU	
04040890	AC Power cord,3.0m,3*1.0mm^2,Black,BS1363AP(3P)AM250V13A,H05VV-F,C13C(3P)STF250V10A,ASTA	

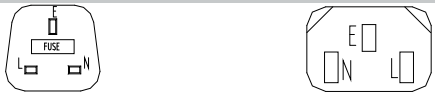
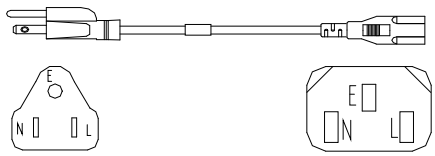
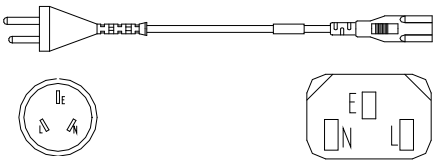
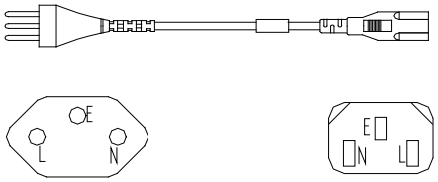
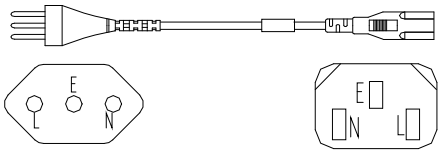
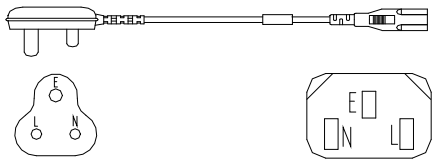
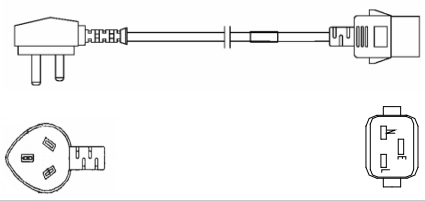
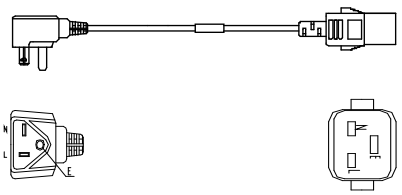
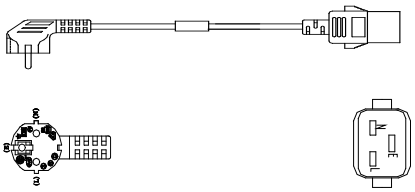
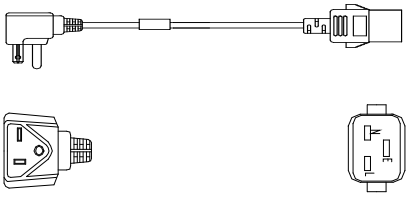
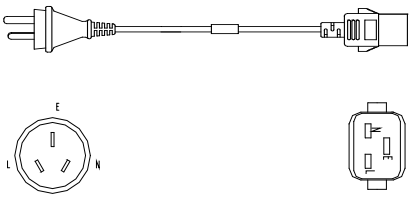
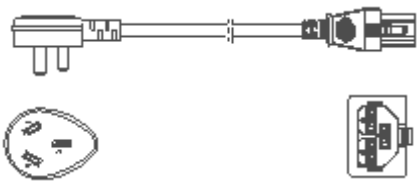
Code	Description	Power cord appearance (User side plug-Device side plug)
		
