



APPENDIX **B**

Technical Specifications

This appendix includes the following sections:

- [Switch Specifications, page B-1](#)
- [Module Specifications, page B-2](#)
- [Power Specifications, page B-4](#)
- [X2 Transceiver Specifications, page B-6](#)
- [SFP Transceiver Specifications, page B-9](#)



Note

Specifications for cables and connectors are provided in [Appendix C, “Cable and Port Specifications.”](#)

Switch Specifications

This section provides switch specifications for the Cisco MDS 9200 Series.

[Table B-1](#) lists the environmental specifications for the Cisco MDS 9200 Series.

Table B-1 *Environmental Specifications for the Cisco MDS 9200 Series*

Description	Specification
Temperature, certified for operation	32 to 104°F (0 to 40°C)
Temperature, designed and tested for operation	32 to 130°F (0 to 55°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, certified for operation	0 to 6500 ft (0 to 2000 m)
Altitude, designed and tested for operation	-200 to 10000 ft (-60 to 3000 m)
Noise levels	70 dB

Table B-2 lists the physical specifications for the Cisco MDS 9200 Series.

Table B-2 Physical Specifications for the Cisco MDS 9200 Series

Description	Specification
Dimensions (HxWxD)	5.25 x 17.5 x 22.75 in. (13.3 x 44.5 x 57.8 cm) Chassis requires 3 RU ¹ . Chassis depth including cable guide is 27.75 in. (70.3 cm).
Weight	Chassis only: 31 lb (14.1 kg). Chassis configured with one supervisor module, fan module, and two power supplies: 53.3 lb (24.3 kg).
Power supply	845-W AC input for each power supply
Airflow	300 lfm ² through system fan module, or 80 cfm ³ per supervisor, switching, or services module. Total of 160 cfm if slot 2 is filled. Spacing requirements: <ul style="list-style-type: none"> • If installed in a cabinet, a minimum of 2.5 in. (6.4 cm) is required between the chassis air vents and the cabinet walls. • If installed in an open rack (no side panels), the horizontal distance required between the chassis and any devices that exhaust air towards the chassis is a minimum of 6 in. (15.2 cm), and the distance required between the chassis air vents and any walls is a minimum of 2.5 in. (6.4 cm).

1. RU = rack unit; 1 RU = 1.75 inches (4.45 cm)

2. lfm = linear feet per minute

3. cfm = cubic feet per minute

Table B-3 lists the specifications for the Cisco MDS 9200 Series supervisor module (which is fixed in the chassis) and the switching and services modules.

Module Specifications

This section provides the Cisco MDS 9200 Series module specifications.

Table B-3 Cisco MDS 9200 Series Module Specifications

Description	Specification
Environmental Requirements	
Temperature, certified for operation	32 to 104°F (0 to 40°C)
Temperature, designed and tested for operation	32 to 130°F (0 to 55°C)
Temperature, ambient nonoperating and storage	-40 to 167°F (-40 to 75°C)
Humidity (RH), ambient (noncondensing) operating	10 to 90%
Altitude, certified for operation	0 to 6500 ft (0 to 2000 m)

Table B-3 Cisco MDS 9200 Series Module Specifications (continued)

Description	Specification
Altitude, designed and tested for operation	-200 to 10000 ft (-60 to 3000 m)
Physical Characteristics	
Dimensions	1.75 x 15.5 x 16.5 in. (4.4 x 39.4 x 41.9 cm) Note These are the maximum dimensions of faceplate and board, and include connectors on board.
Weight	8 to 11.5 lb (1.4 to 5.2 kg)

Table B-4 lists the specifications for the batteries on the Cisco MDS 9000 Family Caching Services Module.

Table B-4 Caching Services Module Battery Specifications

Description	Specification
Nominal voltage	9.6 V
Rated capacity	Typical discharge capacity at 0.2C rate: 2100 mAh
	Minimum discharge capacity at 0.2C rate: 2000 mAh
	Minimum discharge capacity at 5C rate: 1800 mAh (1V/cell discharge cut-off)
Discharge	The battery is capable of continuous discharge from (41 to 140°F (5 to +60°C) at 5C-rate
Charge	From 32 to 59°F (0 to 15°C) at C/10 rate and from 59 to 104°F (15 to 40°C) at C/2-rate
Storage temperature	32 to 95°F (0 to 35°C)
Relative humidity range	From 5 to 90%

Weight of Modules

Table B-5 lists the weight for each module in the Cisco MDS 9000 Family.

