



APPENDIX **B**

Technical Specifications

This appendix provides technical specifications and includes the following sections:

- [Switch Specifications, page B-1](#)
- [Module Specifications, page B-4](#)
- [Power Specifications for the Cisco MDS 9513 Director, page B-6](#)
- [Power Specifications for the Cisco MDS 9509 Director, page B-9](#)
- [Power Specifications for the Cisco MDS 9506 Director, page B-13](#)
- [X2 Transceiver Specifications, page B-18](#)
- [SFP Transceiver Specifications, page B-21](#)



Note

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

Switch Specifications

The Cisco MDS 9500 Series supports hot-swappable fan modules that provide 85 cfm (cubic feet per minute) of airflow per slot with 410 W of power dissipation per slot.

[Table B-1](#) lists the environmental specifications for the Cisco MDS 9500 Series.

Table B-1 *Environmental Specifications for the Cisco MDS 9500 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 9513 Director.

Table B-2 Physical Specifications for the Cisco MDS 9513 Director

Description	Specification
Dimensions (HxWxD)	24.5 x 17.5 x 28 in. (62.2 x 44.5 x 71.1 cm) Chassis requires 14 RU ¹ , 15 RU with a rack-mount kit. Chassis depth including cable guide is 33 in. (83.8 cm). Crossbar module: 1.7 x 14.0 x 11.2 in. (4.4 x 35.6 x 28.4 cm)
Weight	Chassis only: 101 lb (45.36 kg) Fully loaded chassis ² : 375 lb (170.10 kg) System fan tray: 18 lbs (8.2 kg) Crossbar module fan tray: 2.25 lbs (1.02 kg)
Power supply	6000-W, AC input 33 lb (15 kg)
Airflow	275 to 325 lfm ³ through system fan module, or 90 cfm ⁴ per supervisor, switching, or services module. Total of 1150 cfm if all slots are filled. Spacing requirements: <ul style="list-style-type: none"> 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 12 in. (304 cm), and the distance required between the chassis air vents and any walls is a minimum of 6 in. (15.2 cm).

1. RU = rack unit; 1 RU = 1.75 in. (4.45 cm).
2. Depending on what modules are installed in the chassis.
3. lfm = linear feet per minute.
4. cfm = cubic feet per minute.

Table B-3 lists the physical specifications for the Cisco MDS 9509 Director.

Table B-3 Physical Specifications for the Cisco MDS 9509 Director

Description	Specification
Dimensions (HxWxD)	24.5 x 17.25 x 18.8 in. (62.2 x 43.8 x 47.8 cm) Chassis requires 14 RU ¹ plus space for shelf brackets. Chassis depth including cable guide is 21.64 in. (55.0 cm).
Weight	Chassis only: 55 lb (24.9 kg) Chassis configured with two supervisor modules, and 2500-W power supplies: 120 lb (54.4 kg) Chassis configured with two supervisor modules, and 4000-W power supplies: 140 lb (63.5 kg) System fan tray: 10.5 lb (5.0 kg).

Table B-3 Physical Specifications for the Cisco MDS 9509 Director (continued)

Description	Specification
Power supply	4000-W, AC input 3000-W, AC input 2500-W, AC input 2500-W, DC input
Airflow	300 lfm ² through system fan module, or 80 cfm ³ per supervisor, switching, or services module. Total of 720 cfm if all slots are filled. Spacing requirements: <ul style="list-style-type: none"> • If installed in a cabinet, a minimum clearance 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 in. (4.45 cm)
2. lfm = linear feet per minute
3. cfm = cubic feet per minute

Table B-4 lists the physical specifications for the Cisco MDS 9506 Director.