04040887	AC Power cord,3.0m,3*1.25mm^2,Black,JIS C8303P(3P)STM125V12A,HVCTF,C13C(3P)STF125V12A,PSE	
04040888	AC Power cord,3.0m,3*1.0mm^2,Black,AS/NZS3112P(3P)STM250V10A,H05VV-F,C13C(3P)STF250V10A,SAA	
04041119	AC Power cord,3.0m,3*1.0mm^2,Black,SEV1011P(3P)STM250V10A,H05VV-F,C13C(3P)STF250V10A,SEV	
04041120	AC Power cord,3.0m,3*1.0mm^2,Black,CEI23-50P(3P)STM250V10A,H05VV-F,C13C(3P)STF250V10A,IMQ	
0404A0Q0	AC Power cord,3.0m,3*1.0mm^2,Black,IS1293P(3P)AM250V16A,IS694,C13C(3P)STF250V10A,BIS	

Table3-6 16A AC power cords

Code	Description	Power cord appearance (User side plug-Device side plug)
04043396	AC Power cord,3.0m,3*1.5mm^2,Black,GB1002P(3P)AM250V16A,227 IEC 53(RVV),C19C(3P)STF250V16A,CCC	
0404A0C2	AC Jumper Cord,3.0m,3*1.5mm^2,Black,C20C(3P)STM250V16A,227 IEC 53(RVV),C19C(3P)STF250V16A,CCC	

Code	Description	Power cord appearance (User side plug-Device side plug)
		
0404A063	AC Power cord,3.0m,3*3.3mm^2,Black,NEMA5-20PP(3P)AM125V20A,SJT,C19C(3P)STF125V20A,UL	
0404A061	AC Power cord,3.0m,3*1.5mm^2,Black,CEE7-VIIP(3P)AM250V16A,H05VV-F,C19C(3P)STF250V16A,EU	
0404A062	External Power Cable,Japan Power Cable 125V20A,3m,3*3.50mm^2,Black,PMAM,HVCTF-3.5^2(3C)B,C19SF	
0404A01A	AC Power cord,3.0m,3*1.5mm^2,Black,AS/NZS3112P(3P)STM250V15A,H05VV-F,C19C(3P)STF250V15A,SAA	
0404A0RQ	AC Power cord,3.0m,3*1.5mm^2,Black,GB1002P(3P)AM250V16A,227 IEC 53(RVV),HVDCBC(3P)STF250V16A,CCC	

NOTE:

Select the power cord according to the country or region.

Grounding cable

A grounding cable is used to connect a chassis or cabinet to the grounding point.

Figure3-6 Grounding cable

Table3-7 Grounding cable specifications

Item		Description
PGND cable	Ring terminal	2-Hole Ring Terminal-JG2(6AWG-M6-0)
	Cable model	Power Cable-600V UL10455(6AWG)-83A Yellow/Green
Flame retardant grade		CM

Clock cable

Clock cable for common MPUs

If connected to the clock interface of an external device through a clock cable, a router can receive 2-way 2.048MHz/2.048Mbit/s clock synchronization signals from the uplink device and provides 2-way 2.048MHz/2.048Mbit/s signals to the downlink.

A clock cable for common MPUs has an SMB connector at one end for connecting the clock interface on a router. The connector at the other end varies by the clock interface type on the external device.

Clock cable for 1588v2-capable MPUs

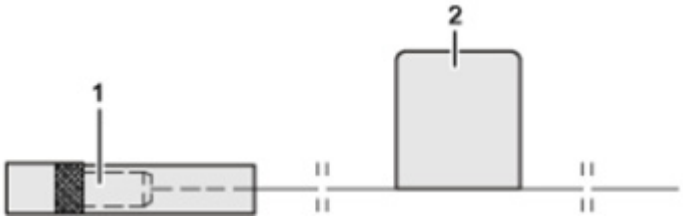
If connected to the clock interface of an external device through a clock cable, a router can receive 2Mbps/2MHz/1PPS+TOD clock signals from the uplink device and provides 2Mbps/2MHz/1PPS+TOD signals to the downlink.

75-ohm clock cables and 120-ohm clock cables are available for 1588v2-capable MPUs. A 75-ohm clock cable is used to transmit 2Mbps and 2MHz clock signals and a 120-ohm clock cable is used to transmit 1PPS+TOD clock signals.

