



CHAPTER **B**

Technical Specifications

This appendix includes the following technical specifications for the Cisco MDS 9100 Series Fixed Configuration Fabric Switch:

- [Switch Specifications, page B-1](#)
- [Power Specifications, page B-2](#)
- [SFP Transceiver Specifications, page B-4](#)
- [X2 Transceiver Specifications, page B-10](#)

Switch Specifications

[Table B-1](#) lists the environmental specifications for the Cisco MDS 9100 Series.

Table B-1 *Environmental Specifications for the Cisco MDS 9100 Series*

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 B-2](#) lists the physical specifications for the Cisco MDS 9100 Series.

Table B-2 Cisco MDS 9100 Series Switch Specifications

Description	Specification
Cisco MDS 9134 Switch Dimensions	Width = 17.16 in. (43.59 cm) Height = 1.72 in. (4.47 cm) Depth = 18.89 in. (47.98 cm)
Cisco MDS 9124 Switch Dimensions	Width = 17.16 in. (44.45 cm) Height = 1.72 in. (4.45 cm) Depth = 16 in. (40.64 cm)
Cisco MDS 9140 and MDS 9120 Switch Dimensions	Width = 17.2 in. (43.69 cm) Height = 1.75 in. (4.45 cm) Depth = 23.1 in. (58.67 cm) Depth with cable guide = 28.1 in. (71.37 cm)
Rack Unit (RU)	Chassis requires 1 RU (1.75 in. or 4.45 cm)
Weight	25 lb (Cisco MDS 9140 Switch and Cisco MDS 9120 Switch chassis with two fan modules and two power supplies installed) 20 lb Cisco MDS 9134 Switch with two power supplies installed 16.5 lb (Cisco MDS 9124 Switch with a single power supply installed) 18.5 lb (Cisco MDS 9124 Switch with two power supplies installed)
Power Supply (fixed)	300-W AC for each power supply
Power Supply (optional redundant power supply)	300-W AC for each power supply Part Number: DS-CAC-300W (Cisco MDS 9140 Switch and Cisco MDS 9120 Switch) Part Number: DS-C49-300AC (Cisco MDS 9124 Switch)
Airflow	Front to back. 250 lfm ¹ or 42 cfm ² through the system. A minimum clearance of 2.5 in. (6.4 cm) is required between the chassis air vents and any walls.

1. lfm = linear feet per minute
2. cfm = cubic feet per minute

Power Specifications

This section includes the following information:

- [General Power Supply Specifications, page B-3](#)
- [Power Supply Requirements and Heat Dissipation Specifications, page B-3](#)
- [Connection Guidelines for AC-Powered Systems, page B-4](#)

General Power Supply Specifications

Table B-3 lists the specifications for the Cisco MDS 9100 Series AC input power supply.

Table B-3 Cisco MDS 9100 Series AC Input Power Supply Specifications

AC-Input Power Supply	Specification
AC-input voltage	Minimum = 85 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 C-5.
AC-input frequency	Minimum = 47 Hz Nominal = 50 to 60 Hz Maximum = 63 Hz
Power supply output capacity	300 W
Power supply output voltage	12 V +/- 6% up to 25 A
Output holdup time	20 ms when input > 100 VAC

Power Supply Requirements and Heat Dissipation Specifications

Table B-4 provides a sample calculation of power and heat dissipation for the Cisco MDS 9100 Series.

Table B-4 Power and Heat Dissipation

Model Number/	AC-Input Power (watts)	Heat Diss. (BTU/hr)	Input Current		
			85 VAC (amps)	110 VAC (amps)	220 VAC (amps)
Cisco MDS 9134 Switch (with fan modules)	96 maximum	330	1.41	1.10	.55
Cisco MDS 9124 Switch (with fan modules)	96 maximum	330	1.41	1.10	.55
Cisco MDS 9140 Switch (with fan modules)	204 maximum	870	3.0	2.32	1.16
Cisco MDS 9120 Switch (with fan modules)	180 maximum	752	2.65	2.05	1.02



Tip

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

Connection Guidelines for AC-Powered Systems

For connecting the Cisco MDS 9100 Series 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 9100 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 they support 850 to 1610 nm nominal wavelengths, depending upon the transceiver.

