Intelbras Transceivers Modules, SFPs and Cables

Contents

Overview

Table 1 describes transceiver modules and network cables available for Intelbras devices. All these transceiver modules and network cables are hot swappable.

Table 1 Transceiver modules and network cables available for Intelbras devices

Transceiver module and network cable type		Interface connector	Data rate
QSFP-DD module (transceiver)	QSFP-DD optical transceiver module	Dual LC	400 Gbps
	QSFP-DD optical transceiver module	MPO	
	QSFP-DD copper cable	N/A	
QSFP56 module (transceiver)	QSFP56 optical transceiver module	MPO	200 Gbps
QSFP28 module (transceiver)	QSFP28 optical transceiver module	MPO/dual LC	100/50 Gbps
	QSPF28 BIDI optical transceiver module	Dual LC	100 Gbps
	QSFP28 copper cable	N/A	
	QSFP28 optical cable		
CFP module (transceiver)	100-Gigabit CFP optical transceiver module	Dual LC	100 Gbps
	40-Gigabit CFP optical transceiver module		
CFP2 module (transceiver)	CFP2 optical transceiver module	MPO/dual LC	100 Gbps
CXP module (transceiver)	100-Gigabit CXP optical transceiver module	MPO	100 Gbps
	100-Gigabit CXP optical cable	N/A	
QSFP+ module (transceiver)	QSFP+ optical transceiver module	MPO/dual LC	40 Gbps
	QSPF+ BIDI optical transceiver module	Dual LC	
	QSFP+ copper cable (for interconnecting QSFP+ ports)	N/A	
	QSFP+ to SFP+ copper cable (for connecting one 40-Gigabit QSFP+ port to four 10-Gigabit SFP+ ports)	N/A	
	QSFP+ optical cable		
SFP28 module (transceiver)	SFP28 optical transceiver module	Dual LC	25 Gbps
	SFP28 copper cable	N/A	
	SFP28 optical cable		
SFP+ module (transceiver)	SFP+ optical transceiver module	Dual LC/SC	10 Gbps
	SFP+ BIDI optical transceiver module	Dual LC	
	SFP+ copper cable (for interconnecting devices)	N/A	
	SFP+ optical cable		

Transceiver module and network cable type		Interface connector	Data rate
10-Gigabit small form-factor pluggable (XFP) module (transceiver)	XFP optical transceiver module	Dual LC	See Table 52.
	10G EPON OLT optical transceiver module	SC	See Table 54.
10-Gigabit CX4 cable (for interconnecting devices)		N/A	12 Gbps
Small form-factor pluggable (SFP) module (transceiver)	2.5-Gigabit SFP optical transceiver module	Dual LC	2.5 Gbps
	Gigabit SFP optical transceiver module		1250 Mbps
	622-Megabit SFP optical transceiver module		622 Mbps
	100-Megabit SFP optical transceiver module		155 Mbps
	Gigabit bi-direction (BIDI) optical transceiver module	Dual LC	1250 Mbps
	100-Megabit bi-direction (BIDI) optical transceiver module		155 Mbps
	BIDI GEPON OLT optical transceiver module	SC	1250 Mbps
	Gigabit GPON ONU optical transceiver module	SC	1250 Mbps
	Gigabit coarse wavelength division multiplexing (CWDM) optical transceiver module	Dual LC	1250 Mbps
	Gigabit SFP copper transceiver module	RJ-45	1250 Mbps
	Gigabit SFP copper cable (for interconnecting devices)	N/A	1250 Mbps

IMPORTANT:

The commercial outer casing temperature range is 0°C to 70°C (32°F to 158°F) and industrial outer casing temperature range is –40°C to +85°C (–40°F to +185°F) for Intelbras transceiver modules. The commercial temperature range is applicable to all transceiver modules except for transceiver modules marked with * and transceiver modules with special temperature requirements specified in this document. An abnormal outer casing temperature might reduce the performance, signal transmission quality, and link status of the transceiver module, and even damage the transceiver module.

NOTE:

- The available transceiver modules and network cables vary by device models and are subject to change over time. For the most up-to-date list of transceiver modules and network cables, contact your Intelbras sales representative or technical support engineer.
- For information about the transceiver modules and network cables available for each device model, see the installation guides.

Optical transceiver modules

Optical modules transmit signals over optical fibers. Optical transmission features low loss and is fit for long distance transmission.

Intelbras devices support optical module models of different specifications. You can choose optical modules as needed for data transmission over optical fibers.

The optical modules include optical transmitters, optical receivers, transceivers, and transponders.

Intelbras devices support transceivers. Transceivers are mainly used for optical-to-electrical and electrical-to-optical conversions and provide the following functions: optical power control, modulation transmission, signal probe, IV conversion, and limiting amplifier and decision regeneration. In addition, transceivers provide some other functions, such as counterfeit-prevention query and TX-disable. Common form factors for transceiver modules include QSFP-DD, QSFP56, QSFP28, CFP, CFP2, CXP, QSFP+, SFP28, SFP+, and SFP.

Data rate

Data rate is the number of bits transmitted per second. The unit of measure for data rate is Mbps (Megabits per second) or Gbps (Gigabits per second). Optical transceiver modules available for Intelbras devices mainly provide the following levels of data rates: 400 Gbps, 200 Gbps, 100 Gbps, 50 Gbps, 40 Gbps, 32 Gbps, 25 Gbps, 16 Gbps, 10 Gbps, 8 Gbps, 4 Gbps, 2.5 Gbps, 2 Gbps, 1 Gbps, 622 Mbps, 155 Mbps, and 100 Mbps.

Transmission distance

The transmission distance of optical transceiver modules is divided into short and long-range types. A distance of 2 km (1.24 miles) and below is generally considered as short-range type. 10 km (6.21 miles) is considered as long-range type.

Transmission distances provided by optical transceiver modules are mainly limited by certain loss and dispersion suffered during the transmission of optical signals over optical fibers.

- Loss is the optical energy loss due to the absorption, dispersion and leakage over the media when light travels through optical fibers. This loss increases in direct ratio to transmission distance.
- Dispersion happens mainly because electromagnetic waves of different wavelengths travel at different rates over the same medium, causing different wave components of optical signals to reach the receiving end early or late as the transmission distance increases, which in turn causes impulse broadening, making the signal values indistinguishable.

To meet different transmission distance requirements, choose optical transceiver modules according to actual networking conditions.

Central wavelength

Central wavelength represents the wave band used for optical signal transmission. At present, there are mainly three central wavelengths for common optical transceiver modules: 850 nm, 1310 nm, and 1550 nm, respectively representing three wavebands.

- The 850 nm wave band is mainly used for short-reach transmission.
- The 1310 nm and 1550 nm wave bands are mainly used for middle- and long-reach transmission.

Fiber

Fiber types

Fibers are classified as multimode fibers and single-mode fibers.

- Multimode fibers

Multimode fibers (MMFs) have thicker fiber cores and can transport light in multiple modes. However, the inter-mode dispersion is greater and worsens as the transmission distance increases.

Multimode fibers can be classified into multiple grades according to their diameters and modal bandwidth. For more information, see Table 2. The modal bandwidth of a multimode fiber is determined by the expression *the modulation frequency of the maximum modulation frequency pulse that can pass a fiber* × *the fiber length*. The modal bandwidth is a comprehensive index reflecting the optical characteristics of a multimode fiber.

International Telecommunication Union (ITU) defines multimode fiber types in its G series standards. The commonly-used multimode fiber is defined in the ITU G.651 standard. The G.651-compliant fiber transmits light at the wavelength range 800 nm to 900 nm or 1200 nm to 1350 nm.

Table 2 Multimode fiber grades

Fiber mode	Fiber grade	Fiber diameter (μm)	Modal bandwidth at 850 nm (MHz*km)
Multimode fiber	OM1	62.5/125	200
	OM2	50/125	500
	OM3	50/125	2000
	OM4	50/125	4700

Other factors that influence the transmission distance of multimode fibers include interface type, central wavelength, and fiber grade. For more information, see Table 3.