Table B-5 Weight of Modules in the Cisco MDS 9000 Family

Module	Weight
48-port 4-Gbps switching module	11.0 lb (4.99 kg)
24-port 4-Gbps switching module	7.75 lb (3.5 kg)
12-port 4-Gbps switching module	7.5 lb (3.40 kg)
4-Port 10-Gbps switching module	8.5 lb (3.86 kg)
32-port FC switching module	9 lb (4.1 kg)
16-port FC switching module	9 lb (4.1 kg)
SSM	11 lb (5 kg)

Table B-5 *Weight of Modules in the Cisco MDS 9000 Family (continued)*

Module	Weight
CSM	11.5 lb (5.2 kg)
ASM	11 lb (5 kg)
IPS-8	10 lb (4.5 kg)
IPS-4	9 lb (4.1 kg)
MSM-18/4	8.5 lb (3.86 kg)
MSFM-18/4	8.5 lb (3.86 kg)
MPS-14/2	10 lb (4.5 kg)
Supervisor-2 for MDS 9500 Series	7.25 lb (kg)
Supervisor-1 for MDS 9500 Series	9 lb (4.1 kg)
Supervisor for MDS 9200 Series	9 lb (4.1 kg)
Module blank panels	0.50 lb (0.25 kg)

Power Specifications

This section includes the following topics:

- [Specifications for the Cisco MDS 9200 Series Power Supplies, page B-4](#)
- [Component Power Requirements and Heat Dissipation Specifications, page B-5](#)

Specifications for the Cisco MDS 9200 Series Power Supplies

[Table B-6](#) lists the specifications for the Cisco MDS 9200 Series power supply, which is 845 W and accepts AC input.

Table B-6 *Specifications for the Cisco MDS 9200 Series Power Supply*

Description	Specification ¹
Voltage	100 to 240 VAC ($\pm 10\%$)
Current rating	12 A at 100 to 120 VAC 5 A at 200 to 240 VAC
Frequency	50/60 Hz (nominal) (± 3 Hz for full range)
Output capacity	845 W
Output voltage	+3.3 V at 10 A +50 V at 16.2 A

1. Autoranging input with power factor corrector

Component Power Requirements and Heat Dissipation Specifications

Consider heat dissipation when sizing the air-conditioning requirements for an installation. The power and heat associated with a Cisco MDS 9200 Series varies based upon the following considerations:

- Switching module type and number of switching modules installed
- Average switching traffic levels

Table B-7 lists the power requirements and heat dissipation for the components of the Cisco MDS 9200 Series.


Note

Unless noted otherwise, the data in Table B-7 is based on worst-case conditions. Typical numbers are approximately 30 percent below the numbers listed here.

Table B-7 Power Requirements and Heat Dissipation for the 845-W Power Supply

Module Type / Product Number	SAN-OS Release	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current			
				90 VAC (amps)	120 VAC (amps)	180 VAC (amps)	240 VAC (amps)
Cisco MDS 9222i chassis with fan module DS-C9222i-K9	3.2(1)	60	256	0.83	0.63	0.42	0.31
Cisco MDS 9222i fixed supervisor module (18-port Fibre Channel and 4-port Gigabit Ethernet module)	3.2(1)	200	855	2.78	2.08	1.39	1.04
Cisco MDS 9216i chassis with fan module DS-C9216i-K9	3.x	60	256	0.83	0.63	0.42	0.31
	2.x and 1.x	38	164	0.53	0.40	0.27	0.20
Cisco MDS 9216A chassis with fan module DS-C9216A-K9	3.x	60	256	0.83	0.63	0.42	0.31
	2.x and 1.x	38	164	0.53	0.40	0.27	0.20
Cisco MDS 9216i fixed supervisor module (14-port Fibre Channel and 2-port Gigabit Ethernet module)	3.x	200	854	2.78	2.08	1.39	1.04
	2.x and 1.x	227	970	3.15	2.37	1.57	1.19
Cisco MDS 9216A fixed supervisor module (16-port Fibre Channel module, 1Gbps/2Gbps)	3.x	210	897	2.92	2.19	1.46	1.09
	2.x and 1.x	220	940	3.05	2.29	1.53	1.15
48-port 4-Gbps switching module, DS-X9148	3.x	185	790	2.57	1.93	1.28	0.96
	2.x and 1.x	—	—	—	—	—	—
24-port 4-Gbps switching module, DS-X9124	3.x	147	628	2.04	1.53	1.02	0.77
	2.x and 1.x	—	—	—	—	—	—
12-port 4-Gbps switching module, DS-X9112	3.x	132	564	1.83	1.38	0.92	0.69
	2.x and 1.x	—	—	—	—	—	—
4-Port 10-Gbps switching module, DS-X9704	3.x	172	734	2.39	1.79	1.19	0.90
	2.x and 1.x	—	—	—	—	—	—