At the router end, a 75-ohm clock cable provides an SMB connector and a 120-ohm clock cable provides an RJ-45 connector. The connector at the other end varies by the clock interface type on the external device.

Figure3-7 75-ohm clock cable

Figure3-8 75-ohm clock cable connector at the route side



(1) Coaxial connector-SMB (2) Label

Table3-8 displays the pinouts for the RJ-45 connector of a 120-ohm cable.

Table3-8 Pinouts for the RJ-45 connector of a 120-ohm cable

RJ-45	Signal	Description
1	NC	N/A
2	NC	N/A
3	422_1_N	1PPS
4	GND	Grounding
5	GND	Grounding
6	422_1_P	1PPS
7	422_2_N	TOD time information
8	422_2_P	TOD time information

Ethernet twisted pair cable

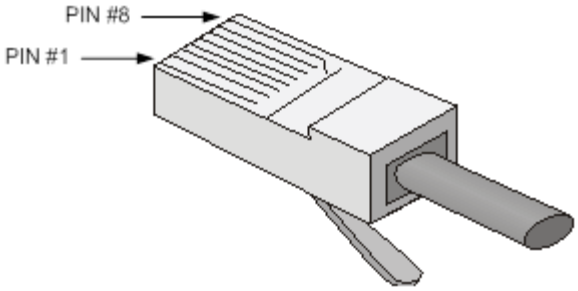
About Ethernet twisted pair cables

An Ethernet twisted pair cable consists of four pairs of insulated wires twisted together. It mainly transmits analog signals and is advantageous in transmitting data over shorter distances. The maximum transmission distance is 100 m (328.08 ft).

RJ-45 connector

An Ethernet twisted pair cable connects network devices through the RJ-45 connectors at the two ends. Figure3-9 shows the pinouts of an RJ-45 connector.

Figure3-9 RJ-45 connector pinout diagram



Cable pinouts

EIA/TIA cabling specifications define two standards: 568A and 568B for cable pinouts.

- **Standard 568A**—pin 1: white/green stripe, pin 2: green solid, pin 3: white/orange stripe, pin 4: blue solid, pin 5: white/blue stripe, pin 6: orange solid, pin 7: white/brown stripe, pin 8: brown solid.
- **Standard 568B**—pin 1: white/orange stripe, pin 2: orange solid, pin 3: white/green stripe, pin 4: blue solid, pin 5: white/blue stripe, pin 6: green solid, pin 7: white/brown stripe, pin 8: brown solid.

NOTE:

White/green represents light green or a white wire with green strips or dots. White/orange, white/blue, and white/brown are the same.

Cable type

Based on performance

Ethernet cables can be classified into category 3, category 4, category 5, category 5e, category 6, category 6A, and category 7 cable based on performance.

Table3-9 Ethernet cable description

Type	Description
Category 5	Transmits data at a maximum speed of 100 Mbps, with a bandwidth of 100 MHz.
Category 5e	Transmits data at a maximum speed of 1000 Mbps, with a bandwidth of 100 MHz.
Category 6	Transmits data at a speed higher than 1 Gbps, with a bandwidth of 250 MHz.
Category 6A	Transmits data at a speed higher than 10 Gbps, with a bandwidth of 500 MHz.
Category 7	Transmits data at a speed higher than 10 Gbps, with a bandwidth of 600 MHz.

A category 5 cable has a transmission frequency of 100MHz and is used for voice and data transmission, mainly for 100BASE-T and 10BASE-T networks. It is the most commonly used Ethernet cable and can also be used to transmit 1000M Ethernet data.

A category 5e cable has low attenuation, less crosstalk, higher attenuation crosstalk ratio (ACR), shorter delay, and greatly improved performance over category 5 cables. Category 5 cables are mainly used for 1000M Ethernet.

