Cisco MDS 9132T Fibre Channel Switch Hardware Installation Guide

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CONTENTS

CHAPTER 1 **Preface** 1

Preface 1

Audience 1

Document Conventions 1

Documentation Feedback 3

Related Documentation 3

Communications, Services, and Additional Information 3

CHAPTER 2 **Overview of Cisco MDS 9132T Fibre Channel Switch** 5

Chassis Components 5

Front View 5

Rear View 6

Grounding Point 7

Switch LEDs 8

Fan Modules 12

Power Supplies 13

Linecard Expansion Module 15

Supported SFP+ Transceivers 16

CHAPTER 3 **Cabinet and Rack Installation** 17

Cabinet and Rack Requirements 17

General Requirements for Cabinets and Racks 17

Requirements Specific to Perforated Cabinets 18

Reference Perforated Cabinet 18

Requirements Specific to Solid-Walled Cabinets 18

CHAPTER 4 **Installing a Cisco MDS 9132T Switch** 21

Preinstallation 21

Installation Options 21

Cisco MDS 9000 Series Telco and EIA Shelf Bracket 22

Shelf-Installation Guidelines 22

Before Installing the Shelf Brackets 22

Preinstallation Guidelines 25

Airflow Considerations 25

Connection Guidelines for AC-Powered Systems 25

Installation Guidelines 25

Unpacking and Inspecting the Switch 26

Installing the Switch 27

Installing the Switch on Shelf Brackets 27

NEBS Compliance 28

Installing the Switch in a 4-Post Rack 29

Installing the Switch into a 2-Post Rack 32

Removing the Shelf Bracket Kit (Optional) 34

Grounding the Switch 35

Installing and Removing Components 36

Installing and Removing the Linecard Expansion Module 36

Installing the Linecard Expansion Module 36

Removing the Linecard Expansion Module 37

Installing and Removing Power Supplies 37

Installing Power Supplies 37

Removing Power Supplies 38

Installing and Removing Fan Modules 39

Installing a Fan Module 39

Removing a Fan Module 40

CHAPTER 5 **Connecting the Cisco MDS 9132T Switch** 41

Preparing for Network Connections 41

Connecting the Console Port 42

Connecting the Console Port to a PC 42

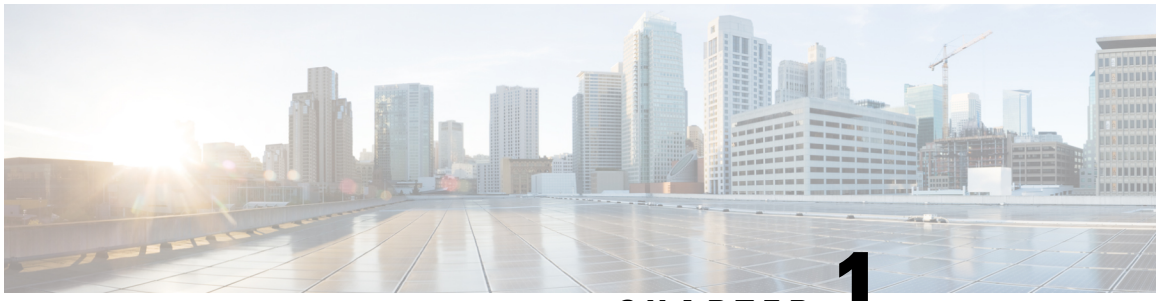
Connecting the Console Port to a Modem Before Switch is Powered On 43
Connecting the Console Port to a Modem After Switch is Powered On 43
Connecting the Management Port 44
Connecting to a Fibre Channel Port 44
Removing and Installing Cables into SFP Transceivers 45
Installing a Cable into an SFP Transceiver 45
Removing a Cable from an SFP Transceiver 46
Removing and Installing SFP Transceivers 46
Installing an SFP Transceiver 46
Removing an SFP Transceiver 47
Maintaining SFP, SFP+, or QSFP+ Transceivers and Fiber-Optic Cables 47
Powering Up the Switch 48

CHAPTER 6 **Technical Specifications** 51
Switch Specifications 51
Power Specifications 52
General Power Supply Specifications 52
Power Supply Requirement Specifications 53
Component Power Requirements and Heat Dissipation 53
SFP Transceiver Specifications 54
Cisco Fibre Channel SFP+ Transceivers 54
General Specifications for Cisco Fibre Channel 32-Gbps SFP+ Transceivers 55
Power Requirements and Environmental Conditions for 32-Gbps SFP+ Transceivers 55
General Specifications for Cisco Fibre Channel 16-Gbps SFP+ Transceivers 56
Power Requirements and Environmental Conditions for 16-Gbps SFP+ Transceivers 57
General Specifications for Cisco Fibre Channel 8-Gbps SFP+ Transceivers 58
Power Requirements and Environmental Conditions for 8-Gbps SFP+ Transceivers 59
Optical Specifications for Cisco CWDM SFP Transceivers 60

APPENDIX A **Cable and Port Specifications** 63
Cables and Adapters 63
Console Port 64
Console Port Pinouts 64
Connecting the Console Port to a Computer Using the DB-25 Adapter 64

Connecting the Console Port to a Computer Using the DB-9 Adapter 65
MGMT Port 65
Supported AC Power Cords and Plugs 67
Power Cords 68
Jumper Power Cord 70

APPENDIX B **Site Planning and Maintenance Records 71**
Site Preparation Checklist 71
Contact and Site Information 73
Chassis and Network Information 73



CHAPTER 1

Preface

This preface describes the audience, organization of, and conventions used in the Cisco MDS 9000 Series Configuration Guides. It also provides information on how to obtain related documentation, and contains the following sections:

- Preface, on page 1

Preface

This preface describes the audience, organization of, and conventions used in the Cisco MDS 9000 Series Configuration Guides. It also provides information on how to obtain related documentation, and contains the following sections:

Audience

This publication is for network administrators who install, configure, and maintain Cisco MDS 9000 Series Switches.

Document Conventions

Command descriptions use these conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
Italic	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element (keyword or argument).
[x | y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x | y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.

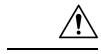
Convention	Description
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
`variable`	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Examples use these conventions:

Convention	Description
`screen font`	Terminal sessions and information the switch displays are in screen font.
`boldface screen font`	Information you must enter is in boldface screen font.
italic screen font	Arguments for which you supply values are in italic screen font.
< >	Nonprinting characters, such as passwords, are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.



Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Warning IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

SAVE THESE INSTRUCTIONS

Documentation Feedback

To provide technical feedback on this document, or to report an error or omission, please send your comments to mds-docfeedback@cisco.com. We appreciate your feedback.

Related Documentation

The entire Cisco MDS 9000 Series switches documentation set is available at the following URL:

https://www.cisco.com/c/en/us/support/storage-networking/mds-9000-nx-os-san-os-software/series.html

Documentation Roadmap

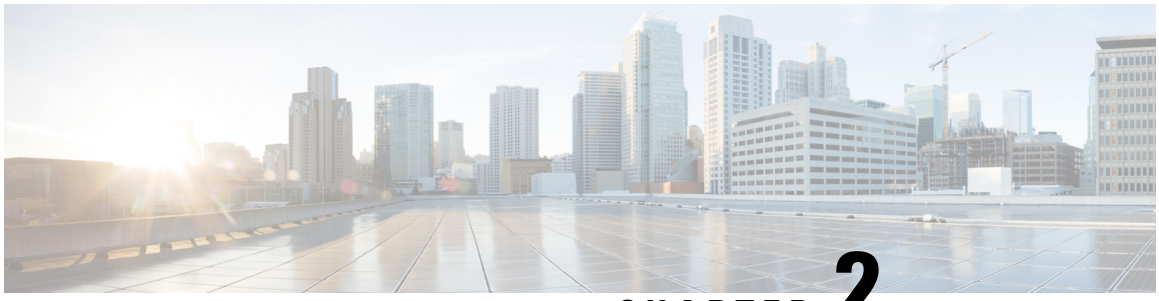
https://www.cisco.com/c/en/us/td/docs/storage/san_switches/mds9000/roadmaps/rel90.html

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business results you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco DevNet.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.



CHAPTER 2

Overview of Cisco MDS 9132T Fibre Channel Switch

The Cisco MDS 9132T 32-Gbps 32-Port Fibre Channel Switch is a powerful and compact 1-rack unit (1RU) SAN fabric switch. This device has the following major features:

- 32-Gbps 32 full line rate Fibre Channel ports.
- Pluggable and modular Linecard Expansion Module (LEM) that can be inserted and removed as a Field Replaceable Unit (FRU).
- Redundant hot-swappable power supplies and fan modules.
- Enterprise-class features, such as In-Service Software Upgrades (ISSU), virtual storage area networks (VSANs), Inter-VSAN Routing, security features, and quality of service (QoS).
- Extensive diagnostics, such as self-test (Cisco Generic Online Diagnostics [GOLD]), link test (ISL and F-port link diagnostics), and peer-port statistics querying (Read Diagnostic Parameters [RDP]).

This chapter contains the following topics:

- Chassis Components, on page 5
- Fan Modules, on page 12
- Power Supplies, on page 13
- Linecard Expansion Module, on page 15
- Supported SFP+ Transceivers, on page 16

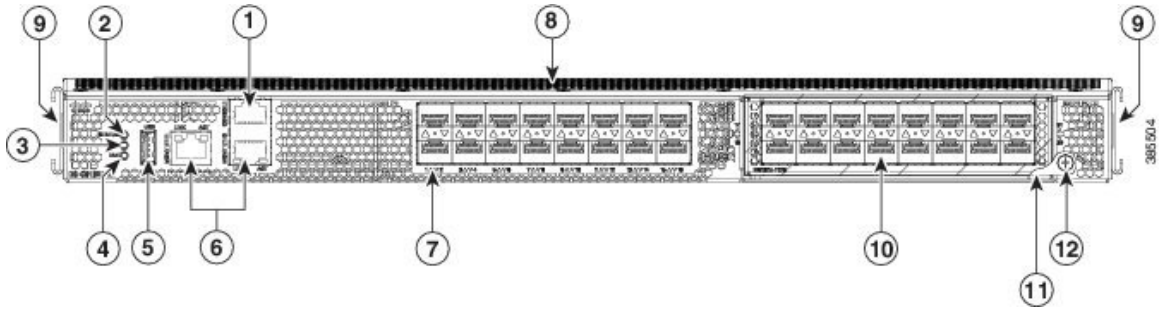
Chassis Components

This section describes the different components of the chassis.

Front View

The following figure shows the front view of a Cisco MDS 9132T Switch:

Figure 1: Front View of the Cisco MDS 9132T Switch



1	Serial console port	7	Fixed FC ports
2	System status LED	8	Airflow grill
3	Power supply status LED	9	Rack-mount mounting rails
4	Fan status LED	10	Linecard Expansion Module (LEM)
5	USB port	11	LEM ejector lever
6	Two 10/100/1000 Mbps Ethernet management ports	12	LEM locking screw

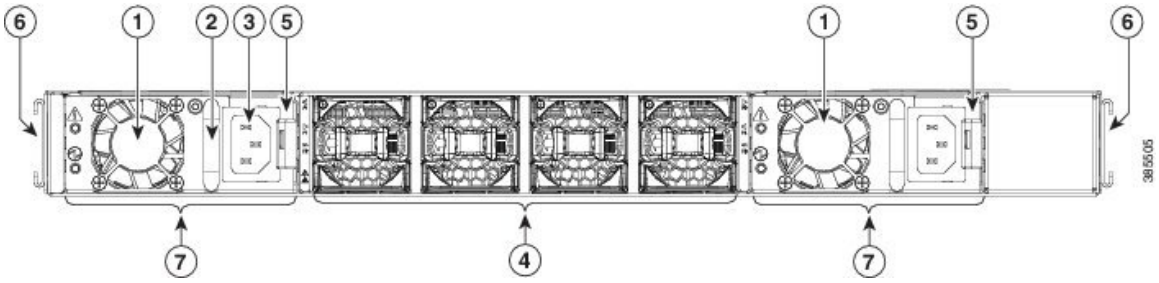
Figure 2: Front Panel Slot Numbering of Cisco MDS 9132T Switch

1	LEM slot 1

Rear View

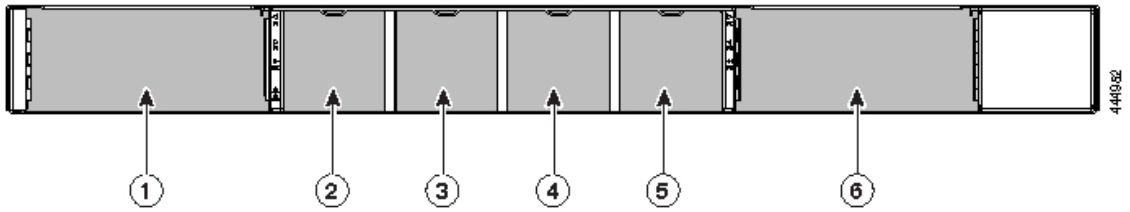
The following figure shows the rear view of a Cisco MDS 9132T Switch:

Figure 3: Rear View of the Cisco MDS 9132T Switch



1	Power supply unit fans	5	Power supply unit locking latches
2	Power supply unit handle	6	Rack-mount mounting rails
3	Power receptacle	7	Power supply units (2 units)
4	Chassis fan modules (4 units)		

Figure 4: Rear Panel Slot Numbering of Cisco MDS 9132T Switch

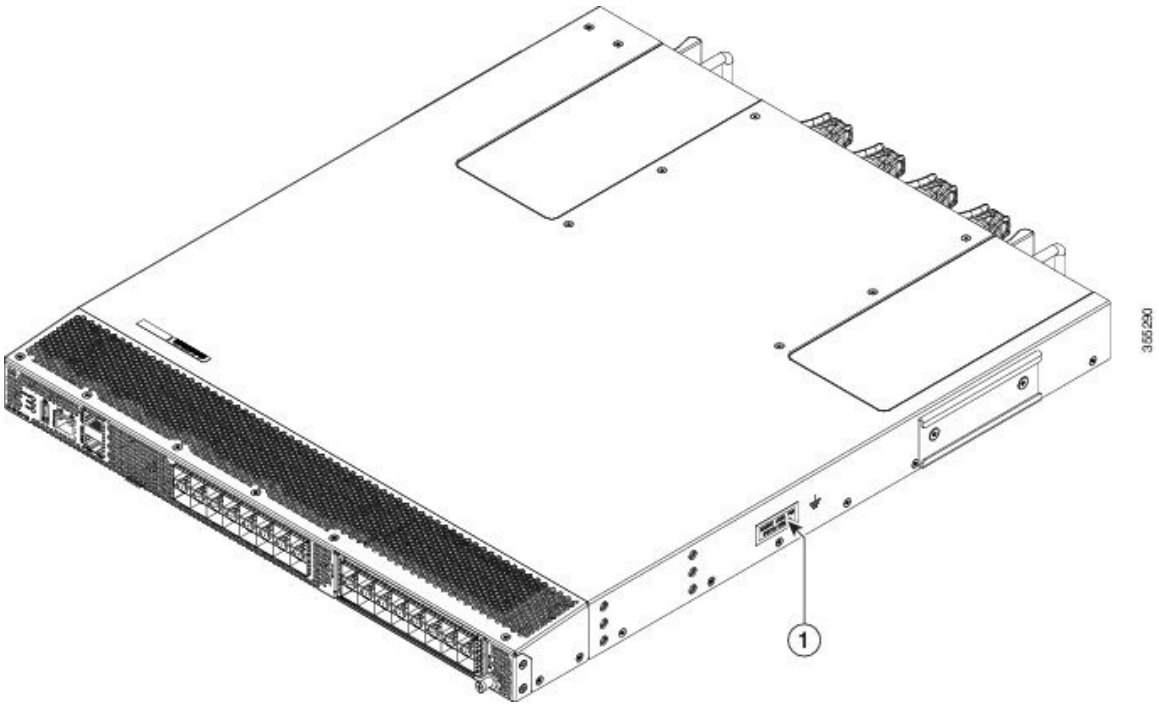


1	Power supply unit slot 1	4	Chassis fan module slot 3
2	Chassis fan module slot 1	5	Chassis fan module slot 4
3	Chassis fan module slot 2	6	Power supply unit slot 2

Grounding Point

The following figure shows the grounding point of a Cisco MDS 9132T Switch:

Figure 5: Grounding Point of the Cisco MDS 9132T Switch



1	Grounding point

Switch LEDs

The following table describes the chassis activity LEDs for a Cisco MDS 9132T switch.

