



## Transceivers and Module Connectors

---

This appendix specifies the transceivers and module connectors used with the Cisco Nexus 7000 Series switches.

This appendix includes the following sections:

- [100-Gigabit CFP Transceivers, page B-1](#)
- [100-Gigabit CPAK Transceivers, page B-3](#)
- [40-Gigabit QSFP+ Transceivers, page B-6](#)
- [10-Gigabit SFP+ Transceivers and Fabric Extender Transceivers, page B-11](#)
- [10-Gigabit X2 Transceivers, page B-17](#)
- [1-Gigabit SFP Transceivers, page B-22](#)
- [RJ-45 Module Connectors, page B-26](#)

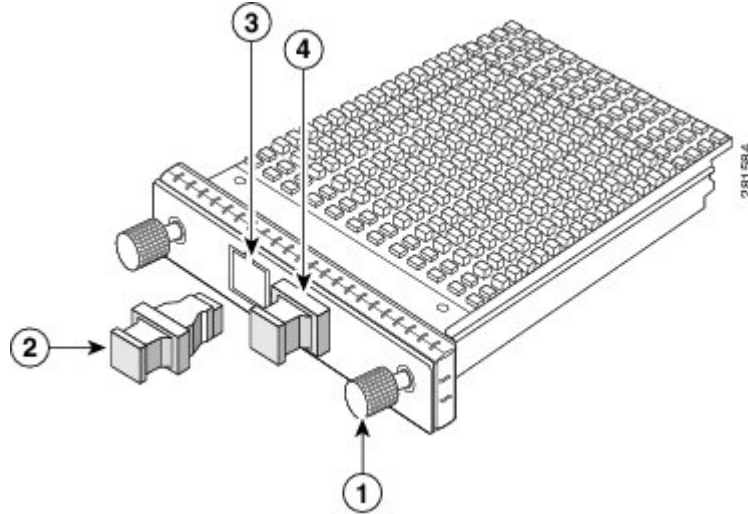
### 100-Gigabit CFP Transceivers

The following 100-Gigabit CFP transceivers are used with the M2-Series 100-Gigabit I/O module (N7K-M202CF-22L):

- CFP-100G-ER4
- CFP-100G-LR4
- CFP-100G-SR10

[Figure B-1](#) identifies the major features of these transceivers. For the cable specifications that apply to these transceivers, see [Table B-1](#). For the optical specifications, see [Table B-2](#). For the environmental specifications, see [Table B-3](#).

Figure B-1 CFP Transceivers



1	Thumb screws	3	Transmit optical bore
2	Dust plug	4	Receive optical bore

Table B-1 Cable Specifications for the CFP Transceivers

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
CFP-100G-ER4	SMF		1310	G.652	—	24.85 miles (40 km)
CFP-100G-LR4	SMF	Dual SC/PC	1310	G.652	—	6.21 miles (10 km)
CFP-100G-SR10	MMF	MPO/MTP	850	50.0 50.0	2000 (OM3) 4700 (OM4)	328 feet (100 m) 492 feet (150 m)

Table B-2 CFP Transceiver Optical Transmit and Receive Specifications

Product Number	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
CFP-100G-ER4	100GBASE-ER 4 CFP	2.9 (maximum per lane) -2.9 (minimum per lane)	4.5 (maximum per lane) -20.9 (minimum per lane)	Four lanes: 1295.6 nm, 1300.1 nm, 1304.6 nm, and 1309.1 nm
CFP-100G-LR4	100GBASE-LR 4 CFP	4.5 (maximum per lane) -4.3 (minimum per lane)	4.5 (maximum per lane) -10.6 (minimum per lane)	Four lanes: 1295.6 nm, 1300.1 nm, 1304.6 nm, and 1309.1 nm
CFP-100G-SR10	100GBASE-SR 10 CFP	-1.0 (maximum per lane) -7.6 (minimum per lane)	2.4 (maximum per lane) -9.5 (minimum per lane)	Ten lanes: 840 to 860 nm

**Table B-3** Environmental and Power Specifications for CFP Transceivers

Parameter	Specification
Storage temperature	–40 to 185°F (–40 to 85°C)
Operating temperature	32 to 158°F (0 to 70°C)
Case temperature	–40 to 158°F (–40 to 70°C)
Storage relative humidity	5 to 95 percent

## 100-Gigabit CPAK Transceivers

The following 100-Gigabit CPAK transceivers are used with the F3-Series 100-Gigabit I/O modules (N7K-F306CK-25):

- CPAK-100G-ER4L
- CPAK-100G-LR4
- CPAK-100G-SR10

For the cable specifications that apply to these transceivers, see [Table B-4](#). For the optical specifications, see [Table B-5](#). For the environmental specifications, see [Table B-6](#).

**Table B-4** Cable Specifications for the CPAK Transceivers

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
CPAK-100G-ER4L	SMF	SC Duplex	1310	G.652	—	15.53 miles (25 km)
CPAK-100G-LR4	SMF	SC Duplex	1310	G.652	—	6.21 miles (10 km)
CPAK-100G-SR10	MMF (OM3) MMF (OM4)	24-fiber MTP/MPO	850	50.0 50.0	2000 (OM3) 4700 (OM4)	328 feet (100 m) 492 feet (150 m)

Table B-5 CPAK Transceiver Optical Transmit and Receive Specifications

Product Number	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
CPAK-100G-ER 4L	100GBASE-ER 4L	2.9 (maximum per lane) −2.9 (minimum per lane)	4.5 (maximum per lane) −14 (minimum per lane)	Four lanes: 1294.53 to 1296.59, 1299.02 to 1301.09, 1303.54 to 1305.63, 1308.09 to 1310.19
CPAK-100G-LR 4	100GBASE-LR 4	4.5 (maximum per lane) −4.3 (minimum per lane)	4.5 (maximum per lane) −10.6 (minimum per lane)	Four lanes: 1294.53 to 1296.59, 1299.02 to 1301.09, 1303.54 to 1305.63, 1308.09 to 1310.19
CPAK-100G-SR 10	100GBASE-SR 10	−1.0 (maximum per lane) −7.6 (minimum per lane)	2.4 (maximum per lane) −9.5 (minimum per lane)	Ten lanes: 850 to 860 nm

Table B-6 Environmental and Power Specifications for CPAK Transceivers

Parameter	Specification
Storage temperature	−40 to 185°F (−40 to 85°C)
Operating temperature	32 to 158°F (0 to 70°C)

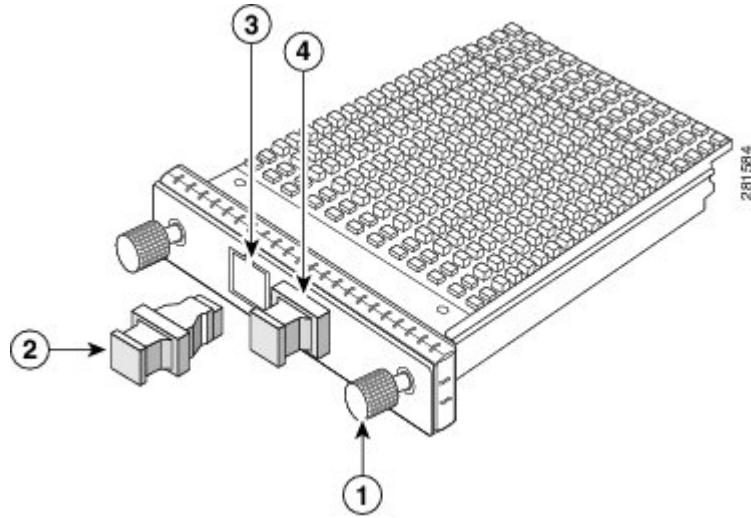
## 40-Gigabit CFP Transceivers

The following 40-Gigabit CFP transceivers are used with the M2-Series 100-Gigabit I/O modules (N7K-M202CF-22L):

- CFP-40G-SR4
- CFP-40G-LR4

Figure B-2 identifies the major features of these transceivers. For the cable specifications that apply to these transceivers, see Table B-7. For the optical specifications, see Table B-8. For the environmental specifications, see Table B-9.