Table B-4 Physical Specifications for the Cisco MDS 9506 Director

Description	Specification
Dimensions (HxWxD)	12.25 x 17.37 x 21.75 in. (31.1 x 44.1 x 55.2 cm). Chassis requires 7 RU ¹ . Chassis depth including cable guides is 26.75 inches (67.9 cm).
Weight	Chassis only: 46 lb (20.9 kg). Chassis configured with two supervisor modules, fan module, and two power supplies: 86 lb (39 kg). System fan tray: 7.70 lbs (3.49 kg) 1900W AC power supply: 11 lbs (4.99 kg)

Table B-4 Physical Specifications for the Cisco MDS 9506 Director (continued)

Description	Specification
Power supply	1900-W, AC input 1900-W, DC input
Airflow	300 lfm ² through system fan module, or 80 cfm ³ per supervisor, switching, or services module (total of 480 cfm if all slots are 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 in. (4.45 cm)
2. lfm = linear feet per minute
3. cfm = cubic feet per minute

Module Specifications

Table B-5 lists the specifications for the Cisco MDS 9500 Series supervisor modules, services modules, and switching modules.

Table B-5 Cisco MDS 9500 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)
Altitude, designed and tested for operation	-200 to 10000 ft (-60 to 3000 m)
Physical Characteristics	

Table B-5 Cisco MDS 9500 Series Module Specifications (continued)

Description	Specification
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 the faceplate and board, and include the connectors on the board.
Weight	8 to 11.5 lb (1.4 to 5.2 kg)

Weight of Modules

Table B-6 lists the weight for each module in the Cisco MDS 9000 Family.

Table B-6 Weight of Modules in the Cisco MDS 9000 Family

Module	Weight
Crossbar switching module	6 lb (2.7 kg)
48-port 4-Gbps switching module	11.0 lb (4.99 kg)
24-port 4-Gbps switching module	7.75 lb (3.52 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)
ASM	11 lb (5 kg)
CSM	11.5 lb (5.2 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)
Crossbar module fan tray	2.25 lb (1.13 kg)
Module blank panels	0.50 lb (0.25 kg)

Table B-7 lists the specifications for the batteries on the Cisco MDS 9000 Family caching services module.

**Note**

The CSM does not support Cisco SAN-OS Release 3.0(1).

Table B-7 Caching Services Module Battery Specifications

Attribute	Value
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 (1 V/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%

Power Specifications for the Cisco MDS 9513 Director

This section includes the following topics:

- [Specifications for the Cisco MDS 9513 Power Supplies, page B-6](#)
- [Component Power Requirements and Heat Dissipation for the Cisco MDS 9513 Director, page B-7](#)
- [AC Power Consumption for the Cisco MDS 9513 Director, page B-8](#)

Specifications for the Cisco MDS 9513 Power Supplies

The 6000-W AC power supply provides power based upon the input voltage. Each power supply has two AC power connections and will provide power as follows:

- One AC power connection @ 110 VAC = No output
- Two AC power connection @ 110 VAC = 2900 W output
- One AC power connection @ 220 VAC = 2900 W output
- One AC power connection @ 110 VAC and one AC power connection @ 220 VAC = 2900 W output
- Two AC power connection @ 220 VAC = 6000 W output

If a 110 VAC input is chosen, a 110-VAC power cord (CAB-7513AC=) must be ordered separately.

**Note**

Power output does not include the power used by the individual modules used in the chassis.

Table B-8 lists the specifications for the Cisco MDS 9513 power supplies.

Table B-8 Specifications for Cisco MDS 9513 Power Supplies

Description	Specification
6000-W AC Power Supply	
Type	Autoranging input with power factor corrector.
Voltage	100 to 240 VAC ($\pm 10\%$).
Current rating	16 A maximum at 100 to 120 VAC and 2900-W output. 16 A maximum at 200 to 240 VAC and 6000-W output.
Frequency	50 to 60 Hz (nominal) (± 3 Hz for full range).
Output capacity	One AC power connection @ 110 VAC = No output Two AC power connection @ 110 VAC = 2900 W output One AC power connection @ 220 VAC = 2900 W output One AC power connection @ 110 VAC and one AC power connection @ 220 VAC = 2900 W output Two AC power connection @ 220 VAC = 6000 W output
Output voltage at 110/120	3.3 V at 10 A, 50 V at 57 A
Output voltage at 200/240	3.3 V at 10A, 50 V at 119 A

Component Power Requirements and Heat Dissipation for the Cisco MDS 9513 Director

Consider heat dissipation when sizing the air-conditioning requirements for an installation. The power and heat associated with a Cisco MDS 9513 Director varies based upon the following considerations:

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

Table B-9 lists the power requirements and heat dissipation for the components of the Cisco MDS 9513 Director.



