Technical Specifications

This appendix includes the following technical specifications for the Cisco MDS 9148S switch:

Switch Specifications

Table 1-1 lists the environmental specifications for the Cisco MDS 9148S switch.

Table 1-1 Environmental Specifications for the Cisco MDS 9148S 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	5 to 95%
Altitude, operating	-197 to 6500 ft (-60 to 2000 m)
Noise levels	60 dB

Table 1-2 lists the physical specifications for the Cisco MDS 9148S switch.

Table 1-2 Cisco MDS 9148S Switch Specifications

Description	Specification
Cisco MDS 9148S Switch Dimensions	Width = 17.16 inch (43.59 centimeter) Height = 1.72 inch (4.37 centimeter) Depth = 16.34 inch (41.50 centimeter)
Rack Unit (RU)	Chassis requires 1 RU (1.75 in. or 4.45 cm)

Table 1-2 Cisco MDS 9148S Switch Specifications (continued)

Description	Specification
Weight	19.84 lb (9 kg) (with two fan modules and two power supplies installed)
Power Supply (fixed)	300-W AC for each power supply Part Number: DS-C48S-300AC Power cord: Notched C15 socket connector connecting to C16 plug on power supply 100 to 240V AC (10% range) 50 to 60 Hz (nominal)
Airflow	Back to front. 200 linear feet per minute (LFM) through the system and a maximum of 380 LMDM. Cisco recommends 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

This section includes the following information:

General Power Supply Specifications

Table 1-3 lists the specifications for the Cisco MDS 9148S switch AC input power supply.

Table 1-3 Cisco MDS 9148S Switch AC Input Power Supply Specifications

AC Input Power Supply	Specification
AC input voltage	Minimum = 90 VAC Nominal = 100 to 240 VAC Maximum = 264 VAC
AC input current rating (maximum)	4.7 A at 85 VAC 3.6 A at 110 VAC 1.8 A at 220 VAC **Note** For plug current rating, see the "Jumper Power Cord" section on page 1-69.
AC input frequency	Nominal = 50 to 60 Hz

Table 1-3 Cisco MDS 9148S Switch AC Input Power Supply Specifications

AC Input Power Supply	Specification
Power supply output capacity	300 W
Power supply output voltage	12 V +/- 6% up to 25 A
Output holdup time	20ms when input > 100 VAC

Power Supply Requirements Specifications

Table 1-4 provides a sample calculation of power for the Cisco MDS 9148S switch AC input power supply.

Table 1-4 Power and Heat Dissipation for AC Input Power Supply

Cisco MDS 9148S Switch	AC Power (Volt)	AC Power (Watt)
	220	**125.08**
Typical Case	220	125.08
	110	127.72
50C/NV	220	144.8
	110	145.87
50C/HV	220	155.3
	110	158.48
Worst Case	220	183.11
	110	187.66

Tip To prevent a loss of input power, ensure that the total maximum load on each circuit supplying the power supply is within the current ratings of the wiring and breakers.

Table 1-5 Power Supply Fuse Information

Part Number	PID	Type	Fuse Rated AMP	I2T	Fuse Melting Time
341-0706-02	DS-C48S-300AC	Time-Lag	6.3 A	144.869	27.7 hrs@8 A, 0.9 s@20 A

Component Power Requirements and Heat Dissipation Specifications

Consider the heat dissipation when sizing the air-conditioning requirements for an installation. The power and heat associated with a Cisco MDS 9148S 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

Table 1-6 Power Requirements and Heat Dissipation for the Cisco MDS 9148S Switch

Module Type / Product Number	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current		
			85 VAC (amps)	110 VAC (amps)	220 VAC (amps)
Cisco MDS 9148S16G Multilayer Fabric Switch	140 maximum	478	1.68	1.28	0.65

Connection Guidelines for AC-Powered Systems

For connecting the Cisco MDS 9148S switch AC power supplies to the site power source, follow these basic guidelines:

- Each power supply should have its own dedicated branch circuit.
- For international, circuits should be sized according to local and national codes.
- The AC power receptacles 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 at the service equipment.

SFP Transceiver Specifications

The Cisco MDS 9148S switch is compatible with SFP transceivers and cables that have LC connectors. Each transceiver must match the transceiver on the other end of the cable in terms of wavelength, and the cable must not exceed the stipulated cable length for reliable communications.

Cisco SFP transceivers provide the uplink interfaces, laser transmit (TX), and laser receive (RX), and they support 850 to 1610 nm nominal wavelengths, depending upon the transceiver.

Use only Cisco SFP transceivers on the Cisco MDS 9148S 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 release notes.

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 of SFP transceivers see the data sheet at the following location:

http://www.cisco.com/en/US/prod/collateral/ps4159/ps6409/ps4358/product_data_sheet09186a00801bc698.html

This section provides the following information:

- Cisco Fibre Channel SFP+ Transceivers, page 1-57

- Optical Specifications for Cisco CWDM SFP Transceivers, page 1-61

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

Table 1-7 lists the Fibre Channel SFP+ transceivers available through Cisco Systems for the Cisco MDS 9148S switch.