Figure B-2 CFP Transceivers



1	Thumb screws	3	Transmit optical bore
2	Dust plug	4	Receive optical bore

Table B-7 Cable Specifications for the CFP Transceivers

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
CFP-40G-SR4	MMF	Dual SC/PC	850	50.0	500 (OM2)	98.4 feet (30 m)
				50.0	2000 (OM3)	328.1 feet (100 m)
				50.0	4700 (OM4)	492.1 feet (150 m)
CFP-40G-LR4	SMF	Dual SC/PC	1310	G.652	—	32.8 feet (10 km)

Table B-8 CFP Transceiver Optical Transmit and Receive Specifications

Product Number	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
CFP-40G-SR4	40GBASE CFP	2.4 (maximum per lane) -7.6 (minimum per lane)	2.4 (maximum per lane) -9.5 (minimum per lane)	Four lanes: 840 to 860 nm
CFP-40G-LR4	40GBASE CFP	2.3 (maximum per lane) -7 (minimum per lane)	2.3 (maximum per lane) -13.7 (minimum per lane)	Four lanes: 1271 nm, 1291 nm, 1311 nm, and 1331 nm

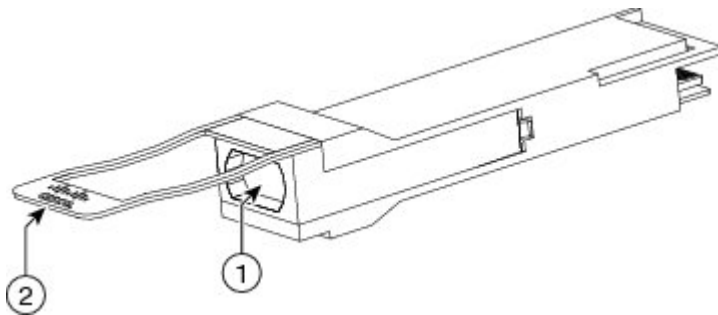
**Table B-9** Environmental and Power Specifications for CFP Transceivers

Parameter	Specification
Storage temperature	–40 to 185°F (–40 to 85°C)
Operating temperature	32 to 158°F (0 to 70°C)
Case temperature	–40 to 158°F (–40 to 70°C)
Storage relative humidity	5 to 95 percent

## 40-Gigabit QSFP+ Transceivers

The 40-Gigabit Quad Small-Form Factor Pluggable Plus (QSFP+) transceivers are used with the F3-Series 40-Gigabit Ethernet (N7K-F312FQ-25), M2-Series 40-Gigabit Ethernet (N7K-M206FQ-23L) and M3-Series 40-Gigabit Ethernet (N7K-M324FQ-25L) I/O modules.

Figure B-3 identifies the major features of these transceivers. For the cable specifications that apply to these transceivers, see Table B-10. For the optical specifications, see Table B-11. For the environmental specifications, see Table B-12.

**Figure B-3** QSFP+ Transceiver

1	Optical bore	2	Pull tab
---	--------------	---	----------

The following 40-Gigabit QSFP+ transceivers are used with the F3-Series 40-Gigabit Ethernet (N7K-F312FQ-25) I/O modules:

- CVR-QSFP-SFP10G
- FET-40G
- QSFP-40G-SR-BD
- QSFP-40G-SR4
- QSFP-40G-SR4-S
- QSFP-40G-CSR4
- QSFP-40G-LR4
- QSFP-40G-LR4-S
- QSFP-H40G-ACUxM

- QSFP-4X10G-ACxM
- QSFP-4X10G-LR-S
- QSFP-H40G-AOCxM
- QSFP-H40G-AOC15M
- QSFP-4X10G-AOCxM
- QSFP-40G-ER4
- WSP-Q40GLR4L

The following 40-Gigabit QSFP+ transceivers are used with the F3-Series 40-Gigabit Ethernet (N7K-M206FQ-23L) I/O modules:

- FET-40G
- QSFP-40G-SR-BD
- QSFP-40G-SR4
- QSFP-40G-SR4-S
- QSFP-40G-CSR4
- QSFP-40G-LR4
- QSFP-40G-LR4-S
- QSFP-H40G-ACUxM
- QSFP-4X10G-ACxM
- QSFP-H40G-AOCxM
- QSFP-H40G-AOC15M
- QSFP-4X10G-AOCxM
- QSFP-40G-ER4
- WSP-Q40-GLR4L

The following 40-Gigabit QSFP+ transceivers are used with the F3-Series 40-Gigabit Ethernet (N7K-M324FQ-25L) I/O modules:

- QSFP-H40G-ACUxM
- QSFP-H40G-AOCxM
- QSFP-4X10G-AC7M
- QSFP-4X10G-AC10M
- QSFP-4X10G-ACUxM
- QSFP-4X10G-AOC1M
- QSFP-4X10G-AOC2M
- QSFP-4X10G-AOC3M
- QSFP-4X10G-AOC5M
- QSFP-4X10G-AOC7M
- QSFP-4X10G-AOC10M

## 40-Gigabit QSFP+ Transceivers

- QSFP-40G-CSR4
- QSFP-40G-ER4
- QSFP-4x10G-LR-S
- QSFP-40G-LR4
- QSFP-40G-LR4-S
- QSFP-40G-SR4
- QSFP-40G-SR4-S
- QSFP-40G-SR-BD

Table B-10 Cable Specifications for the 40-Gigabit QSFP+ Transceivers


Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
FET-40G	MMF	QSFP+ to QSFP+	850	50.0 50.0 50.0	500 (OM2) 2000 (OM3) 4700 (OM4)	98.4 feet (30 meters) 328.1 feet (100 meters) 328.1 feet (100 meters)
 <b>Note</b> FET-40G is not supported with N7K-M324FQ-2 5L.						
QSFP-H40G-ACUxM	Direct attach copper, active	QSFP+ to QSFP+	—	—	—	23.0 feet (7 meters) 32.8 feet (10 meters)
QSFP-H40G-AOCxM	Active optical cable assembly	QSFP+ to QSFP+	—	—	—	3.3 feet (1 meter) 6.6 feet (2 meters) 9.8 feet (3 meters) 16.4 feet (5 meters) 23.0 feet (7 meters) 32.8 feet (10 meters) 49.2 feet (15 meters)
QSFP-4X10G-ACxM	Direct attach breakout copper, active	QSFP+ to four SFP+	—	—	—	23.0 feet (7 meters) 32.8 feet (10 meters)