Table B-7 Power Requirements and Heat Dissipation for the 845-W Power Supply (continued)

Module Type / Product Number	SAN-OS Release	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current			
				90 VAC (amps)	120 VAC (amps)	180 VAC (amps)	240 VAC (amps)
32-port 1-Gbps/2-Gbps Fibre Channel module, DS-X9032	3.x	191	816	2.65	1.99	1.33	0.99
	2.x and 1.x	200	855	2.78	2.08	1.39	1.04
16-port 1-Gbps/2-Gbps Fibre Channel module, DS-X9016	3.x	210	897	2.92	2.19	1.46	1.09
	2.x and 1.x	200	940	3.05	2.29	1.53	1.15
MSM-18/4 module DS-X9304-18K9	3.2(1)	200	855	2.78	2.08	1.39	1.04
MSFM-18/4 module DS-X9304-18FK9	3.2(1)	200	855	2.78	2.08	1.39	1.04
MPS-14/2 DS-X9302-14K9	3.x	200	854	2.78	2.08	1.39	1.04
	2.x and 1.x	227	970	3.15	2.37	1.57	1.19
8-port IPS module DS-X9308-SMIP	3.x	200	854	2.78	2.08	1.39	1.04
	2.x and 1.x	220	940	3.05	2.29	1.53	1.15
4-port IPS module DS-X9304-SMIP	3.x	160	683	2.22	1.67	1.11	0.83
	2.x and 1.x	185	789	2.57	1.93	1.28	0.96
32-port SSM, DS-X9032-SSM	3.x	281	1200	3.90	2.93	1.95	1.46
	2.x and 1.x	295	1260	4.10	3.07	2.05	1.54
32-port ASM DS-X9032-SMV	3.x	281	1200	3.90	2.93	1.95	1.46
	2.x and 1.x	295	1260	4.10	3.07	2.05	1.54
CSM, DS-X9560-SMC	3.x	200	854	2.78	2.08	1.39	1.04
	2.x and 1.x	210	907	2.95	2.22	1.48	1.11

X2 Transceiver Specifications

The Cisco MDS 9200 Series is compatible with X2 transceivers and cables that have SC 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.

Use only Cisco X2 transceivers on the Cisco MDS 9200 Series. Each Cisco X2 transceiver is encoded with the model information that enables the switch to verify that the SFP transceiver meets the requirements for the switch.

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

Cisco 10-Gbps Fibre Channel X2 Transceivers

Table B-8 lists the Cisco 10-Gbps Fibre Channel X2 transceivers.

Table B-8 Cisco 10-Gbps Fibre Channel X2 Transceivers

Transceiver Module Product Number	Description	Type
DS-X2-FC10G-SR	10-Gbps Fibre Channel SR, X2, SC	Short Reach
DS-X2-FC10G-LR	10-Gbps Fibre Channel LR, X2, SC	Long Reach
DS-X2-FC10G-ER	10-Gbps Fiber Channel ER, X2, SC	Extended Reach
DS-X2-FC10G-CX4	10-Gbps Fiber Channel Copper, X2, CX4	–

General Specification for Cisco 10-Gbps Fibre Channel X2 Transceivers

Table B-9 provides the general specifications for Cisco 10-Gbps Fibre Channel X2 transceivers.

Table B-9 General Specifications for the Cisco 10-Gbps Fibre Channel X2 Transceivers

X2	Wavelength (nanometer)	Fibre Type	Core Size (micon)	Baud Rate (GBd)	Cable Distance
DS-X2-FC10G-SR	850	MMF	62.5	10.51875	33 m (108 ft)
			50.0 (OM3)	10.51875	300 m (984 ft)
DS-X2-FC10G-LR	1310	SMF	9.0	10.51875	24.8 miles (40 km)
DS-X2-FC10G-ER	1550	SMF	9.0	10.51875	6.2 miles (10 km)
DS-X2-FC10G-CX4	–	Copper	–	10.51875	15 m (49.2 ft)



Note

The minimum cable distance for all the transceivers such as, multi mode fiber (MMF) and single-mode fiber (SMF), except CX4 is 2 meters (6.5 feet).

Environmental Conditions and Power Requirement Specifications for Cisco 10-Gbps Fibre Channel X2 Transceivers

Table B-10 provides the power requirement specifications for Cisco 10-Gbps Fibre Channel X2 transceivers.