Note

Unless noted otherwise, the data listed in Table B-9 is based on worst-case conditions. Typical numbers are approximately 30 percent below the numbers listed here.

Table B-9 Requirements and Heat Dissipation for 6000-W AC Power Supplies

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)
Fan tray 1 (front panel), DS-13SLT-FAN-F	3.x	248	1059	3.44	2.58	1.72	1.29
Fan tray 2 (rear panel), DS-13SLT-FAN-R	3.x	70	299	0.97	0.73	0.49	0.36
Cisco MDS 9513 chassis, DS-C9513, with front (DS-13SLT-FAN-F) and rear (DS-13SLT-FAN-R) fan trays	3.x	318	1358	4.41	3.31	2.21	1.65
Supervisor-2, DS-X9530-SF2-K9	3.x	126	538	1.75	1.31	0.88	0.66
48-port 4-Gbps switching module, DS-X9148	3.x	185	790	2.57	1.93	1.28	0.96
24-port 4-Gbps switching module, DS-X9124	3.x	147	628	2.04	1.53	1.02	0.77
12-port 4-Gbps switching module, DS-X9112	3.x	132	564	1.83	1.38	0.92	0.69
4-Port 10-Gbps switching module, DS-X9704	3.x	172	734	2.39	1.79	1.19	0.90
18/4 Multiservice module, DS-X9304-18K9	3.2.(1)	200	855	2.78	2.08	1.39	1.04
Crossbar module, DS-13SLT-FAB1, DS-13SLT-FAB2	3.x	63	269	0.88	0.66	0.44	0.33

AC Power Consumption for the Cisco MDS 9513 Director

Table B-10 shows the typical AC power consumption for a Cisco MDS 9513 Director.

Table B-10 Typical AC Power Consumption for a Cisco MDS 9513 Director

Module Type / Product Number	Typical AC Power Consumption (Watts)
Cisco MDS 9513 chassis, DS-C9513, with front (DS-13SLT-FAN-F) and rear (DS-13SLT-FAN-R) fan trays, two Supervisor-2 (DS-X9530-SF2-K9), and two crossbar modules (DS-13SLT-FAB1 or DS-13SLT-FAB2)	697
48-port 4-Gbps switching module, DS-X9148	181
24-port 4-Gbps switching module, DS-X9124	127
12-port 4-Gbps switching module, DS-X9112	107
4-Port 10-Gbps switching module, DS-X9704	162

Power Specifications for the Cisco MDS 9509 Director

This section includes the following topics:

- [Specifications for the Cisco MDS 9509 Power Supplies, page B-9](#)
- [Component Power Requirements and Heat Dissipation for the Cisco MDS 9509 Director, page B-10](#)
- [AC Power Consumption for the Cisco MDS 9509 Director, page B-13](#)

Specifications for the Cisco MDS 9509 Power Supplies

The 3000-W AC power supply provides power based upon the input voltage, as follows:

- Maximum of 1400 W at input of 100 to 120 VAC (1174 W available to modules and fans)
- Maximum of 3000 W at input of 200 to 240 VAC (2774 W available to modules and fans)

The 2500-W AC power supply provides power based upon the input voltage, as follows:

- Maximum of 1325 W at input of 100 to 120 VAC (1150 W available to modules and fans)
- Maximum of 2525 W at input of 200 to 240 VAC (2331 W available to modules and fans)

If a 110-VAC input is chosen, a 110-VAC power cord (CAB-7513AC=) must be ordered separately.