Table B-10 Cable Specifications for the 40-Gigabit QSFP+ Transceivers (continued)

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
QSFP-4X10G-ACUxM	Direct attach breakout copper, active	QSFP+ to four SFP+	—	—	—	23.0 feet (7 meters) 32.8 feet (10 meters)
QSFP-4X10G-AOCxM	Active optical breakout cable assembly	QSFP+ to four SFP+	—	—	—	3.3 feet (1 meter) 6.6 feet (2 meters) 9.8 feet (3 meters) 16.4 feet (5 meters) 23.0 feet (7 meters) 32.8 feet (10 meters)
QSFP-40G-CSR4	MMF	12-fiber MTP/MPO	850	62.5 50.0 50.0 50.0	200 (OM1) 500 (OM2) 2000 (OM3) 4700 (OM4)	108.2 feet (33 m) 269.0 feet (82 m) 984.3 feet (300 m) 132.3 feet (400 m)
QSFP-40G-ER4	SMF	LC	1310	G.652	—	40 km <sup>4</sup>
QSFP-4x10G-LR-S	SMF	12-fiber MTP/MPO	1310	G.652	—	6.1 miles (10 km)
QSFP-40G-LR4	SMF	LC	1310	G.652	—	6.1 miles (10 km)
QSFP-40G-LR4-S	SMF	LC	1310	G.652	—	6.1 miles (10 km)
QSFP-40G-SR4	MMF	PC or UPC	850	50.0 50.0 50.0	500 (OM2) 2000 (OM3) 4700 (OM4)	98.4 feet (30 meters) 328.1 feet (100 meters) 492.1 feet (150 meters)

Table B-10 Cable Specifications for the 40-Gigabit QSFP+ Transceivers (continued)

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
QSFP-40G-SR4-S	MMF	12-fiber MPO	850	50.0 50.0	2000 (OM3) 4700 (OM4)	100m 150 m <sup>2</sup>
QSFP-40G-SR-BD	MMF	LC Duplex	850/900	50.0 50.0 50.0	500 (OM2) 2000 (OM3) 4700 (OM4)	98.4 feet (30 meters) 328.1 feet (100 meters) 492.1 feet (150 meters)

Table B-11 QSFP+ Transceiver Optical Transmit and Receive Specifications

Product Number	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
FET-40G	FEX	-1 (maximum per lane*6) -8.0 (minimum per lane)	-1 (maximum per lane) -9.9 (minimum per lane)	840 to 860
QSFP-40G-CSR4	40GBASE-CSR4	0 (maximum per lane) -7.3 (minimum per lane)	0 (maximum per lane*6) -9.9 (minimum per lane)	840 to 860
QSFP-40G-ER4	40GBASE-ER4	4.5 (maximum per lane) -2.7 (minimum per lane)	-4.5 (maximum per lane) -21.2 (minimum per lane)	Four lanes: 1271 nm, 1291 nm, 1311 nm, and 1331 nm
QSFP-4x10G-LR-S	4x10GBASE-LR	0.5 (maximum per lane) -8.2 (minimum per lane)	0.5 (maximum per lane) -14.4 (minimum per lane)	1260 to 1355
QSFP-40G-LR4	40GBASE-LR4	2.3 (maximum per lane) -7.0 (minimum per lane)	2.3 (maximum per lane) -13.7 (minimum per lane)	Four lanes: 1271 nm, 1291 nm, 1311 nm, and 1331 nm
QSFP-40G-LR4-S	40GBASE-LR4	2.3 (maximum per lane) -7.0 (minimum per lane)	2.3 (maximum per lane) -13.7 (minimum per lane)	Four lanes: 1271 nm, 1291 nm, 1311 nm, and 1331 nm
QSFP-40G-SR4	40GBASE-SR4	-1.0 (maximum per lane) -7.6 (minimum per lane)	2.4 (maximum per line) -9.5 (minimum per line)	840 to 860

Table B-11 QSFP+ Transceiver Optical Transmit and Receive Specifications

Product Number	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
QSFP-40G-SR4-S	40GBASE-SR4	2.4 (maximum per lane) -7.6 (minimum per lane)	2.4 (maximum per line) -9.5 (minimum per line)	840 to 860
QSFP-40G-SR-BD	40GBASE-SR-BiDi	5 (maximum per lane) -4 (minimum per lane)	5 (maximum per line) -6 (minimum per line)	832 to 918

Table B-12 Environmental and Power Specifications for CFP Transceivers

Parameter	Specification
Storage temperature	-40 to 185°F (-40 to 85°C)
Operating temperature	32 to 104°F (0 to 40°C)
Case temperature	-40 to 158°F (-40 to 70°C)
Storage relative humidity	5 to 95 percent

## 10-Gigabit SFP+ Transceivers and Fabric Extender Transceivers

The 10-Gigabit SFP+ transceivers are used with the following I/O modules:

- F1 Series 32-port 1- and 10-Gigabit Ethernet I/O module (N7K-F132XP-15)
- F2 Series 48-port 1- and 10-Gigabit I/O module (N7K-F248XP-25 and N7K-F248XP-25E)
- F3 Series 48-port 1- and 10-Gigabit I/O module (N7K-F348XP-25)
- M1 Series 32-port 10-Gigabit Ethernet I/O module (N7K-M132XP-12)
- M1 Series 32-port 10-Gigabit Ethernet I/O module with XL option (N7K-M132XP-12L)
- M1 Series 8-port 10-Gigabit Ethernet I/O module with XL option (N7K-M108X2-12L) (requires the OneX Converter Module to adapt the SFP+ transceiver to the X2 ports on this I/O module)
- M2 Series 24-port 10-Gigabit Ethernet I/O module with XL option (N7K-M224XP-23L)
- M3 Series 48-port 1- and 10-Gigabit Ethernet I/O module with XL option (N7K-M348XP-25L)

The 10-Gigabit Fabric Extender Transceiver (FET) is used with only the following I/O modules when connecting them to the Cisco Nexus 2248TP, 2248TP-E, 2232PP, 2232TM, and 2224TP Fabric Extenders (FEXs):

- F2 Series 48-port 1- and 10-Gigabit I/O module (N7K-F248XP-25 and N7K-F248XP-25E)
- F3 Series 48-port 1- and 10-Gigabit I/O module (N7K-F348XP-25)
- M1 Series 32-port 10-Gigabit Ethernet I/O module (N7K-M132XP-12)
- M1 Series 32-port 10-Gigabit Ethernet I/O module with XL option (N7K-M132XP-12L)
- M2 Series 24-port 10-Gigabit Ethernet I/O module with XL option (N7K-M224XP-23L)

Starting with Cisco NX-OS Release 8.1(1), the 10-Gigabit Fabric Extender Transceiver (FET) can be used with M3 Series 48-port 1- and 10-Gigabit Ethernet I/O modules with XL option (N7K-M348XP-25L) when connecting them to the Cisco Nexus 2248TP, 2248TP-E, 2232PP, 2232TM, and 2224TP Fabric Extenders (FEXs).