Table 3 Multimode fiber specifications

Interface type	Central wavelength (nm)	Fiber grade	Transmission distance
1000BASE-SX	850	OM1	< 275 m (902.23 ft)
		OM2	< 550 m (1804.46 ft)
10GBASE-SR	850	OM1	< 33 m (108.27 ft)
		OM2	< 82 m (269.03 ft)
		OM3	< 300 m (984.25 ft)
		OM4	< 400 m (1312.34 ft)
40GBASE-CSR4	850	OM3	< 300 m (984.25 ft)
		OM4	< 400 m (1312.34 ft)
40GBASE-SR4	850	OM3	< 70 m (229.66 ft)
		OM4	< 100 m (328.08 ft)
100GBASE-eSR4	850	OM4	< 300 m (984.25 ft)
100GBASE-SR4	850	OM3	< 70 m (229.66 ft)
		OM4	< 100 m (328.08 ft)
200GBASE-SR4	850	OM3	< 70 m (229.66 ft)
		OM4	< 100 m (328.08 ft)
400GBASE-SR8	850	OM3	< 70 m (229.66 ft)
		OM4	< 100 m (328.08 ft)
25GBASE-SR	850	OM3	< 70 m (229.66 ft)

Interface type	Central wavelength (nm)	Fiber grade	Transmission distance
		OM4	< 100 m (328.08 ft)

- Single-mode fibers

  Single-mode fibers (SMFs) have a small core size, typically 9 μm or 10 μm, and can transmit light in only one mode. Single-mode fibers suffer little inter-mode dispersion and are suitable for long-reach communication. Single-mode fibers transmit light at the central wavelength of 1310 nm or 1550 nm.

  Telecommunication Industries Alliance (TIA)/Electronic Industries Alliance (EIA) defines that single-mode fibers use yellow outer jackets with the mark "SM".

  ITU defines single-mode fiber types in its G series standards. The mostly-commonly used single-mode fibers are defined in ITU G.652 and G.655 standards. Table 4 describes features of the G.652 and G.655-compliant fibers.

  Table 4 Features of G.652 and G.655-compliant fibers

Single-mode fiber type	Wavelength (nm)	Features	Applications
G.652-compliant fiber (standard single-mode fiber)	• 1260 to 1360 • 1530 to 1565	Zero dispersion at 1310 nm.	Connecting transceiver modules with a central wavelength of 1310 nm or 1550 nm.
G.655-compliant fiber (non-zero dispersion shifted fiber)	1530 to 1565	Near-zero dispersion around 1550 nm.	For 1550-nm wavelength-division multiplexing (WDM) transmissions.

Fiber diameter

Fiber diameter is generally expressed as core diameter/cladding diameter, in μm. For example, 9/125 μm means the fiber core diameter is 9 μm and the fiber cladding diameter is 125 μm.

For the Intelbras devices, the following fiber diameters are recommended:

- **G.652 standard single-mode fiber**—9/125 μm.
- **G.655 single-mode fiber**—9/125 μm.
- **G.651 standard multimode fiber**—50/125 μm or 62.5/125 μm.

Connector

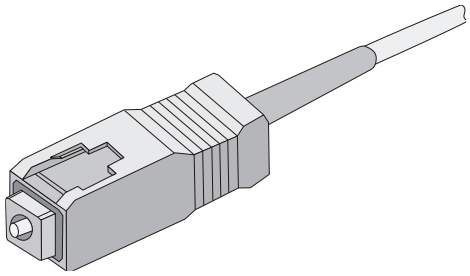
CAUTION:

Cover the connector with a dust cap when it is not connected to any optical fiber.

Connectors connect transceiver modules to the corresponding transmission media. The optical transceiver modules available for Intelbras devices use the following types of connectors:

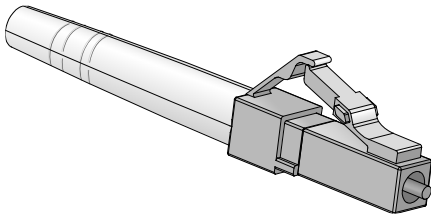
- Subscriber connector standard connector (SC).

Figure 1 SC connector



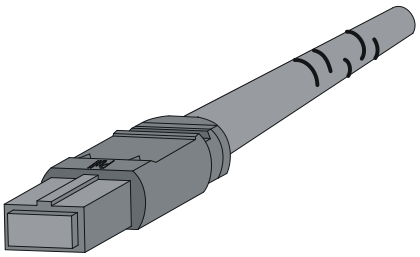
- Lucent connector or local connector (LC).

  Figure 2 LC connector



- Multi-fiber Push On connector (MPO).

  Figure 3 MPO connector



  Intelbras transceiver modules use only female MPO connectors, which have guide holes in the end face.

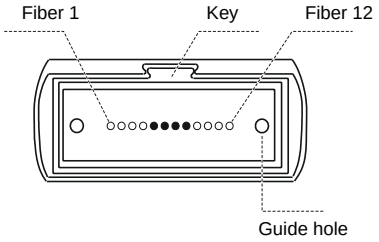
  MPO connectors are classified as the following types based on the polish type:

  - **Physical contact (PC)**—End face polished flat.
  - **Angle-polished contact (APC)**—End face polished with an angle, typically 8°.

  MPO connectors are available with 12 fibers, 16 fibers, or 24 fibers:

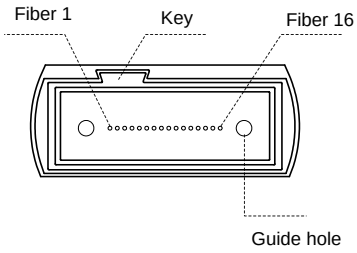
  - 12-fiber MPO connector

    Figure 4 End face of a 12-fiber connector



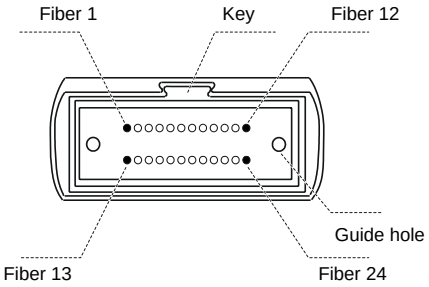
  - 16-fiber MPO connector

Figure 5 End face of a 16-fiber connector



- 24-fiber MPO connector

Figure 6 End face of a 24-fiber connector



Optical parameters

CAUTION:

The average transmit power of a long-haul optical transceiver module is greater than the saturated optical power. Be careful about the length of the optical fiber you use to make sure the actual receive power reaching the optical transceiver module is less than its saturated optical power. Otherwise, the optical transceiver module might be damaged.

NOTE:

Average transmit and receive power ranges are provided for transceiver modules in this guide.

Transmit power

Transmit power is the power at which the transmitter of an optical transceiver module transmits optical signals, in dBm.

Receive power

Receive power is the power at which the receiver of an optical transceiver module receives optical signals, in dBm.

Receiving sensitivity

Receiving sensitivity is the minimum optical power that is needed at the receiving end for the optical module to receive optical signals at a given data rate and bit error rate, in dBm. The higher the data rate is, the worse the receiving sensitivity is, the greater the minimum receive power is. A greater receive power has higher requirements on the receiving components of the optical module.

Saturated optical power

Saturated optical power (also known as optical saturation) is the maximum receive power at a given data rate and bit error rate range (10^{-10} to 10^{-12}), in dBm.

Saturated photocurrent occurs if a fiber probe is irradiated by intensive light. When this occurs, it takes the probe some time to recover. In this case, the receiving sensitivity worsens and the received signals may be decided incorrectly, causing bit errors. This will probably damage the receiving probe. Therefore, when you perform operations, try to maintain a normal saturated optical power level.

Copper transceiver modules

Copper transceiver modules, also called RJ-45 modules, transmit electrical signals over twisted pair cables and do not provide conversion between electrical and optical signals. Compared with optical fibers, twisted pair cables provide a short transmission distance, suitable only for small-scale networking environments.

You can use copper transceiver modules to connect two fiber ports over a network cable.

Intelbras devices support SFP and SFP+ copper transceiver modules.

Data rate

Data rate refers to the number of bits transmitted per second. Data rates of copper transceiver modules are typically measured in Mbps or Gbps.

10 Gbps, 1250 Mbps, and 100 Mbps copper transceiver modules are available for Intelbras devices.

Transmission distance

Through UTP cables, electrical signals can be transmitted over a distance of 100 m (328.08 ft) only. This is because electrical signals attenuate during transmission through the UTP cables.

Attenuation refers to the dissipation of the power of a transmitted signal as it travels over a cable. Attenuation occurs because signal transmission suffers certain resistance from the cable, which weakens the electrical signals as they travel over the cable. When signals are transmitted over a very long distance, signal strength decreases very significantly, causing the signal-to-noise ratio to drop below the accepted level. This makes it impossible to distinguish between signals and noise, resulting in decision errors.

To transmit signals over a short distance, use copper transceiver modules only.

Connector

RJ-45 (Registered Jack-45) twisted pair connectors are used as the connectors for copper transceiver modules. Figure 7 shows the appearance of an RJ-45 connector.