Table B-10 Power Requirement Specifications for Cisco 10-Gbps Fibre Channel X2 Transceivers

X2	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dBm)
	Maximum	Minimum	Maximum	Minimum	
DS-X2-FC10G-SR	-1.2	-7.3	-1.0	-9.9	2.6 (50.0 micron-OM3)
DS-X2-FC10G-LR	0.5	-8.2	0.5	-14.4	6.2
DS-X2-FC10G-ER	4.0	-4.7	-1.0	-15.8	11.1

**Note**

DS-X2-FC10G-CX4 is not an optical module; therefore, it is not listed in [Table B-10](#).

[Table B-11](#) provides the environmental specifications for the Cisco 10-Gbps Fibre Channel X2 transceivers.

Table B-11 Environmental Specifications for the Cisco 10-Gbps Fibre Channel X2 Transceivers

X2	Operating		Storage	
	Maximum	Minimum	Maximum	Minimum
DS-X2-FC10G-SR	40°C	0°C	85°C	-40°C
DS-X2-FC10G-LR	40°C	0°C	85°C	-40°C
DS-X2-FC10G-ER	40°C	0°C	85°C	-40°C
DS-X2-FC10G-CX4	40°C	0°C	85°C	-40°C

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

Cisco 10-Gbps Ethernet X2 Transceivers

[Table B-12](#) lists the Cisco 10-Gbps Ethernet X2 transceivers.

Table B-12 Cisco 10-Gbps Ethernet X2 Transceivers

Transceiver Module Product Number	Description	Type
DS-X2-E10G-SR	10-Gbps Ethernet Short Reach, X2, SC	Short reach

General Specification for Cisco 10-Gbps Ethernet X2 Transceivers

[Table B-13](#) provides the general specifications for Cisco 10-Gbps Ethernet X2 transceivers.

Table B-13 General Specifications for the Cisco 10-Gbps Ethernet X2 Transceivers

X2	Wavelength (nanometer)	Fiber Type	Core Size (micon)	Baud Rate (GBd)	Cable Distance
DS-X2-E10G-SR	850	MMF	62.5	10.3125	33 (108 ft)
			50.0 (OM3)	10.3125	300 (984 ft)

**Note**

The minimum cable distance for the MMF transceiver listed above is 2 meters (6.5 feet).

Environmental and Power Requirements Specifications for Cisco 10-Gbps Ethernet X2 Transceiver

Table B-14 provides the power requirement specifications for the Cisco 10-Gbps Ethernet X2 transceiver.

Table B-14 Power Requirement Specification for Cisco 10-Gbps Ethernet X2 Transceivers

X2	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dBm)
	Maximum	Minimum	Maximum	Minimum	
DS-X2-E10G-SR	-1.2	-7.3	-1.0	-9.9	2.6 (50.0 micron-OM3)

Table B-15 provides the environmental specifications for the Cisco 10-Gbps Ethernet X2 transceivers.

Table B-15 Environmental Specifications for Cisco 10-Gbps Ethernet X2 Transceiver

X2	Operating		Storage	
	Maximum	Minimum	Maximum	Minimum
DS-X2-E10G-SR	40°C	0°C	85°C	-40°C

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

SFP Transceiver Specifications

The Cisco MDS 9200 Series 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 support 850 to 1610 nm nominal wavelengths, depending upon the transceiver.

Use only Cisco SFP transceivers on the Cisco MDS 9200 Series. 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.



Note

Generation 2 modules will not support 1-Gbps/2-Gbps SFPs. Generation 2 modules only support 4-Gbps SFPs.

This section provides the following topics:

- [Cisco Fibre Channel SFP Transceivers, page B-10](#)
- [Cisco Fibre Channel/Gigabit Ethernet Transceivers, page B-13](#)
- [Cisco CWDM SFP Transceivers, page B-15](#)
- [Cisco Gigabit Ethernet Transceivers, page B-19](#)
- [DWDM Fibre Channel SFP Transceivers, page B-20](#)

Cisco Fibre Channel SFP Transceivers

Table B-16 lists the Cisco 2-Gbps and 4-Gbps Fibre Channel SFP transceivers.