You can also use the SFP-10G-SR and SFP-10G-LR transceivers when connecting the 32-port 10-Gigabit Ethernet I/O modules to FEXs.

This section includes the following sections:

- [10BASE-X SFP+ Transceivers, page B-12](#)
- [10BASE-DWDM SFP+ Transceivers, page B-17](#)

## 10BASE-X SFP+ Transceivers

To see which SFP+ transceivers are used with the F1 or F2 Series I/O modules, see [Table B-13](#). To see which SFP+ transceivers are used with the M1, M2 and M3 Series I/O modules, see [Table B-14](#). To see information on the DWDM SFP+ transceivers, see the “[10BASE-DWDM SFP+ Transceivers](#)” section on [page B-17](#).

**Table B-13** SFP+ Transceivers Used with F1, F2 and F3 Series I/O Modules

Transceiver	I/O Module		
	32-port 1- and 10-Gigabit (N7K-F132XP-15)	48-port 1- and 10-Gigabit (N7K-F248XP-25 and N7K-F248XP-25E)	48-port 1- and 10-Gigabit (N7K-F348XP-25)
DWDM-SFP10G-xx.xx	X	X	X
FET-10G		X <sup>1</sup>	X <sup>1</sup>
SFP-10G-ER	X	X	X
SFP-10G-LR	X <sup>1</sup>	X	X
SFP-10G-LRM	X	X	X
SFP-10G-SR	X	X	X
SFP-10G-ZR	X	X	X
SFP-H10GB-CU1M	X	X	X
SFP-H10GB-CU3M	X	X	X
SFP-H10GB-CU5M	X	X	X
SFP-H10GB-ACU7M	X	X	X
SFP-H10GB-ACU10M	X	X	X

1. Requires revision 2 of this transceiver.

Table B-14 SFP+ Transceivers Used with M1, M2 and M3 Series Modules

Transceiver	8-port 10-Gigabit (N7K-M108X 2-12L)	32-port 10-Gigabit (N7K-M132XP- 12)	32-port 10-Gigabit with XL option (N7K-M132X P-12L)	24-Port 10-Gigabit (N7K-M224XP -23L)	48-Port 1-/10-Gigabit (N7K-M348XP- 25L)
CWDM-SFP 10G-1xxx					X
DWDM-SFP 10G-xx.xx			X	X	X
FET-10G		X <sup>1</sup>	X <sup>1</sup>	X <sup>1</sup>	X <sup>2</sup>
SFP-10G-B XD-I					X
SFP-10G-B XU-I					X
SFP-10G-A OC1M			X	X	X
SFP-10G-A OC2M			X	X	X
SFP-10G-A OC3M			X	X	X
SFP-10G-A OC5M			X	X	X
SFP-10G-A OC7M			X	X	X
SFP-10G-A OC10M			X	X	X
SFP-10G-E R		X	X	X	X
SFP-10G-E R-S			X	X	X
SFP-10G-L R	X	X	X	X	X
SFP-10G-L R-S	X		X	X	X
SFP-10G-L RM (SMF)	X		X	X	X
SFP-10G-L RM (MMF)	X		X	X	
SFP-10G-SR	X <sup>3</sup>	X	X	X	X
SFP-10G-SR -S	X		X	X	X

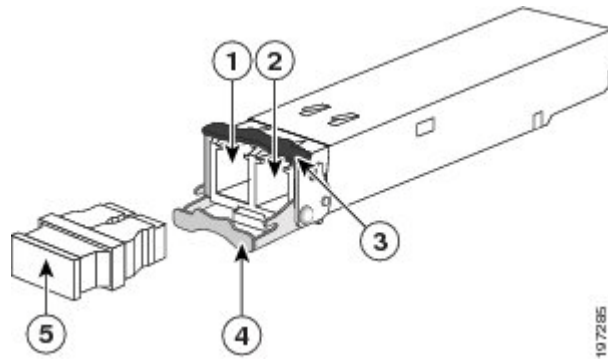
Table B-14 SFP+ Transceivers Used with M1, M2 and M3 Series Modules

Transceiver	8-port 10-Gigabit (N7K-M108X 2-12L)	32-port 10-Gigabit (N7K-M132XP- 12)	32-port 10-Gigabit with XL option (N7K-M132X P-12L)	24-Port 10-Gigabit (N7K-M224XP -23L)	48-Port 1-/10-Gigabit (N7K-M348XP- 25L)
SFP-10G-Z R		X <sup>3</sup>	X <sup>3</sup>	X <sup>3</sup>	X
SFP-10G-Z R-S			X	X	X
SFP-H10GB -ACU7M		X <sup>4</sup>	X	X	X
SFP-H10GB -ACU10M		X <sup>3</sup>	X	X	X
SFP-H10GB -CU1M	X		X <sup>3</sup>	X <sup>3</sup>	X
SFP-H10GB -CU1-5M			X	X	X
SFP-H10GB -CU2M			X	X	X
SFP-H10GB -CU2-5M			X	X	X
SFP-H10GB -CU3M	X		X <sup>3</sup>	X <sup>3</sup>	X
SFP-H10GB -CU5M	X		X <sup>3</sup>	X <sup>3</sup>	X

1. The FET-10G transceiver is used only for connections with a Cisco Nexus 2248TP, 2248TP-E, 2232PP, 2232TM, and 2224TP Fabric Extender (FEX).
2. Supported from Cisco NX-OS Release 8.1(1).
3. Requires the OneX Converter Module (part number CVR-X2-SFP10G) when this transceiver is used with the 8-port 10-GB I/O module.
4. Requires revision 2 of this transceiver.

Figure B-4 identifies the major features of these transceivers. For the cable specifications that apply to SFP+ transceivers and FETs, see Table B-15. For the physical and environmental specifications, see Table B-16. For the environmental specifications that apply to these transceivers, see Table B-17.