Use only Cisco SFP transceivers on the Cisco MDS 9100 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. For the list of supported SFP transceivers, see the release notes.

This section provides the following information:

- [Cisco Fibre Channel SFP Transceivers, page B-4](#)
- [Cisco Gigabit Ethernet/Fibre Channel Transceivers, page B-6](#)
- [Cisco CWDM SFP Transceivers, page B-7](#)

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 B-5](#) lists the Fibre Channel SFP transceivers available through Cisco Systems for the Cisco MDS 9124 Switch.

Table B-5 Cisco Fibre Channel SFP Transceivers for the Cisco MDS 9124 Switch

Part Number	Description	Type
DS-SFP-FC4G-SW	4-Gbps/2-Gbps/1-Gbps Fibre Channel—short wavelength SFP	Short wavelength
DS-SFP-FC4G-MR	4-Gbps/2-Gbps/1-Gbps Fibre Channel—long wavelength SFP	Long wavelength
DS-SFP-FC4G-LW	4-Gbps/2-Gbps/1-Gbps Fibre Channel—long wavelength SFP	Long wavelength

Table B-6 lists the Fibre Channel SFP transceivers available through Cisco Systems for the Cisco MDS 9140 Switch and the Cisco MDS 9120 Switch.

Table B-6 Cisco Fibre Channel SFP Transceivers for the Cisco MDS 9140 Switch and the Cisco MDS 9120 Switch

Part Number	Description	Type
DS-SFP-FC2G-SW	2-Gbps/1-Gbps Fibre Channel–short wavelength SFP	Short wavelength
DS-SFP-FC2G-LW	2-Gbps/1-Gbps Fibre Channel–long wavelength SFP	Long wavelength

General Specifications for Cisco Fibre Channel SFP Transceivers

Table B-7 lists general specifications for Cisco Fibre Channel SFP transceivers at 4 Gbps.



Note

The cable distances provided are for 4 Gbps.

Table B-7 General Specifications for Cisco Fibre Channel SFP Transceivers at 4 Gbps

Description	Short wavelength		Long wavelength
Connector type	LC		LC
Wavelength	850 nm		1310 nm
Fiber type	MMF		SMF
Core size	50 microns	62.5 microns	9/125 microns
Cable distance ¹	328.08 yd (300 m)	164.04 yd (150 m)	6.2 miles (10 km)
Transmit power	-9 to -2.5 dBm		-8.4 to -2 dBm

1. Approximate; actual distance may vary depending on fiber quality and other factors.

Table B-8 lists general specifications for Cisco Fibre Channel SFP transceivers at 2 Gbps.



Note

The cable distances provided are for 2 Gbps.

Table B-8 General Specifications for Cisco Fibre Channel SFP Transceivers

Description	Short wavelength		Long wavelength
Connector type	LC		LC
Wavelength	850 nm		1310 nm
Fiber type	MMF		SMF
Core size	50 microns	62.5 microns	9/125 microns
Cable distance ¹	300 m	150 m	10 km
Transmit power	-10 to -1.5 dBm		-9.5 to -3 dBm

1. Approximate; actual distance may vary depending on fiber quality and other factors.

Environmental and Electrical Specifications for Cisco Fibre Channel SFP Transceivers

Table B-9 provides the maximum environmental and electrical ratings for Cisco Fibre Channel SFP transceivers.

Table B-9 Maximum Environmental and Electrical Ratings for Cisco Fibre Channel SFP Transceivers

Parameter	Symbol	Min.	Max.	Unit
Storage temperature ¹	T _S	-40	85	°C
Case temperature ^{1, 2}	T _C	0	70	°C
Relative humidity ¹	RH	5	95	%
Module supply voltage ¹	V _{CC} T,R	3.1	3.5	V

1. 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. See Reliability Data Sheet for specific reliability performance.
2. Functional performance is not intended, device reliability is not implied, and damage to the device may occur over an extended period of time between absolute maximum ratings and the recommended operating conditions.