Note For switches running Cisco MDS NX-OS Release 8.3(1) or earlier, the fan status LED is green when four fans are installed and operational. On Cisco MDS NX-OS Release 8.3(2) or later, the fan status LED is green when two or four fans are installed and operational.

Table 1: Chassis Activity LEDs for a Cisco MDS 9132T Switch

Indicator	Location	Function	Color	Status	State
Power LED	Front panel of the chassis	Chassis Power/Health	Off	Off	Either of the following conditions exists: • The system is not receiving sufficient power from the PSUs. • The operating system is not running.
			Green	Solid On	Both PSUs are installed and operational.
			Red	Solid On	Either of the following conditions exists: • A PSU has failed. • A PSU has been removed.

Indicator	Location	Function	Color	Status	State
Status LED	Front panel of the chassis	System Status	Green	Solid On	All diagnostics have passed, Cisco NX-OS is running and the system is operational.
			Orange	Solid On	Any of the following conditions exists: • The system is running bootup diagnostics. • The system is booting. • A minor temperature threshold is exceeded.
			Red	Blinking	Mismatched airflow direction observed in one of the following modules: • Fan modules—The switch will go down in 10-15 seconds. • PSUs—The switch will go down after 10 minutes. • Fan modules and PSUs—The switch will go down after 10 minutes.
				Solid On	One of the following conditions exists: • A diagnostic test failed or another fault occurred during bootup. • A major temperature threshold is exceeded.
Fan status	Front panel of the chassis	Fan health	Green	Solid on	All fan modules are operational.
			Red	Solid on	Fan failure.

Indicator	Location	Function	Color	Status	State
PSU Status Indicators	Faceplate of each PSU	PSU input/output	Green	Off	No input to the PSU.
				Solid on	PSU output is OK.
				Blinking	PSU output is not OK, but input is OK.
		PSU operation	Amber	Off	PSU is operating normally.
				Solid on	One of the following conditions exists in the PSU: Over voltage Over current Over temperature Fan failure.
				Blinking	PSU has a fault, but is still operational.
Fan Status	Faceplate of each fan module	Fan module	Green	Solid on	Fan module is operating normally.
			Amber	Solid on	All fans in the fan module have failed.

The following table describes the Ethernet port LEDs for a Cisco MDS 9132T switch.

LED Position	Status	State
Left	Off	There is no link.
	Solid Green	Indicates a physical link.
Right	Off	There is no activity.
	Blinking Amber	Indicates activity.

The following table describes the Fibre Channel port LEDs for a Cisco MDS 9132T switch.

Status	State
Solid Green	The link is up.
Regular Blinking Green	The link is up and the port beacon is active.
Intermittent Blinking Green	The link is up (indicates traffic on the port).

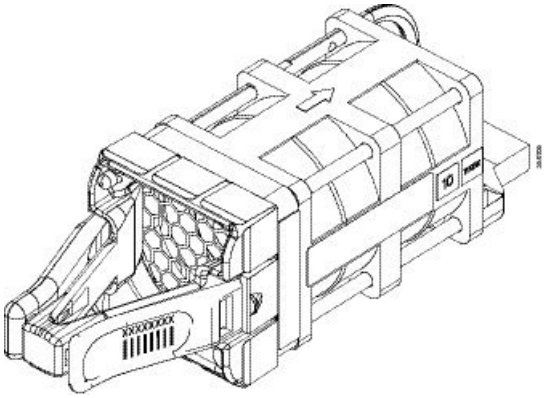
Status	State
Solid Orange	The link is disabled by the software.
Blinking Orange	A faulty condition exists.
Off	No link.

Fan Modules

Cisco MDS 9132T Switch fan modules have a fixed handle for insertion into and removal from the chassis. The fan modules are hot-swappable to allow replacement of a fan module during operation for uninterrupted service. Fan blank modules must be installed in empty fan bays when operating the system for longer than several minutes to provide correct airflow and cooling. If the airflow is inadequate then the preset temperature thresholds will be exceeded and the system will automatically shut down to prevent permanent thermal damage.

The Cisco MDS 9132T Switch may be deployed with either two or four operating fan modules. One or three operating fan modules is classed as an error condition. When only two fan modules are installed there is no fan redundancy as the system requires a minimum of two operating fan modules to prevent automatic shutdown. This requirement is relaxed during fan module replacement and the system may operate for a maximum of 3 minutes with a single operating fan module for uninterrupted service. For optimal system cooling when using only two fans modules, install the modules in fan bays 2 and 4. When four fan modules are installed, there is redundancy for uninterrupted system operation in the event of up to two fan module failures.

Figure 6: Cisco MDS 9132T Fan Module



To facilitate different data center cooling configurations of hot or cold aisles and racks, there are two models of fan modules. The first type has airflow with port-side intake and exhaust at the rear of the chassis. The second type has airflow in the opposite direction, that is, rear-chassis intake and port-side exhaust. The airflow direction is denoted on each fan module as follows:

- Red: Port-side intake airflow
- Blue: Port-side exhaust airflow

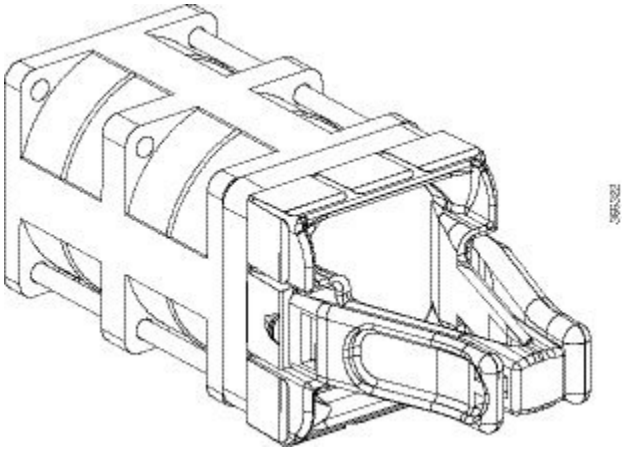
Fan Requirements for Redundancy

Note Number of fan units is not related to the port counts that are enabled on the switch; however, we recommend that high port count configurations are deployed with fan redundancy.

- Two fan trays: No redundancy
- Four fan trays: Supports fan redundancy

The following figure shows a fan blank module:

Figure 7: Fan Blank Module



For more information on installing and removing fan modules, see Installing and Removing Fan Modules.

Power Supplies

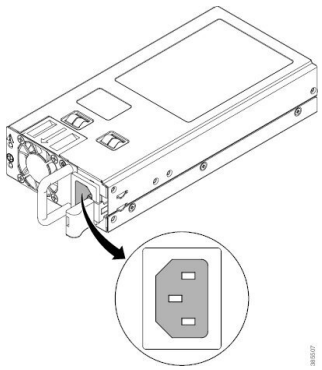
The Cisco MDS 9132T Switch PSUs have an unswitched power receptacle, a PSU status LED and a handle for inserting and removing the PSU from the chassis. The Cisco MDS 9132T Switch requires a minimum of one operating power supply unit. It supports installation of up to two PSUs. This provides redundancy for uninterrupted operation in the event of PSU failure. The PSUs are hot-swappable to allow swapping out of a PSU during operation for uninterrupted operation. A PSU blank module must be installed if there is an empty PSU bay when operating for longer than several minutes to provide correct airflow. If the airflow is inadequate the preset temperature thresholds will be exceeded and the system will automatically shut down to prevent permanent damage.

The switch supports any one of the following PSUs:

- 650-W AC, port-side exhaust variant (up to two per switch)
- 650-W AC, port-side intake variant (up to two per switch)

The switch supports PSUs of only one airflow type at a time. Both PSUs have to be either port-side exhaust, or port-side intake PSUs.

Figure 8: Cisco MDS 9132T PSU



To facilitate different data center cooling configurations of hot or cold aisles and racks, there are two models of PSUs. The first type has airflow with port-side intake and exhaust at the rear of the chassis. The second type has airflow in the opposite direction, that is, rear chassis intake and port-side exhaust. The airflow direction is denoted on each PSU as follows:

- Red—Port-side intake airflow
- Blue—Port-side exhaust airflow

Note The direction of PSU airflow must match the direction of the fan module airflow.

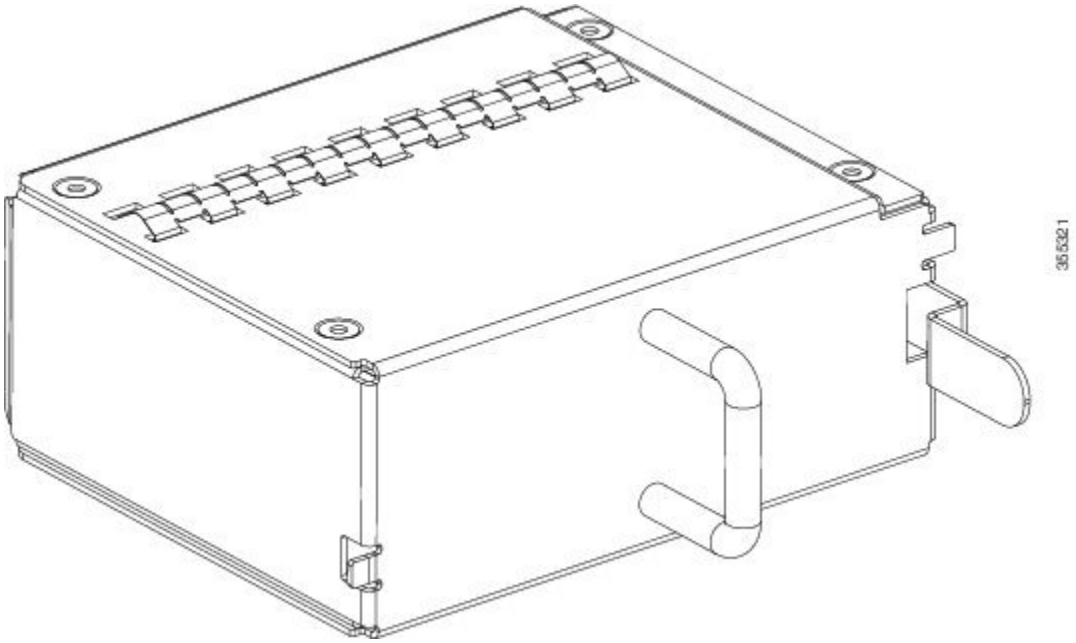
Power Suppply Requirements for Redundancy

Note Number of power supply units is not related to the port counts that are enabled on the switch; however, we recommend that high port count configurations are deployed with power supply redundancy.

- One power supply: No redundancy
- Two power supplies: 1:1 power redundancy

The following figure shows a power supply blank module:

Figure 9: Power Supply Blank Module



For more information on installing and removing PSUs, see Installing and Removing Power Supplies.

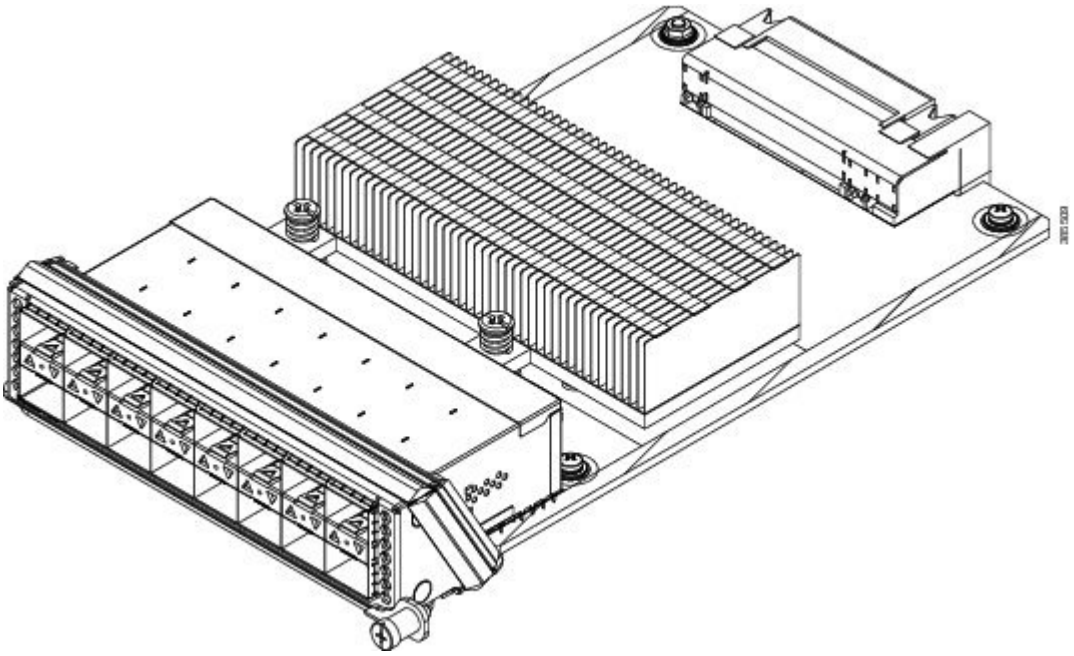
Linecard Expansion Module

The Linecard Expansion Module (LEM) is a pluggable expansion module for the Cisco MDS 9132T Switch.

The LEM is field replaceable in the Cisco MDS 9132T Switch. However, this module is not hot swappable; the switch must be powered down before removing or inserting it.

The LEM blank module must be installed if the LEM bay is empty when operating for longer than several minutes to provide correct airflow. If the airflow is inadequate the preset temperature thresholds will be exceeded and the system will automatically shut down to prevent permanent damage.

Figure 10: Cisco MDS 9132T LEM



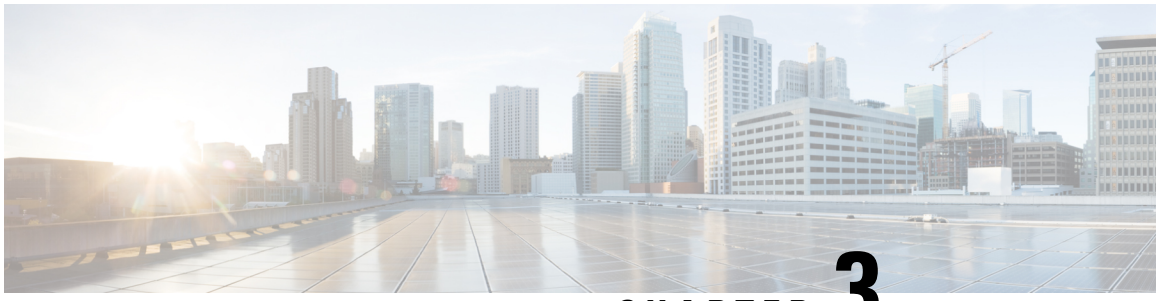
For more information on installing and removing the LEM, see the chapter "Installing the Cisco MDS 9132T Fibre Channel Switch."

Supported SFP+ Transceivers

SFP+ transceivers are field-replaceable. You can use any combination of SFP+ transceivers that are supported by the switch. The only restrictions are that Shortwave (SW) transceivers must be paired with SW transceivers on the peer device, and Longwave (LW) transceivers with LW transceivers on the peer device, and the cable must not exceed the stipulated cable length for reliable communications.

For a list of SFP+ transceivers supported on the Cisco MDS 9132T Switch, see SFP Transceiver Specifications. SFP+ transceivers can be ordered either separately or with the Cisco MDS 9132T Switch.

Note Use only Cisco SFP+ transceivers in the Cisco MDS 9132T switches. Each Cisco SFP+ transceiver is encoded with model information that enables the switch to verify that the SFP+ transceiver meets the requirements for the switch.



CHAPTER 3

Cabinet and Rack Installation

- Cabinet and Rack Requirements, on page 17

Cabinet and Rack Requirements

This section provides the Cisco MDS 9000 Series switches requirements for the following types of cabinets and racks in an external ambient air temperature range of 0 to 40°C. If you are selecting an enclosed cabinet, we recommend that you choose one of these thermally validated types:

- Standard perforated cabinets
- Solid-walled cabinets with a roof fan tray (bottom-to-top cooling)

General Requirements for Cabinets and Racks

A cabinet or rack must belong to one of the following types:

- Standard 19-in. four-post EIA cabinet or rack, with mounting posts that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992. See Requirements Specific to Perforated Cabinets and Requirements Specific to Solid-Walled Cabinets.
- Standard two-post telco rack, with mounting posts that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992.