Table B-16 Cisco 2-Gbps and 4-Gbps Fibre Channel SFP Transceivers

Transceiver Module Product Number	Description	Type
DS-SFP-FC4G-SW	1/2/4-Gbps Fibre Channel SW, SFP, LC	Short wavelength
DS-SFP-FC4G-MR	1/2/4-Gbps Fibre Channel LW 4-km, SFP, LC	Long wavelength
DS-SFP-FC4G-LW	1/2/4-Gbps Fibre Channel LW 10-km, SFP, LC	Long wavelength
DS-SFP-FC-2G-SW	1/2-Gbps Fibre Channel SW, SFP, LC	Short wavelength
DS-SFP-FC-2G-LW	1/2-Gbps Fibre Channel LW, SFP, LC	Long wavelength

General Specifications for Cisco 4-Gbps Fibre Channel SFP Transceivers

Table B-17 provides the general specifications for Cisco Fibre Channel SFP transceivers.

Table B-17 General Specifications for Cisco 4-Gbps Fibre Channel SFP Transceivers

SFP	Wavelength (nanometer)	Fibre Type	Core Size (micron)	Baud Rate (GBd)	Cable Distance (meter)
DS-SFP-FC4G-SW	850	MMF	62.5	1.0625	300 m (984 ft)
			62.5	2.125	150 m (492 ft)
			62.5	4.250	70 m (230 ft)
			50.0 (OM2)	1.0625	500 m (1640 ft)
			50.0 (OM2)	2.125	300 m (984 ft)
			50.0(OM2)	4.250	150 m (492 ft)
			50. 0 (OM3)	1.0625	860 m (2821 ft)
			50. 0 (OM3)	2.125	500 m (1640 ft)
DS-SFP-FC4G-MR	1310	SMF	9.0	1.0625	6.2 miles (10 km)
			9.0	2.125	2.4 miles (4 km)
			9.0	4.250	2.4 miles (4 km)
DS-SFP-FC4G-LW	1310	SMF	9.0	1.0625	6.2 miles (10 km)
			9.0	2.125	6.2 miles (10 km)
			9.0	4.250	2.4 miles (4 km)



Note

The minimum cable distance for all the transceivers, such as MMF and SMF, is 2 meters (6.5 feet).

Environmental and Power Requirement for Cisco 4-Gbps Fibre Channel SFP Transceivers

Table B-18 provides the power specification for the Cisco 4-Gbps Fibre Channel SFP transceivers.

Table B-18 Power Requirement Specification for Cisco 4-Gbps Fibre Channel SFP Transceivers

SFP	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dBm)
	Maximum	Minimum	Maximum	Minimum	
DS-SFP-FC4G-SW	-1.2	-9	0	–	1.78 (62.5 micron), 2.06 (50 micron - OM2), 4.48 (50 micron - OM3)
DS-SFP-FC4G-MR	-3	-11.2	-1	–	4.8
DS-SFP-FC4G-LW	-3	-8.4	-1.0	–	7.8

Table B-19 provides the environment specification for the Cisco 4-Gbps Fibre Channel SFP transceivers.

Table B-19 Environmental Specifications for Cisco 4-Gbps Fibre Channel SFP Transceivers

SFP	Operating		Storage	
	Maximum	Minimum	Maximum	Minimum
DS-SFP-FC4G-SW	40°C	0°C	85°C	-40°C
DS-SFP-FC4G-MR	40°C	0°C	85°C	-40°C
DS-SFP-FC4G-LW	40°C	0°C	85°C	-40°C

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

General Specifications for Cisco 2-Gbps Fibre Channel SFP Transceivers

Table B-20 provides general specification for the 4-Gbps Fibre Channel SFP transceiver.

Table B-20 General Specifications for Cisco 4-Gbps Fibre Channel SFP Transceivers

SFP	Wavelength (nanometer)	Fibre Type	Core Size (micon)	Baud Rate (GBd)	Cable Distance (meter)
DS-SFP-FC-2G-SW	850	MMF	62.5	1.0625	300 m (984 ft)
			62.5	2.125	150 m (492 ft)
			50.0 (OM2)	1.0625	500 m (1640 ft)
			50.0 (OM)	2.125	300 m (984 ft)
DS-SFP-FC-2G-LW	1310	SMF	9.0	1.0625	6.2 miles (10 km)
			9.0	2.125	6.2 miles (10 km)



Note

The minimum cable distance for both the transceivers such as MMF and SMF is 2 meters (6.5 feet).

Environmental and Power Requirement for Cisco 2-Gbps Fibre Channel SFP Transceivers

Table B-21 provides the power specification for Cisco 2-Gbps Fibre Channel SFP transceivers.