Figure 7 RJ-45 connector

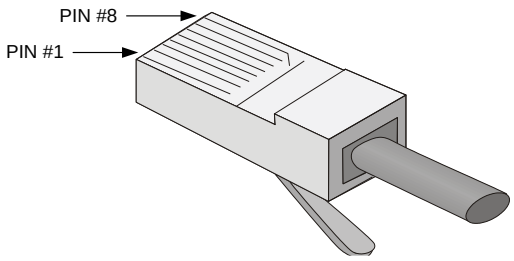


Table 5 RJ-45 GE connector pin assignment

Pin	Signal	Function
1	MX_0+	Data transmit/receive
2	MX_0-	Data transmit/receive
3	MX_1+	Data transmit/receive
4	MX_2+	Data transmit/receive
5	MX_2-	Data transmit/receive
6	MX_1-	Data transmit/receive
7	MX_3+	Data transmit/receive
8	MX_3-	Data transmit/receive

PoE optical transceiver modules

PoE optical transceiver modules are typically used to connect photoelectric hybrid cables to photoelectric hybrid ports (for example, PSFP or PSFP+ ports) on optical switches in a hybrid fiber and copper scheme. Compared with common transceiver modules, PoE optical transceiver modules can transmit both data and power over photoelectric hybrid cables. Such a transmission mode features longer transmission distance, which is suitable for large-scale networking environments.

Intelbras devices support SFP and SFP+ PoE optical transceiver modules.

Data rate

Data rate refers to the number of bits transmitted per second. Data rates of PoE optical transceiver modules are typically measured in Mbps or Gbps.

10 Gbps, 5000 Mbps, 2500 Mbps, and 1250 Mbps PoE optical transceiver modules are available for Intelbras devices.

Transmission distance

The transmission distance of PoE optical transceiver modules is divided into short and long-range types. A distance of 2 km (1.24 miles) and below is generally considered as short-range type. 10 km (6.21 miles) is considered as long-range type.

Transmission distances provided by PoE optical transceiver modules are limited by the following factors:

- Certain loss and dispersion suffered during the transmission of optical signals over optical fibers in photoelectric hybrid cables.
    - Loss is the optical energy loss due to the absorption, dispersion and leakage over the media when light travels through optical fibers. This loss increases in direct ratio to transmission distance.
    - Dispersion happens mainly because electromagnetic waves of different wavelengths travel at different rates over the same medium, causing different wave components of optical signals to reach the receiving end early or late as the transmission distance increases, which in turn causes impulse broadening, making the signal values indistinguishable.
- Power of the power supply ports on the optical switch. A longer transmission distance indicates more power consumption for the powered devices and larger power for the power supply ports.

- Cable impedance. A longer transmission distance indicates larger cable impedance and larger power for the power supply ports.
- Total power consumption of the remote powered devices (PDs) and wireless APs and PDs that connect to the remote PDs.

Choose compatible PoE optical transceiver modules and photoelectric hybrid cables as required.

Central wavelength

Central wavelength represents the wave band used for optical signal transmission. At present, PoE optical transceiver modules available for Intelbras devices use the 1310 nm wave band.

Fiber

PoE optical transceiver modules available for Intelbras devices use SMFs. For more information, see "Fiber."

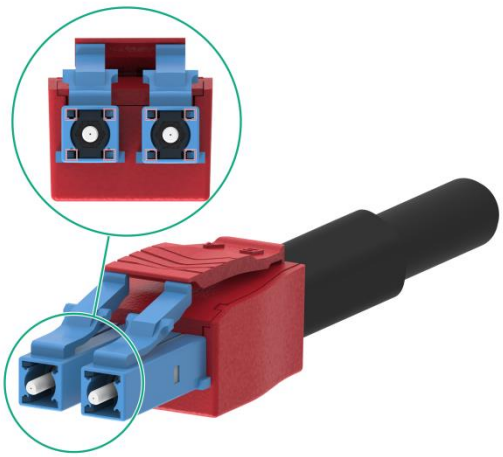
Connector

CAUTION:

- Cover the connector with a dust cap when it is not connected to any optical fiber.
- You can insert only Power Ethernet Lucent connectors (PELC) into PoE optical transceiver modules.

PoE optical transceiver modules available for Intelbras devices use PELC connectors. With conductive terminals, a PELC connector can provide high-speed and long-range data transmission and supply power for remote devices. As shown in Figure 8, the parts marked in small red square boxes are conductive terminals.

Figure 8 PELC connector



Optical parameters

The optical parameters are the same for PoE optical transceiver modules and common optical transceiver modules. For more information, see "Optical parameters."

QSFP-DD modules

QSFP-DD optical transceiver modules (MPO)

Figure 9 QSFP-DD optical transceiver module (MPO)

Models and specifications

QSFP-DD optical transceiver modules (MPO) provide a transmission rate of 400 Gbps.

Table 6 Specifications for QSFP-DD optical transceiver modules (MPO) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Fiber cores	Modal bandwidth (MHz*km)	Transmission distance
QSFPDD-400G-SR8-MM850	850	MMF	50/125	16	2000	70 m (229.66 ft)
					4700	100 m (328.08 ft)

Table 7 Specifications for QSFP-DD optical transceiver modules (MPO) (2)

Model	Connector	Optical parameters (dBm)	
		Transmit power	Receive power
QSFPDD-400G-SR8-MM850	MPO (APC polished, 16-fiber)	–6.5 to +4	–8.4 to +4

QSFP-DD optical transceiver modules (dual LC)

Figure 10 QSFP-DD optical transceiver module (dual LC)

Models and specifications

QSFP-DD optical transceiver modules (dual LC) provide a transmission rate of 400 Gbps.

Table 8 Specifications for QSFP-DD optical transceiver modules (dual LC) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
QSFPDD-400G-FR4-WDM1300	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	N/A	2 km (1.24 miles)
QSFPDD-400G-LR4-WDM1300-DC	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	N/A	6 km (3.73 miles, complying with the IEEE802.3cu standard) 10 km (6.21 miles, complying with the 100G Lambda MSA standard)
QSFPDD-400G-LR8-WDM1300	Four lanes: • 1273.54 • 1277.89 • 1282.26 • 1286.66 • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	N/A	10 km (6.21 miles)

Table 9 Specifications for QSFP-DD optical transceiver modules (dual LC) (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
QSFPDD-400G-FR4-WDM1300	–3.3 to +3.5	–7.3 to +3.5
QSFPDD-400G-LR4-WDM1300-DC	–2.7 to +5.1	–6.8 to +5.1
QSFPDD-400G-LR8-WDM1300	–2.8 to +5.3	–7.2 to +5.3

NOTE:

The transmit power and receive power provided in Table 9 are average values of the four lanes.

QSFP-DD copper cable

Figure 11 QSFP-DD copper cable

Models and specifications

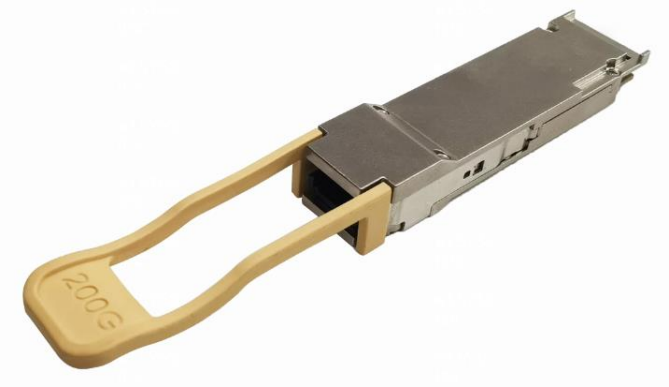
Table 10 Specifications for QSFP-DD copper cables

Model	Length	Data rate
QSFPDD-400G-D-CAB-2M	2 m (6.56 ft)	400 Gbps

QSFP56 modules

QSFP56 optical transceiver modules (MPO)

Figure 12 QSFP56 optical transceiver module (MPO)



Models and specifications

QSFP56 optical transceiver modules (MPO) provide a transmission rate of 200 Gbps and use an MPO connector.

Table 11 Specifications for QSFP56 optical transceiver modules (MPO) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Fiber cores	Modal bandwidth (MHz*km)	Transmission distance
QSFP56-200G-SR4-MM850	850	MMF	50/125	8	2000	70 m (229.66 ft)
					4700	100 m (328.08 ft)

Table 12 Specifications for QSFP56 optical transceiver modules (MPO) (2)

Model	Connector	Optical parameters (dBm)	
		Transmit power	Receive power
QSFP56-200G-SR4-MM850	MPO (PC polished, 12-fiber)	–6.5 to +4	–8.4 to +4

QSFP28 modules

QSFP28 optical transceiver modules (MPO)

Figure 13 QSFP28 optical transceiver module (MPO)

Models and specifications

QSFP28 optical transceiver modules (MPO) provide a transmission rate of 100 Gbps and use an MPO connector.