Cisco Gigabit Ethernet/Fibre Channel Transceivers

Table B-10 lists the combination Gigabit Ethernet/Fibre Channel (GE/FC) SFP transceivers available through Cisco Systems for the Cisco MDS 9140 Switch and the Cisco MDS 9120 Switch.

Table B-10 Cisco Gigabit Ethernet / Fibre Channel SFP Transceivers

Part Number	Description	Type
DS-SFP-FCGE-SW	1-Gbps Ethernet and 1-Gbps/2-Gbps Fibre Channel—short wavelength SFP	Short wavelength
DS-SFP-FCGE-LW	1-Gbps Ethernet and 1-Gbps/2-Gbps Fibre Channel—long wavelength SFP	Long wavelength
DS-SFP-GE-T	1-Gbps Ethernet SFP	

General Specifications for Cisco GE/FC SFP Transceivers

Table B-11 lists general specifications for Cisco combination Gigabit Ethernet/Fibre Channel SFP transceivers.



Note

The cable distances provided are for 2-Gbps.

Table B-11 General Specifications for Cisco Gigabit Ethernet/Fibre Channel SFP Transceivers

Description	Short wavelength		Long wavelength
Connector type	LC		LC
Wavelength	850 nm		1310 nm
Fiber type	MMF		SMF
Core size	50 microns	62.5 microns	9/125 microns
Cable distance ¹	300 m	150 m	10 km
Transmit power	-1.5 to -9.5 dBm		-3 to -9.5 dBm

1. Approximate; actual distance may vary depending on fiber quality and other factors.

Environmental and Electrical Specifications for Cisco GE/FC SFP Transceivers

Table B-12 provides the maximum environmental and electrical ratings for Cisco GE/FC SFP transceivers.

Table B-12 Maximum Environmental and Electrical Ratings for Cisco GE/FC SFP Transceivers

Parameter	Symbol	Min.	Max.	Unit
Storage temperature ¹	T_S	-40	100	°C
Case temperature ^{1, 2}	T_C	0	85	°C
Relative humidity ¹	RH	5	95	%
Module supply voltage ¹	$V_{CC}^{T,R}$	3.1	3.5	V

1. 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. See Reliability Data Sheet for specific reliability performance.
2. Functional performance is not intended, device reliability is not implied, and damage to the device may occur over an extended period of time between absolute maximum ratings and the recommended operating conditions.

Cisco CWDM SFP Transceivers

Table B-13 lists the CWDM SFP transceivers available through Cisco Systems. These SFP transceivers are supported by the Cisco MDS 9140 and Cisco MDS 9120 switch.

Table B-13 Cisco CWDM SFP Transceivers

Part Number	Description
DS-CWDM-xxxx	Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps Fibre Channel SFP LC interface xxxx where xxxx = 1470, 1490, 1510, 1530, 1550, 1570, 1590, or 1610 nm.
DS-CWDM-MUX-4	Add/drop multiplexer for four CWDM wavelengths.
DS-CWDM-MUX-8	Add/drop multiplexer for eight CWDM wavelengths.
DS-CWDMCHASSIS	Two slot chassis for CWDM add/drop multiplexers.

Table B-14 Cisco CWDM SFP Transceivers Color Codes

Description	Color
Cisco CWDM SFP 1470 nm; Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps FC	Gray
Cisco CWDM SFP 1490 nm; Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps FC	Violet
Cisco CWDM SFP 1510 nm; Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps FC	Blue
Cisco CWDM SFP 1530 nm; Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps FC	Green
Cisco CWDM SFP 1550 nm; Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps FC	Yellow
Cisco CWDM SFP 1570 nm; Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps FC	Orange
Cisco CWDM SFP 1590 nm; Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps FC	Red
Cisco CWDM SFP 1610 nm; Gigabit Ethernet and 1-Gbps/2-Gbps/4-Gbps FC	Brown

General Specifications for Cisco CWDM SFP Transceivers

Table B-15 lists general specifications for Cisco CWDM SFP transceivers.