The transmission frequency of category 6 is 1MHz to 250MHz. Category 6 cables provide improved performance in terms of crosstalk and return loss, which is extremely important for the new generation of full-duplex, high-speed network applications. Category 6 cabling systems have a large margin of power sum attenuation crosstalk ratio (PS-ACR) at 200MHz, which provides two times the

bandwidth of category 5e, and its transmission performance is much higher than the category 5e standard. Category 6 is the most suitable for applications with a transmission rate higher than 1Gbps.

Note that 10/100M Ethernet uses only two pairs of wires, white/orange, orange, white/green, and green, to send and receive data, and 1000M Ethernet uses four pairs of twisted pair wires.

NOTE:

The 10 Gbps RJ-45 Ethernet ports use category 6A or category 7 Ethernet twisted pair cables for connection. Other RJ-45 Ethernet ports use category 5 or higher Ethernet twisted pair cables for connection.

Based on pinouts

Ethernet twisted pair cables can be classified into straight through and crossover cables based on their pinouts.

- **Straight-through**—The pinouts at both ends comply with standard 568B, as shown in Figure3-10.
- **Crossover**—The pinouts at one end comply with standard 568B, and those at the other end comply with standard 568A, as shown in Figure3-11.

Figure3-10 Straight-through cable

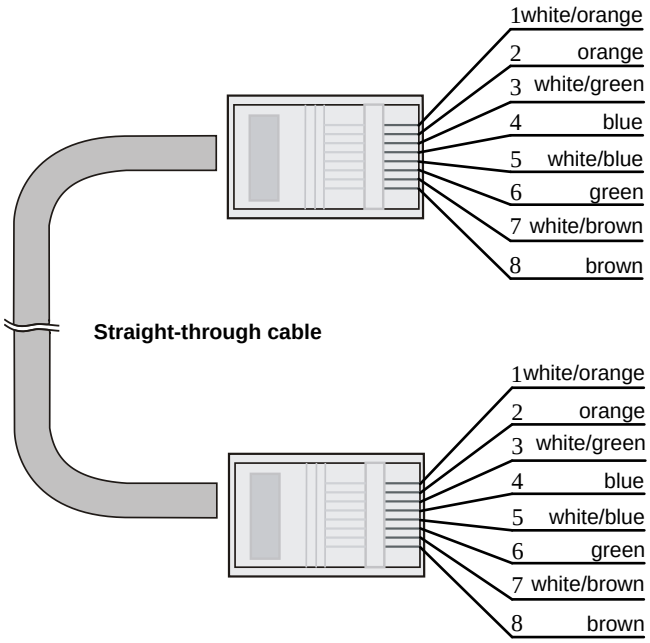
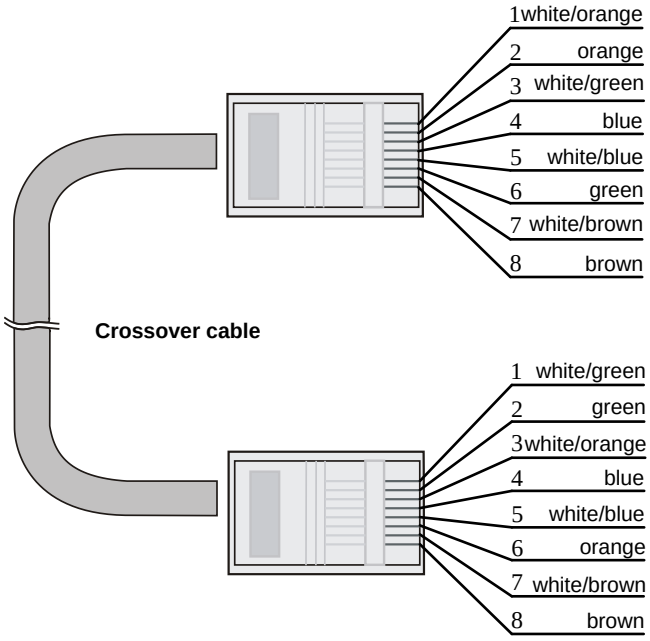


Figure3-11 Crossover cable



NOTE:

Refer to the figures above when distinguishing and making Ethernet cables, and strictly follow the line sequence. If you fail to do so, the communication quality will be affected even if the equipment at both ends can be connected.