Table B-21 Power Requirement Specification for Cisco 2-Gbps Fibre Channel SFP Transceivers

SFP	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dBm)
	Maximum	Minimum	Maximum	Minimum	
DS-SFP-FC-2G-SW	-1.2	-10.0	0	–	2.1 (62.5 micron), 2.62 (50 micron -OM2)
DS-SFP-FC-2G-LW	-3	-11.7	-3	–	7.8

Table B-22 provides the environmental specification for Cisco 2-Gbps Fibre Channel SFP transceivers.

Table B-22 Environmental Specifications for Cisco 2-Gbps Fibre Channel SFP Transceivers

SFP	Operating		Storage	
	Maximum	Minimum	Maximum	Minimum
DS-SFP-FC-2G-SW	40°C	0°C	85°C	-40°C
DS-SFP-FC-2G-LW	40°C	0°C	85°C	-40°C

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

Maximum Environmental and Electrical Ratings for Cisco Fibre Channel SFP Transceivers

Table B-23 provides the maximum environmental and electrical ratings for Cisco Fibre Channel SFP transceivers.

Table B-23 Maximum Environmental and Electrical Ratings for Cisco Fibre Channel SFP Transceivers

Parameter ¹	Symbol	Min.	Max. ²	Unit	Notes
Storage temperature	T _S	-40	85	°C	1
Case temperature	T _C	0	70	°C	1, 2
Relative humidity	RH	5	95	%	1

1. Do not operate outside the recommended operating conditions. Device reliability may be affected and damage to the device may occur over an extended period of time.
2. Absolute maximum ratings are those values beyond which damage to the device may occur if these limits are exceeded for other than a short period of time.

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

Cisco Fibre Channel/Gigabit Ethernet Transceivers

Table B-24 lists the combination Fibre Channel/Gigabit Ethernet SFP transceivers.

Table B-24 Cisco Fibre Channel/Gigabit Ethernet SFP Transceivers

Transceiver Module Product Number	Description	Type
DS-SFP-FCGE-LW	1-Gbps Ethernet and 1-Gbps/2-Gbps Fibre Channel-LW SFP, LC	Long wavelength
DS-SFP-FCGE-SW	1-Gbps Ethernet and 1-Gbps/2-Gbps Fibre Channel-SW SFP, LC	Short wavelength

General Specifications for Cisco Fibre Channel/Gigabit Ethernet SFP Transceivers

Table B-25 provides general specification for Cisco Fibre Channel/Gigabit Ethernet SFP transceiver.

Table B-25 General Specifications for Cisco Fibre Channel/Gigabit Ethernet SFP Transceivers

SFP	Wavelength (nanometer)	Fibre Type	Core Size (micron)	Baud Rate (GBd)	Cable Distance (meter)
DS-SFP-FCGE-SW	850	MMF	62.5	1.0625	300 m (984 ft)
			62.5	2.125	150 m (492 ft)
			50.0 (OM2)	1.0625	500 m (1640 ft)
			50.0 (OM2)	2.125	300 m (984 ft)
DS-SFP-FCGE-LW	1310	SMF	9.0	1.0625	6.2 miles (10 km)
			9.0	2.125	6.2 miles (10 km)



Note

The minimum cable distance for both the transceivers listed above (multi-mode fiber (MMF)) and single-mode fiber (SMF) is 2 meters (6.5 feet).

Environmental and Power Requirement Specifications for Cisco Fibre Channel/Gigabit Ethernet SFP Transceivers

Table B-26 provides the power requirement specification for Cisco Fibre Channel/Gigabit Ethernet SFP transceivers.

Table B-26 Power Requirement Specification for Cisco Fibre Channel/Gigabit Ethernet SFP Transceivers

SFP	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dBm)
	Maximum	Minimum	Maximum	Minimum	
DS-SFP-FCGE-SW	-1.2	-10.0 (FC) -9.5 (GE)	0	-17 (GE)	2.1 (FC - 62.5 micron), 2.62 (FC - 50.0 micron) 2.38 (GE - 62.5 micron), 3.37 (FC - 50.0 micron)
DS-SFP-FCGE-LW	-3	-11.0	-3	-19 (GE)	7.8 (FC) 4.57 (GE)

Table B-27 provides the environmental specification for Cisco Fibre Channel/Gigabit Ethernet SFP transceivers.

Table B-27 Environmental Specifications for Cisco Fibre Channel/Gigabit Ethernet SFP Transceivers

SFP	Operating		Storage	
	Maximum	Minimum	Maximum	Minimum
DS-SFP-FCGE-SW	40°C	0°C	85°C	-40°C
DS-SFP-FCGE-LW	40°C	0°C	85°C	-40°C

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

Cisco CWDM SFP Transceivers

Table B-28 lists the Cisco 1-Gbps and 2-Gbps CWDM SFP transceivers.