Table 13 Specifications for QSFP28 optical transceiver modules (MPO) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Fiber cores	Modal bandwidth (MHz*km)	Transmission distance
QSFP-100G-SR4-MM850	850	MMF	50/125	8	2000	70 m (229.66 ft)
					4700	100 m (328.08 ft)
QSFP-100G-SR4-MM850-H	850	MMF	50/125	8	2000	70 m (229.66 ft)
					4700	100 m (328.08 ft)
QSFP-100G-SR4-MM850-B-CM	850	MMF	50/125	8	2000	70 m (229.66 ft)
					4700	100 m (328.08 ft)
QSFP-100G-SR4-MM850-CM	850	MMF	50/125	8	2000	70 m (229.66 ft)
					4700	100 m (328.08 ft)
QSFP-100G-SR4-MM850-A	850	MMF	50/125	8	2000	70 m (229.66 ft)
					4700	100 m (328.08 ft)
QSFP-100G-eSR4-MM850	850	MMF	50/125	8	4700	300 m (984.25 ft)
QSFP-100G-PSM4-SM1310	1310	SMF	9/125	8	N/A	0.5 km (0.31 miles)

Table 14 Specifications for QSFP28 optical transceiver modules (MPO) (2)

Model	Connector	Optical parameters (dBm)	
		Transmit power	Receive power
QSFP-100G-SR4-MM850	MPO (PC polished, 12-fiber)	–8.4 to +2.4	–10.3 to +2.4
QSFP-100G-SR4-MM850-H	MPO (PC polished, 12-fiber)	–8.4 to +2.4	–10.3 to +2.4
QSFP-100G-SR4-MM850-B-CM	MPO (PC polished, 12-fiber)	–2 to +2.4	–10.3 to +2.4
QSFP-100G-SR4-MM850-CM	MPO (PC polished, 12-fiber)	–8.4 to +2.4	–10.3 to +2.4
QSFP-100G-SR4-MM850-A	MPO (PC polished, 12-fiber)	–8.4 to +2.4	–10.3 to +2.4
QSFP-100G-eSR4-MM850	MPO (PC polished, 12-fiber)	–8.4 to +2.4	–10.3 to +2.4
QSFP-100G-PSM4-SM1310	MPO (APC polished, 12-fiber)	–9.4 to +2	–12.66 to +2

QSFP28 optical transceiver modules (dual LC)

Figure 14 QSFP28 optical transceiver module (dual LC)

Models and specifications

QSFP28 optical transceiver modules (dual LC) in Table 15 and Table 16 provide a transmission rate of 100 Gbps and 50 Gbps, respectively. The QSFP28 optical transceiver modules use a dual LC connector.

Table 15 Specifications for QSFP28 optical transceiver modules (dual LC) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
QSFP-100G-ER4L-WDM1300	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	N/A	40 km (24.86 miles)
QSFP-100G-ER4-WDM1300	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	N/A	40 km (24.86 miles)
QSFP-100G-LR4-WDM1300	Four lanes: • 1295.56 • 1300.05 • 1304.58	SMF	9/125	N/A	10 km (6.21 miles)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
	• 1309.14				
QSFP-100G-LR4-WDM1300-A	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	N/A	10 km (6.21 miles)
QSFP-100G-LR4L-WDM1300	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	N/A	2 km (1.24 miles)
QSFP-100G-ZR4-WDM1300	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	N/A	80 km (49.71 miles)
QSFP-100G-CWDM4-SM1300-A	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	N/A	2 km (1.24 miles)
QSFP-100G-SWDM4-MM850	Four lanes: • 850 • 880 • 910 • 940	MMF	50/125	2000	75 m (246.06 ft)
				4700	100 m (328.08 ft)
QSFP-100G-BIDI-MM850 (end of sale)	Four lanes: • 855 • 908	MMF	50/125	2000	70 m (229.66 ft)
				4700	100 m (328.08 ft)

Table 16 Specifications for QSFP28 optical transceiver modules (dual LC) (2)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
QSFP-50G-LR-SM1311	1311	SMF	9/125	N/A	10 km (6.2 miles)
QSFP-50G-ER-SM1311	1311	SMF	9/125	N/A	40 km (24.86 miles)

Table 17 Specifications for QSFP28 optical transceiver modules (dual LC) (3)

Model	Optical parameters (dBm)	
	Transmit power (average)	Receive power (average)
QSFP-100G-ER4L-WDM1300	+0.5 to +4.5 per lane	–20.5 to –1.9 per lane

Model	Optical parameters (dBm)	
	Transmit power (average)	Receive power (average)
QSFP-100G-ER4-WDM1300	–2.9 to +2.9 per lane	–20.9 to –3.5 per lane
QSFP-100G-LR4-WDM1300	–4.3 to +4.5 per lane	–10.6 to +4.5 per lane
QSFP-100G-LR4-WDM1300-A	–4.3 to +4.5 per lane	–10.6 to +4.5 per lane
QSFP-100G-LR4L-WDM1300	–6.5 to +2.5 per lane	–11.5 to +2.5 per lane
QSFP-100G-ZR4-WDM1300	+2 to +6.5 per lane	–28 to –7 per lane
QSFP-100G-CWDM4-SM1300-A	–6.5 to +2.5 per lane	–11.5 to +2.5 per lane
QSFP-100G-SWDM4-MM850	–7.5 to +2.4 per lane	–9.5 to +2.4 per lane
QSFP-100G-BIDI-MM850	–6 to +4 per lane	–7.9 to +4 per lane
QSFP-50G-LR-SM1311	–4.5 to +4.2 per lane	–10.8 to +4.2 per lane
QSFP-50G-ER-SM1311	+0.4 to +6.6 per lane	–17.6 to –3.4 per lane

NOTE:

- The operating outer casing temperature of a QSFP-100G-BIDI-MM850 transceiver module is in the range of 10°C to 60°C (50°F to 140°F). The performance, signal transmitting and receiving capability, and link status of the transceiver module deteriorate when the outer casing temperature is out of this range.
- To use the QSFP-100G-ER4L-WDM1300 transceiver module to transmit data over a distance of 40 km (24.86 miles), you must enable FEC on the traffic transmitting and receiving ports. If FEC is not enabled on the peer ports, the transmission distance can only reach a maximum of 30 km (18.64 miles).

QSFP28 copper cable

Figure 15 QSFP28 copper cable

Models and specifications

Table 18 Specifications for QSFP28 copper cables

Model	Length	Data rate
QSFP-100G-D-CAB-1M	1 m (3.28 ft)	100 Gbps
QSFP-100G-D-CAB-3M	3 m (9.84 ft)	
QSFP-100G-D-CAB-3M-CM	3 m (9.84 ft)	
QSFP-100G-D-CAB-5M	5 m (16.40 ft)	

QSFP28 to SFP28 copper cables

A QSFP28 to SFP28 copper cable has a QSFP28 module at one end and four SFP28 modules at the other end.

Figure 16 QSFP28 to SFP28 copper cable

Models and specifications

Table 19 Specifications for QSFP28 to SFP28 copper cables

Model	Length	Data rate	Remarks
QSFP-100G-4SFP-25G-CAB-1M	1 m (3.28 ft)	100 Gbps	Used for connecting one 100G QSFP28 port to four 25G SFP28 ports.
QSFP-100G-4SFP-25G-CAB-3M	3 m (9.84 ft)		
QSFP-100G-4SFP-25G-CAB-3M-CM	3 m (9.84 ft)		
QSFP-100G-4SFP-25G-CAB-5M	5 m (16.40 ft)		
QSFP-100G-4SFP-25G-CAB-5M-CM	5 m (16.40 ft)		

QSFP28 optical cables

Figure 17 QSFP28 optical cable

Models and specifications

Table 20 Specifications for QSFP28 optical cables

Model	Length	Data rate
QSFP-100G-D-AOC-7M	7 m (22.97 ft)	100 Gbps
QSFP-100G-D-AOC-10M	10 m (32.81 ft)	
QSFP-100G-D-AOC-20M	20 m (65.62 ft)	

CFP modules

100-Gigabit CFP optical transceiver modules

Figure 18 100-Gigabit/40-Gigabit CFP optical transceiver module

Models and specifications

100-Gigabit CFP optical transceiver modules provide a transmission rate of 100 Gbps and use LC connectors.

Table 21 Specifications for 100-Gigabit CFP optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
CFP-100G-LR4-WDM1300 (end of sale)	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	10 km (6.21 miles)
CFP-100G-LR4-WDM1300-A	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	10 km (6.21 miles)
CFP-100G-ER4-WDM1300 (end of sale)	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	40 km (24.86 miles)

Table 22 Specifications for 100-Gigabit CFP optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power (average)	Receive power (average)
CFP-100G-LR4-WDM1300	–4.3 to +4.5	–10.6 to +4.5
CFP-100G-LR4-WDM1300-A	–4.3 to +4.5	–10.6 to +4.5
CFP-100G-ER4-WDM1300	–2.9 to +2.9	–20.9 to +4.5

40-Gigabit CFP optical transceiver modules

See Figure 18 for a view of the 40-Gigabit CFP optical transceiver module.