Pin assignments

Select an Ethernet twisted pair cable according to the RJ-45 Ethernet interface type on your device. An RJ-45 Ethernet interface can be MDI (for routers and PCs) or MDIX (for routers). For the pinouts of RJ-45 Ethernet interfaces, see Table3-10 and Table3-11.

Table3-10 RJ-45 MDI interface pinouts

Pin	10BASE-T/100BASE-TX		1000BASE-T	
	Signal	Function	Signal	Function
1	Tx+	Send data	BIDA+	Bi-directional data cable A+
2	Tx-	Send data	BIDA-	Bi-directional data cable A-
3	Rx+	Receive data	BIDB+	Bi-directional data cable B+
4	Reserved	N/A	BIDC+	Bi-directional data cable C+
5	Reserved	N/A	BIDC-	Bi-directional data cable C-
6	Rx-	Receive data	BIDB-	Bi-directional data cable B-
7	Reserved	N/A	BIDD+	Bi-directional data cable D+
8	Reserved	N/A	BIDD-	Bi-directional data cable D-

Table3-11 RJ-45 MDI-X interface pinouts

Pin	10BASE-T/100BASE-TX		1000BASE-T	
	Signal	Function	Signal	Function
1	Rx+	Receive data	BIDB+	Bi-directional data cable B+
2	Rx-	Receive data	BIDB-	Bi-directional data cable B-
3	Tx+	Send data	BIDA+	Bi-directional data cable A+
4	Reserved	N/A	BIDD+	Bi-directional data cable D+
5	Reserved	N/A	BIDD-	Bi-directional data cable D-
6	Tx-	Send data	BIDA-	Bi-directional data cable A-
7	Reserved	N/A	BIDC+	Bi-directional data cable C+
8	Reserved	N/A	BIDC-	Bi-directional data cable C-

To ensure normal communication, the pins for sending data on one port should correspond to the pins for receiving data on the peer port. When both of the ports on the two devices are MDI or MDIX, a crossover Ethernet cable is needed. A cross-over cable connects devices of the same type. When one port is MDI and the other is MDIX, a straight-through Ethernet cable is needed. A straight-through cable connects devices of different types.

The RJ-45 Ethernet ports on the router support auto-MDI/MDIX. By default, auto-MDI/MDIX is enabled on a port.

Optical fiber

△ **CAUTION:**

Use the same types of transceiver modules, pigtail cords, patch cords, and fiber cables. If you use single-mode optical fibers, the transceiver modules, pigtail cords, patch cords, and fiber cables must be single-mode.

About optical fibers

Optical fiber

Optical fibers are widely used in fiber-optic communications, which are advantageous for long-distance communications.

Optical fibers can be classified into the following types:

- **Single mode fiber**—It has a core size of 10 μm or smaller, and has a lower modal dispersion. It carries only a single ray of light. It is mostly used for communication over longer distances.
- **Multi-mode fiber**—It has a core size of 50 μm or 62.5 μm or higher, and has a higher modal dispersion than single-mode optical fiber. It is mostly used for communication over shorter distances.

Table3-12 Allowed maximum tensile force and crush load

Period of force	Tensile load (N)	Crush load (N/mm)
Short period	150	500
Long term	80	100

Optical fiber cable

An optical fiber cable is a cable containing one or more optical fibers. Typically, the optical fiber elements are individually coated with plastic layers and contained in a protective tube. Optical fiber cables contain single-mode and multi-mode optical fiber cables.

Patch cord

A fiber that has connectors at both ends is called a patch cord. A patch cord connects one optical device to another for signal routing. Patch cords contain single-mode and multi-mode patch cords.