Table B-15 General Specifications for Cisco CWDM SFP Transceivers

Description	Specification
Connector type	LC
Wavelength	1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm
Fiber type	SMF
Core size	9/125 microns
Cable distance ¹	100 km
Transmit power	0 to 5 dBm
Receive sensitivity	-28 to -7 dBm

1. Approximate; actual distance may vary depending on fiber quality and other factors.

Environmental and Electrical Specifications for Cisco CWDM SFP Transceivers

Table B-16 provides the environmental specifications for CWDM SFP transceivers.

Table B-16 Environmental Specifications for Cisco CWDM SFP Transceivers

Description	Specification
Temperature, ambient operating	32 to 122°F (0 and 50°C)
Temperature, ambient nonoperating and storage	-40 to 185°F (-40 to 85°C)

Table B-17 provides the electrical specifications for CWDM SFP transceivers.

Table B-17 Electrical Specifications for Cisco CWDM SFP Transceivers

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Current	I_s		220	300	mA
Surge Current	I_{surge}			+30	mA
Input voltage	V_{max}	3.1	3.3	3.6	V

Optical Specifications for Cisco CWDM SFP Transceivers

Table B-18 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 B-18 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	

Table B-18 Optical Specifications for Cisco CWDM SFP Transceivers (continued)

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Dispersion penalty at 60 km				2	dB	
Dispersion penalty at 100 km				2	db	@ 1.25 Gbps
				3	dB	@ 2.12 Gbps

X2 Transceiver Specifications

The Cisco MDS 9134 Switch 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 with the Cisco MDS 9134 Switch. Each Cisco X2 transceiver is encoded with 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*.

[Table B-19](#) lists the 10-Gigabit/Ethernet X2 transceiver module available through Cisco.

Table B-19 10-Gigabit X2 Transceiver Modules

X2 Transceiver Module Product Number	Description
DS-X2-FC10G-SR	Cisco 10GFC-SR X2 transceiver module for MMF, dual SC connector
DS-X2-FC10G-LR	Cisco 10GFC-LR X2 transceiver module for SMF, dual SC connector
DS-X2-FC10G-ER	Cisco 10GFC-ER X2 transceiver module for SMF, dual SC connector
DS-X2-FC10G-CX4	Cisco 10GFC-CX4 X2 copper transceiver module, CX4 connector

[Table B-20](#) lists the port cabling specifications for the 10-Gigabit X2 transceiver modules. [Table B-21](#) lists the X2 transceiver optical transmit and receive specifications.

Table B-20 X2 Transceiver Port Cabling Specifications

X2 Product Number	Wavelength (nm)	Cable Type	Core Size (microns)	Modal Bandwidth (MHz/km)	Maximum Cabling Distance
DS-X2-FC10G-SR	850	MMF	62.5	160	26 m (85.3 ft.)
			62.5	200	33 m (108.3 ft.)
			50.0	400	66 m (216.5 ft.)
			50.0	500	82 m (269 ft.)
			50.0	2000	300 m (984.3 ft.)
DS-X2-FC10G-LR	1310	SMF	G.652 fiber	—	10 km (6.21 miles)

Table B-20 X2 Transceiver Port Cabling Specifications (continued)

X2 Product Number	Wavelength (nm)	Cable Type	Core Size (microns)	Modal Bandwidth (MHz/km)	Maximum Cabling Distance
DS-X2-FC10G-ER	1550	SMF	G.652 fiber	—	40 km (24.8 miles)
DS-X2-FC10G-CX4	Copper	CX4	Copper	—	15 m (49.2 ft.)

Table B-21 X2 Transceiver Optical Transmit and Receive Specifications

X2 Product Number	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
DS-X2-FC10G-SR	10GFC-SR, 850-nm MMF	— (Max) -7.3 (Min)	-1.0 (Max) -9.9 (Min)	840 to 860
DS-X2-FC10G-LR	10GFC-LR, 1310-nm SMF	0.5 (Max) -8.2 (Min)	0.5 (Max) -14.4 (Min)	1260 to 1355
DS-X2-FC10G-ER	10GFC-ER, 1550-nm SMF	4.0 (Max) -4.7 (Min)	-1.0 (Max) -15.8 (Min)	1550
DS-X2-FC10G-CX4	10GFC-CX4, Copper	—	—	—