[Table B-11](#) lists the specifications for the Cisco MDS 9509 power supplies.

Table B-11 Specifications for Cisco MDS 9509 Power Supplies

Description	Specification
2500-W AC Power Supply	
Type	Autoranging input with power factor corrector.
Voltage	100 to 240 VAC ($\pm 10\%$).
Current rating	16 A maximum at 100 to 120 VAC and 1300-W output. 16 A maximum at 200 to 240 VAC and 2500-W output. Note For current ratings of plugs, see Figure C-5 on page C-10 .
Frequency	50 to 60 Hz (nominal) (± 3 Hz for full range).
Output capacity	1325 W maximum (100 to 120 VAC). 2525 W maximum (200 to 240 VAC).
Output voltage at 110/120	3.3 V at 15 A; 5 V at 5 A; 12 V at 12 A; 42 V at 27.5 A.
Output voltage at 200/240	3.3 V at 15 A; 5 V at 5 A; 12 V at 12 A; 42 V at 55.5 A.
2500-W DC Power Supply	
Voltage	-48 VDC to -60 VDC continuous.
Current rating	70 A at -48 VDC; 55 A at -60 VDC; 80 A at -40.5 VDC.
Terminal block	Accommodates 2 to 14 AWG copper conductors. Use 90°C copper conductors for North American installations. Note Actual size of the wire required is determined by the installer or local electrician. Terminal block material is rated at 302°F (150°C).
Output capacity	2525 W maximum (-48 to -60 VDC).

Table B-11 Specifications for Cisco MDS 9509 Power Supplies (continued)

Description	Specification
Output voltage	3.3 V at 15 A; 5 V at 5 A; 12 V at 12 A; 42 V at 55.5 A.
3000-W AC Power Supply	
Type	Autoranging input with power factor corrector.
Voltage	100 to 240 VAC ($\pm 10\%$).
Current rating	17.6 A maximum at 100 to 120 VAC and 1400-W output. 17.6 A maximum at 200 to 240 VAC and 3000-W output. For current ratings of plugs, see Figure C-5 on page C-10
Frequency	50 to 60 Hz (nominal) (± 3 Hz for full range).
Output capacity	1400 W maximum (100 to 120 VAC). 3000 W maximum (200 to 240 VAC).
Output voltage at 110/120	3.3 V at 15 A; 12 V at 12 A; 42 V at 27.9 A.
Output voltage at 200/240	3.3 V at 15 A; 12 V at 12 A; 42 V at 66 A.
4000-W AC Power Supply	
Type	High-line input with power factor corrector, 220 VAC, single-phase circuit.
Voltage	200 to 240 VAC ($\pm 10\%$).
Current rating	23 A Note For current ratings of plugs, see Figure C-8 on page C-12 .
Frequency	50/60 Hz (nominal) ($\pm 3\%$ for full range).
Output capacity	4000 W maximum.
Output voltage at 200/240	3.3 V at 15 A; 5 V at 5 A; 12 V at 12 A; 42 V at 91.2 A

Component Power Requirements and Heat Dissipation for the Cisco MDS 9509 Director

When sizing the air-conditioning requirements for an installation, consider heat dissipation. The power and heat associated with a Cisco MDS 9509 Director varies based upon the following considerations:

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

[Table B-12](#) and [Table B-13](#) list the power requirements and heat dissipation for the components of the Cisco MDS 9509 Director.



Note

Unless noted otherwise, the data listed in [Table B-12](#) and [Table B-13](#) is based on worst-case conditions. Typical numbers are approximately 30 percent below the numbers listed here.