Figure B-4 SFP+ Transceivers and FETs



1	Receive optical bore	4	Clasp shown in open position
2	Transmit optical bore	5	Dust plug
3	Clasp shown in closed position		

Table B-15 Cable Specifications for the 10-Gigabit SFP+ Transceivers and FETs

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
FET-10G	MMF	Dual LC/PC	850	50 50	500 2000	82 feet (25 meters) 328 feet (100 meters)
SFP-H10GB-ACUxM	Twinax cable, active, 30-AWG cable assembly	—	—	—	—	22.8 feet (7 meters) 32.5 feet (10 meters)
SFP-H10GB-CU1M	Twinax cable, passive, 30-AWG cable assembly	—	—	—	—	3.3 feet (1 meter) 9.8 feet (3 meters) 16.4 feet (5 meters)
SFP-10G-AOCxM	Active optical cable assembly	—	—	—	—	3.3 feet (1 meter) 6.6 feet (2 meters) 9.8 feet (3 meters) 16.4 feet (5 meters) 23.0 feet (7 meters) 32.8 feet (10 meters)
SFP-10G-ER	SMF	Dual LC/PC	1550	G.652 fiber	—	24.9 miles (40 km)
SFP-10G-LR	SMF	Dual LC/PC	1310	G.652 fiber	—	6.2 miles (10 km)

Table B-15 Cable Specifications for the 10-Gigabit SFP+ Transceivers and FETs (continued)

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
SFP-10G-LRM	MMF	Dual LC/PC	1310	62.5	500	722 feet (220 meters)
				50	400	328 feet (100 meters)
				50	500	722 feet (220 meters)
				G.652	—	984 feet (300 meters)
SFP-10G-SR	MMF	Dual LC/PC	850	62.5	160	85 feet (26 meters)
				62.5	200	108 feet (33 meters)
				50.0	400	216 feet (66 meters)
				50.0	500	269 feet (82 meters)
				50.0	2000	984 feet (300 meters)

Table B-16 SFP+ Transceiver Optical Transmit and Receive Specifications

X2 Transceiver Product Number	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
SFP-10G-ER	10GBASE-ER, 1550-nm SMF	4.0 (maximum) -4.7 (minimum)	-1.0 (maximum) -15.8 (minimum)	1530 to 1565
SFP-10G-LR	10GBASE-LR, 1310-nm SMF	0.5 (maximum) -8.2 (minimum)	0.5 (maximum) -14.4 (minimum)	1260 to 1355
SFP-10G-LRM	10GBASE-LRM, 1310-nm MMF and SMF	0.5 (maximum) -6.5 (minimum)	0.5 (maximum) -8.4 (minimum) (in average) -6.4 (minimum) (in OMA) <sup>1</sup>	1260 to 1355
SFP-10G-SR	10GBASE-SR, 850-nm MMF	-1.2 (maximum) <sup>2</sup> -7.3 (minimum)	-1.0 (maximum) -9.9 (minimum)	840 to 860

- Both the average and the OMA specifications must be met simultaneously.
- The launch power shall be the lesser of the class 1 safety limit or the maximum receive power. Class 1 laser requirements are defined by IEC 60825-1:2001.

Table B-17 Environmental and Power Specifications for the 10-Gigabit SFP+ Transceivers and FETs

Parameter	Specification
Storage temperature	-40 to 185°F (-40 to 85°C)
Operating temperature	32 to 158°F (0 to 70°C)
Case temperature	32 to 158°F (0 to 70°C)
Module supply voltage	3.1 to 3.5 V



## 10BASE-DWDM SFP+ Transceivers

The Dense Wavelength Division Multiplexing (DWDM) SFP+ transceivers are part of a DWDM optical network to provide high-capacity bandwidth across a fiber-optic network. There are 32 fixed-wavelength DWDM SFP+ transceivers that support the International Telecommunications Union (ITU) 100-GHz wavelength grid. These transceivers have duplex SC connectors. DWDM SFP+ transceivers can transmit and receive optical signals up to 50 miles (80 km) depending on the quality of the fiber-optic cable used.

DWDM SFP+ transceivers look like the typical 10GBASE-X SFP+ transceivers as shown in [Figure B-4 on page B-15](#).

For the specifications that differentiate the 10GBASE-DWDM SFP+ transceivers, see the [10-Gigabit Ethernet Transceiver Modules Compatibility Matrix](#).

## 10-Gigabit X2 Transceivers

**Note**

---

Starting with Cisco NX-OS Release 8.0(1), the 8-port 10-GB Ethernet (N7K-M108X2-12L) I/O modules are not supported.

---

The following 10-Gigabit X2 transceivers are used with the 8-port 10-GB Ethernet (N7K-M108X2-12L) I/O modules:

- DWDM-X2-xx.xx
- X2-10GB-CX4
- X2-10GB-ER
- X2-10GB-LR
- X2-10GB-LRM
- X2-10GB-LX4
- X2-10GB-SR
- X2-10GB-ZR

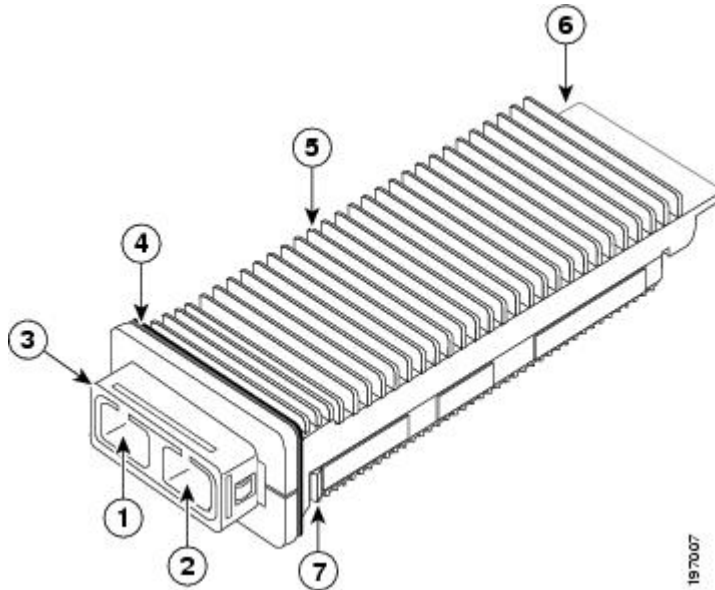
Additionally, you can use the following SFP+ transceivers with the OneX Converter Module (part number CVR-X2-SFP10G) that adapts SFP+ transceivers to X2 ports:

- SFP-10G-SR
- SFP-H10GB-CUxM

For information on the SFP+ 10GB transceivers, see the [“10-Gigabit SFP+ Transceivers and Fabric Extender Transceivers”](#) section on page B-11.

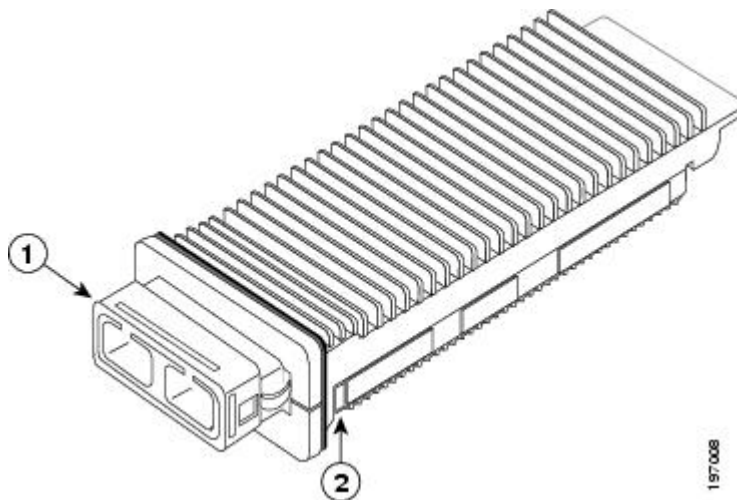
[Figure B-5](#) identifies the major features of the X2 transceivers, and [Figure B-6](#) shows the transceiver with its latching sleeve extended (you pull the sleeve out to remove the transceiver from the I/O module).