Models and specifications

40-Gigabit CFP optical transceiver modules provide a transmission rate of 40 Gbps and use a dual LC connector.

Table 23 Specifications for 40-Gigabit CFP optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
CFP-40G-LR4-SM1310 (end of sale)	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	10 km (6.21 miles)
CFP-40G-ER4-WDM1300 (end of sale)	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	40 km (24.86 miles)

Table 24 Specifications for 40-Gigabit CFP optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power (average)	Receive power (average)
CFP-40G-LR4-SM1310	–4 to +3	–11.5 to +3
CFP-40G-ER4-WDM1300	–2.7 to +4.5	–21 to –4.5

CFP2 modules

CFP2 optical transceiver modules (MPO)

Figure 19 CFP2 optical transceiver module (MPO)

Models and specifications

CFP2 optical transceiver modules (MPO) provide a transmission rate of 100 Gbps and use an MPO connector.

Table 25 Specifications for CFP2 optical transceiver modules (MPO) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Fiber cores	Modal bandwidth (MHz*km)	Transmission distance
CFP2-100G-SR 10-MM850	850	MMF	50/125	20	2000	100 m (328.08 ft)
					4700	150 m (492.13 ft)

Table 26 Specifications for CFP2 optical transceiver modules (MPO) (2)

Model	Connector	Optical parameters (dBm)	
		Transmit power	Receive power
CFP2-100G-SR10-MM850	MPO (PC polished, 24-fiber)	–7.6 to +2.4	–9.5 to +2.4

CFP2 optical transceiver modules (dual LC)

Figure 20 CFP2 optical transceiver module (dual LC)

Models and specifications

CFP2 optical transceiver modules (dual LC) provide a transmission rate of 100 Gbps and use a dual LC connector.

Table 27 Specifications for CFP2 optical transceiver modules (dual LC) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (µm)	Transmission distance
CFP2-100G-LR4-WDM1300	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	10 km (6.21 miles)
CFP2-100G/112G-LR4-WDM1300 (end of sale)	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	10 km (6.21 miles)
CFP2-100G-ER4-WDM1300	Four lanes: • 1295.56 • 1300.05 • 1304.58 • 1309.14	SMF	9/125	40 km (24.86 miles)

Table 28 Specifications for CFP2 optical transceiver modules (dual LC) (2)

Model	Optical parameters (dBm)	
	Transmit power (average)	Receive power (average)
CFP2-100G-LR4-WDM1300	–4.3 to +4.5	–10.6 to +4.5
CFP2-100G/112G-LR4-WDM1300	–4.3 to +4.5	–10.6 to +4.5
CFP2-100G-ER4-WDM1300	–2.7 to +2.9	–20.9 to +4.5

CXP modules

CXP optical transceiver modules

Figure 21 CXP optical transceiver module

Models and specifications

CXP optical transceiver modules provide a transmission rate of 100 Gbps and use an MPO connector.

Table 29 Specifications for CXP optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Fiber cores	Modal bandwidth (MHz*km)	Transmission distance
CXP-100G-SR10-MM850 (end of sale)	850	MMF	50/125	20	2000	100 m (328.08 ft)
CXP-100G-SR10-MM850-A (end of sale)	850	MMF	50/125	20	2000	100 m (328.08 ft)

Table 30 Specifications for CXP optical transceiver modules (2)

Model	Connector	Optical parameters (dBm)	
		Transmit power	Receive power
CXP-100G-SR10-MM850	MPO (PC polished, 24-fiber)	–7.6 to +2.4	–9.5 to +2.4
CXP-100G-SR10-MM850-A	MPO (PC polished, 24-fiber)	–7.6 to +2.4	–9.5 to +2.4

CXP optical cables

Figure 22 CXP optical cable

Models and specifications

Table 31 Specifications for CXP optical cables

Model	Length	Transmission rate
CXP-CXP-AOC-30M (end of sale)	30 m (98.43 ft)	100 Gbps
CXP-CXP-AOC-10M (end of sale)	10 m (32.81 ft)	

QSFP+ modules

QSFP+ optical transceiver modules (MPO)

Figure 23 QSFP+ optical transceiver module (MPO)

Models and specifications

QSFP+ optical transceiver modules (MPO) provide a transmission rate of 40 Gbps and use an MPO connector.

Table 32 Specifications for QSFP+ optical transceiver modules (MPO) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Fiber cores	Modal bandwidth (MHz*km)	Transmission distance
QSFP-40G-SR4-MM850	850	MMF	50/125	8	2000	100 m (328.08 ft)
					4700	150 m (492.13 ft)
QSFP-40G-SR4-MM850-H	850	MMF	50/125	8	2000	100 m (328.08 ft)
					4700	150 m (492.13 ft)
QSFP-40G-SR4-MM850-CM	850	MMF	50/125	8	2000	100 m (328.08 ft)
					4700	150 m (492.13 ft)
QSFP-40G-SR4-MM850-NDDM (end of sale)	850	MMF	50/125	8	2000	100 m (328.08 ft)
					4700	150 m (492.13 ft)
QSFP-40G-CSR4-MM850	850	MMF	50/125	8	2000	300 m (984.25 ft)
					4700	400 m (1312.33 ft)
QSFP-40G-CSR4-MM850-H	850	MMF	50/125	8	2000	300 m (984.25 ft)
					4700	400 m (1312.33 ft)
QSFP-40G-CSR4-MM850-NDDM (end of sale)	850	MMF	50/125	8	2000	300 m (984.25 ft)
					4700	400 m (1312.33 ft)
QSFP-40G-IR4-PSM1310 (end of sale)	1310	SMF	9/125	8	N/A	1.4 km (0.87 miles)
QSFP-40G-LR4-PSM1310	1310	SMF	9/125	8	N/A	10 km (6.21 miles)
QSFP-40G-LR4-PSM1310-A	1310	SMF	9/125	8	N/A	10 km (6.21 miles)

Table 33 Specifications for QSFP+ optical transceiver modules (MPO) (2)

Model	Connector	Optical parameters (dBm)	
		Transmit power	Receive power
QSFP-40G-SR4-MM850	MPO (PC polished, 12-fiber)	–7.6 to 0	–9.5 to +2.4
QSFP-40G-SR4-MM850-H	MPO (PC polished, 12-fiber)	–7.6 to +2.4	–9.5 to +2.4
QSFP-40G-SR4-MM850-CM	MPO (PC polished, 12-fiber)	–7.6 to 0	–9.5 to +2.4
QSFP-40G-SR4-MM850-NDDM	MPO (PC polished, 12-fiber)	–7.6 to 0	–9.5 to +2.4
QSFP-40G-CSR4-MM850	MPO (PC polished, 12-fiber)	–7.6 to 0	–9.9 to +2.4
QSFP-40G-CSR4-MM850-H	MPO (PC polished, 12-fiber)	–7.6 to +2.4	–9.9 to +2.4
QSFP-40G-CSR4-MM850-NDDM	MPO (PC polished, 12-fiber)	–7.6 to 0	–9.9 to +2.4
QSFP-40G-IR4-PSM1310	MPO (APC polished, 12-fiber)	–6 to +0.5	–11.5 to +2.3
QSFP-40G-LR4-PSM1310	MPO (APC polished, 12-fiber)	–8.2 to +1.5	–12.6 to +1.5

Model	Connector	Optical parameters (dBm)	
		Transmit power	Receive power
QSFP-40G-LR4-PSM1310-A	MPO (APC polished, 12-fiber)	–8.2 to +1.5	–12.6 to +1.5

NOTE:

The 40G QSFP+ ports of the QSFP-40G-SR4-MM850, QSFP-40G-SR4-MM850-H, QSFP-40G-SR4-MM850-CM, QSFP-40G-SR4-MM850-NDDM, QSFP-40G-CSR4-MM850, QSFP-40G-CSR4-MM850-H, QSFP-40G-CSR4-MM850-NDDM, QSFP-40G-IR4-PSM1310, QSFP-40G-LR4-PSM1310, and QSFP-40G-LR4-PSM1310-A optical transceiver modules can be split into four channels. You can connect a 40G QSFP+ port to four 10G SFP+ ports. The QSFP+ optical transceiver module and SFP+ optical transceiver modules to be connected must be the same in specifications, including central wavelength and fiber type.

QSFP+ optical transceiver modules (dual LC)

Figure 24 QSFP+ optical transceiver module (dual LC)

Models and specifications

QSFP+ optical transceiver modules (dual LC) provide a transmission rate of 40 Gbps and use a dual LC connector.