The cabinet or rack must also meet the following requirements:

- The minimum vertical rack space per chassis should be 1 RU, equal to 1.75 in. (4.4 cm).
- The width between the inside edges of the mounting posts must be at least 17.75 in. (45.1 cm). This is the distance between the two front posts of the four-post EIA racks.
- The minimum rack-load ratings per RU are listed in the following table:

Rack Type	MDS 9132T
EIA (4 post)	7.5 lb (3.4 kg)
Telco (2 post)	15 lb (6.8 kg)

- For four-post EIA cabinets (perforated or solid-walled):

- The minimum spacing for bend radius for fiber-optic cables should have the front mounting posts of the cabinet offset from the front door by a minimum of 3 in. (7.6 cm).
- The distance between the outside face of the front mounting post and the outside face of the back mounting post should be 26 to 32 in. (66 to 81 cm) to allow for rear-bracket installation.
- The distance between the rear of the chassis and the perforated rear door of the cabinet (required for airflow in the cabinet, if used) should be 3.0 in. (7.6 cm).
- No clearance is required between the chassis and the sides of the rack or cabinet (no side airflow).

Note

- Optional jumper power cords are available for use in a cabinet. See Jumper Power Cord.
- Cisco MDS 9132T switches are compatible with Cisco racks (such as Cisco R42612) and PDUs.

Requirements Specific to Perforated Cabinets

In addition to the requirements listed in the "General Requirements for Cabinets and Racks" section, perforated cabinets must meet the following requirements:

- The front and rear doors must have at least a 60 percent open area perforation pattern, with at least 15 sq. in. (96.7 sq cm) of open area per rack unit of door height.
- We recommend that the roof be perforated with at least 20 percent open area, unless the cabinet only contains Cisco MDS 9132T switch, in which case the roof does not have to be perforated.
- We recommend an open or perforated cabinet floor to enhance cooling but it is not required.

Reference Perforated Cabinet

A perforated cabinet that conforms to the above requirements is available from Rittal Corporation:

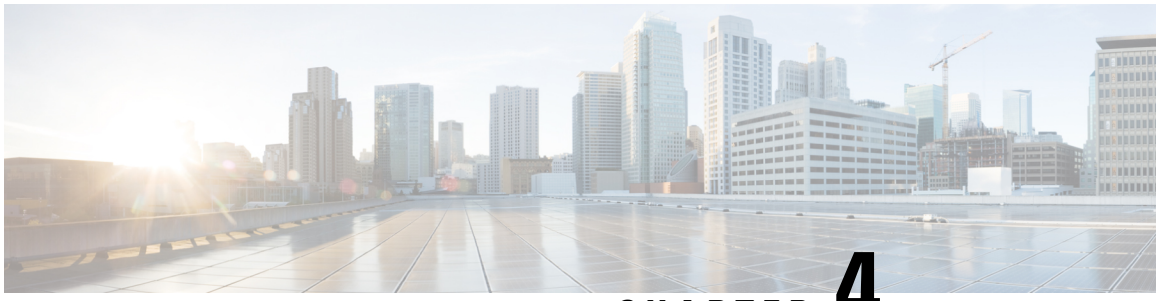
```
Rittal Corporation
One Rittal Place
Springfield, OH 45504
Phone: (800) 477-4000
Cabinet P/N: Rittal 9969427
Cabinet description: PS-DK/OEM Cabinet Assembly, 1998 x 600 x 1000 (H x W x D)
(42U)
```

Requirements Specific to Solid-Walled Cabinets

In addition to the requirements listed in the "General Requirements for Cabinets and Racks" section, solid-walled cabinets must meet the following requirements:

- A roof-mounted fan tray and an air-cooling scheme in which the fan tray pulls air in at the bottom of the cabinet and sends it out from the top, with a minimum of 849.5 m^3/h of airflow exiting the cabinet roof through the fan tray, should be available.

- Nonperforated (solid and sealed) front and back doors and side panels should be present so that air travels predictably from bottom to top.
- The overall cabinet depth should be 36 to 42 in. (91.4 to 106.7 cm) to allow the doors to close and to facilitate adequate airflow.
- A minimum of 150 sq. in. (968 sq. cm) of open area should be available at the floor air intake of the cabinet.
- The lowest piece of equipment should be installed at a minimum of 1.75 in. (4.4 cm) above the floor openings to prevent blockage of the floor intake.



CHAPTER 4

Installing a Cisco MDS 9132T Switch

This chapter describes how to install a Cisco MDS 9132T switch and its components.

Before you install, operate, or service the system, see the Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family document for important safety information.

Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.** Statement 1017

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

Each new switch requires a license. See the Cisco MDS 9000 Family NX-OS Licensing Guide for instructions on installing a license.

- Preinstallation, on page 21
- Installing the Switch, on page 27
- Grounding the Switch, on page 35
- Installing and Removing Components, on page 36

Preinstallation

This section includes the following information:

Installation Options

A Cisco MDS 9132T Switch can be installed using the following methods:

- In an open EIA rack
- In a perforated EIA cabinet

The rack-mount kit enables you to install the switch into racks of varying depths. You can use the rack-mount kit parts to position the switch with easy access to either the port connections end of the chassis or the end of

the chassis with the fan and power supply modules. For instructions on how to install the rack-mount kit, see the Installing the Switch section.

Cisco MDS 9000 Series Telco and EIA Shelf Bracket

The optional Telco and EIA Shelf Bracket Kit (part number DS-SHELF=) can temporarily or permanently support the Cisco MDS 9132T switch during installation. After the front rack-mount brackets are securely attached to the rack-mounting rails, the shelf bracket can be removed.

The Telco and EIA Shelf Bracket kit supports the following configurations:

- A Cisco MDS 9132T Switch in a two-post Telco rack
- A Cisco MDS 9132T Switch in a four-post EIA rack

Note Telco and EIA Shelf Bracket optional kit is not provided with the switch; to order the kit, contact your switch supplier.

This section describes the procedure for installing a Cisco MDS 9132T switch in a rack or cabinet using the optional Telco and EIA Shelf Bracket Kit.

Shelf-Installation Guidelines

Caution

- If the rack is on wheels, ensure that the brakes are engaged or the rack is otherwise stabilized.
- If you are installing this kit in an EIA rack, attach the shelf to all four rack-mounting posts; the EIA posts may not be thick enough to prevent flexing of shelf brackets if only two posts are used.

Before Installing the Shelf Brackets

Before installing the shelf brackets, inspect the contents of your kit. The following table lists the contents of the shelf bracket kit:

Quantity	Part Description
2	Slider brackets
2	Shelf brackets
1	Crossbar
2	10-32 x 3/8-in. Phillips pan-head screws
16	12-24 x 3/4-in. Phillips screws
16	10-24 x 3/4-in. Phillips screws

Required Equipment

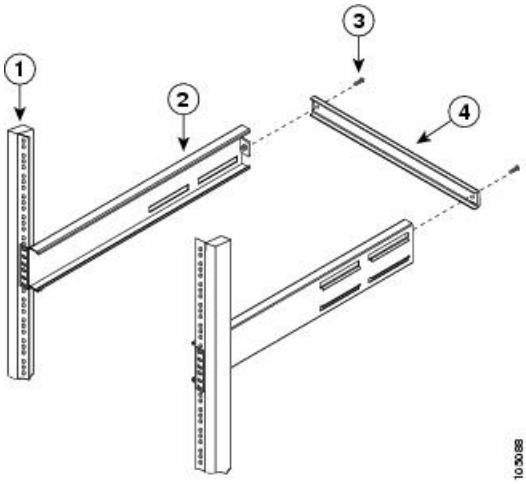
You need the following equipment for this installation:

- Number 2 Phillips screwdriver
- Tape measure and level (to ensure that shelf brackets are at level with each other)
- NEBS plate - If the airflow is port-side intake

Installing the Shelf Bracket Kit into a Two-Post Telco Rack

The following figure shows the installation of the shelf bracket kit into a two-post Telco rack:

Figure 11: Installing the Shelf Bracket Kit into a Telco Rack



1	Rack-mounting post	3	10-32 screws
2	Shelf bracket	4	Crossbar

To install the shelf brackets in a Telco rack, follow these steps:

Procedure

Step 1 Position a shelf bracket inside a rack-mounting post as shown in Figure 11: Installing the Shelf Bracket Kit into a Telco Rack, on page 23 and align the screw holes at the front of the shelf bracket with the holes in the rack-mounting post. Then, attach the shelf bracket to the rack-mounting post using a minimum of four 12-24 or 10-24 screws.

Note
The bottom hole of the shelf bracket should align with the bottom hole (the hole immediately above the 1/2 in. spacing) of a rack unit on the rack-mounting post.

Step 2 Repeat Step 1 with the other shelf brackets.

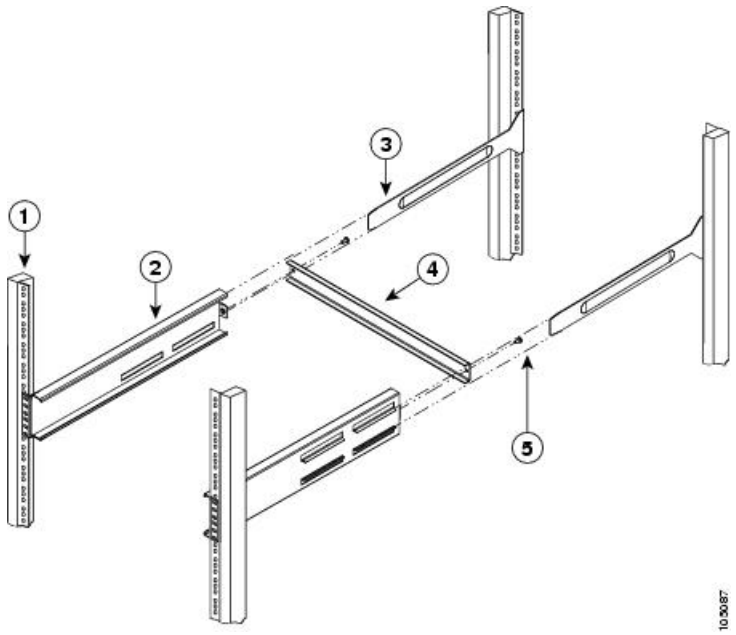
Step 3 Verify that the shelf brackets are at the same height (using the level or tape measure, as desired).

Step 4 Attach the crossbar to the rear of the shelf brackets, as shown in Figure 11: Installing the Shelf Bracket Kit into a Telco Rack, on page 23, using the 10-32 screws.

Installing the Shelf Bracket Kit into a Four-Post EIA Rack

The following figure shows the installation of the shelf bracket kit into a four-post EIA rack:

Figure 12: Installing the Shelf Bracket Kit into an EIA Rack



1	Rack-mounting post	4	Crossbar
2	Shelf bracket	5	10-32 screws
3	Slider post		

To install the shelf brackets in an EIA rack, follow these steps:

Procedure

Step 1 Position a shelf bracket inside the rack-mounting posts, as shown in Figure 12: Installing the Shelf Bracket Kit into an EIA Rack, on page 24. Align the screw holes at the front of the shelf bracket with the holes in the front rack-mounting post. Then, attach the shelf bracket to the front rack-mounting post using a minimum of four 12-24 or 10-24 screws.

Note
The bottom hole of the shelf bracket should align with the bottom hole (the hole immediately above the 1/2 in. spacing) of a rack unit on the rack-mounting post.

Step 2 Repeat Step 1 with the other shelf brackets.

Step 3 Verify that the shelf brackets are at the same height (using the level or tape measure, as desired).

Step 4 Attach the crossbar to the shelf brackets, as shown in Figure 12: Installing the Shelf Bracket Kit into an EIA Rack, on page 24, using the 10-32 screws.

Step 5 Insert the slider posts into the shelf brackets, as shown in Figure 12: Installing the Shelf Bracket Kit into an EIA Rack, on page 24. Attach them to the rear rack-mounting posts, using a minimum of four 12-24 or 10-24 screws.

Preinstallation Guidelines

Airflow Considerations

The switch comes with fan modules and power supply units that have either port-side intake or port-side exhaust airflow for cooling the switch. If you are positioning the port end of the switch in a cold aisle, make sure that the switch has a port-side intake fan and power supply modules with red colorings. If you are positioning the port end of the switch in a cold aisle, make sure that the switch has a port-side exhaust fan and power supply modules with blue colorings. If you are positioning the fan and power supply modules in a cold aisle, make sure that the switch has port-side bidirectional fan and power supply modules with white colorings. All fan modules and power-supply modules must have the same direction of airflow.

Connection Guidelines for AC-Powered Systems

To connect to the Cisco MDS 9132T switch AC power supplies to the site power source, follow these guidelines:

- Each power supply should have its own dedicated branch circuit.
- Circuits should be sized according to local and national codes.
- The AC power receptacles that are used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground in the service equipment.

Installation Guidelines

Follow these guidelines when installing the Cisco MDS 9132T switch:

- Plan your site configuration and prepare the site before installing the switch. The recommended site planning tasks are listed in the Site Planning and Maintenance Records section.
- Ensure that there is adequate space around the switch to allow for servicing the switch and for adequate airflow. The airflow requirements are listed the Technical Specifications section.
- Ensure that you are positioning the switch in a rack so that it takes in cold air from the cold aisle and sends out air to the hot aisle. For more informatiom, see the Airflow Considerations section.
- Ensure that the air-conditioning meets the heat-dissipation requirements listed in the Technical Specifications section.
- Ensure that the cabinet or rack meets the requirements listed in the Cabinet and Rack Installation section.
- Ensure that the chassis is adequately grounded. If the switch is not mounted on a grounded rack, we recommend that you connect both the system ground on the chassis and the site power ground to an earth ground.

- Ensure that the site power meets the power requirements listed in the Technical Specifications section. If available, you can use an uninterruptible power supply (UPS) to protect against power failures.

Caution Avoid UPS types that use ferro-resonant technology. These UPS types can become unstable with systems such as the Cisco MDS 9000 Series, which can in turn have substantial current draw fluctuations because of fluctuating data traffic patterns.

- Ensure that circuits are sized according to local and national codes.

  For North America, the 650-W power supplies require a 15-A circuit. If you are using a 200 or 240 VAC power source in North America, the circuit must be protected by a two-pole circuit breaker.

Caution To prevent loss of input power, ensure that the total maximum loads on the circuits supplying power to the switch are within current ratings for wiring and breakers.

- As you install and configure the switch, record the information listed in the Site Planning and Maintenance Records section.

Unpacking and Inspecting the Switch

Caution When handling switch components, wear an ESD strap and handle modules using only the carrier edges. An ESD socket is provided on the chassis. For an ESD socket to be effective, the chassis must be grounded through the power cable, the chassis ground, or the metal-to-metal connection with a grounded rack.

Tip Retain the shipping container in case the chassis has to be shipped in the future.

Note The switch is thoroughly inspected before shipment. If any damage occurs during transportation, or if any item is missing, contact your customer representative immediately. If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support.

To inspect the shipment, follow these steps:

1. Compare the shipment to the equipment list provided by your customer service representative and verify that you have received all items, including the following:
   - Grounding lug kit
   - Rack-mount kit
   - ESD wrist strap

- Cables and connectors
- Optional items, if any, ordered

2. Check for damage and report any discrepancies or damage, to your customer service representative. Have the following information ready:
   - Invoice number of shipper (see packing slip)
   - Model and serial number of the damaged unit
   - Description of damage
   - Effect of damage on the installation
3. Check to be sure that all the power supplies and the fan trays have the expected direction of airflow. Port-side intake airflow modules have a red coloring, and port-side exhaust airflow modules have blue coloring. For more information, see the Power Supplies and Fan Modules sections.

Installing the Switch

This section describes how to use the rack-mount kit to install the Cisco MDS 9132T switch into a cabinet or rack that meets the requirements described in the Cabinet and Rack Requirements section.

Installing the Switch on Shelf Brackets

This section provides general instructions for installing the switch on top of the shelf brackets. Note that this is an optional task.