Figure B-5 10-Gigabit X2 Transceiver (Latching Sleeve Not Extended)



1	Transmit optical bore	5	Transceiver heat sink
2	Receive optical bore	6	Module connector
3	Latching sleeve (retracted)	7	Latch (extended when sleeve is retracted)
4	EMI gasket		

Figure B-6 X2 Transceiver with Latching Sleeve Extended



1	Latching sleeve (extended to remove transceiver)	2	Latch (retracted to enable you to remove the transceiver)
---	--	---	---

This section includes the following topics:

- [10GBASE-X X2 Transceivers, page B-19](#)
- [10GBASE-DWDM X2 Transceivers, page B-20](#)

## 10GBASE-X X2 Transceivers

For the 10GBASE-X X2 transceiver cabling specifications, see [Table B-18](#). For the optical transmit and receive specifications, see [Table B-19](#). For the physical and environmental specifications, see [Table B-20](#).

**Table B-18** X2 Transceiver Cabling Specifications

X2 Transceiver Product Number	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cabling Distance <sup>1</sup>
X2-10GB-CX4	Copper		—	—	—	49.2 feet (15 meters)
X2-10GB-ER	SMF	SC duplex	1550	G.652 fiber	—	24.9 miles (40 km)
X2-10GB-LR	SMF	SC duplex	1310	G.652 fiber	—	6.2 miles (10 km)
X2-10GB-LRM	MMF	SC duplex	1310	62.5	500	722 feet (220 meters)
				50.0	400	328 feet (100 meters)
				50.0	500	722 feet (220 meters)
				G.652 fiber	—	984 feet (300 meters)
X2-10GB-LX4	MMF		1300	62.5	500	984 feet (300 meters)
				50.0	400	787 feet (240 meters)
				50.0	500	984 feet (300 meters)
X2-10GB-SR	MMF	SC duplex	850	62.5	160	85 feet (26 meters)
				62.5	200	108 feet (33 meters)
				50.0	400	217 feet (66 meters)
				50.0	500	269 feet (82 meters)
				50.0	2000	984 feet (300 meters)
X2-10GB-ZR	SMF					49.3 miles (80 km)

1. Cable distances are based on fiber loss. Additional factors, such as the number of splices and the optical quality of the fiber, can affect cabling distances.

Table B-19 X2 Transceiver Optical Transmit and Receive Specifications

X2 Transceiver Product Number	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
X2-10GB-ER	10GBASE-ER, 1550-nm SMF	4.0 (maximum) -4.7 (minimum)	-1.0 (maximum) -15.8 (minimum)	1530 to 1565
X2-10GB-LR	10GBASE-LR, 1310-nm SMF	0.5 (maximum) -8.2 (minimum)	0.5 (maximum) -14.4 (minimum)	1260 to 1355
X2-10GB-LRM	10GBASE-LRM, 1310-nm MMF and SMF	0.5 (maximum) -6.5 (minimum)	0.5 (maximum) -8.4 (minimum) (in average) -6.4 (minimum) (in OMA) <sup>1</sup>	1260 to 1355
X2-10GB-SR	10GBASE-SR, 850-nm MMF	-1.2 (maximum) <sup>2</sup> -7.3 (minimum)	-1.0 (maximum) -9.9 (minimum)	840 to 860

- Both the average and the OMA specifications must be met simultaneously.
- The launch power shall be the lesser of the class 1 safety limit or the maximum receive power. Class 1 laser requirements are defined by IEC 60825-1:2001.

Table B-20 X2 Transceiver Physical and Environmental Specifications

Characteristic	Specification
Dimensions (H x W x D)	0.53 x 1.41 x 3.58 inches (13.46 x 36 x 91 mm)
Operating temperature	
X2-10GB-ER	32° to 122°F (0° to 50°C)
X2-10GB-LR	32° to 122°F (0° to 50°C)
X2-10GB-LRM	32° to 158°F (0° to 70°C)
X2-10GB-LX4	32° to 158°F (0° to 70°C)
X2-10GB-SR	32° to 122°F (0° to 50°C)
X2-10GB-ZR	32° to 122°F (0° to 50°C)
Storage temperature	-40° to 185° F (-40° to 85°C)

## 10GBASE-DWDM X2 Transceivers

The Dense Wavelength Division Multiplexing (DWDM) X2 transceivers are part of a DWDM optical network to provide high-capacity bandwidth across a fiber-optic network. As listed in [Table B-21](#), there are 32 fixed-wavelength DWDM X2 transceivers that support the International Telecommunications Union (ITU) 100-GHz wavelength grid. These transceivers have duplex SC connectors. DWDM X2 transceivers can transmit and receive optical signals up to 50 miles (80 km) depending on the quality of the fiber-optic cable used.

DWDM X2 transceivers look like the typical 10GBASE-X X2 transceivers as shown in [Figure B-5 on page B-18](#).

For the specifications that differentiate the 10GBASE-DWDM X2 transceivers, see the 10-Gigabit Ethernet Transceiver Modules Compatibility Matrix.

*Table B-21 DWDM X2 Transceivers*

Part Number	100-GHz ITU Channel	Description
DWDM-X2-60.61=	21	10GBASE-DWDM 1560.61 nm X2
DWDM-X2-59.79=	22	10GBASE-DWDM 1559.79 nm X2
DWDM-X2-58.98=	23	10GBASE-DWDM 1558.98 nm X2
DWDM-X2-58.17=	24	10GBASE-DWDM 1558.17 nm X2
DWDM-X2-56.55=	26	10GBASE-DWDM 1556.55 nm X2
DWDM-X2-55.75=	27	10GBASE-DWDM 1555.75 nm X2
DWDM-X2-54.94=	28	10GBASE-DWDM 1554.94 nm X2
DWDM-X2-54.13=	29	10GBASE-DWDM 1554.13 nm X2
DWDM-X2-52.52=	31	10GBASE-DWDM 1552.52 nm X2
DWDM-X2-51.72=	32	10GBASE-DWDM 1551.72 nm X2
DWDM-X2-50.92=	33	10GBASE-DWDM 1550.92 nm X2
DWDM-X2-50.11=	34	10GBASE-DWDM 1550.11 nm X2
DWDM-X2-48.51=	36	10GBASE-DWDM 1548.51 nm X2
DWDM-X2-47.72=	37	10GBASE-DWDM 1547.72 nm X2
DWDM-X2-46.92=	38	10GBASE-DWDM 1546.92 nm X2
DWDM-X2-46.12=	39	10GBASE-DWDM 1546.12 nm X2
DWDM-X2-44.53=	41	10GBASE-DWDM 1544.53 nm X2
DWDM-X2-43.73=	42	10GBASE-DWDM 1543.73 nm X2
DWDM-X2-42.94=	43	10GBASE-DWDM 1542.94 nm X2
DWDM-X2-42.14=	44	10GBASE-DWDM 1542.14 nm X2
DWDM-X2-40.56=	46	10GBASE-DWDM 1540.56 nm X2
DWDM-X2-39.77=	47	10GBASE-DWDM 1539.77 nm X2
DWDM-X2-38.98=	48	10GBASE-DWDM 1538.98 nm X2
DWDM-X2-38.19=	49	10GBASE-DWDM 1538.19 nm X2
DWDM-X2-36.61=	51	10GBASE-DWDM 1536.61 nm X2
DWDM-X2-35.82=	52	10GBASE-DWDM 1535.82 nm X2
DWDM-X2-35.04=	53	10GBASE-DWDM 1535.04 nm X2
DWDM-X2-34.25=	54	10GBASE-DWDM 1534.25 nm X2
DWDM-X2-32.68=	56	10GBASE-DWDM 1532.68 nm X2
DWDM-X2-31.90=	57	10GBASE-DWDM 1531.90 nm X2
DWDM-X2-31.12=	58	10GBASE-DWDM 1531.12 nm X2
DWDM-X2-30.33=	59	10GBASE-DWDM 1530.33 nm X2