Table B-12 Requirements and Heat Dissipation for 2500-, 3000-, and 4000-W AC Power Supplies

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 9509 chassis with fan module DS-C9509	3.x	210	897	2.92	2.19	1.46	1.09
	2.x and 1.x	216	920	3.00	2.25	1.50	1.13
Supervisor/fabric 1 DS-X9530-SF1	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
Supervisor-2, DS-X9530-SF2-K9	3.x	126	538	1.75	1.31	0.88	0.66
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	—	—	—	—	—	—
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	220	940	3.05	2.29	1.53	1.15
18/4 Multiservice module, DS-X9304-18K9	3.2.(1)	200	855	2.78	2.08	1.39	1.04
MPS-14/2 module 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	919	2.99	2.19	1.50	1.12

Table B-13 Power Requirements and Heat Dissipation for the 2500-W DC Power Supply

Module Type/ Product Number	SAN-OS Release	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current	
				48 VDC (amps)	60 VDC (amps)
Cisco MDS 9509 chassis with fan module DS-C9509	3.x	210	956	5.83	4.67
	2.x and 1.x	216	983	6.00	4.80
Supervisor/fabric 1 DS-X9530-SF1	3.x	210	956	5.83	4.67
	2.x and 1.x	220	1000	6.10	4.88
32-port 1-Gbps/2-Gbps Fibre Channel module DS-X9032	3.x	191	869	5.31	4.24
	2.x and 1.x	200	911	5.56	4.45
16-port 1-Gbps/2-Gbps Fibre Channel module DS-X9016	3.x	210	956	5.83	4.67
	2.x and 1.x	220	1000	6.10	4.88
MSM-18/4 module, DS-X9304-18K9	3.2(1)	200	855	2.78	2.08
MSFM-18/4 module, DS-X9304-18FK9	3.2(1)	200	855	2.78	2.08
MPS-14/2 module DS-X9302-14K9	3.x	200	910	5.56	4.44
	2.x and 1.x	227	970	3.15	2.37
8-port IPS module DS-X9308-SMIP	3.x	200	910	5.56	4.44
	2.x and 1.x	220	1000	6.10	4.88
4-port IPS module DS-X9304-SMIP	3.x	160	728	4.44	3.56
	2.x and 1.x	185	841	5.14	4.11
32-port SSM DS-X9032-SSM	3.x	281	1279	7.81	6.24
	2.x and 1.x	295	1342	8.19	6.56
32-port ASM DS-X9032-SMV	3.x	281	1279	7.81	6.24
	2.x and 1.x	295	1342	8.19	6.56
CSM DS-X9560-SMC	3.x	200	910	5.56	4.44
	2.x and 1.x	210	956	5.83	4.67

AC Power Consumption for the Cisco MDS 9509 Director

Table B-14 shows the typical AC power consumption for the Cisco MDS 9509 Director

Table B-14 Typical AC Power Consumption for a Cisco MDS 9509 Director

Module Type / Product Number	Typical AC Power Consumption (Watts)
Cisco MDS 9509 chassis, DS-C9509, with fan module, and two Supervisor-2 (DS-X9530-SF2-K9)	380
Cisco MDS 9509 chassis, DS-C9509, with fan module, and two Supervisor-1 (DS-X9530-SF1-K9)	622
48-port 4-Gbps switching module, DS-X9148	181
24-port 4-Gbps switching module, DS-X9124	127
12-port 4-Gbps switching module, DS-X9112	107
4-Port 10-Gbps switching module, DS-X9704	162
32-port 1-Gbps/2-Gbps Fibre Channel module, DS-X9032	174
16-port 1-Gbps/2-Gbps Fibre Channel module, DS-X9016	144
MPS-14/2 module, DS-X9302-14K9	178
32-port SSM, DS-X9032-SSM	211
8-port IPS module, DS-X9308-SMIP	175
4-port IPS module, DS-X9304-SMIP	128

Power Specifications for the Cisco MDS 9506 Director

This section includes the following topics:

- [Specifications for the Cisco MDS 9506 Power Supplies, page B-14](#)
- [Component Power Requirements and Heat Dissipation for the Cisco MDS 9506 Director, page B-15](#)
- [AC Power Consumption for the Cisco MDS 9506 Director, page B-18](#)

Specifications for the Cisco MDS 9506 Power Supplies



Caution

The following applies to AC power supplies on the Cisco MDS 9506 only: The DS-C9506 equipment is suitable for use on TN power systems and the IT-power system connection of Norway (max 230 v phase-phase). If connected to a 230/400-V IT power system, beware of high leakage current. Earth connection is essential before connecting the supply.