Table 1-7 Cisco Fibre Channel SFP + Transceivers for the Cisco MDS 9148S Switch

Part Number	Description	Type
DS-SFP-FC16G-SW	Cisco MDS 4/8/16-Gbps Fibre Channel SW SFP+, LC	Short wavelength
DS-SFP-FC16G-LW	Cisco MDS 4/8/16-Gbps Fibre Channel LW SFP+, LC	Long wavelength
DS-SFP-FC8G-SW	Cisco MDS 2/4/8-Gbps Fibre Channel SW SFP+, LC	Short wavelength
DS-SFP-FC8G-LW	Cisco MDS 2/4/8-Gbps Fibre Channel LW SFP+, LC	Long wavelength
DS-SFP-FC8G-ER	Cisco MDS 2/4/8-Gbps Fibre Channel Extended Reach SFP+, LC	Extended Reach
DS-CWDM8Gxxxx	Cisco MDS 2/4/8-Gbps CWDM Long Distance SFP, LC	Long Distance

General Specifications for Cisco Fibre Channel 16 Gbps SFP+ Transceivers

Table 1-8 summarizes cabling specifications for 16 Gbps.

Table 1-8 Cisco 16-Gbps Fibre Channel SFP+ Cabling Specifications

SFP+	Wavelength (nanometers)	Fiber Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance
DS-SFP-FC16G-SW	850	MMF	62.5	14.025	15 m (49 ft) (OM1)
			50.0	14.025	35 m (115 ft) (OM2)
			50.0	14.025	100 m (328 ft) (OM3)
			50.0	14.025	
			62.5	8.5	125 m (410 ft) (OM4)
			50.0	8.5	21 m (69 ft) (OM1)
			50.0	8.5	50 m (164 ft) (OM2)
			50.0	8.5	150 m (492 ft) (OM3)
			62.5	4.25	
			50.0	4.25	190 m (623 ft) (OM4)
			50.0	4.25	
			50.	4.25	70 m (230 ft) (OM1)
					150 m (492 ft) (OM2)
					380 m (1247 ft) (OM3)
					400 m (1312 ft) (OM4)
DS-SFP-FC16G-LW	1310	SMF	9.0	14.025	10 km (6.2 mi)
			9.0	8.5	10 km (6.2 mi)
			9.0	4.25	10 km (6.2 mi)

Environmental Conditions and Power Requirements 16 Gbps

Table 1-9 provides the optical parameters for 16 Gbps.

Table 1-9 Optical Parameters for 16 Gbps

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dB)		
	Max	Min	Max	Min	62.5 microns [OM1])	(50.0 microns [OM2])	(50.0 microns [OM3])
DS-SFP-FC16G-SW	-1.3	7, 8	0	-10.3	2.08 (4 Gbps) 1.68 (8 Gbps) 1.63 (16 Gbps)	2.08 (4 Gbps) 1.68 (8 Gbps) 1.63 (16 Gbps)	2.88 (4 Gbps) 2.04 (8 Gbps) 1.86 (16 Gbps)
DS-SFP-FC16G-LW	2.0	-5.0	2.0	10	7.8 (4 Gbps) 6.4 (8 Gbps) 6.4 (16 Gbps)		

Table 1-10 provides information on operating and storage temperature ranges

Table 1-10 Operating and Storage Temperature Ranges for 16 Gbps

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

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

Table 1-11 summarizes cabling specifications for 8 Gbps.

Table 1-11 Cisco 8-Gbps Fibre Channel SFP+ Cabling Specifications

SFP+	Wavelength (nanometers)	Fiber Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance
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 (OM2)	2.125	300 m (984 ft)
			50.0 (OM2)	4.250	150 m (492 ft)
			50.0 (OM2)	8.500	50 m (164 ft)
			50.0 (OM3)	2.125	500 m (1640 ft)
			50.0 (OM3)	4.250	380 m (1246 ft)
			50.0 (OM3)	8.500	150 m (492 ft)
			50.0 (OM4)	2.125	520 m (1706 ft)
			50.0 (OM4)	4.250	400 m (1312 ft)
			50.0 (OM4)	8.500	190 m (623 ft)
DS-SFP-FC8G-LW	1310	SMF	9.0	2.125	10 km (6.2 mi)
			9.0	4.250	10 km (6.2 mi)
			9.0	8.500	10 km (6.2 mi)
DS-SFP-FC8G-ER	1550	SMF	9.0	2.125	40 km (24.85 mi)
			9.0	4.250	40 km (24.85 mi)
			9.0	8.500	40 km (24.85 mi)

Environmental Conditions and Power Requirements for 8 Gbps

Table 1-12 provides the optical parameters for 8 Gbps.

Table 1-12 Optical Parameters for 8 Gbps

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dB)		
	Max	Min	Max	Min	62.5 microns [OM1])	(50.0 microns [OM2])	(50.0 microns [OM3])
DS-SFP-FC8G-SW	-1.3	-10 (2 Gbps) -9 (4 Gbps) -8.2 (8 Gbps)	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	-3 (2 Gbps) -1 (4 Gbps) 0.5 (8 Gbps)	-11.7 (2 Gbps) -8.4 (4 Gbps) -8.4 (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	-4.7	-1	—		10.9	

Table 1-13 provides information on operating and storage temperature ranges for 8 Gbps.

Table 1-13 Operating and Storage Temperature Ranges for 8 Gbps

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

Optical Specifications for Cisco CWDM SFP Transceivers

Table 1-14 provides the optical specifications for CWDM SFP transceivers. CWDM SFP transceivers have an optical link budget of 28 decibels (db).

Note The parameters are specified over temperature and at end of life unless otherwise noted.

Note 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.

Table 1-14 Optical Specifications for Cisco CWDM SFP Transceivers

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Transmitter central wavelength	λ_c	(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	@ 2.12 Gbps