# 1-Gigabit SFP Transceivers

The 1-Gigabit Ethernet SFP transceivers are used with the following 1-Gigabit Ethernet I/O modules:

- F1 Series 32-port 1- and 10-Gigabit Ethernet I/O modules (N7K-F132XP-15)
- F2 Series 48-port 1- and 10-Gigabit Ethernet I/O modules (N7K-F248XP-25 and N7K-F248XP-25E)
- F3 Series 48-port 1- and 10-Gigabit Ethernet I/O modules (N7K-F348XP-25)
- M1 Series 48-port 1-Gigabit Ethernet I/O modules (N7K-M148GS-11)
- M1 Series 48-port 1-Gigabit Ethernet I/O modules with XL option (N7K-M148GS-11L)
- M3 Series 48-port 1- and 10-Gigabit Ethernet I/O modules with XL option (N7K-M348XP-25L)

To see which of these transceivers are used with each of these I/O modules, see [Table B-22](#).

**Table B-22** SFP Transceivers Used with Each I/O Module

Transceiver	I/O Modules					
	32-port 1- and 10-Gigabit (N7K-F132XP-15)	48-port 1- and 10-Gigabit (N7K-F248XP-25 and N7K-F248XP-25E)	48-port 1- and 10-Gigabit (N7K-F348XP-25)	48-port 1-Gigabit (N7K-M148GS-11)	48-port 1-Gigabit with XL option (N7K-M148GS-11L)	48-port 1- and 10-Gigabit with XL option (N7K-M348XP-25L)
CWDM-SFP-xx xx	X	X	X	X	X	X
DWDM-SFP-xx xx	X	X	X	X	X	X
GLC-BX-D		X	X	X	X	X
GLC-BX-U		X	X	X	X	X
GLC-EX-SMD	X	X	X			X
GLC-LH-SMD	X	X	X	X	X	X
GLC-SX-MMD	X	X	X	X	X	X
GLC-TE	X	X	X	X	X	X
GLC-ZX-SMD	X	X	X	X	X	X
SFP-GE-L	X	X		X	X	
SFP-GE-S	X	X		X	X	
SFP-GE-T	X	X		X	X	
SFP-GE-Z	X	X		X	X	

This section includes the following topics:

- [1000BASE-CWDM SFP Transceiver Cables, page B-23](#)
- [1000BASE-DWDM SFP Transceivers, page B-23](#)
- [1000BASE-T and 1000BASE-X SFP Transceivers, page B-24](#)

## 1000BASE-CWDM SFP Transceiver Cables

The Coarse Wavelength Division Multiplexing (CWDM) SFP transceivers are hot-swappable transceivers that you plug into SFP-compatible I/O modules. The CWDM SFP transceiver uses an LC optical connector to connect to single-mode fiber-optic (SMF) cable. You can connect the CWDM SFPs to CWDM passive optical system optical add/drop multiplexer (OADM) modules or multiplexer/demultiplexer plug-in modules using SMF cables. CWDM SFP transceivers can transmit and receive optical signals up to 61 miles (100 km) depending on the quality of the fiber-optic cable used.

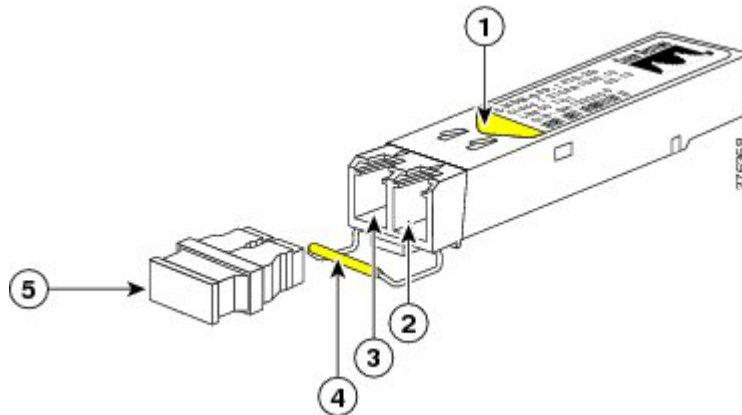
CWDM SFP transceivers are color coded to indicate their designated optical wavelength. [Figure B-7](#) shows the CWDM transceiver, which looks like a standard 1000BASE-X SFP transceiver with a colored arrow and bail clasp to indicate the designated wavelength.



### Note

Whenever the transceiver receive optical bores are not filled with optical cables, you should minimize the chance of contamination by plugging the transceiver with its dust plug.

*Figure B-7 CWDM SFP Transceiver (Yellow Color Code)*



1	Colored arrow on label specifies the wavelength	4	Bail clasp
2	Receive optical bore	5	Dust plug
3	Transmit optical bore		

For the specifications that differentiate the 1000BASE-CWDM SFP transceivers, see the [Cisco Gigabit Ethernet Transceiver Modules Compatibility Matrix](#). For specifications and installation information that apply to all CWDM SFP transceivers, see the [Cisco SFP and SFP+ Transceiver Module Installation Notes](#).

## 1000BASE-DWDM SFP Transceivers

The Dense Wavelength Division Multiplexing (DWDM) SFP transceivers are part of a DWDM optical network to provide high-capacity bandwidth across a fiber-optic network. There are 40 fixed-wavelength DWDM SFP transceivers that support the International Telecommunications Union (ITU) 100-GHz wavelength grid. These transceivers have duplex SC connectors. DWDM SFP transceivers can transmit and receive optical signals up to 50 miles (80 km) depending on the quality of the fiber-optic cable used.

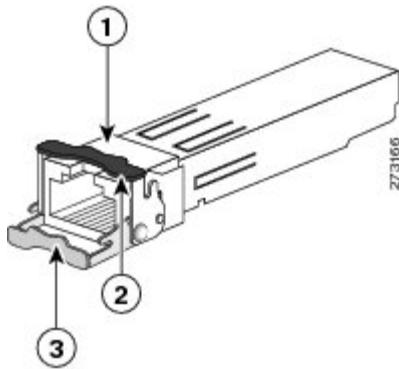
DWDM SFP transceivers look like the typical 1000BASE-X transceivers as shown in [Figure B-9](#) on page B-24.