The 1900-W AC power supply provides power based upon the input voltage:

- Maximum of 1050 W at input of 100 to 120 VAC
- Maximum of 1900 W at input of 200 to 240 VAC

A 110-VAC power cord (CAB-7513AC=) must be ordered separately.

[Table B-15](#) lists the specifications for the Cisco MDS 9506 power supplies.

Table B-15 Specifications for Cisco MDS 9506 Power Supplies

Description	Specification
1900-W AC Power Supply	
Type	Autoranging input with power factor corrector.
Voltage	100 to 240 VAC ($\pm 10\%$).
Current rating	12 A maximum at 100 to 120 VAC and 1050-W output. 12 A maximum at 200 to 240 VAC and 1900-W output. Note For current ratings of plugs, see Figure C-5 on page C-10.
Frequency	50/60 Hz (nominal) (± 3 Hz for full range).
Output capacity	1050 W maximum (at input of 100 to 120 VAC). 1900 W maximum (at input of 200 to 240 VAC).
Output voltage at 110/120	3.3 V at 2.5 A; 1.5 V at 15 A; 50 V at 20.4 A.
Output voltage at 200/240	3.3 V at 2.5 A; 1.5 V at 15 A; 50 V at 37.4 A.
1900-W DC Power Supply	
Voltage	-48 to -60 VDC continuous.
Current rating	50 A at -48 VDC, 40 A at -60 VDC, 60 A at -40.5 VDC.
Terminal block	Accommodates 2 to 14 AWG copper conductors. Use 90°C copper conductors for North American installations. Note Actual size of the wire required is determined by the installer or local electrician. Terminal block material is rated at 302°F (150°C).
Output capacity	1900 W maximum (at input of -48 to -60 VDC).
Output voltage	3.3 V at 2.5 A; 1.5 V at 15 A; 50 V at 37.4 A.

Component Power Requirements and Heat Dissipation for the Cisco MDS 9506 Director

When sizing the air-conditioning requirements for an installation, consider heat dissipation. The power and heat associated with a Cisco MDS 9506 Director varies depending upon the following:

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

Table B-16 and Table B-16 list the AC and DC power requirements and heat dissipation for the components of the Cisco MDS 9506 Director.



Note

Unless noted otherwise, the information listed in Table B-16 and Table B-16 is based on worst-case conditions. Typical numbers are approximately 30 percent below the numbers listed here.

Table B-16 Power Requirements and Heat Dissipation for the 1900-W AC 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 9506 chassis with fan module DS-C9506	3.x	126	538	1.75	1.31	0.88	0.66
	2.x and 1.x	126	538	1.75	1.32	0.88	0.66
Supervisor/fabric 1 DS-X9530-SF1	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
Supervisor-2, DS-X9530-SF2-K9	3.x	126	538	1.75	1.31	0.88	0.66
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	—	—	—	—	—	—
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	220	940	3.05	2.29	1.53	1.15
18/4 Multiservice module, DS-X9304-18K9	3.2.(1)	200	855	2.78	2.08	1.39	1.04

Table B-16 Power Requirements and Heat Dissipation for the 1900-W AC 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)
MPS-14/2 module 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