Note Before you install, operate, or service the system, refer to Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family for important safety information.

To install the switch on top of the shelf brackets, follow these steps:

Procedure

Step 1 Verify that the shelf brackets are level and securely attached to the rack-mounting posts, the crossbar is securely attached to the shelf brackets, and the rack is stabilized.

Step 2 Slide the switch onto the shelf brackets, ensuring that it is squarely positioned.

Step 3 Attach the switch to the rack-mounting posts.

Caution
We recommend that you ground the chassis even if the rack is already grounded. A grounding pad with two threaded M4 holes is provided on the chassis for attaching a grounding lug.

Note

For switches installing in the USA, the grounding lug must be NRTL listed and compatible with copper conductors. Only copper conductors (wires) must be used and these conductors must comply with National Electrical Code (NEC) for ampacity.

NEBS Compliance

In case of port-side intake airflow, the chassis has to be NEBS compliant. To be NEBS compliant, install the NEBS kit by following these steps:

1. Install two NEBS rack–mount brackets onto the switch.
2. Install the NEBS air-baffle onto the switch, and ensure that the direction is as shown in the following images.

Figure 13: NEBS Kit for 2-post installation

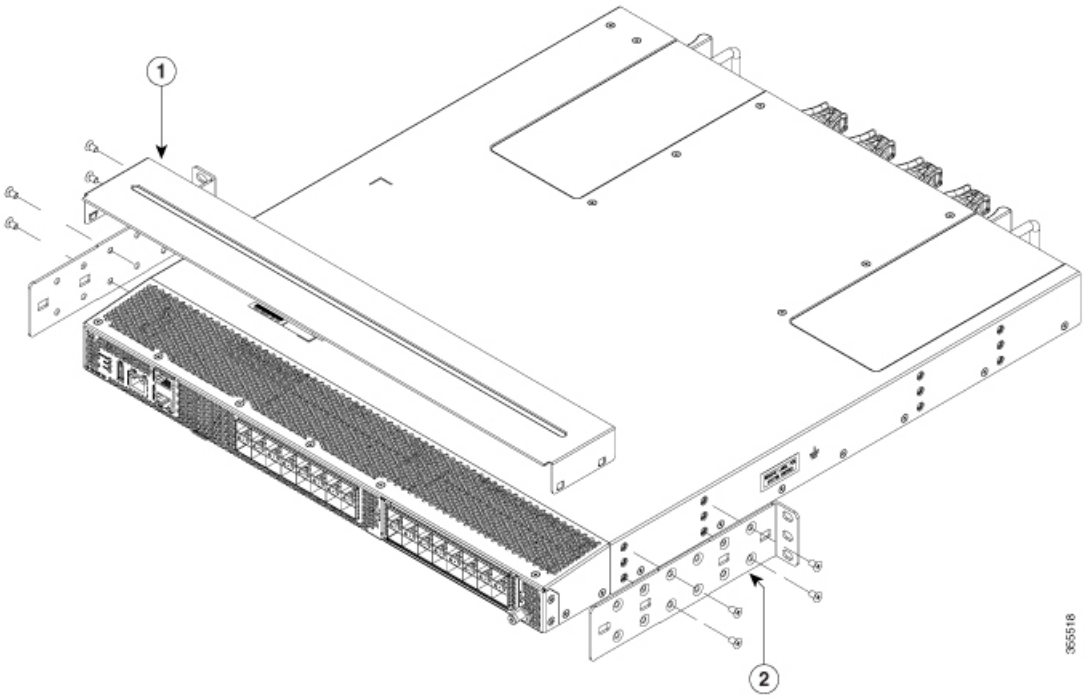
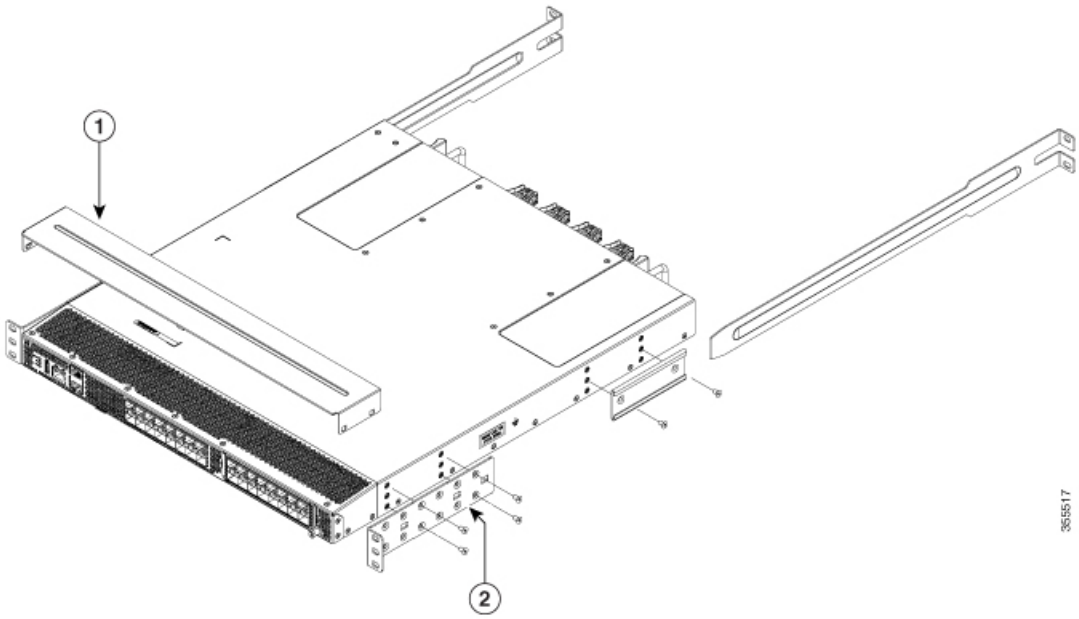


Figure 14: NEBS Kit for 4-post installation



1.	NEBS air-baffle

For more information on how to install the switch, see the Installing the Switch in a 4-post Rack and Installing the Switch in a 2-post Rack.

Installing the Switch in a 4-Post Rack

To install the switch, you must attach the front and rear mounting brackets to the switch, install the slider rails on the rear of the rack, slide the switch into the slider rails, and secure the switch to the front of the rack. Typically, the front of the rack is the side that is easiest to access for maintenance.

Before you begin

- Inspect the switch shipment to ensure that you have everything you ordered.
- Make sure that the switch rack-mount kit includes the following parts:
  - Front rack-mount brackets (2)
  - Rear rack-mount brackets (2)
  - Slider rails (2)
  - M4 x 0.7 x 8-mm Phillips countersink screws (12)
- The rack is installed and secured to its location.

Procedure

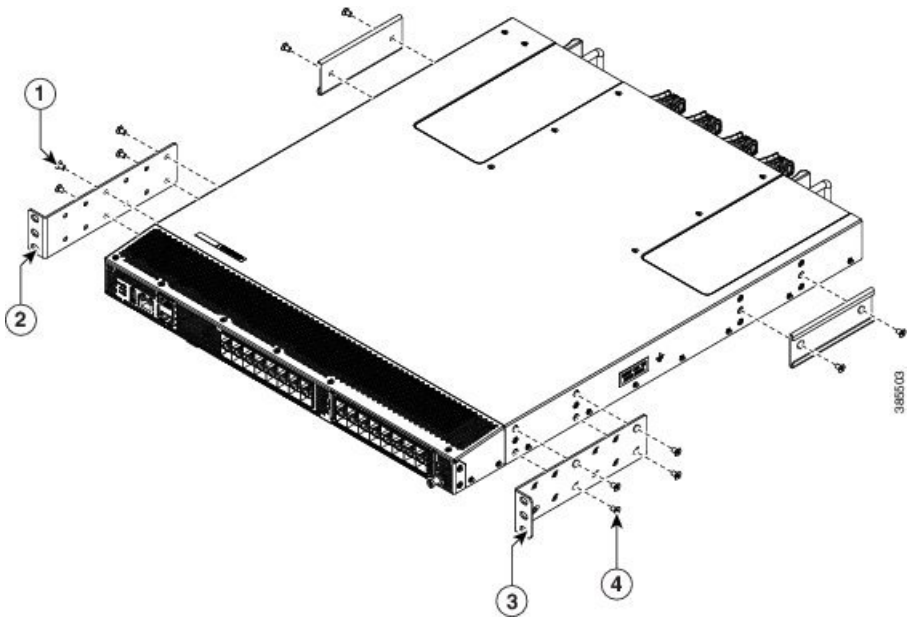
Step 1 Install two front-mount brackets to the switch as follows:

a. Determine which end of the chassis is to be located in the cold aisle as follows:

- If the switch has port-side intake modules (fan modules with red coloring), position the switch so that its ports are in the cold aisle.
- If the switch has port-side exhaust modules (fan modules with blue coloring), position the switch so that its fan and power-supply modules are in the cold aisle.

b. Position a front-mount bracket so that four of its screw holes are aligned to the screw holes on the side of the chassis.

Note
You can align any four of the holes in the front rack-mount bracket to four of the six screw holes on the side of the chassis. The holes that you use depend on the requirements of your rack and the amount of clearance required for interface cables (3 in. [76 mm] minimum) and module handles (1 in. [25 mm] minimum).



1 & 4. Four M4 screws	2 & 3. Front rack-mount bracket

c. Secure the front-mount bracket to the chassis using the four M4 screws and tighten each screw to 12 in-lb (1.36 N·m) of torque.

d. Repeat Step 1 for the other front rack-mount bracket on the other side of the switch, and be sure to position that bracket the same distance from the front of the switch.

Step 2 Install the two rear rack-mount brackets on the chassis, as follows:

a. Align the two screw holes on a rear rack-mount bracket to the middle two screw holes in the remaining six screw holes on a side of the chassis if you are aligning the guide to holes that are near the port connections end of the chassis.

b. Attach the guide to the chassis using two M4 screws. Tighten the screws to 12 in-lb (1.36 N·m) of torque.

c. Repeat Step 2 for the other rear rack-mount bracket on the other side of the switch.

Step 3 If you are not installing the chassis into a grounded rack, you must attach a customer-supplied grounding wire to the chassis, as explained in Grounding the Switch. However, if you are installing the chassis into a grounded rack, you can skip this step.

Step 4 Install the slider rails into the rack or cabinet, as follows:

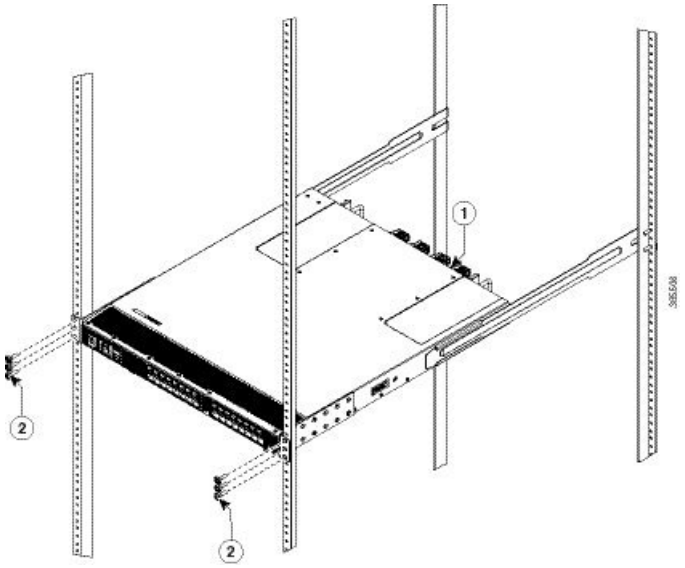
a. Determine which two posts of the rack or cabinet you should use for the slider rails. Of the four vertical posts in the rack or cabinet, two will be used for the front-mount brackets attached to the easiest-accessed end of the chassis, and the other two posts will have the slider rails.

b. Position a slider rail at the desired level on the back side of the rack and use two 12-24 screws or two 10-32 screws, depending on the rack thread type, to attach the posts to the rack. Tighten the 12-24 screws to 30 in-lb (3.39 N·m) of torque, and tighten the 10-32 screws to 20 in-lb (2.26 N·m) of torque.

c. Repeat Step 3 to attach the other slider rail to the other side of the rack.

To make sure that the slider rails are at the same level, you should use a level tool or tape measure, or carefully count the screw holes in the vertical mounting posts.

Step 5 Insert the switch into the rack and attach it as follows:



1. Fan-tray end of the chassis.	2. Customer-supplied rack-mount screw.

a. Holding the switch with both hands, position the two rear rack-mount brackets on the switch between the rack or cabinet posts that do not have slider rails attached to them.

b. Align the two rear rack-mount guides on either side of the switch with the slider rails installed in the rack. Slide the rack-mount guides onto the slider rails, and then gently slide the switch all the way into the rack until the front rack-mount brackets come in contact with two rack or cabinet posts.

Note
If you attached a grounding cable to the chassis, you will need to bend one of the rack-mount posts slightly to allow the grounding lug to go behind the post.

c. Holding the chassis level, insert two screws (12-24 or 10-32, depending on the rack type) into each of the two front rack-mount brackets (using a total of four screws), and into the cage nuts or threaded holes in the vertical rack-mounting posts.

d. Tighten the 10-32 screws to 20 in-lb (2.26 N·m), or tighten the 12-24 screws to 30 in-lb (3.39 N·m).

Step 6 If you have attached a grounding wire to the chassis grounding pad, connect the other end of the wire to the facility ground.

Installing the Switch into a 2-Post Rack

Procedure

Step 1 Install two rack–mount brackets onto the switch as follows:

a) Determine which end of the chassis is to be located in the cold aisle as follows:

- If the switch has port-side intake modules (fan modules with red coloring), position the switch so that its ports is in the cold aisle.
- If the switch has port-side exhaust modules (fan modules with blue coloring), position the switch so that its fan and power supply modules is in the cold aisle.

b) Position a rack–mount bracket so that four of its screw holes are aligned to the screw holes on the side of the chassis. Then, secure the front-mount bracket to the chassis using four M4 screws.

Note
You can align four of the holes in the front rack-mount bracket to four of the screw holes on the front side of chassis or four of the screw holes on the rear side of the chassis. The holes that you use depend on which side of your chassis needs to be put in the cold aisle.