For the specifications that differentiate the 1000BASE-DWDM SFP transceivers, see the [Cisco Gigabit Ethernet Transceiver Modules Compatibility Matrix](#). For specifications and installation information that apply to all CWDM SFP transceivers, see the [Cisco SFP and SFP+ Transceiver Module Installation Notes](#).

## 1000BASE-T and 1000BASE-X SFP Transceivers

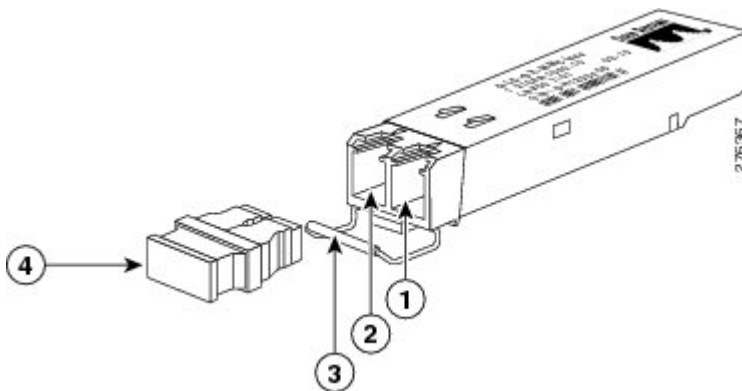
The 1000BASE-T and 1000BASE-X SFPs are hot-swappable transceivers that you plug into SFP-compatible I/O modules. The 1000BASE-T transceiver, shown in [Figure B-8](#), provides an RJ-45 connection for copper cables, and the 1000BASE-X transceiver, shown in [Figure B-9](#), provides an optical connection for fiber-optic cables.

**Figure B-8** 1000BASE-T SFP Transceiver



1	RJ-45 connector	3	Bail clasp shown in the open (unlocked) position
2	Bail clasp shown in the closed (locked) position		

**Figure B-9** 1000BASE-X SFP Transceiver





1	Receive optical bore	3	Bail clasp
2	Transmit optical bore	4	Dust plug

For the 1000BASE-T and 1000BASE-X transceiver cable specifications, see [Table B-23](#).

**Table B-23** Cable Specifications for 1000BASE-X and 1000BASE-T SFP Transceivers

Transceiver Type	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
1000BASE-BX10 (GLC-BX-U)	SMF <sup>1</sup>	Single LC/PC	1310	G.652 <sup>4</sup>	—	6.2 miles (10 km)
1000BASE-BX10 (GLC-BX-D)	SMF <sup>1</sup>	Single LC/PC	1490	G.652 <sup>4</sup>	—	6.2 miles (10 km)
1000BASE-SX (GLC-SX-MMD, GLC-SX-MM, and SFP-GE-S)	MMF <sup>2</sup>	LC duplex	850	62.5	160	722 feet (220 m)
				62.5	200	902 feet (275 m)
				50.0	400	1640 feet (500 m)
				50.0	500	1804 feet (550 m)
1000BASE-LX (GLC-LH-SMD, GLC-LH-SM, and SFP-GE-L)	MMF <sup>2</sup>	LC duplex	1310	62.5	500	1804 feet (550 m) <sup>3</sup>
				50.0	400	1804 feet (550 m) <sup>3</sup>
				50	500	1804 feet (550 m) <sup>3</sup>
	SMF <sup>1</sup>	LC duplex	1310	G.652 <sup>4</sup>	—	6.2 miles (10 km)
1000BASE-ZX (GLC-ZX-SM and SFP-GE-Z)	SMF <sup>1</sup>	LC duplex	1550	G.652 <sup>2</sup>	—	Approximately 43.4 to 60 miles (70 to 100 km) depending on link loss
1000BASE-T (GLC-T and SFP-GE-T)	Category 5, 5E, or 6 UTP/FTP	RJ45	—	—	—	328 feet (100 meters)

1. Single-mode fiber optic (SMF)
2. Multimode fiber optic (MMF)
3. You must use a mode-conditioning patch cord, as specified by the IEEE standard, regardless of the amount of span.
4. ITU-T G.652 SMF as specified by the IEEE 802.32 standard.

The transceivers that support Digital Optical Monitoring have a greater range of temperatures for operations, as shown in [Table B-24](#).

Table B-24 Environmental Specifications for 1000BASE-X and 1000BASE-T Transceivers

Transceiver Type	Part Number	Digital Optical Monitoring Support	Operating Temperature	Storage Temperature
1000BASE-SX	GLC-SX-MMD	YES	EXT <sup>2</sup>	-40 to 185°F (-40 to 85°C)
	GLC-SX-MM	No	COM <sup>1</sup>	
	SFP-GE-S	Yes	EXT <sup>2</sup>	
1000BASE-LX	GLC-LH-SMD	Yes	EXT <sup>2</sup>	
	GLC-LH-SM	No	COM <sup>1</sup>	
	SFP-GE-L	Yes	EXT <sup>2</sup>	
1000BASE-ZX	GLC-ZX-SM	No	COM <sup>1</sup>	
	SFP-GE-Z	Yes	EXT <sup>2</sup>	
1000BASE-T	GLC-T	—	COM <sup>1</sup>	
	SFP-GE-T	—	EXT <sup>2</sup>	

1. Commercial (COM) temperature range is 32 to 158°F (0 to 70°C).

2. Extended (EXT) temperature range is 23 to 185°F (-5 to 85°C).

## RJ-45 Module Connectors

The RJ-45 connector connects Category 3, Category 5, Category 5e, Category 6, or Category 6A foil twisted-pair or unshielded twisted-pair cable from the external network to the following module interface connectors:

- Supervisor modules
  - CONSOLE port
  - COM1/AUX port
  - MGMT ETH port
  - CMP MGMT ETH port
- 48-port 10/100/1000 Ethernet I/O modules (N7K-M148GT-11 and N7K-M148GT-11L)
  - 10/100/1000 ports
- 48-port 1- and 10-GBASE-T I/O modules (N7K-F248XT-25E)
  - 1- and 10-GBASE-T ports
- Cisco Nexus 2248TP and 2248TP-E Fabric Extenders
  - 100/1000 downlink ports



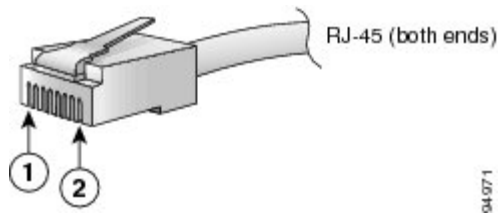
**Note** If you need to connect a host that operates at up to 10 Mbps to a FEX, you can connect the host to a Cisco Nexus 2248TP-E FEX, which has large port buffers that enable it to work at the slower 10-Mbps speed. If the 10-Mbps host that you are connecting cannot autonegotiate speeds, you must configure the host for 10 Mbps when connecting it to the Cisco Nexus 2248TP-E FEX.

  
**Caution**

To comply with GR-1089 intrabuilding, lightning immunity requirements, you must use foil twisted-pair (FTP) cable that is properly grounded at both ends.

Figure B-10 shows the RJ-45 connector.

*Figure B-10 RJ-45 Connector*



1	Pin 1	2	Pin 8
---	-------	---	-------