Power Requirements and Heat Dissipation for the 1900-W DC Power Supply

Module Type/ Product Number	SAN-OS Release	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current	
				48 VDC (amps)	60 VDC (amps)
Cisco MDS 9506 chassis with fan module DS-C9506	3.x	126	573	3.50	2.80
	2.x and 1.x	126	573	3.50	2.80
Supervisor/fabric 1 DS-X9530-SF1	3.x	210	956	5.83	4.67
	2.x and 1.x	220	1000	6.10	4.88
32-port 1-Gbps/2-Gbps Fibre Channel module DS-X9032	3.x	191	869	5.31	4.24
	2.x and 1.x	200	911	5.56	4.45
16-port 1-Gbps/2-Gbps Fibre Channel module DS-X9016	3.x	210	956	5.83	4.67
	2.x and 1.x	220	1000	6.10	4.88
18/4 Multiservice module, DS-X9304-18K9	3.2.(1)	200	855	2.78	2.08
MPS-14/2 module DS-X9302-14K9	3.x	200	910	5.56	4.44
	2.x and 1.x	227	970	3.15	2.37
8-port IPS module DS-X9308-SMIP	3.x	200	910	5.56	4.44
	2.x and 1.x	220	1000	6.10	4.88
4-port IPS module DS-X9304-SMIP	3.x	160	728	4.44	3.56
	2.x and 1.x	185	841	5.14	4.11

Power Requirements and Heat Dissipation for the 1900-W DC Power Supply (continued)

Module Type/ Product Number	SAN-OS Release	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current	
				48 VDC (amps)	60 VDC (amps)
32-port SSM DS-X9032-SSM	3.x	281	1279	7.81	6.24
	2.x and 1.x	295	1342	8.19	6.56
32-port ASM DS-X9032-SMV	3.x	281	1279	7.81	6.24
	2.x and 1.x	295	1342	8.19	6.56
CSM DS-X9560-SMC	3.x	200	910	5.56	4.44
	2.x and 1.x	210	955	5.83	4.66

AC Power Consumption for the Cisco MDS 9506 Director

Table B-17 shows the typical AC Power consumption for the Cisco MDS 9506 Director.

Table B-17 Typical AC Power Consumption for a Cisco MDS 9506 Director

Module Type / Product Number	Typical AC Power Consumption (Watts)
Cisco MDS 9506 chassis, DS-C9506, with fan module, and two Supervisor-2 (DS-X9530-SF2-K9)	395
Cisco MDS 9506 chassis, DS-C9506, with fan module, and two Supervisor-1 (DS-X9530-SF1-K9)	624
48-port 4-Gbps switching module, DS-X9148	181
24-port 4-Gbps switching module, DS-X9124	127
12-port 4-Gbps switching module, DS-X9112	107
4-Port 10-Gbps switching module, DS-X9704	162
32-port 1-Gbps/2-Gbps Fibre Channel module, DS-X9032	174
16-port 1-Gbps/2-Gbps Fibre Channel module, DS-X9016	144
MPS-14/2 module, DS-X9302-14K9	178
32-port SSM, DS-X9032-SSM	211
8-port IPS module, DS-X9308-SMIP	175
4-port IPS module, DS-X9304-SMIP	128

X2 Transceiver Specifications

The Cisco MDS 9500 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 9500 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-18 lists the Cisco 10-Gbps Fibre Channel X2 transceivers.

Table B-18 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-19 provides the general specifications for Cisco 10-Gbps Fibre Channel X2 transceivers.

Table B-19 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 which is 2 meters (6.5 feet).

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

Table B-20 provides the power requirement specifications for Cisco 10-Gbps Fibre Channel X2 transceivers.

Table B-20 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-20](#).

[Table B-21](#) provides the environmental specifications for the Cisco 10-Gbps Fibre Channel X2 transceivers.

Table B-21 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-22](#) lists the Cisco 10-Gbps Ethernet X2 transceivers.

Table B-22 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-23](#) provides the general specifications for Cisco 10-Gbps Ethernet X2 transceivers.

Table B-23 General Specifications for the Cisco 10-Gbps Ethernet X2 Transceivers

X2	Wavelength (nanometer)	Fibre Type	Core Size (micon)	Baud Rate (GBd)	Cable Distance
DS-X2-E10G-SR	850	MMF	62.5	10.312	33 (108 ft)
			50.0	10.312	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-24 provides the power requirement specifications for the Cisco 10-Gbps Ethernet X2 transceiver.

