



## Technical Specifications

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## Switch Specifications

The following table lists the environmental specifications for the Cisco MDS 9396S switch.

**Table 1: Environmental Specifications for the Cisco MDS 9396S 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

The following table lists the physical specifications for the Cisco MDS 9396S switch.

**Table 2: Cisco MDS 9396S Switch Specifications**

Description	Specification
Cisco MDS 9396S Switch Dimensions	Width = 17.16 inch (43.59 cm) Height = 1.72 inch (4.37 cm) Depth = 16.34 inch (41.50 cm)
Rack Unit (RU)	Chassis requires 2 RU (1.75 in. or 4.45 cm)

Description	Specification
Weight	19.84 lb (9 kg) (with two fan modules and two power supplies installed)
Power Supply	1200 W with 180-264 VAC input; 800 W with 90-180 VAC input Part Number: DS-CAC-1200W-E Power cord: Notched C13 socket connector connecting to C14 plug on power supply 100 to 240V AC (10% range) 50 to 60 Hz (nominal)
Airflow	Port side exhausted. 110 linear feet per minute (LFM) through the system and a maximum of 255 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

### General Power Supply Specifications

The following table lists the specifications for the Cisco MDS 9396S switch AC input power supply.

AC Input Power	Specification
AC input voltage	Minimum = 90 VAC Nominal = 100 to 240 VAC Maximum = 264 VAC
Power consumption (maximum)	700 W (on base model configuration running 16 Gbps 100% traffic load at 25° C) 800 W (on fully populated configuration running 16 Gbps 100% traffic load at 25° C) <b>Note</b> For plug current rating, see the <a href="#">Jumper Power Cord</a> section.
AC input frequency	Nominal = 50 to 60 Hz
Power supply output capacity	1200 W

AC Input Power	Specification
Power supply output voltage	12 V +/- 5% up to 66.67 A (90-180 VAC input) 12 V +/- 5% up to 66.67 A (180-264 VAC input)
Output holdup time	20 ms when input > 100 VAC

## Power Supply Requirements Specifications

The following table provides a sample calculation of power for the Cisco MDS 9396S switch AC input power supply.

**Table 3: Power Dissipation for AC Input Power Supply**

Cisco MDS 9396T Switch	Port Number	AC Power (Volt)	AC Power (Watt)
Typical Case	48 ports	220	675.41
	48ports	110	705.46
	96 ports	220	732.12
	96 ports	110	765.47



**Note** 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 4: Power Supply Fuse Information**

Part Number	PID	Type	Fuse Rated AMP	I2T	Fuse Melting Time
341-100316-02	DSCAC-1200WE	Fast acting	16 A	384	1000 s@28 A, 0.1 s@90 A
341-100315-02	DS-CAC-1200W			260	2.77 hrs@17 A, 0.1 s@55 A

## Connection Guidelines for AC-Powered Systems

For connecting the Cisco MDS 9396S 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 9396S 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 9396S 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 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 available through Cisco Systems for the Cisco MDS 9396S switch.

**Table 5: Cisco Fibre Channel SFP+ Transceivers for the Cisco MDS 9396S Switch**

Part Number	Description	Type
DS-SFP-FC10G-SW	Cisco MDS 10-Gbps Fibre Channel SW SFP+, LC	Short wavelength
DS-SFP-FC10G-LW	Cisco MDS 10-Gbps Fibre Channel LW SFP+, LC	Long wavelength
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

Part Number	Description	Type
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

The following table summarizes cabling specifications for 16 Gbps.

**Table 6: General Specifications for Cisco 16-Gbps Fibre Channel SFP+ Transceivers**

SFP+	Wavelength (nm)	Fibre 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	125 m (410 ft) (OM4)
			62.5	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)
			50.0	8.5	190 m (623 ft) (OM4)
			62.5	4.25	70 m (230 ft) (OM1)
			50.0	4.25	150 m (492 ft) (OM2)
			50.0	4.25	380 m (1247 ft) (OM3)
			50.0	4.25	400 m (1312 ft) (OM4)

SFP+	Wavelength (nm)	Fibre Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance
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

The following table provides the optical parameters for 16 Gbps.

**Table 7: 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)	2.08 (4 Gbps)	2.88 (4 Gbps)
					1.68 (8 Gbps)	1.68 (8 Gbps)	2.04 (8 Gbps)
					1.63 (16 Gbps)	1.63 (16 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)		

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

**Table 8: Operating and Storage Temperature Ranges for 16 Gbps**

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

## General Specifications for Cisco Fibre Channel 10 Gbps SFP+ Transceivers

The following table summarizes cabling specifications for 10 Gbps.

**Table 9: General Specifications for Cisco 10-Gbps Fibre Channel SFP+ Transceivers**

SFP+	Wavelength (nm)	Fibre Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance
DS-SFP-FC10G-SW	850	MMF	62.5 (OM1)	10.518	33 m (104 ft)
			50.0 (OM3)	10.518	82 m (269 ft)
			50.0 (OM3)	10.518	300 m (984 ft)
DS-SFP-FC10G-LW	1310	SMF	9.0	10.518	10 km (6.2 mi)

## Environmental Conditions and Power Requirements 10 Gbps

The following table provides the optical parameters for 16 Gbps.

**Table 10: Optical Parameters for 16 Gbps**

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dB)
	Max	Min	Max	Min	
DS-SFP-FC10G-SW	-1.3	7.3	-1.0	-9.9	7.3
DS-SFP-FC10-LW	-0.5	-8.2	-1.0	-9.9	7.4

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

**Table 11: Operating and Storage Temperature Ranges for 10 Gbps**

SFP+	Operating		Storage	
	Max	Min	Max	Min
DS-SFP-FC10G-SW	70°C	0°C	85°C	-40°C
DS-SFP-FC10-LW	70°C	0°C	85°C	-40°C

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

The following table summarizes cabling specifications for 8 Gbps.

**Table 12: General Specifications for Cisco 8-Gbps Fibre Channel SFP+ Transceivers**

SFP+	Wavelength (nm)	Fibre 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	1310	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

The following table provides the optical parameters for 8 Gbps.

**Table 13: 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])

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dB)		
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-FC8G-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	10.9

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

**Table 14: Operating and Storage Temperature Ranges for 8 Gbps**

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

## Optical Specifications for Cisco CWDM SFP Transceivers

The following table 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. 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	$\lambda_c$	(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<math>10^{-12}</math> with PRBS <math&gt;2^7-1&lt; math&gt;)<="" td=""> <td><math>P_{in}</math></td> <td>-28.0</td> <td></td> <td>-7.0</td> <td>dBm</td> <td>@ 2.12 Gbps, 140°F (60°C) case temp.</td> </math&gt;2^7-1&lt;>	$P_{in}$	-28.0		-7.0	dBm	@ 2.12 Gbps, 140°F (60°C) case temp.
Receiver optical input wavelength	$\lambda_{in}$	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