Table 34 Specifications for QSFP+ transceiver modules (dual LC) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
QSFP-40G-LR4-WDM1300	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	N/A	10 km (6.21 miles)
QSFP-40G-LR4L-WDM1300	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	N/A	2 km (1.24 miles)
QSFP-40G-ER4-WDM1300	Four lanes: • 1271 • 1291 • 1311 • 1331	SMF	9/125	N/A	40 km (24.86 miles)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
QSFP-40G-LX4-WDM1300	Four lanes: • 1271 • 1291 • 1311 • 1331	MMF	50/125	2000	150 m (492.13 ft)
				4700	
QSFP-40G-BIDI-SR-MM850	Two lanes: • 850 • 900	MMF	50/125	2000	100 m (328.08 ft)
				4700	150 m (492.13 ft)
QSFP-40G-BIDI-WDM1310 (end of sale)	Two lanes: • 1271 • 1291 • 1311 • 1331	MMF	50/125	2000	140 m (459.32 ft)
				4700	160 m (524.93 ft)
QSFP-40G-BIDI-WDM850	Two lanes: • 850 • 880 • 910 • 940	MMF	50/125	2000	240 m (787.40 ft)
				4700	350 m (1148.29 ft)

Table 35 Specifications for QSFP+ transceiver modules (dual LC) (2)

Model	Optical parameters (dBm)	
	Transmit power (average)	Receive power (average)
QSFP-40G-LR4-WDM1300	–7 to +2.3	–13.7 to +2.3
QSFP-40G-LR4L-WDM1300	–10 to +2.3	–11.5 to +2.3
QSFP-40G-ER4-WDM1300	–2.7 to +4.5	–21.2 to –4.5
QSFP-40G-LX4-WDM1300	–5 to +3.5	–10.5 to +3.5
QSFP-40G-BIDI-SR-MM850	–4 to +5	–6 to +5
QSFP-40G-BIDI-WDM1310	–7 to +4.3	–10 to +4.3
QSFP-40G-BIDI-WDM850	–7.6 to +3	–9 to +3

NOTE:

- The operating outer casing temperature of a QSFP-40G-BIDI-SR-MM850 transceiver module is in the range of 10°C to 70°C (50°F to 158°F). The performance, signal transmitting and receiving capability, and link status of the transceiver module deteriorate when the outer casing temperature is out of this range.
- The **`display transceiver diagnosis`** command displays the current values of the digital diagnosis parameters on transceiver modules. However, if you use this command for a port in which a QSFP-40G-BIDI-SR-MM850 transceiver module is installed, the transmit and receive power of the transceiver module will not be displayed.
- In the scenario where optical distribution frames (ODFs) are used, the transmission line from a QSFP-40G-LX4-WDM1300 transceiver module can pass through only one ODF if the ODFs use MPO interfaces and can pass through two ODFs if the ODFs use LC interfaces.

QSFP+ copper cables

Figure 25 QSFP+ copper cable

Models and specifications

Table 36 Specifications for QSFP+ copper cables

Model	Length	Data rate	Type	Remarks
LSWM1QSTK0	1 m (3.28 ft)	40 Gbps	QSFP+ copper cable	Used for interconnecting 40-Gigabit QSFP+ ports
LSWM1QSTK1	3 m (9.84 ft)			
QSFP-40G-3M-CM	3 m (9.84 ft)			
LSWM1QSTK2	5 m (16.40 ft)			
QSFP-40G-5M-CM	5 m (16.40 ft)			

QSFP+ to SFP+ copper cables

One end of a QSFP+ to SFP+ copper cable provides a QSFP+ module, and the other end provides four SFP+ modules.

Figure 26 QSFP+ to SFP+ copper cable

Models and specifications

Table 37 Specifications for QSFP+ to SFP+ copper cables

Model	Length	Data rate	Cable type	Remarks
LSWM1QSTK3	1 m (3.28 ft)	40 Gbps	40G QSFP+ to 4 x 10G SFP+ copper cable	Used for connecting a 40-Gigabit QSFP+ port to four 10-Gigabit SFP+ ports
LSWM1QSTK4	3 m (9.84 ft)			
QSFP-40G-4SFP-10G-CAB-3M-CM	3 m (9.84 ft)			
LSWM1QSTK5	5 m (16.40 ft)			
QSFP-40G-4SFP-10G-CAB-5M-CM	5 m (16.40 ft)			

QSFP+ optical cables

Figure 27 QSFP+ optical cable

Models and specifications

Table 38 Specifications for QSFP+ optical cables

Model	Length	Data rate
QSFP-40G-D-AOC-3M	3 m (9.84 ft)	40 Gbps
QSFP-40G-D-AOC-7M	7 m (22.97 ft)	
QSFP-40G-D-AOC-7M-H	7 m (22.97 ft)	
QSFP-40G-D-AOC-7M-CM	7 m (22.97 ft)	
QSFP-40G-D-AOC-10M	10 m (32.81 ft)	
QSFP-40G-D-AOC-10M-H	10 m (32.81 ft)	
QSFP-40G-D-AOC-10M-CM	10 m (32.81 ft)	
QSFP-40G-D-AOC-20M	20 m (65.62 ft)	
QSFP-40G-D-AOC-20M-H	20 m (65.62 ft)	
QSFP-40G-D-AOC-20M-CM	20 m (65.62 ft)	

SFP28 modules

SFP28 optical transceiver modules

Figure 28 SFP28 optical transceiver module

Models and specifications

SFP28 optical transceiver modules provide a transmission rate of 25 Gbps and use a dual LC connector.

Table 39 Specifications for SFP28 transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
SFP-25G-SR-MM850	850	MMF	50/125	2000	70 m (229.66 ft)
				4700	100 m (328.08 ft)
SFP-25G-SR-MM850-H	850	MMF	50/125	2000	70 m (229.66 ft)
				4700	100 m (328.08 ft)
SFP-25G-LR-SM1310	1310	SMF	9/125	N/A	10 km (6.21 miles)
*SFP-25G-LR-SM1310-I	1310	SMF	9/125	N/A	10 km (6.21 miles)
SFP-25G-CSR-MM850	850	MMF	50/125	2000	200 m (656.17 ft)
				> 3500	300 m (984.25 ft)
				> 5500	400 m (1312.34 ft)

Table 40 Specifications for SFP28 transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-25G-SR-MM850	–8.4 to +2.4	–10.3 to +2.4
SFP-25G-SR-MM850-H	–8.4 to +2.4	–10.3 to +2.4
SFP-25G-LR-SM1310	–7 to +2	–13.3 to +2
*SFP-25G-LR-SM1310-I	–7 to +2	–13.3 to +2

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-25G-CSR-MM850	–6.4 to +2.4	–10.3 to +2.4

SFP28 copper cables

Figure 29 SFP28 copper cable

Models and specifications

Table 41 Specifications for SFP28 copper cables

Model	Length	Data rate
SFP-25G-D-CAB-1M	1 m (3.28 ft)	25 Gbps
SFP-25G-D-CAB-1M-A	1 m (3.28 ft)	
SFP-25G-D-CAB-2M-A	2 m (6.56 ft)	
SFP-25G-D-CAB-3M	3 m (9.84 ft)	
SFP-25G-D-CAB-3M-CM	3 m (9.84 ft)	
SFP-25G-D-CAB-3M-A	3 m (9.84 ft)	
SFP-25G-D-CAB-4M-A	4 m (13.12 ft)	
SFP-25G-D-CAB-5M	5 m (16.40 ft)	
SFP-25G-D-CAB-5M-A	5 m (16.40 ft)	
SFP-25G-D-ACC-7M	7 m (22.97 ft)	
SFP-25G-D-ACC-10M	10 m (32.81 ft)	

SFP28 optical cables

Figure 30 SFP28 optical cable

Models and specifications

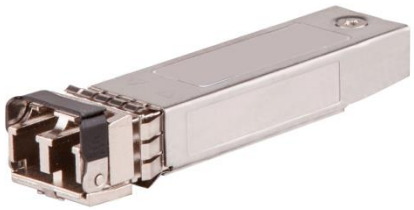
Table 42 Specifications for SFP28 optical cables

Model	Length	Data rate
SFP-25G-D-AOC-3M	3 m (9.84 ft)	25 Gbps
SFP-25G-D-AOC-5M	5 m (16.40 ft)	
SFP-25G-D-AOC-5M-H	5 m (16.40 ft)	
SFP-25G-D-AOC-5M-DG	5 m (16.40 ft)	
SFP-25G-D-AOC-5M-DT (end of sale)	5 m (16.40 ft)	
SFP-25G-D-AOC-7M	7 m (22.97 ft)	
SFP-25G-D-AOC-7M-H	7 m (22.97 ft)	
SFP-25G-D-AOC-7M-DG	7 m (22.97 ft)	
SFP-25G-D-AOC-7M-DT (end of sale)	7 m (22.97 ft)	
SFP-25G-D-AOC-10M	10 m (32.81 ft)	
SFP-25G-D-AOC-10M-H	10 m (32.81 ft)	
SFP-25G-D-AOC-10M-DG	10 m (32.81 ft)	
SFP-25G-D-AOC-10M-DT (end of sale)	10 m (32.81 ft)	
SFP-25G-D-AOC-20M	20 m (65.62 ft)	
SFP-25G-D-AOC-20M-H	20 m (65.62 ft)	
SFP-25G-D-AOC-20M-DG	20 m (65.62 ft)	
SFP-25G-D-AOC-20M-DT (end of sale)	20 m (65.62 ft)	

SFP+ modules

SFP+ optical transceiver modules (dual LC)

Figure 31 SFP+ optical transceiver module (dual LC)



Models and specifications

SFP+ optical transceiver modules (dual LC) use a dual LC connector.