Table B-24 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-25 provides the environmental specifications for the Cisco 10-Gbps Ethernet X2 transceivers.

Table B-25 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 9500 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 9500 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-22](#)
- [Cisco Fibre Channel and Gigabit Ethernet Transceivers, page B-25](#)
- [Cisco CWDM SFP Transceivers, page B-27](#)
- [Cisco Gigabit Ethernet Transceivers, page B-31](#)

Cisco Fibre Channel SFP Transceivers

Table B-26 lists the Cisco 2-Gbps and 4-Gbps Fibre Channel SFP transceivers.

Table B-26 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-27 provides the general specifications for Cisco Fibre Channel SFP transceivers.

Table B-27 General Specifications for Cisco 4-Gbps Fibre Channel SFP Transceivers

SFP	Wavelength (nanometer)	Fiber 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-28 provides the power specification for the Cisco 4-Gbps Fibre Channel SFP transceivers.

Table B-28 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-29 provides the environment specification for the Cisco 4-Gbps Fibre Channel SFP transceivers.

Table B-29 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-30 provides general specification for the 4-Gbps Fibre Channel SFP transceiver.

Table B-30 General Specifications for Cisco 4-Gbps Fibre Channel SFP Transceivers

SFP	Wavelength (nanometer)	Fiber Type	Core Size (micron)	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-31 provides the power specification for Cisco 2-Gbps Fibre Channel SFP transceivers.

Table B-31 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-32 provides the environmental specification for Cisco 2-Gbps Fibre Channel SFP transceivers.

Table B-32 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-33 provides the maximum environmental and electrical ratings for Cisco Fibre Channel SFP transceivers.

Table B-33 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 and Gigabit Ethernet Transceivers

Table B-34 lists the combination Fibre Channel/Gigabit Ethernet SFP transceivers.

Table B-34 Cisco Fibre Channel and 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 and Gigabit Ethernet SFP Transceivers

Table B-35 provides general specification for Cisco Fibre Channel and Gigabit Ethernet SFP transceiver.

Table B-35 General Specifications for Cisco Fibre Channel and Gigabit Ethernet SFP Transceivers

SFP	Wavelength (nanometer)	Fiber 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 (multimode fiber (MMF)) and single-mode fiber (SMF) is 2 meters (6.5 feet).

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

Table B-36 provides the power requirement specification for Cisco Fibre Channel and Gigabit Ethernet SFP transceivers.

Table B-36 Power Requirement Specification for Cisco Fibre Channel and 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-37 provides the environmental specification for Cisco Fibre Channel and Gigabit Ethernet SFP transceivers.

Table B-37 Environmental Specifications for Cisco Fibre Channel and 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-38 lists the Cisco 1-Gbps and 2-Gbps CWDM SFP transceivers.

Table B-38 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-39 lists the Cisco 4-Gbps CWDM SFP transceivers available through Cisco.

Table B-39 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-40 provides the environmental specifications for the Cisco 2-Gbps CWDM SFP transceivers.

Table B-40 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-41 provides the optical specifications for the Cisco 2-Gbps CWDM SFP transceivers.

Table B-41 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 shorted 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-42 provides the environmental specifications for the Cisco 4-Gbps CWDM SFP transceivers.

Table B-42 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-43 provides the optical specifications for Cisco 4-Gbps CWDM SFP transceivers.

Table B-43 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 62.1 miles (100 km)	–	–	–	3	dB	At 2.12 Gbps



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 shorted 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-44](#) lists the transceiver supported on the Cisco MDS 9216.

Table B-44 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-45](#) provides the general specification for the Cisco Gigabit Ethernet SFP transceiver.

Table B-45 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-46](#) provides the environmental specifications for the Cisco Gigabit Ethernet transceivers.

Table B-46 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*.