Table B-28 Cisco 1-Gbps and 2-Gbps CWDM SFP Transceivers

Description	Color
Cisco CWDM SFP 1470 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Gray
Cisco CWDM SFP 1490 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Violet
Cisco CWDM SFP 1510 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Blue
Cisco CWDM SFP 1530 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Green
Cisco CWDM SFP 1550 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Yellow
Cisco CWDM SFP 1570 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Orange
Cisco CWDM SFP 1590 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Red
Cisco CWDM SFP 1610 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Brown

Table B-29 lists the Cisco 4-Gbps CWDM SFP transceivers available through Cisco.

Table B-29 Cisco 4-Gbps CWDM SFP Transceivers

Description	Color
DS-CWDM4G1470: Cisco MDS9000 1470 nm; CWDM 4-Gbps FC	Gray
DS-CWDM4G1490: Cisco MDS9000 1490 nm; CWDM 4-Gbps FC	Violet
DS-CWDM4G1510: Cisco MDS9000 1510 nm; CWDM 4-Gbps FC	Blue
DS-CWDM4G1530: Cisco MDS9000 1530 nm; CWDM 4-Gbps FC	Green
DS-CWDM4G1550: Cisco MDS9000 1550 nm; CWDM 4-Gbps FC	Yellow
DS-CWDM4G1570: Cisco MDS9000 1570 nm; CWDM 4-Gbps FC	Orange
DS-CWDM4G1590: Cisco MDS9000 1590 nm; CWDM 4-Gbps FC	Red
DS-CWDM4G1610: Cisco MDS9000 1610 nm; CWDM 4-Gbps FC	Brown

Environmental and Optical Specifications for Cisco 2-Gbps CWDM SFP Transceivers

Table B-30 provides the environmental specifications for the Cisco 2-Gbps CWDM SFP transceivers.

Table B-30 Environmental Specifications for Cisco 2-Gbps CWDM SFP Transceivers

SFP	Operating		Storage	
	Maximum	Minimum	Maximum	Minimum
All Cisco 2-Gbps CWDM SFP Transceivers	40°C	0°C	85°C	-40°C

Table B-31 provides the optical specifications for the Cisco 2-Gbps CWDM SFP transceivers.

Table B-31 Optical Specification for Cisco 2-Gbps CWDM SFP Transceivers

Parameters	Symbol	Minimum	Typical	Maximum	Units	Notes/Conditions
Transmitter Center Wavelength	λ_c	x-4	–	x+7	nm	Available center wavelengths are 1470, 1490, 1510, 1530, 1550, 1570, 1590, and 1610 nm
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	At 2.12 Gbps, 140°F (60°C) case temperature
Receiver Optical Input Power (BER <10 ⁻¹² with PRBS 2-7-1)	P_{in}	-29.0	–	-7.0	dBm	At 1.25 Gbps, 140°F (60°C) case temperature
Receiver Optical Input Wavelength	λ_{in}	1450	–	1620	nm	–
Transmitter Extinction Ratio	OMI	9	–	–	dB	–
Dispersion Penalty at 62.1 miles (100 km)	–	–	–	3	dB	At 2.12 Gbps
Dispersion Penalty at 62.1 miles (100 km)	–	–	–	2	dB	At 1.25 Gbps



Note

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

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

Environmental and Optical Specifications for Cisco 4-Gbps CWDM SFP Transceivers

Table B-32 provides the environmental specifications for the Cisco 4-Gbps CWDM SFP transceivers.

Table B-32 Environmental Specifications for Cisco 4-Gbps CWDM SFP Transceivers

SFP	Operating		Storage	
	Maximum	Minimum	Maximum	Minimum
All Cisco 4-Gbps CWDM SFP Transceivers	40°C	0°C	85°C	-40°C

Table B-33 provides the optical specifications for Cisco 4-Gbps CWDM SFP transceivers.