Figure 15: Installing Rack-mount Brackets on the Front Side of the Chassis

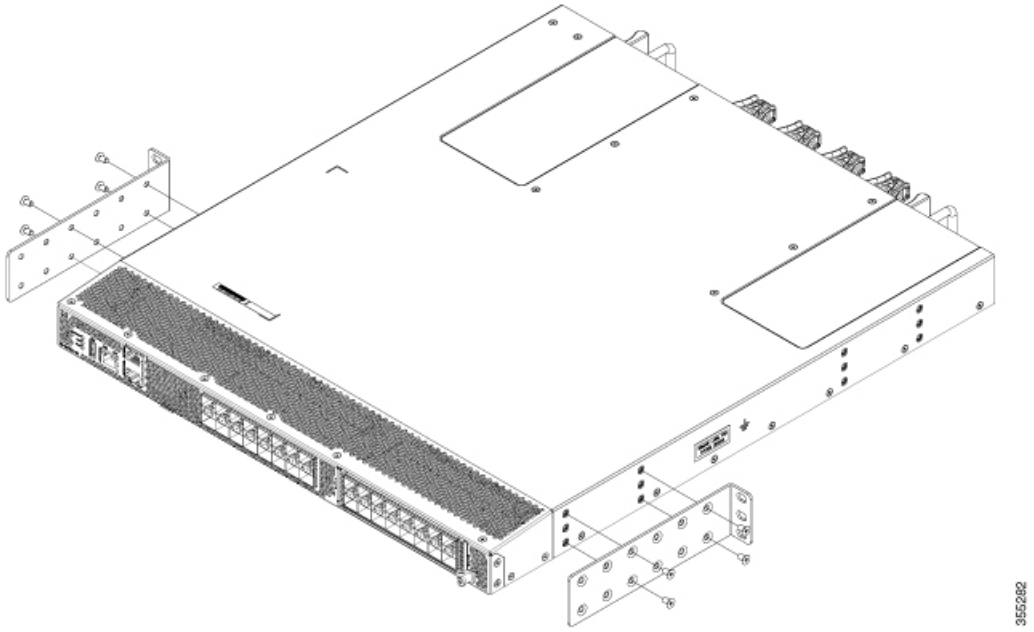
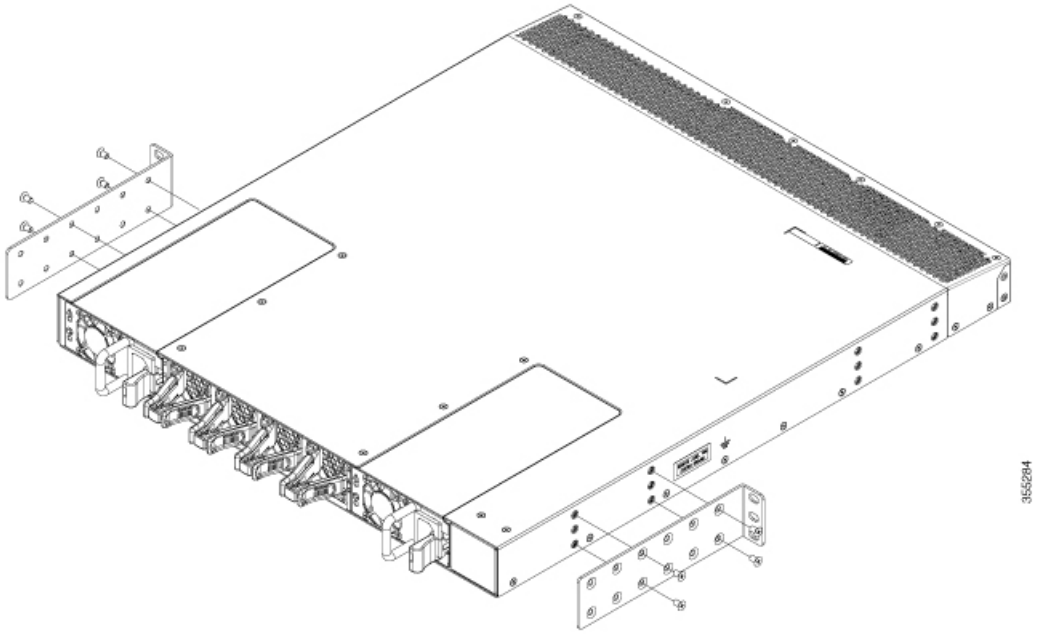


Figure 16: Installing Rack-mount Brackets on the Rear Side of the Chassis

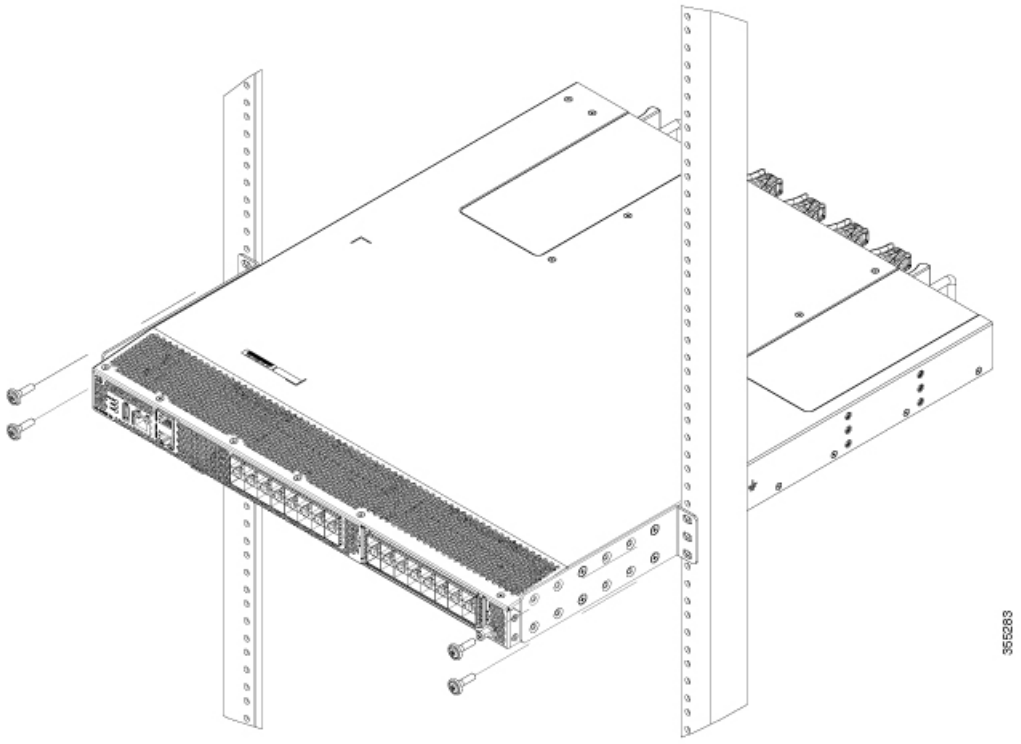


c) Repeat Step 1b, for the other front rack-mount bracket on the other side of the switch and be sure to position that bracket the same distance from the front of the switch.

Step 2 Install the switch onto the 2-post rack:

a) Holding the switch with both hands, position the back of the switch between the two posts of the rack. Then gently move the switch until the front rack-mount brackets come in contact with two rack posts.
b) Holding the chassis level, insert two screws (12-24 or 10-32, depending on the rack type) into each of the two front rack-mount brackets (using a total of four screws) and into the cage nuts or threaded holes in the vertical rack-mounting posts.

Figure 17: Installing the Switch onto the 2-post Rack



c) Tighten the 10-32 screws to 20 in-lb (2.26 N.m) or tighten the 12-24 screws to 30 in-lb (3.39 N.m).

Removing the Shelf Bracket Kit (Optional)

The shelf bracket kit can be removed after the Cisco MDS 9132T switch has been installed in a four-post EIA rack, and the front rack-mount brackets and the C brackets are securely attached to the rack-mounting posts.

To remove the shelf bracket kit, follow these steps:

Procedure

Step 1 Remove the screws fastening the slider brackets to the rear rack-mounting posts, and then slide the slider brackets out of the shelf brackets.

Step 2 Remove the screws fastening the crossbar to the shelf brackets, and then remove the crossbar.

Step 3 Remove the screws fastening the shelf brackets to the front rack-mounting posts and remove the shelf brackets from the rack.

Grounding the Switch

The switch chassis is automatically grounded when you install the switch properly in a grounded rack with metal-to-metal connections between the switch and rack.

Alternatively, you can ground the chassis (this is required if the rack is not grounded) by attaching a customer-supplied grounding cable to the chassis grounding pad and the facility ground.

Warning This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. **Statement 1024**

Warning When installing or replacing the unit, the ground connection must always be made first and disconnected last. **Statement 1046**

To connect the switch chassis to the facility ground, you need the following tools and materials:

- Grounding lug—A two-holed standard barrel lug that supports up to 6 AWG wire. This lug is supplied with the accessory kit.
- Grounding screws—Two M4 x 8 mm (metric) pan-head screws. These screws are shipped with the accessory kit.
- Grounding wire—Not supplied with the accessory kit. This wire should be sized to meet local and national installation requirements. Depending on the power supply and system, a 12 AWG to 6 AWG copper conductor is required for the USA installations. We recommend that you use commercially available 6 AWG wire. The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.
- Number 1 manual Phillips-head torque screwdriver.
- Crimping tool to crimp the grounding wire to the grounding lug.
- Wire stripping tool to remove the insulation from the grounding wire.

Procedure

Step 1 Use a wire stripping tool to remove approximately 0.75 in. (19 mm) of the covering from the end of the grounding wire.

Step 2 Insert the stripped end of the grounding wire into the open end of the grounding lug, and use a crimping tool to crimp the lug to the wire. Verify that the ground wire is securely attached to the grounding lug by attempting to pull the wire out of the crimped lug.

Step 3 Secure the grounding lug to the chassis grounding pad with two M4 screws, and tighten each screw to 11.5 to 15 in-lb (1.3 to 1.7 N·m) of torque.

Step 4 Prepare the other end of the grounding wire and connect it to an appropriate grounding point in your site to ensure an adequate earth ground for the switch. If the rack is fully bonded and grounded, connect the grounding wire, as explained in the documentation provided by the vendor from whom you bought the rack.

Installing and Removing Components

Warning **Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.** Statement 1034

Caution During this procedure, wear grounding wrist straps to avoid ESD damage to the switch.

Installing and Removing the Linecard Expansion Module

This section provides instructions for installing and removing the Linecard Expansion Module.

Installing the Linecard Expansion Module

To install a Linecard Expansion Module, follow the steps provided in this section:

Before you begin

If the LEM blank module is installed, remove it as follows:

1. Unscrew the locking screw.
2. Gently pull the linecard expansion module ejector till the linecard expansion blank module is slightly ejected.
3. Remove the linecard expansion blank module.

Procedure

Step 1 Power off the switch.

Step 2 Gently pull the LEM ejector so as to insert the LEM.

Step 3 Gently slide the LEM into the LEM bay till it clicks into place with the help of the Linecard Expansion Module ejector.

Step 4 Secure the Linecard Expansion Module ejector with the locking screw.

Removing the Linecard Expansion Module

To remove a Linecard Expansion Module, follow these steps:

Procedure

Step 1 Power off the switch.

Step 2 Unscrew the locking screw.

Step 3 Gently pull the LEM ejector till the LEM is slightly ejected.

Step 4 Remove the LEM.

Step 5 Physically insert the linecard expansion blank module to ensure proper system cooling.

Installing and Removing Power Supplies

This section provides instructions for installing and removing the power supplies in the Cisco MDS 9132T Switch.

Installing Power Supplies

You can replace one power supply while the other one provides power to the switch.

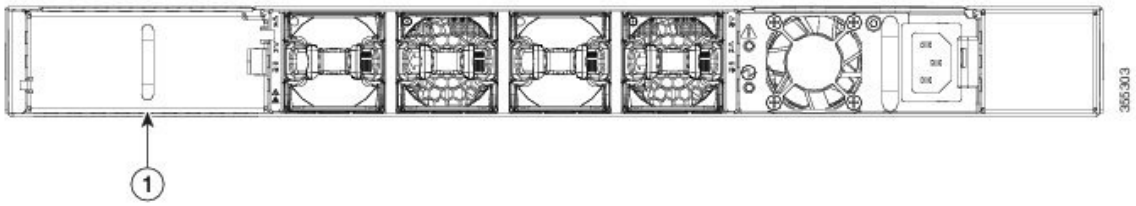
Before you begin

If the PSU blank module is inserted, remove it as follows:

1. Unscrew the locking screw.

2. Gently pull the power supply blank module out of the bay.

Figure 18: Inserted Power Supply Blank Module



1	Power supply blank module

- To implement n+n redundancy, there must be two external power sources and two PSUs attached to each power source. Otherwise, only one power source is required.
- There must be an earth ground connection to the chassis to which you are installing the replacement module. Typically, the chassis is grounded by its metal-to-metal connection with a grounded rack. If you need to ground the chassis, see Grounding the Switch.

Procedure

Step 1 Holding the power supply unit with one hand underneath it and the other hand holding the handle, turn the power supply so that its release latch is on the right side, and align the back end of the power supply (the end with the electrical connections) to the open power supply slot. Carefully slide the power supply unit all the way into the slot until it clicks into place.

Note
If the power supply unit does not fit into the slot opening, turn the unit over and try again.

Step 2 Test the installation by trying to pull the power supply out of the slot without using the release latch.

If the power supply does not move out of place, it is secured in the slot. If the power supply moves, carefully press it all the way into the slot until it clicks in place and tighten the locking screw.

Step 3 Attach the power cable to the electrical outlet on the front of the power supply.

Step 4 Make sure that the other end of the power cable is attached to the appropriate power source for the power supply. If the power source has a switch, slide it to the On position.

Note
Depending on the outlet receptacle on your power distribution unit, you might need the optional jumper cable to connect the switch to your outlet receptacle.

Step 5 Verify that the power supply is operational by making sure that the power supply LED is green. For information on what the power supply LEDs indicate, see the Switch LEDs section.

Removing Power Supplies

You can remove one faulty power supply, while the other one provides enough power to the switch. Install a new power supply or a power supply blank module in the open slot.

Procedure

Step 1 Holding the plug for the power cable, pull the plug out from the power receptacle on the power supply, and verify that both the power supply LEDs are off.

Step 2 Grasp the power supply handle while pressing the release latch towards the power supply handle.

Step 3 Place your other hand under the power supply to support it while you slide it out of the chassis.

Caution
Do not touch the electrical connectors on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 4 Insert a power supply blank module, as shown in Power Supply Blank Module if you do not have a new power supply unit.

Installing and Removing Fan Modules

This section provides instructions for installing and removing the fan modules for the Cisco MDS 9132T switch.

You can replace one of the four fan modules even when the switch is operating so long as you perform the replacement within one minute of removing the old fan module. If you cannot perform the replacement within one minute, leave the original fan module in the chassis to maintain the designed airflow until you have the replacement fan module on hand and can perform the replacement.

Caution If you are replacing a module during operations, be sure that the replacement fan module has the correct direction of airflow, which means that it has the same airflow direction as the other modules in the chassis. Also, be sure that the airflow direction takes in air from a cold aisle and sends it out to a hot aisle. Otherwise, the switch can overheat and shut down.

If you are changing the airflow direction of all the modules in the chassis, you must shut down the switch before replacing all the fan and power supply modules with modules using the other airflow direction. During operations, all the modules must have the same direction of airflow.

Installing a Fan Module

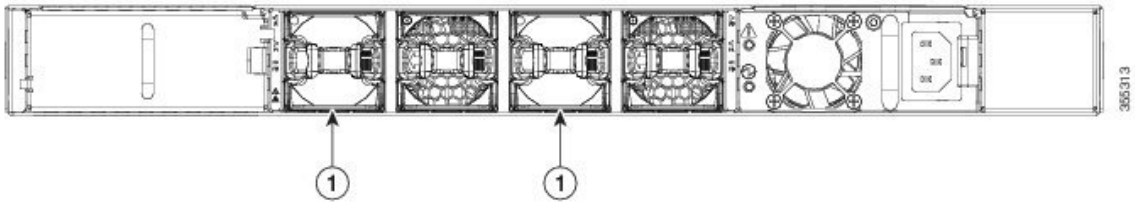
To install a new fan module, follow these steps:

Before you begin

If a fan blank module is installed, remove it as follows:

- Press the two sides of the fan blank module handle and pull on the handles enough to unseat it from its connectors.
- Holding the handle, pull the module out of the chassis.

Figure 19: Inserted Fan Blank Modules



1	Fan blank modules

- A fan slot must be open and ready for the new fan module to be installed.
- You must have a new fan module on hand and ready to install within one minute of removing the original fan module if the switch is operating.

- The new fan module must have the same airflow direction as the other fan and power supply modules installed in the switch. All of these modules must have either red coloring (port-side intake airflow) or they must all have blue coloring (port-side exhaust airflow).

Procedure

Step 1 Holding the fan module by its handle, align the back of the fan module (the side with the electrical connectors) to the open fan slot in the chassis.

Step 2 Slide the fan module into the fan module bay until it clicks into place and tighten the locking screw.

Step 3 Verify that the Status LED turns on and becomes green.

Removing a Fan Module

The fan module is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damaging the system.

Caution The Cisco MDS 9000 Series Switches have internal temperature sensors that can shut down the system if the temperature within the chassis exceed certain safety thresholds. To accurately monitor the system temperature, the temperature sensors require sufficient airflow through the chassis. In the event that a fan module is removed from the chassis and the airflow is reduced, the system will bypass the temperature sensor information and shut down after five minutes to prevent undetected overheating. However, the switches will shut down sooner if the major temperature threshold is exceeded.