- **Single-mode patch cord**—The jacket is yellow. It permits transmission over longer distances.
- **Multi-mode patch cord**—The jacket is orange. It permits transmission over shorter distances.

Patch cords are mainly classified into SC, LC, and FC based on interface type. The typical length of a patch cord can be 0.5 m (1.64 ft), 1 m (3.28 ft), 2 m (6.56 ft), 3 m (9.84 ft), 5 m (16.40 ft), and 10 m (32.81 ft).

Pigtail cord

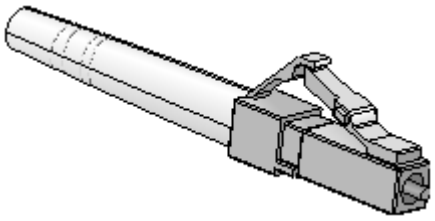
A pigtail cord is an optical fiber that has an optical connector on one end and a length of exposed fiber on the other. The end of the pigtail is fusion spliced to a fiber, connecting the fiber cable and transceiver.

Pigtail cords contain single-mode (yellow) and multi-mode (orange) pigtail cords. Based on interface type, pigtail cords can also be classified into two main types, LC and FC.

Fiber connector

Fiber connectors are indispensable passive components in an optical fiber communication system. They allow the removable connection between optical channels, which makes the optical system debugging and maintenance more convenient and the transit dispatching of the system more flexible.

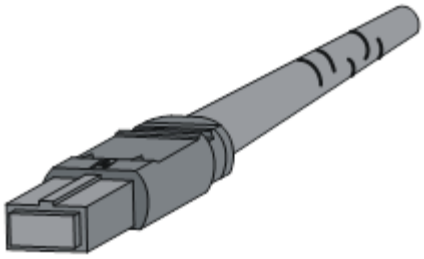
Figure3-12 LC connector



When you plug or unplug an LC optical connector, follow these restrictions and guidelines:

- Do not rotate the connector.
- When insert the connector into a fiber port, carefully align the connector with the port and gently insert it into the port without using any excessive force.
- When unplug the connector from a fiber port, pinch the clip on the connector, slightly press the connector into the port, and then pull the connector out.

Figure3-13 MPO connector



When you plug or unplug an MPO optical connector, follow these restrictions and guidelines:

- Do not rotate the connector.
- When insert the connector into a fiber port, carefully align the connector with the port and gently insert it into the port without using any excessive force.
- When unplug the connector from a fiber port, pull the unlocking sleeve, and then pull the connector out.

Precautions

- Make sure the fiber connector and fiber type match the transceiver module type.
- The fiber ports on some cards have shielded covers. Remove the shielded covers before using the fiber ports. Fiber interfaces must be installed with shielded covers when they are not in use. Keep them safely.
- Fiber connectors must be protected under safe and reliable outer packing, and be fitted with dust caps. Fiber connectors must be installed with dust caps when they are not in use. Take care not to scratch their end face. Replace the dust cap if it is loose or polluted.
- Before connecting a fiber, use dust free paper and absolute alcohol to clean the end face of the fiber connector. You can brush the end face only in one direction. You also need to brush the end face of the fiber port.
- Never bend or curve a fiber when connecting it. After a fiber is installed correctly, the bend radius must be not less than 40 mm (the minimum dynamic bend radius is 20 D, and the minimum static bend radius is 10 D. D indicates the outer diameter of dust caps).
- If the fiber has to pass through a metallic board hole, the hole must have a sleek and fully filleted surface (the filleting radius must be not less than 2 mm). When passing through a metallic board hole or bending along the acute side of mechanical parts, the fiber must wear jackets or cushions.
- Insert and remove a plug with care. Never exert a fierce force to the fiber or plug; otherwise the plug might be damaged or the fiber might be broken. Never pull, press or extrude the fiber fiercely. For the allowed maximum tensile load and crush load, see Table3-12.