Table 43 Specifications for SFP+ optical transceiver modules (dual LC) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance	Data rate
SFP-XG-SX-MM850-A	850	MMF	50/125	4700	400 m (1312.34 ft)	10.31 Gbps
				2000	300 m (984.25 ft)	
				500	82 m (269.03 ft)	
				400	66 m (216.54 ft)	
			62.5/125	200	33 m (108.27 ft)	
				160	26 m (85.30 ft)	
SFP-XG-SX-MM850-B (end of sale)	850	MMF	50/125	4700	400 m (1312.34 ft)	10.31 Gbps
				2000	100 m (328.08 ft)	
				500	25 m (82.02 ft)	
				400	20 m (65.62 ft)	
			62.5/125	200	10 m (32.81 ft)	
				160	8 m (26.25 ft)	
SFP-XG-SX-MM850-D	850	MMF	50/125	4700	400 m (1312.34 ft)	10.31 Gbps
				2000	300 m (984.25 ft)	
				500	82 m (269.03 ft)	
				400	66 m (216.54 ft)	
			62.5/125	200	33 m (108.27 ft)	
				160	26 m (85.30 ft)	
SFP-XG-SX-MM850-S	850	MMF	50/125	4700	400 m (1312.34 ft)	10.31 Gbps
				2000	300 m (984.25 ft)	

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance	Data rate
				500	82 m (269.03 ft)	
				400	66 m (216.54 ft)	
			62.5/125	200	33 m (108.27 ft)	
				160	26 m (85.30 ft)	
SFP-XG-SX-MM850-E	850	MMF	50/125	4700	400 m (1312.34 ft)	10.31 Gbps
				2000	300 m (984.25 ft)	
				500	82 m (269.03 ft)	
				400	66 m (216.54 ft)	
			62.5/125	200	33 m (108.27 ft)	
				160	26 m (85.30 ft)	
SFP-XG-SX-MM850-F1 (end of sale)	850	MMF	50/125	4700	400 m (1312.34 ft)	10.31 Gbps
				2000	300 m (984.25 ft)	
				500	82 m (269.03 ft)	
				400	66 m (216.54 ft)	
			62.5/125	200	33 m (108.27 ft)	
				160	26 m (85.30 ft)	
SFP-XG-LX220-MM1310 (end of sale)	1310	MMF	50/125	1500	220 m (721.78 ft)	10.31 Gbps
				500	220 m (721.78 ft)	
				400	100 m (328.08 ft)	
			62.5/125	200	220 m (721.78 ft)	
				160	220 m (721.78 ft)	
SFP-XG-LX-SM1310	1310	SMF	9/125	N/A	10 km (6.21 miles)	10.31 Gbps
SFP-XG-LX-SM1310-D	1310	SMF	9/125	N/A	10 km (6.21 miles)	10.31 Gbps
SFP-XG-LX-SM1310-S	1310	SMF	9/125	N/A	10 km (6.21 miles)	10.31 Gbps
SFP-XG-LX-SM1310-CM	1310	SMF	9/125	-	10 km (6.21 miles)	10.31 Gbps
SFP-XG-LX-SM1310-E	1310	SMF	9/125	N/A	10 km (6.21 miles)	10.31 Gbps
SFP-XG-LH40-SM1550	1550	SMF	9/125	N/A	40 km (24.86 miles)	10.31 Gbps
SFP-XG-LH40-SM1550-D	1550	SMF	9/125	N/A	40 km (24.86 miles)	10.31 Gbps
SFP-XG-LH80-SM1550	1550	SMF	9/125	N/A	80 km (49.71 miles)	10.31 Gbps
SFP-XG-LH	1550	SMF	9/125	N/A	80 km (49.71	10.31 Gbps

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance	Data rate
80-SM1550-D					miles)	
SFP-FC-8G-SW-MM850	850	MMF	62.5/125	200	150 m (492.13 ft)	2.125 Gbps
					70 m (229.66 ft)	4.25 Gbps
					21 m (68.90 ft)	8.5 Gbps
			50/125	500	300 m (984.25 ft)	2.125 Gbps
					150 m (492.13 ft)	4.25 Gbps
					50 m (164.04 ft)	8.5 Gbps
				2000	500 m (1640.42 ft)	2.125 Gbps
					380 m (1246.72 ft)	4.25 Gbps
					150 m (492.13 ft)	8.5 Gbps
				4700	N/A	2.125 Gbps
					400 m (1312.34 ft)	4.25 Gbps
					190 m (623.36 ft)	8.5 Gbps
SFP-FC-8G-SW-MM850-CM	850	MMF	62.5/125	200	150 m (492.13 ft)	2.125 Gbps
					70 m (229.66 ft)	4.25 Gbps
					21 m (68.90 ft)	8.5 Gbps
			50/125	500	300 m (984.25 ft)	2.125 Gbps
					150 m (492.13 ft)	4.25 Gbps
					50 m (164.04 ft)	8.5 Gbps
				2000	500 m (1640.42 ft)	2.125 Gbps
					380 m (1246.72 ft)	4.25 Gbps
					150 m (492.13 ft)	8.5 Gbps
				4700	N/A	2.125 Gbps
					400 m (1312.34 ft)	4.25 Gbps
					190 m (623.36 ft)	8.5 Gbps
SFP-FC-8G-LW-SM1310	1310	SMF	9/125	N/A	10 km (6.21 miles)	2.125 Gbps
						4.25 Gbps
						8.5 Gbps

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance	Data rate
SFP-FC-16G-SW-MM850	850	MMF	62.5/125	200	70 m (229.66 ft)	4.25 Gbps
					21 m (68.90 ft)	8.5 Gbps
					15 m (49.21 ft)	14.025 Gbps
			50/125	500	150 m (492.13 ft)	4.25 Gbps
					50 m (164.04 ft)	8.5 Gbps
					35 m (114.83 ft)	14.025 Gbps
				2000	380 m (1246.72 ft)	4.25 Gbps
					150 m (492.13 ft)	8.5 Gbps
					100 m (328.08 ft)	14.025 Gbps
				4700	400 m (1312.33 ft)	4.25 Gbps
					190 m (623.36 ft)	8.5 Gbps
					125 m (410.11 ft)	14.025 Gbps
SFP-FC-16G-SW-MM850-CM	850	MMF	62.5/125	200	70 m (229.66 ft)	4.25 Gbps
					21 m (68.90 ft)	8.5 Gbps
					15 m (49.21 ft)	14.025 Gbps
			50/125	500	150 m (492.13 ft)	4.25 Gbps
					50 m (164.04 ft)	8.5 Gbps
					35 m (114.83 ft)	14.025 Gbps
				2000	380 m (1246.72 ft)	4.25 Gbps
					150 m (492.13 ft)	8.5 Gbps
					100 m (328.08 ft)	14.025 Gbps
				4700	400 m (1312.33 ft)	4.25 Gbps
					190 m (623.36 ft)	8.5 Gbps
					125 m (410.11 ft)	14.025 Gbps
SFP-FC-16G-LW-SM1310	1310	SMF	9/125	N/A	10 km (6.21 miles)	4.25 Gbps
						8.5 Gbps
						14.025 Gbps
SFP-FC-16G-LW-SM1310-CM	1310	SMF	9/125	N/A	10 km (6.21 miles)	4.25 Gbps
						8.5 Gbps
						14.025 Gbps