Warning **While removing the fan module, keep your hands and fingers away from the spinning fan blades. Let the fan blades completely stop before you remove the fan module.** Statement 258

To remove an existing fan module, follow these steps:

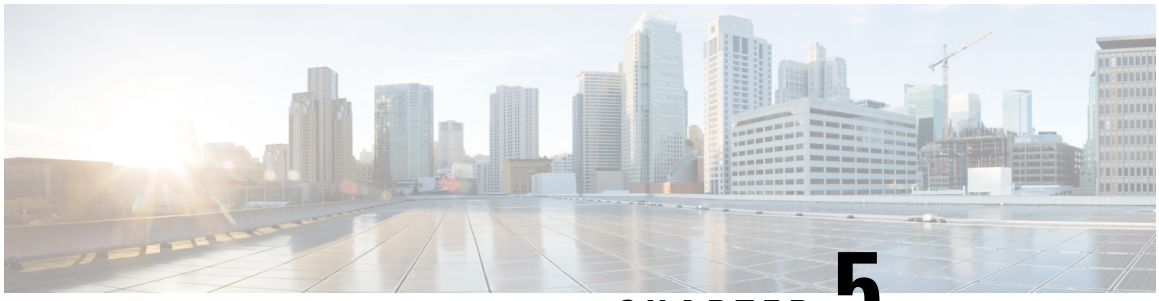
Procedure

Step 1 On the fan module that you are removing, press the two sides of the fan module handle next to where it connects to the fan module and pull on the handles enough to unseat it from its connectors.

Step 2 Holding the handle, pull the module out of the chassis.

Caution
Do not touch the electrical connectors on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 3 Insert a fan blank module, as shown in Figure 19: Inserted Fan Blank Modules, on page 39 if you do not have a new fan module.



CHAPTER 5

Connecting the Cisco MDS 9132T Switch

The Cisco MDS 9132T switch provides the following types of ports:

- Console port—An RS-232 port that you can use to create a local management connection.
- MGMT 10/100/1000 Ethernet port—Two Ethernet port that you can use to access and manage the switch by IP address, such as through the CLI or Fabric Manager. One of the Ethernet ports can also be used to export analytic data.
- Fibre Channel ports—Fibre Channel ports that you can use to connect to the SAN, or for in-band management.
- USB port—USB port for USB flash disk that you can use for configuration file backups, log dumps, report captures, and so on.

This chapter describes how to connect the various components of the Cisco MDS 9132T switch.

- Preparing for Network Connections, on page 41
- Connecting the Console Port, on page 42
- Connecting the Management Port, on page 44
- Connecting to a Fibre Channel Port, on page 44
- Powering Up the Switch, on page 48

Preparing for Network Connections

When preparing your site for network connections to the Cisco MDS 9132T switch, consider the following for each type of interface:

- Cabling required for each interface type
- Distance limitations for each signal type
- Additional interface equipment needed

Before installing the component, have all the additional external equipment and cables available.

Connecting the Console Port

This section describes how to connect the RS-232 console port to a PC. The console port allows you to perform the following functions:

- Configure the switch from the CLI.
- Monitor network statistics and errors.
- Configure SNMP agent parameters.
- Download software updates to the switch or distribute software images residing in flash memory to attached devices.
- Perform initial switch configuration
- Perform password recovery

Connecting the Console Port to a PC

You can connect the console port to a PC serial port for local administrative access to the Cisco MDS 9132T switch.

Note The PC must support VT100 terminal emulation. The terminal emulation software—frequently a PC application, such as HyperTerminal Plus—makes the communication between the Cisco MDS 9132T switch and your PC possible during setup and configuration.

To connect the console port to a PC, follow these steps:

Procedure

Step 1 Configure the baud rate and character format of the PC terminal emulation program to match the following management port default characteristics:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity

Step 2 Attach the adapter required for your PC to its communication port. It must present an RJ-45 socket towards the switch.

- For a DB-9 serial port, attach the supplied RJ-45-to-DB-9 female adapter.
- For a DB-25 serial port, attach the supplied RJ-45-to-DB-25 female adapter.
- For a USB port, attach a customer-supplied USB-to-serial dongle.

Step 3 Connect one end of the supplied console cable (a rollover RJ-45-to-RJ-45 cable) to the console port. Connect the other end to the female RJ-45 adapter attached to the PC communication port.

Connecting the Console Port to a Modem Before Switch is Powered On

Caution Do not connect the console port to a modem while the switch is booting as it may interrupt the boot process. Connect the console port to a modem either before powering the switch on or after the switch has completed the boot process.

To connect the console port to a modem before the switch is powered on, follow these steps:

Procedure

Step 1 Connect the supplied console cable (a rollover RJ-45-to-RJ-45 cable) to the console port.

Step 2 Connect the other end of the console cable to the supplied RJ-45-to-DB-25 adapter.

Step 3 Connect the RJ-45-to-DB-25 adapter to the DB-25 port on the modem.

Step 4 Power on the switch. The switch boots automatically, and the following default console port characteristics are applied to the modem connection:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity
- Default initialization string (ATE0Q1&D2&C1S0=1\015) if previously configured

Note
For instructions on how to change these settings, see the Cisco Fabric Manager Fundamentals Configuration Guide.

Connecting the Console Port to a Modem After Switch is Powered On

To connect the console port to a modem after the switch is powered on, follow these steps:

Procedure

Step 1 Ensure that the system has completed booting and the system image is running.

Step 2 Connect the supplied console cable (a rollover RJ-45-to-RJ-45 cable) to the console port.

Step 3 Connect the other end of the console cable to the supplied RJ-45-to-DB-25 adapter.

Step 4 Connect the RJ-45-to-DB-25 adapter to the DB-25 port on the modem.

Step 5 Initialize and configure the modem as specified in the Cisco Fabric Manager Fundamentals Configuration Guide and the Cisco NX-OS Fundamentals Configuration Guide.

Connecting the Management Port

The autosensing 10/100/1000 Mbps Ethernet management ports are located on the left side of the front panel (labeled MGMT ETH0 and MGMT ETH1), below the console port. MGMT ETH0 is the default Ethernet management port (interface mgmt0). This port is used for out-of-band management of the Cisco MDS 9132T switch. It can also be used for upstream data transferring.

Note MGMT ETH1 is disabled and reserved for further use.

Use a modular, RJ-45, straight-through UTP cable (Cisco Catalyst 5000 Switch or Cisco Catalyst 6000 Switch) to connect the 10/100/1000 Mbps Ethernet management ports to external hubs and switches.

Connecting to a Fibre Channel Port

The Fibre Channel ports are compatible with FC LC-type fiber-optic SFP transceivers and cables (see the Removing and Installing Cables into SFP Transceivers section). You can use these ports to connect to the SAN or for in-band management. For information about configuring the switch for in-band management, see the Cisco Fabric Manager Fundamentals Configuration Guide or the Cisco NX-OS Fundamentals Configuration Guide.

Each transceiver must match the transceiver at the other end of the cable, and the cable must not exceed the stipulated cable length for reliable communications. SFP transceivers can be ordered either separately or with the Cisco MDS 9132T switch.

Warning **Class 1 laser product**. Statement 1008

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

Note Wear an ESD wrist strap connected to the chassis when handling transceivers. Keep optical connectors covered when not in use, and do not touch connector ends. The fiber-optic connectors must be free of dust, oil, and other contaminants.

Removing and Installing Cables into SFP Transceivers

Caution To prevent damage to the fiber-optic cables, do not place more tension on them than the rated limit and do not bend to a radius of less than one inch (2.5 cm) if there is no tension in the cable, or two inches (5 cm) if there is tension in the cable.

Installing a Cable into an SFP Transceiver

Caution To prevent possible damage to the cable or transceiver, install the transceiver in the port before installing the cable in the transceiver.

To install a cable into a transceiver, follow these steps:

Procedure

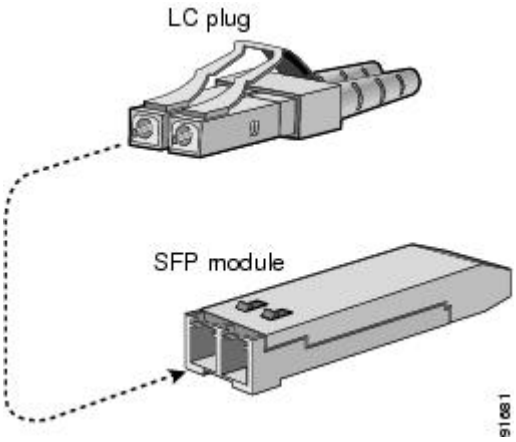
Step 1 Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2 Remove the dust cover from the connector on the cable.

Step 3 Remove the dust plug from the cable-end of the transceiver.

Step 4 Align the cable connector with the transceiver and insert the connector into the transceiver until it clicks into place.

Figure 20: Connecting the LC-Type Cable to a Fibre Channel Port



Caution
If the cable does not install easily, ensure that it is correctly oriented before continuing.

For instructions on verifying connectivity, see the Cisco Fabric Manager Fundamentals Configuration Guide and the Cisco NX-OS Fundamentals Configuration Guide.

Removing a Cable from an SFP Transceiver

Caution

- When pulling a cable from a transceiver, grip the body of the connector. Do not pull on the jacket sleeve because this can compromise the fiber optic termination in the connector.
- If the cable does not remove easily, ensure that any latch present on the cable has been released before continuing.

To remove the cable, follow these steps:

Procedure

Step 1 Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2 Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.

Step 3 Insert a dust plug into the cable-end of the transceiver.

Step 4 Insert a dust cover into the end of the cable.

Removing and Installing SFP Transceivers

Warning Removing and installing an SFP transceiver can shorten its useful life. Do not remove and insert SFP transceivers more often than is absolutely necessary. We recommend that you disconnect the cables before installing or removing SFP transceivers to prevent damage to the cable or transceiver.

Note Use only Cisco SFP transceivers on the Cisco MDS 9132T switch. Each Cisco SFP transceiver is encoded with model information that enables the switch to verify that the SFP transceiver meets the requirements for the switch.

The Cisco MDS 9132T switch supports SFP transceivers with the following types of latching devices:

- Mylar tab latch
- Bale-clasp latch

Installing an SFP Transceiver

To install an SFP transceiver, follow these steps:

Procedure

Step 1 Attach an ESD-preventive wrist strap and follow its instructions for use.

Caution
If the transceiver does not install easily, ensure that it is correctly oriented and the tab or clasp are in the correct position before continuing.

Step 2 Remove the dust plug from the switch-port cage.

Step 3 Remove the dust cover from the port-end of the transceiver.

Step 4 Insert the transceiver into the port.

Step 5 Insert or leave the dust plug in the cable-end of the transceiver if a cable is not being installed in the transceiver.

Removing an SFP Transceiver

To remove an SFP transceiver, follow these steps:

Procedure

Step 1 Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2 Remove attached fibre-optic cables, if any. For more information, see the Removing a Cable from an SFP Transceiver section.

Step 3 Remove the transceiver from the port:

- If the transceiver has a mylar tab latch, gently pull the tab straight out (do not twist), and then pull the transceiver out of the port.
- If the transceiver has a bale-clasp latch, open the clasp by pressing it downwards, and then pull the transceiver out of the port.

Step 4 Insert a dust cover into the cable-end of the transceiver and place the transceiver on an antistatic mat or into a static shielding bag.

Step 5 Protect the switch port by inserting a clean dust plug if another transceiver is not being installed.

Maintaining SFP, SFP+, or QSFP+ Transceivers and Fiber-Optic Cables

SFP, SFP+, or QSFP+ transceivers and fiber optic cables must be kept clean and dust-free to maintain high signal accuracy and prevent damage to the connectors. Attenuation (loss of light) is increased by contamination. Therefore, attenuation should be kept below 0.35 dB.

Follow these maintenance guidelines:

- SFP, SFP+, or QSFP+ transceivers are sensitive to static discharge. To prevent ESD damage, wear an ESD-preventive wrist strap that is connected to the chassis.

- Do not remove and reinsert a transceiver more often than necessary. Repeated removals and insertions can shorten its useful life.
- Keep all optical connections covered when not in use. If they become dusty, clean before using in order to prevent dust from scratching the fiber optic cable ends.
- Do not touch the ends of connectors. This prevents fingerprints and other contamination of the connectors.
- Inspect cables before installation, for dust and damage. If damage is suspected, clean the ends and check for excessive light loss with a light meter.

Powering Up the Switch

This section provides instructions for powering up the switch and verifying component installation.

Caution During this procedure, wear grounding wrist straps to avoid ESD damage to the switch.

Note Do not connect the MGMT 10/100/1000 Ethernet port to the LAN until the initial switch configuration has been performed. For instructions on connecting to this port, see the Connecting the Management Port section.

To power up the switch and verify hardware operation, follow these steps:

Procedure

Step 1 Verify that the power supplies and fan modules are installed, and tighten loose captive screws, if any.

Step 2 Plug the power cables into the power supplies and arrange the cables so that they cannot be accidentally pulled out.

Note
Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the Cisco MDS 9132T Switch to your outlet receptacle. For more information about the jumper power cord, see the Jumper Power Cord section.

Step 3 Connect the other end of the power cables to the site power outlets that have the required power voltages.

Step 4 Ensure that the switch is adequately grounded, as described in the Grounding the Switch section.

Step 5 Connect a terminal device to the serial console port. For more information, see the Connecting the Console Port section.

Step 6 Turn the site power outlet switches to On. The switch boots automatically.

Step 7 Listen for the fans; they should begin operating as soon as the switch is powered on.

Note
Do not operate the switch without a functioning fan module, except briefly during the fan module-replacement procedure. Cisco MDS 9000 Series Switches can operate for only a few minutes without any functioning fan modules before they begin to overheat.

Step 8 Verify that the LED behavior is as follows when the switch has finished booting:

- Fan status LED is green.
- Each power supply LED is green.
- The switch status LED is green. If this LED is orange or red, it indicates that one or more environmental monitors is reporting a problem.
- The Ethernet port link LEDs should not be On unless the cable is connected.

Note
The LEDs for the Fibre Channel ports remain orange until the ports are enabled, and the LED for the MGMT 10/100/1000 Ethernet ports remains Off until the port is connected.

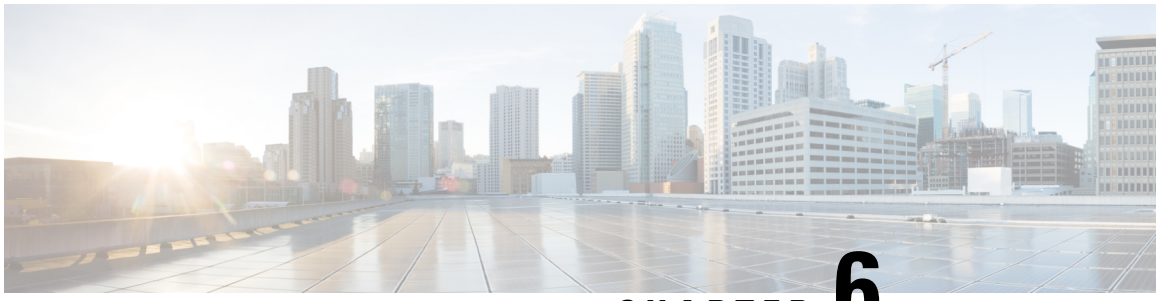
Step 9 If a component is not operating properly, try removing and reinstalling it. If it still does not operate correctly, contact your customer service representative for a replacement.

Note
If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support.

Step 10 Verify that the system software has booted and the switch has initialized without error messages. If any problems occur, see the Cisco MDS 9000 Series System Messages Guide. If you cannot resolve an issue, contact your customer service representative.

Step 11 Complete the worksheets provided in Site Planning and Maintenance Records for future reference.

Note
A setup utility is automatically launched the first time you access the switch, and guides you through the basic configuration. For instructions about how to configure the switch and check module connectivity, see the Cisco Fabric Manager Fundamentals Configuration Guide.



CHAPTER 6

Technical Specifications

- Switch Specifications, on page 51
- Power Specifications, on page 52
- SFP Transceiver Specifications, on page 54

Switch Specifications

The following table lists the environmental specifications for the Cisco MDS 9132T switch:

Table 2: Environmental Specifications for the Cisco MDS 9132T Switch

Description	Specification
Temperature, ambient operating	32 to 104°F (0 to 40°C)
Temperature, ambient nonoperating and storage	-40 to 158°F (-40 to 70°C)
Humidity (RH), ambient (noncondensing) operating	10 to 90%
Humidity (RH), ambient (noncondensing) nonoperating and storage	10 to 95%
Altitude, operating	-197 to 6500 ft (-60 to 2000 m)

The following table lists the physical specifications for the Cisco MDS 9132T switch.