E1 cable

You can use an E1 cable to connect E1-HM96 Ethernet copper ports.

Figure3-14 E1 cable (1)

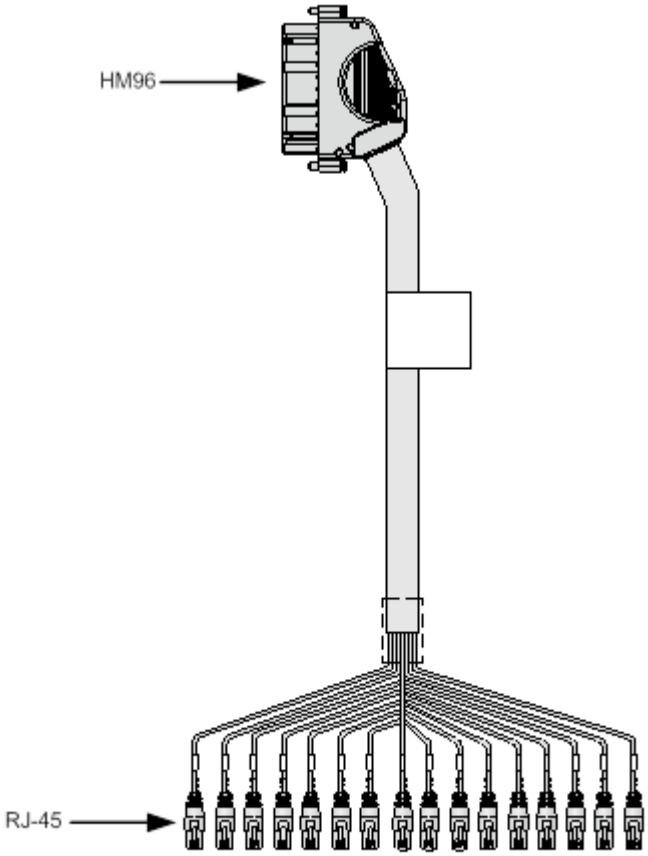


Figure3-15 E1 cable (2)

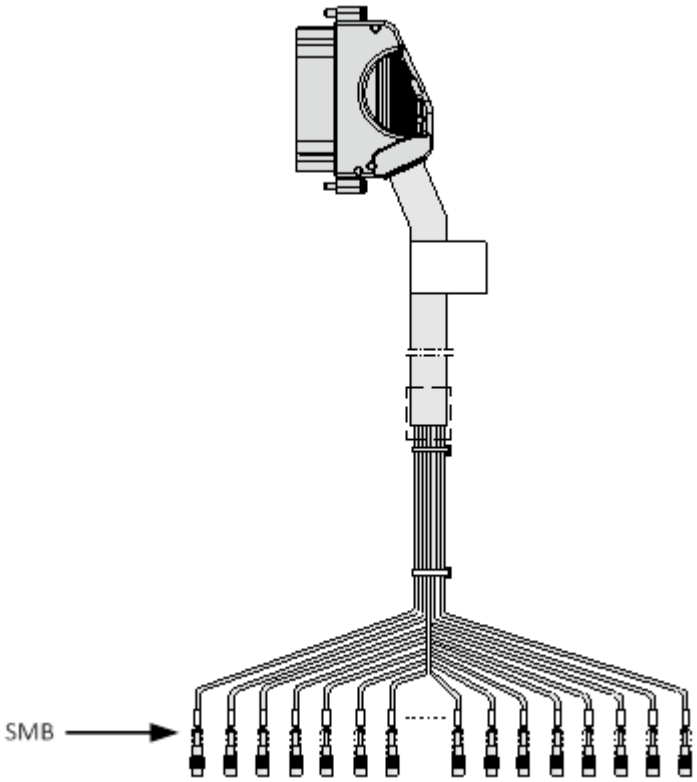


Figure3-16 E1 cable (3)