Table B-33 Optical Specification for Cisco 4-Gbps CWDM SFP Transceivers

Parameters	Symbol	Minimum	Typical	Maximum	Units	Notes/Conditions
Transmitter Center Wavelength	λ_c	(x-6)	x	x+6	nm	Available center wavelengths are 1470, 1490, 1510, 1530, 1550, 1570, 1590, and 1610 nm
Side-mode Suppression Ratio	SMSR	30	–	–	dB	–
Transmitter Optical Output Power	P_{out}	1.0	–	5.0	dBm	Average power coupled into single-mode fiber
Receiver Optical Input Power (BER <10 ⁻¹² with PRBS 2-23-1)	P_{in}	-15.7	–	0.0	dBm	140°F (60°C) case temperature
Link Budget	–	17.8	–	–	dB	–
Receiver Optical Input Wavelength	λ_{in}	1450	–	1620	nm	–
Transmitter Extinction Ratio	OMI	4	–	–	dB	–
Dispersion Penalty at 15.5 miles (25 km)	–	–	–	3	dB	–



Note

- In typical point-to-point deployments, all wavelengths have a minimum reach of 24.8 miles (40 km).
- Parameters are specified over temperature and at end of life unless otherwise noted.
- When shorter distances of single-mode fiber are used, it is necessary to insert an in-line optical attenuator in the link to avoid overloading the receiver.
- A maximum of 24 4-Gbps CWDM SFPs are supported in a single MDS switching module.

- When interoperating a Cisco 4-Gbps CWDM SFP transceiver with a Cisco 1/2-Gbps CWDM transceiver, the speed of ports on the Cisco 4-Gbps CWDM SFP transceiver must be manually configured to 1-Gbps or 2-Gbps.

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

Cisco Gigabit Ethernet Transceivers

Cisco Systems provides a 1-Gbps Gigabit Ethernet SFP transceiver used on the Cisco MDS 9000 IPS modules. [Table B-34](#) lists the transceiver supported on the Cisco MDS 9216.

Table B-34 Cisco Gigabit Ethernet SFP Transceivers

Transceiver Module Product Number	Description
DS-SFP-GE-T	1-Gbps Ethernet SFP



Note

DS-SFP-GE-T is not supported on Cisco MDS 9222.

General Specifications for Cisco Gigabit Ethernet Transceivers

[Table B-35](#) provides the general specification for the Cisco Gigabit Ethernet SFP transceiver.

Table B-35 General Specification for the Cisco Gigabit Ethernet SFP Transceivers

SFP	Cable Type	Cable Distance
DS-SFP-GE-T	Category 5 UTP	100 m (328 ft)

Environmental and Power Requirement Specifications for Cisco Gigabit Ethernet Transceivers

[Table B-36](#) provides the environmental specifications for the Cisco Gigabit Ethernet transceivers.

Table B-36 Environmental Specifications for Cisco Gigabit Ethernet Transceivers

SFP	Operating		Storage	
	Maximum	Minimum	Maximum	Minimum
DS-SFP-GE-T	40°C	0°C	85°C	-40°C

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

DWDM Fibre Channel SFP Transceivers

Fibre Channel ports on the Cisco MDS 9222i support 2-Gbps DWDM SFP transceivers. [Table B-37](#) lists the DWDM Fibre Channel transceivers supported on the Cisco MDS 9200 Series.


Note

A maximum of eight 2-Gbps DWDM SFPs are supported in a single MDS switching module.

Table B-37 Supported DWDM Fibre Channel SFP Transceivers for Cisco MDS 9200 Series

Part Number	Product Name
DWDM-SFP-6061	Cisco 6061 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5979	Cisco 5979 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5898	Cisco 5898 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5817	Cisco 5817 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5655	Cisco 5655 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5575	Cisco 5575 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5494	Cisco 5494 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5413	Cisco 5413 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5252	Cisco 5252 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5172	Cisco 5172 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5092	Cisco 5092 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-5012	Cisco 5012 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4851	Cisco 4851 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4772	Cisco 4772 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4692	Cisco 4692 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4612	Cisco 4612 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4453	Cisco 4453 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4373	Cisco 4373 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4294	Cisco 4294 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4214	Cisco 4214 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-4056	Cisco 4056 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3977	Cisco 3977 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3898	Cisco 3898 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3819	Cisco 3819 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3661	Cisco 3661 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3582	Cisco 3502 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3504	Cisco 3504 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3425	Cisco 3425 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3268	Cisco 3268 nm; DWDM 1/2-Gbps Fibre Channel SFP

Table B-37 Supported DWDM Fibre Channel SFP Transceivers for Cisco MDS 9200 Series

Part Number	Product Name
DWDM-SFP-3190	Cisco 3190 nm; DWDM 1/2-Gbps Fibre Channel SFP
DWDM-SFP-3112	Cisco 3112 nm; DWDM 1/2-Gbps Fibre Channel SF
DWDM-SFP-3033	Cisco 3033 nm; DWDM 1/2-Gbps Fibre Channel SF