Table 3: Physical Specifications for the Cisco MDS 9132T Switch

Description	Specification
Dimensions (HxWxD)	1.72 x 17.3 x 20.11 in. (4.36 x 43.94 x 51.07 cm) excluding PSU and fan module handles
Rack Space	Chassis requires 1 RU (1.75 in. or 4.45 cm)
Weight	21.65 lb (9.82 kg)

Description	Specification
Power Supply	• 650-W AC, port-side exhaust variant (up to 2 per switch) • 650-W AC, port-side intake variant (up to 2 per switch) • AC input—100 to 240 V AC (10% range) • Frequency—50 to 60 Hz (nominal)
Airflow	• Back to front (toward ports) using port-side exhaust fans • Front to back (into ports) using port-side intake fans • 50 CFM (0.02 m^3/s) through system fan assembly at 25°C • 100 CFM (0.04 m^3/s) maximum We recommend that you maintain a minimum air space of 2.5 in. (6.4 cm) between walls and chassis air vents and a minimum horizontal separation of 6 in. (15.2 cm) between two chassis to prevent overheating.

Power Specifications

General Power Supply Specifications

The following table lists the specifications for the Cisco MDS 9132T switch AC input power supply:

AC Input Power	Specification
AC input voltage	100 to 240 VAC
AC input frequency	Nominal = 50 to 60 Hz
Power supply output capacity	650 W
Power supply output voltage	12 V +/- 5% up to 54 A
Output holdup time	20 ms

Power Supply Requirement Specifications

The following table provides a sample calculation of power for the Cisco MDS 9132T switch AC input power supply:

Table 4: Power Dissipation for AC Input Power Supply

Power Mode	Optics	Speed	LEM	Traffic Rate	Temperature	Voltage	PSU	Fan Modules	Power at 110 V/60 Hz (Watts)	Power at 220 V/50 Hz (Watts)
Idle	0	NA	No	0%	Room	Normal	1	2	76	74
Idle	0	NA	Yes	0%	Room	Normal	1	2	118	116
Typical	16	32G	No	50%	Room	Normal	1	2	100	98
Typical	24	32G	Yes	50%	Room	Normal	1	2	150	147
Typical	32	32G	Yes	50%	Room	Normal	1	2	159	156
Max in 55°C	32	32G	Yes	100%	50°C	+5%	2	4	231	226

Table 5: Power Supply Fuse Information

Part Number	PID	Type	Fuse Rated AMP	I2T	Fuse Melting Time
341-100716-02	DS-CAC-650W-E	Fast acting	12.5 A	400	1000 s@20 A, 0.1 s@56 A
341-100717-02	DS-CAC-650W-I				

Component Power Requirements and Heat Dissipation

Consider heat dissipation when sizing the air-conditioning requirements for an installation. The power and heat associated with a Cisco MDS 9132T 32-Gbps 32-Port Fibre Channel Switch varies based on the following considerations:

- The environment (temperature) outside the chassis
- Internal chassis temperature
- Any hardware component failure in the chassis
- Average switching traffic levels

The following table lists the power requirements and heat dissipation for the components of the Cisco MDS 9132T 32-Gbps 32-Port Fibre Channel Switch.

Table 6: Power Requirements and Heat Dissipation for the Cisco MDS 9132T 32-Gbps 32-Port Fibre Channel Switch

Module Type/Product Number	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current		
			85VAC(amps)	110VAC(amps)	220VAC(amps)
Cisco MDS 9132T 32-Gbps 32-Port Fibre Channel Switch	180 maximum	614	2.12	1.64	0.82

SFP Transceiver Specifications

The Cisco MDS 9132T switch is compatible with SFP transceivers and cables that have LC connectors. Each transceiver must match the transceiver at the other end of the cable in terms of wavelength. The cable must not exceed the stipulated cable length for reliable communications to take place.

Cisco SFP transceivers support 850 to 1610 nm nominal wavelengths, depending upon the transceiver.

Use only Cisco SFP transceivers on the Cisco MDS 9132T switch. Each Cisco SFP transceiver is encoded with model information that enables the switch to verify that the SFP transceiver meets the requirements for the switch. For the list of supported SFP transceivers, see the Cisco MDS 9000 Series Compatibility Matrix.

Use only genuine Cisco SFP+ transceivers in Cisco MDS series switches. Each Cisco SFP+ transceiver is encoded with serial number, vendor name, and other parameters that enable Cisco NX-OS to verify that the transceiver meets the requirements of the switch. If discrepancies are found, the SFP+ will be allowed to function, if possible, but will cause a warning syslog message to be generated. Cisco TAC does not support switch ports populated with non-Cisco SFP+ transceivers.

For details about SFP transceivers see the Cisco MDS 9000 Family Pluggable Transceivers Data Sheet.

For information about safety, regulatory, and standards compliance, see the Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family.

Cisco Fibre Channel SFP+ Transceivers

The following table lists the Fibre Channel SFP+ transceivers that are available through Cisco for the Cisco MDS 9132T switch:

Table 7: Cisco Fibre Channel SFP + Transceivers for the Cisco MDS 9132T Switch

Part Number	Description	Type
DS-SFP-FC32G-SW	32-Gbps Fibre Channel SW SFP+	Short wavelength
DS-SFP-FC32G-LW	32-Gbps Fibre Channel LW SFP+	Long wavelength
DS-SFP-FC16G-SW	16-Gbps Fibre Channel SW, SFP+	Short wavelength
DS-SFP-FC16G-LW	16-Gbps Fibre Channel LW, SFP+	Long wavelength
DS-SFP-FC16G-ELW	16-Gbps Fibre Channel ELW, SFP+	Extended long wavelength

Part Number	Description	Type
DS-SFP-FC8G-SW	8-Gbps Fibre Channel SW, SFP+	Short wavelength
DS-SFP-FC8G-LW	8-Gbps Fibre Channel LW, SFP+	Long wavelength
DS-SFP-FC8G-ER	8-Gbps Fibre Channel ER SFP+	Extended Reach
DS-CWDM8Gxxxx	8-Gbps Fibre Channel CWDM SFP+	Long Distance

General Specifications for Cisco Fibre Channel 32-Gbps SFP+ Transceivers

The following table summarizes cabling specifications for 32 Gbps.

Table 8: General Specifications for Cisco 32-Gbps Fibre Channel SFP+ Transceivers

SFP+	Wavelength (nm)	Fibre Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance				
					OM2		OM3	OM4	OM5
DS-SFP-FC32G-SW	850	MMF	50.0	28.05	65 ft (20 m)		230 ft (70 m)	328 ft (100 m)	328 ft (100 m)
			62.5	14.025	—		—	—	—
			50.0	14.025	— 115 ft (35 m) (OM2)		328 ft (100 m)	410 ft (125 m)	410 ft (125 m)
			62.5	8.5	69 ft (21 m) (OM1)	—	—	—	—
			50.0	8.5	—	164 ft (50 m) (OM2)	492 ft (150 m)	623 ft (190 m)	623 ft (190 m)
DS-SFP-FC32G-LW	1310	SMF	9.0	28.05	10 km (6.2 mi)				
			9.0	14.025	10 km (6.2 mi)				
			9.0	8.5	10 km (6.2 mi)				
DS-SFP-FC32G-ELW	1310	SMF	9.0	32G	25 km (15.5 mi)				

Power Requirements and Environmental Conditions for 32-Gbps SFP+ Transceivers

The following table provides the optical parameters for 32-Gbps SFP+ transceivers:

Table 9: Optical Parameters for 32-Gbps SFP+ Transceivers

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber-Loss Budget (dB)			
	Min	Max	Min	Max	OM2	OM3	OM4	OM5
DS-SFP-FC32G-SW	-6.2	2.0	-8.2	2.0	1.68 (8 Gbps) 1.63 (16 Gbps) 2.02 (32 Gbps)	2.04 (8 Gbps) 1.86 (16 Gbps) 1.86 (32 Gbps)	2.04 (8 Gbps) 1.95 (16 Gbps) 1.86 (32 Gbps)	2.04 (8 Gbps) 1.95 (16 Gbps) 1.86 (32 Gbps)
DS-SFP-FC32G-LW	-5.0	2.0	-11.4	2.0	6.4 (8 Gbps) 6.4 (16 Gbps) 6.4 (32 Gbps)			
DS-SFP-FC32G-ELW	7	30	-15.8	4.5	20			

The following table provides information on operating and storage temperature ranges for 32-Gbps SFP+ transceivers:

Table 10: Operating and Storage Temperature Ranges for 32-Gbps SFP+ Transceivers

SFP+	Operating		Storage	
	Min	Max	Min	Max
DS-SFP-FC32G-SW DS-SFP-FC32G-LW DS-SFP-FC32G-ELW	0°C	70°C	-40°C	85°C

General Specifications for Cisco Fibre Channel 16-Gbps SFP+ Transceivers

The following table summarizes cabling specifications for 16-Gbps SFP+ transceivers:

Table 11: General Specifications for 16-Gbps Fibre Channel SFP+ Transceivers

SFP+	Wavelength (nm)	Fibre Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance		
					OM2	OM3	OM4
DS-SFP-FC16G-SW	850	MMF	62.5	14.025	35 m (115 ft)	100 m (328 ft)	125 m (410 ft)
			62.5	8.5	—	—	—
			50.0	8.5	50 m (164 ft)	150 m (492 ft)	190 m (623 ft)
			62.5	4.25	—	—	—
			50.0	4.25	150 m (492 ft)	380 m (1247 ft)	400 m (1312 ft)
DS-SFP-FC16G-LW	1310	SMF	9.0	14.025	10 km (6.2 mile)		
			9.0	8.5	10 km (6.2 mile)		
			9.0	4.25	10 km (6.2 mile)		
DS-SFP-FC16G-ELW	1310	SMF	9.0	14.025	25 km (15.5 mile)		
			9.0	8.5	25 km (15.5 mile)		
			9.0	4.25	25 km (15.5 mile)		

Power Requirements and Environmental Conditions for 16-Gbps SFP+ Transceivers

The following table provides the optical parameters for 16-Gbps SFP+ transceivers:

Table 12: Optical Parameters for 16-Gbps SFP+ Transceivers

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber-Loss Budget (dB)			
	Min	Max	Min	Max	(50.0 microns [OM2])	(50.0 microns [OM3])	(50.0 microns [OM4])	(50.0 microns [OM5])

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber-Loss Budget (dB)			
DS-SFP-FC16G-SW	-7.8	-1.3	-10.3	0	2.08 (4 Gbps) 1.68 (8 Gbps) 1.63 (16 Gbps)	2.88 (4 Gbps) 2.04 (8 Gbps) 1.86 (16 Gbps)	2.04 (8 Gbps) 1.95 (16 Gbps) 1.86 (32 Gbps)	2.04 (8 Gbps) 1.95 (16 Gbps) 1.86 (32 Gbps)
DS-SFP-FC16G-LW	-5.0	2.0	-12.0	2.0	7.8 (4 Gbps) 6.4 (8 Gbps) 6.4 (16 Gbps)			
DS-SFP-FC16G-ELW	- 2.0	5.0	-14.0	2.0	10 (16 Gbps)			

The following table provides information on operating and storage temperature ranges:

Table 13: Operating and Storage Temperature Ranges for 16-Gbps SFP+ Transceivers

SFP+	Operating		Storage	
	Min	Max	Min	Max
DS-SFP-FC16G-SW	0°C	70°C	-40°C	85°C
DS-SFP-FC16G-LW	0°C	70°C	-40°C	85°C
DS-SFP-FC16G-ELW	0°C	70°C	-40°C	85°C

General Specifications for Cisco Fibre Channel 8-Gbps SFP+ Transceivers

The following table summarizes cabling specifications for 8-Gbps transceivers:

Table 14: General Specifications for Cisco 8-Gbps Fibre Channel SFP+ Transceivers

SFP+	Wavelength (nm)	Fibre Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance			
					OM1	OM2	OM3	OM4
DS-SFP-FC8G-SW	850	MMF	62.5	2.125	150 m (492 ft)	—	—	—
			62.5	4.250	70 m (230 ft)	—	—	—
			62.5	8.500	21 m (69 ft)	—	—	—
			50.0	2.125	—	300 m (984 ft)	500 m (1640 ft)	520 m (1706 ft)
			50.0	4.250	—	150 m (492 ft)	380 m (1246 ft)	400 m (1312 ft)
			50.0	8.500	—	50 m (164 ft)	150 m (492 ft)	190 m (623 ft)
DS-SFP-FC8G-LW	1310	SMF	9.0	2.125	10 km (6.2 miles)			
			9.0	4.250	10 km (6.2 miles)			
			9.0	8.500	10 km (6.2 miles)			
DS-SFP-FC8G-ER	1550	SMF	9.0	2.125	40 km (24.85 miles)			
			9.0	4.250	40 km (24.85 miles)			
			9.0	8.500	40 km (24.85 miles)			

Power Requirements and Environmental Conditions for 8-Gbps SFP+ Transceivers

The following table provides the optical parameters for 8-Gbps SFP+ transceivers:

Table 15: Optical Parameters for 8 Gbps SFP+ Transceivers

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber-Loss Budget (dB)		
	Min	Max	Min	Max	(62.5 microns [OM1])	(50.0 microns [OM2])	(50.0 microns [OM3])

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber-Loss Budget (dB)		
DS-SFP-FC8G-SW	-10 (2 Gbps) -9 (4 Gbps) -8.2 (8 Gbps)	-1.3	—	0	2.10 (2 Gbps) 1.78 (4 Gbps) 1.58 (8 Gbps)	2.08 (4 Gbps) 1.68 (8 Gbps) 1.63 (16 Gbps)	3.31 (2 Gbps) 2.88 (4 Gbps) 2.04 (8 Gbps)
DS-SFP-FC8 G-LW	-11.7 (2 Gbps) -8.4 (4 Gbps) -8.4 (8 Gbps)	-3 (2 Gbps) -1 (4 Gbps) 0.5 (8 Gbps)	—	-3 (2 Gbps) -1 (4 Gbps) 0.5 (8 Gbps)	—	-7.8 (2 Gbps) 7.8 (4 Gbps) 6.4 (8 Gbps)	—
DS-SFP-FC8G-ER	-4.7	4	-1		10.9	10.9	10.9

The following table provides information on operating and storage temperature ranges:

Table 16: Operating and Storage Temperature Ranges for 8-Gbps SFP+ Transceivers

SFP+	Operating		Storage	
	Min	Max	Min	Max
DS-SFP-FC8G-SW	0°C	70°C	-40°C	85°C
DS-SFP-FC8G-LW	0°C	70°C	-40°C	85°C

Optical Specifications for Cisco CWDM SFP Transceivers

The following table provides the optical specifications for CWDM SFP transceivers, which have an optical link budget of 28 decibels (db).

Note

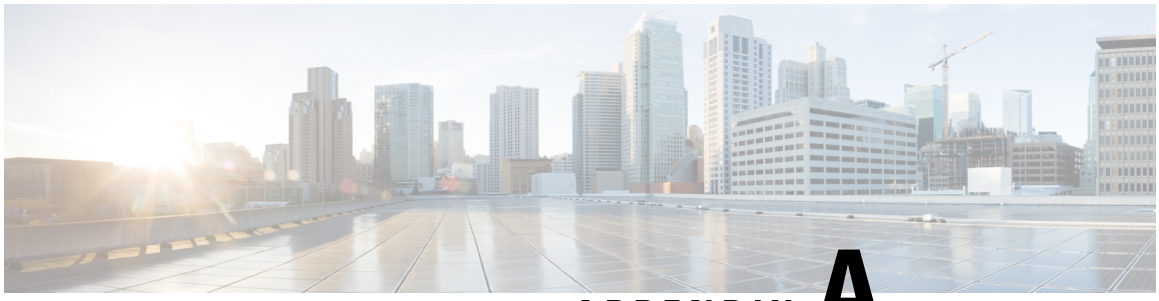
- The parameters are specified over temperature and at end of life unless otherwise noted.
- When shorter distances of single-mode fiber are used, it might be necessary to insert an inline optical attenuator in the link to avoid overloading the receiver.

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Transmitter central wavelength	λc	(x-4)	(x+1)	(x+7)	nm	Available center wavelengths: 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm
Wavelength temperature dependence			0.08	0.1	nm/° C	
Side-mode suppression ratio	SMSR	30			dB	
Transmitter optical output power	P_{out}	0.0		5.0	dBm	Average power coupled into single-mode fiber
Receiver optical input power (BER<10^{-12} with PRBS 2^{-7}–1)	P_{in}	-28.0		-7.0	dBm	@ 2.12 Gbps, 140°F (60°C) case temp.
Receiver optical input wavelength	λ_{in}	1450		1620	Nm	
Transmitter extinction ratio	OMI	9			dB	
Dispersion penalty at 60 km				2	dB	
Dispersion penalty at 100 km				2	db	@ 1.25 Gbps
				3	dB	@ 1.25 Gbps

The following table provides information on operating and storage temperature ranges for Cisco 8-Gbps CWDM SFP modules:

Table 17: Operating and Storage Temperature Ranges for Cisco 8-Gbps CWDM SFP+ Transceivers

SFP+	Operating		Storage	
	Min	Max	Min	Max
DS-CWDM8Gxxxx	0°C	70°C	-40°C	85°C



APPENDIX A

Cable and Port Specifications

This appendix includes information about the cables and connectors used with the Cisco MDS 9132T Multilayer Fabric Switch.

Caution We strongly recommend that power cable runs and other potential noise sources be located as far away as practical from network cabling that terminates at Cisco equipment. In situations where long parallel cable runs exist, but cannot be separated by at least 3.3 ft. (1 m), we recommend that you shield these potential noise sources. To avoid interference, the source should be shielded by housing it in a grounded metallic conduit.

- Cables and Adapters, on page 63
- Console Port, on page 64
- MGMT Port, on page 65
- Supported AC Power Cords and Plugs, on page 67

Cables and Adapters

The Cisco MDS 9132T Switch accessory kit includes the following:

- RJ-45-to-RJ-45 rollover cable
- RJ-45-to-DB-9 female DTE adapter (labeled Terminal)
- RJ-45-to-DB-25 female DTE adapter (labeled Terminal)
- RJ-45-to-DB-25 male DCE adapter (labeled Modem)

Note Additional cables and adapters can be ordered from your customer service representative.

Note If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at http://www.cisco.com/c/en/us/support/index.html.

Console Port

The console port is an asynchronous RS-232 serial port with an RJ-45 connector. You can use the RJ-45-to-RJ-45 rollover cable and the RJ-45-to-DB-9 female adapter or the RJ-45-to-DB-25 female DTE adapter (depending on your computer serial port) to connect the console port to a computer running terminal emulation software.

Console Port Pinouts

The following table lists the pinouts for the console port on the Cisco MDS 9132T switch:

Table 18: Console Port Pinouts

Pin	Signal
1[1]	RTS
2	DTR
3	TxD
4	GND
5	GND
6	RxD
7	DSR
8	CTS

1. Pin 1 is connected internally to pin 8.

Connecting the Console Port to a Computer Using the DB-25 Adapter

You can use the RJ-45-to-RJ-45 rollover cable and the RJ-45-to-DB-25 female DTE adapter (labeled Terminal) to connect the console port to a computer running terminal emulation software. The following table lists the pinouts for the console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 female DTE adapter:

Table 19: Port-Mode Signaling and Pinouts with DB-25 Adapter

Console Port	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-25 Pin**	**Signal**
RTS	1	8	5	CTS
DTR	2	7	6	DSR
TxD	3	6	3	RxD

Console Port	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	TxD
DSR	7	2	20	DTR
CTS	8	1	4	RTS

Connecting the Console Port to a Computer Using the DB-9 Adapter

You can use the RJ-45-to-RJ-45 rollover cable and RJ-45-to-DB-9 female DTE adapter (labeled Terminal) to connect the console port to a computer running terminal emulation software. The following table lists the pinouts for the console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-9 female DTE adapter:

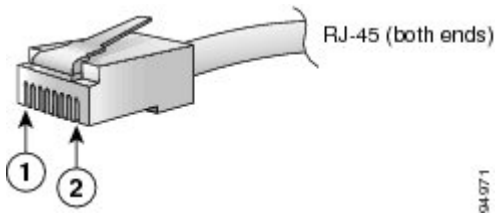
Table 20: Port-Mode Signaling and Pinouts with DB-9 Adapter

Console Port	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-9 Terminal Adapter	Console Device
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-9 Pin**	**Signal**
RTS	1	8	8	CTS
DTR	2	7	6	DSR
TxD	3	6	2	RxD
GND	4	5	5	GND
GND	5	4	5	GND
RxD	6	3	3	TxD
DSR	7	2	4	DTR
CTS	8	1	7	RTS

MGMT Port

Use a modular, RJ-45, straight-through UTP cable to connect the 10/100/1000 management Ethernet port to external hubs and switches.

Figure 21: RJ-45 Interface Cable Connector



1. Pin	2. Pin
1	8

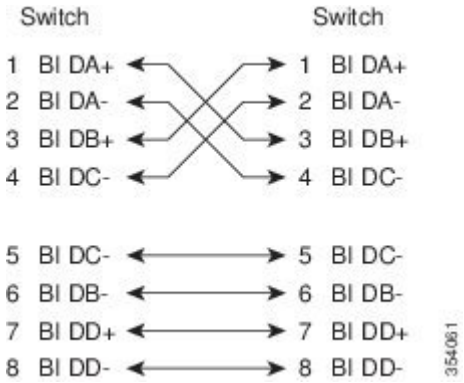
The following table lists the connector pinouts and signal names for a 10/100/1000BASE-T management port (MDI) cable.

Table 21: 10/100/1000 BASE-T Management Port Cable Pinout

Pin	Signal
1	BI DA+
2	BI DA-
3	BI DB+
4	BI DC+
5	BI DC-
6	BI DB-
7	BI DD+
8	BI DD-

The following figure shows a schematic representation of the 10/100/1000 BASE-T cable:

Figure 22: Twisted-Pair 10/100/1000 BASE-T Cable



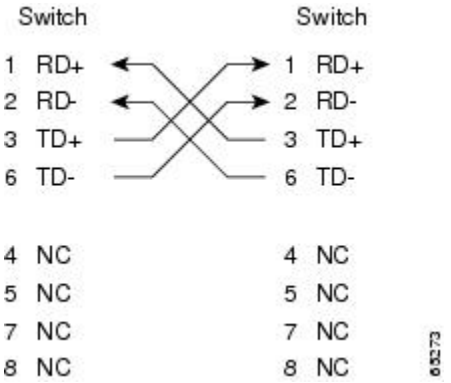
The following table lists the connector pinouts and signal names for a 10/100 BASE-T management port (MDI) cable:

Table 22: 10/100 BASE-T Management Port Cable Pinout

Pin	Signal
1	TD+
2	TD-
3	RD+
4	RD-
5	Not used
6	Not used
7	Not used
8	Not used

The following figure shows a schematic of the 10/100 BASE-T cable:

Figure 23: Twisted-Pair 10/100 BASE-T Cable Schematic



Supported AC Power Cords and Plugs

Each switch AC power supply unit requires one power cord. Cisco approved cords may be ordered with the product. Standard power cords with a country specific plug can be used with wall outlets. Jumper power cords can be used with cabinet outlets. The user may also source their own power cords for the product, as long as they meet the power cord specifications for this product.

Note

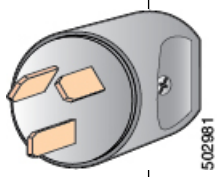
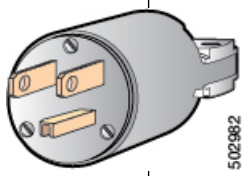
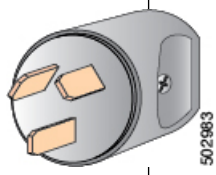
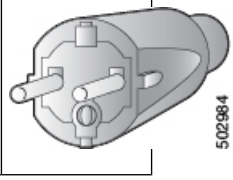
- Only standard power cords and jumper power cords provided with the switch are supported.
- If you do not order a power cord with the system, you are responsible for selecting the appropriate power cord for the product. Using a non-compatible power cord with this product may result in electrical safety hazard. Orders delivered to Argentina, Brazil, and Japan must have the appropriate power cord explicitly ordered at the time of purchase of the system.
- Not all cables are compatible with the locking mechanism.

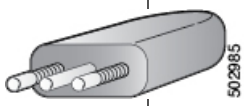
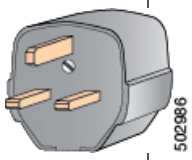
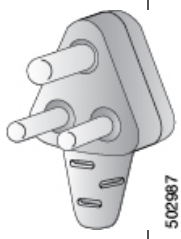
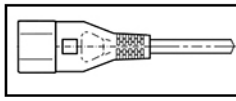
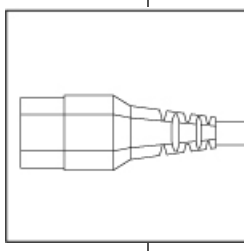
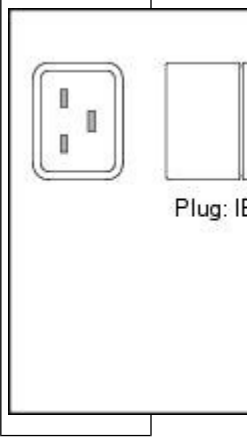
Power Cords

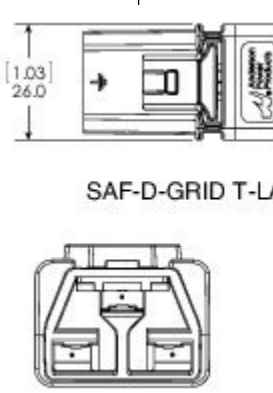
Cisco standard power cords for the Cisco MDS 9132T switch have an IEC C15 connector on the outlet end of the cord and a country specific plug on the inlet end of the cord. The optional jumper power cords have an IEC C15 connector on the end that plugs into the switch, and an IEC C14 connector on the end that plugs into an IEC C13 outlet receptacle.

The following table lists the supported power cords and power plugs for the Cisco MDS 9132T switch:

Table 23: Supported Power Cords and Power Plugs for the Cisco MDS 9132T Switch

Locale	Power Cord Part Number	Source Plug Type	Cordset Rating	Length		Power Plug Reference Illustration
				Feet	Meters	
Argentina	CAB-9K10A-AR	IRAM 2073 plug (10 A)	10 A, 250 V	8.2	2.5	 502981
North America	CAB-9K12A-NA	NEMA 5-15P plug (15 A)	15 A, 125 V	8.2	2.5	 502982
Australia and New Zealand	CAB-9K10A-AU	SAA/3 plug, AS/NZS 3112-1993 (10 A)	10 A, 250 V	8.2	2.5	 502983
Europe	CAB-9K10A-EU	VIIG Plug, CEE (7) VII (16 A)	10 A, 250 V	8.2	2.5	 502984

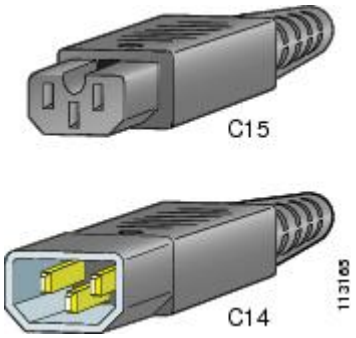
Locale	Power Cord Part Number	Source Plug Type	Cordset Rating	Length		Power Plug Reference Illustration
				Feet	Meters	
Italy	CAB-9K10A-IT	1/3G plug, CEI 23-16 (10 A)	10 A, 250 V	8.2	2.5	
United Kingdom	CAB-9K10A-UK	BS89/13, BS 1363/A (13 A; replaceable fuse)	10 A, 250 V	8.2	2.5	
South Africa	CAB-9K10A-SA	EL 208, SABS 164-1 (10 A)	10 A, 250 V	5.12	1.82	
Switzerland	CAB-9K10A-SW	12G SEV 1011 (10 A)	10 A, 250 V	8.2	2.5	
Japan	CAB-C15-CBN-JP	C14-C15	12 A, 250 VAC	10	3.05 m	
Cabinet Jumper Power Cord	CAB-C15-CBN	C14-C15 Connectors	13A, 250 VAC	4	1.22	
Cabinet Jumper Power Cord	CAB-C19-CBN	C20-C19 Connectors	250 VAC, 16 A	8.9	2.74	

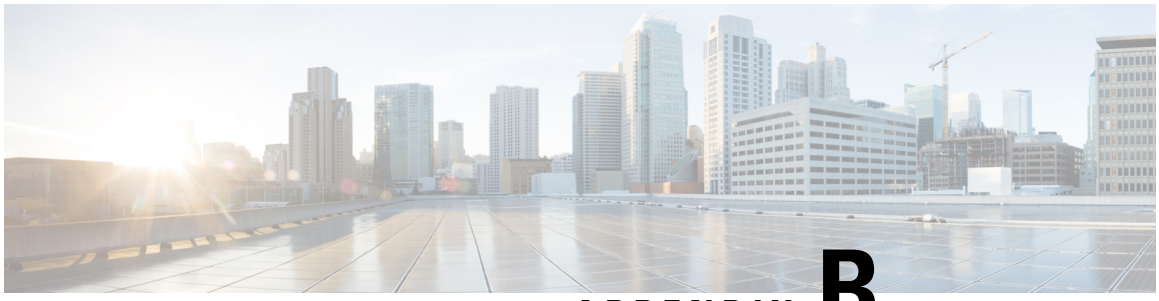
Locale	Power Cord Part Number	Source Plug Type	Cordset Rating	Length		Power Plug Reference Illustration
				Feet	Meters	
CAB-HVAC-C14-2M Power Cord and Plugs for the 1.2-kW HVDC/HVAC Power Supply Unit	CAB-HVAC-C14-2M	C14-C15	230 V AC	6.5	2.0	

Jumper Power Cord

The following figure shows the C14 and C15 connectors on the optional jumper power cord for the Cisco MDS 9132T switch. The C15 connector connects into the C14 inlet on the Cisco MDS 9132T switch power supply, while the C14 connector connects into the C13 receptacle of a power distribution unit for a cabinet.

Figure 24: Connectors on Jumper Power Cord for Cisco MDS 9132T Switch





APPENDIX B

Site Planning and Maintenance Records

This section includes a site planning checklist and maintenance records to use when installing the Cisco MDS 9132T Multilayer Fabric Switch.

For information about how to query the switch for configuration information, see the Cisco NX-OS Fundamentals Configuration Guide.

- Site Preparation Checklist, on page 71
- Contact and Site Information, on page 73
- Chassis and Network Information, on page 73

Site Preparation Checklist

Planning the location and layout of your equipment rack or wiring closet is essential for successful switch operation, ventilation, and accessibility. The following table lists the site planning tasks we recommend that you complete before installing the Cisco MDS 9132T Switch.

Consider heat dissipation when sizing the air-conditioning requirements for an installation.

Table 24: Site Planning Checklist

Task No.	Planning Activity	Verified By	Time	Date
1	Space evaluation: • Space and layout • Floor covering • Impact and vibration • Lighting • Maintenance access			

Task No.	Planning Activity	Verified By	Time	Date
2	Environmental evaluation: • Ambient temperature • Humidity • Altitude • Atmospheric contamination • Air flow			
3	Power Evaluation: • Input power type • Power receptacles[1] • Receptacle proximity to the equipment • Dedicated circuit for power supply • Dedicated (separate) circuits for redundant power supplies • UPS[2] for power failures			
4	Grounding evaluation: • Circuit breaker size • CO ground (AC-powered systems)			
5	Cable and interface equipment evaluation: • Cable type • Connector type • Cable distance limitations • Interface equipment (transceivers)			

Task No.	Planning Activity	Verified By	Time	Date
6	Electromagnetic interference (EMI) evaluation: • Distance limitations for signaling • Site wiring • RFI[3] levels			

1. Verify that the power supply installed in the chassis has a dedicated AC source circuit.

2. UPS = uninterruptible power supply.

3. RFI = radio frequency interference.

Contact and Site Information

Use the following worksheet to record contact and site information:

Table 25: Contact and Site Information

Contact person	
Contact phone	
Contact E-Mail	
Building/site name	
Data center location	
Floor location	
Address (line 1)	
Address (line 2)	
City	
State	
Zip code	
Country	

Chassis and Network Information

Use the following worksheet to record chassis and network information:

Contract Number :

Chassis Serial Number:

Product Number:

Switch IP address	
Switch IP netmask	
Host name	
Domain name	
IP broadcast address	
Gateway/router address	
DNS address	
Modem telephone number	