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (µm)	Modal bandwidth (MHz*km)	Transmission distance	Data rate
SFP-FC-32G-SW-MM850	850	MMF	62.5/125	200	21 m (68.90 ft)	8.5 Gbps
					15 m (49.21 ft)	14.025 Gbps
					N/A	28.05 Gbps
			50/125	500	50 m (164.04 ft)	8.5 Gbps
					35 m (114.83 ft)	14.025 Gbps
					20 m (65.62 ft)	28.05 Gbps
				2000	150 m (492.13 ft)	8.5 Gbps
					100 m (328.08 ft)	14.025 Gbps
					70 m (229.66 ft)	28.05 Gbps
				4700	190 m (623.36 ft)	8.5 Gbps
					125 m (410.11 ft)	14.025 Gbps
					100 m (328.08 ft)	28.05 Gbps
SFP-FC-32G-SW-MM850-CM	850	MMF	62.5/125	200	21 m (68.90 ft)	8.5 Gbps
					15 m (49.21 ft)	14.025 Gbps
					N/A	28.05 Gbps
			50/125	500	50 m (164.04 ft)	8.5 Gbps
					35 m (114.83 ft)	14.025 Gbps
					20 m (65.62 ft)	28.05 Gbps
				2000	150 m (492.13 ft)	8.5 Gbps
					100 m (328.08 ft)	14.025 Gbps
					70 m (229.66 ft)	28.05 Gbps
				4700	190 m (623.36 ft)	8.5 Gbps
					125 m (410.11 ft)	14.025 Gbps
					100 m (328.08 ft)	28.05 Gbps
SFP-XG-LH80-Tunable (end of sale)	1547.75	SMF	9/125	N/A	80 km (49.71 miles)	9.95 to 11.3 Gbps
*SFP-XG-CPRI-IR-SM1310	1310	SMF	9/125	N/A	1.4 km (0.87 miles)	4.91 to 10.31 Gbps
*SFP-XG-CPRI-LR-SM1310	1310	SMF	9/125	N/A	10 km (6.21 miles)	4.91 to 10.31 Gbps

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance	Data rate
SFP-XG-LX-SM1270-BIDI	Transmitting end (TX): 1270 Receiving end (RX): 1330	SMF	9/125	N/A	10 km (6.21 miles)	10.31Gbps
SFP-XG-LX-SM1270-BIDI-S	Transmitting end (TX): 1270 Receiving end (RX): 1330	SMF	9/125	N/A	10 km (6.21 miles)	10.31Gbps
SFP-XG-LX-SM1330-BIDI	Transmitting end (TX): 1330 Receiving end (RX): 1270	SMF	9/125	N/A	10 km (6.21 miles)	10.31Gbps
SFP-XG-LX-SM1330-BIDI-S	Transmitting end (TX): 1330 Receiving end (RX): 1270	SMF	9/125	N/A	10 km (6.21 miles)	10.31Gbps
SFP-XG-LH40-SM1270-BIDI	Transmitting end (TX): 1270 Receiving end (RX): 1330	SMF	9/125	N/A	40 km (24.86 miles)	10.31Gbps
SFP-XG-LH40-SM1330-BIDI	Transmitting end (TX): 1330 Receiving end (RX): 1270	SMF	9/125	N/A	40 km (24.86 miles)	10.31Gbps
SFP-XG-LH80-SM1490-BIDI	Transmitting end (TX): 1490 Receiving end (RX): 1550	SMF	9/125	N/A	80 km (49.71 miles)	10.31Gbps
SFP-XG-LH80-SM1550-BIDI	Transmitting end (TX): 1550 Receiving end (RX): 1490	SMF	9/125	N/A	80 km (49.71 miles)	10.31Gbps

NOTE:

- BIDI optical transceiver modules use different central wavelengths in transmit and receive directions, in order to implement bidirectional transmission of optical signals over the same fiber.
- You must use the SFP-XG-LX-SM1270-BIDI and SFP-XG-LX-SM1330-BIDI transceiver modules in pairs.

Table 44 Specifications for SFP+ optical transceiver modules (dual LC) (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-XG-SX-MM850-A	–7.3 to –1	–9.9 to +0.5
SFP-XG-SX-MM850-B	–7.3 to –1	–9.9 to +0.5
SFP-XG-SX-MM850-D	–7.3 to –1	–9.9 to +0.5
SFP-XG-SX-MM850-S	–7.3 to –1	–9.9 to +0.5
SFP-XG-SX-MM850-E	–7.3 to –1	–9.9 to +0.5
SFP-XG-SX-MM850-F1	–7.3 to –1	–9.9 to +0.5
SFP-XG-LX220-MM1310	–6.5 to +0.5	–6.5 to +1.5
SFP-XG-LX-SM1310	–8.2 to +0.5	–14.4 to +0.5
SFP-XG-LX-SM1310-D	–8.2 to +0.5	–14.4 to +0.5
SFP-XG-LX-SM1310-S	–8.2 to +0.5	–14.4 to +0.5
SFP-XG-LX-SM1310-CM	–8.2 to +0.5	–14.4 to +0.5
SFP-XG-LX-SM1310-E	–8.2 to +0.5	–14.4 to +0.5
SFP-XG-LH40-SM1550	–4.7 to +4	–15.8 to –1
SFP-XG-LH40-SM1550-D	–4.7 to +4	–15.8 to –1
SFP-XG-LH80-SM1550	0 to +4	–24 to –7
SFP-XG-LH80-SM1550-D	0 to +4	–24 to –7
SFP-FC-8G-SW-MM850	–10 to 0 (2.125 Gbps)	–13.1 to 0 (2.125 Gbps)
	–9 to 0 (4.25 Gbps)	–12.1 to 0 (4.25 Gbps)
	–8.2 to 0 (8.5 Gbps)	–11.2 to 0 (8.5 Gbps)
SFP-FC-8G-LW-SM1310	–9.5 to –3 (2.125 Gbps)	–18.2 to –3 (2.125 Gbps)
	–8.4 to –1 (4.25 Gbps)	–15.4 to –1 (4.25 Gbps)
	–8.4 to +0.5 (8.5 Gbps)	–13.8 to +0.5 (8.5 Gbps)
SFP-FC-16G-SW-MM850	–9 to 0 (4.25 Gbps)	–12.1 to 0 (4.25 Gbps)
	–8.2 to 0 (8.5 Gbps)	–11.2 to 0 (8.5 Gbps)
	–7.8 to 0 (14.025 Gbps)	–10.5 to 0 (14.025 Gbps)
SFP-FC-16G-SW-MM850-CM	–9 to 0 (4.25 Gbps)	–12.1 to 0 (4.25 Gbps)
	–8.2 to 0 (8.5 Gbps)	–11.2 to 0 (8.5 Gbps)
	–7.8 to 0 (14.025 Gbps)	–10.5 to 0 (14.025 Gbps)
SFP-FC-16G-LW-SM1310	–8.4 to –1 (4.25 Gbps)	–15.4 to –1 (4.25 Gbps)
	–8.4 to +0.5 (8.5 Gbps)	–13.8 to +0.5 (8.5 Gbps)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
	–5 to +2 (14.025 Gbps)	–12 to +2 (14.025 Gbps)
SFP-FC-16G-LW-SM1310-CM	–8.4 to –1 (4.25 Gbps)	–15.4 to –1 (4.25 Gbps)
	–8.4 to +0.5 (8.5 Gbps)	–13.8 to +0.5 (8.5 Gbps)
	–5 to +2 (14.025 Gbps)	–12 to +2 (14.025 Gbps)
SFP-FC-32G-SW-MM850	–8.2 to 0 (8.5 Gbps)	–11.2 to 0 (8.5 Gbps)
	–7.8 to 0 (14.025 Gbps)	–10.5 to 0 (14.025 Gbps)
	–6.2 to +2 (28.05 Gbps)	–10.2 to +2 (28.05 Gbps)
SFP-XG-LH80-Tunable	–1 to +3	–24 to –7
*SFP-XG-CPRI-IR-SM1310	–8.2 to +0.5	–14.4 to +0.5
*SFP-XG-CPRI-LR-SM1310	–8.2 to +0.5	–14.4 to +0.5
SFP-XG-LX-SM1270-BIDI	-8.2 to -0.5	–14.4 to +0.5
SFP-XG-LX-SM1270-BIDI-S	-8.2 to -0.5	–14.4 to +0.5
SFP-XG-LX-SM1330-BIDI	-8.2 to -0.5	–14.4 to +0.5
SFP-XG-LX-SM1330-BIDI-S	-8.2 to -0.5	–14.4 to +0.5
SFP-XG-LH40-SM1270-BIDI	0 to +5	–15 to +0.5
SFP-XG-LH40-SM1330-BIDI	0 to +5	–15 to +0.5
SFP-XG-LH80-SM1490-BIDI	0 to +4	–23 to –6
SFP-XG-LH80-SM1550-BIDI	–1 to +3	–23 to –6

NOTE:

- A mode conditioning patch cord is required when you use OM1 or OM2 fiber types on an SFP-XG-LX220-MM1310. No mode conditioning patch cords are required for OM3 fiber types. For more information about mode conditioning patch cords, see the IEEE 802.3 standard.
- The SFP-XG-LH80-Tunable module supports wavelength adjustment. Cold-starting of the module takes a longer time (usually not exceeding 90 seconds) than other SFP+ modules.

SFP+ optical transceiver modules (SC)

Figure 32 SFP+ optical transceiver module (SC)

Models and specifications

Table 45 Specifications for SFP+ optical transceiver modules (SC) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-XG-PR30-U-SM1270	• Transmitting end (TX): 1270 • Receiving end (RX): 1577.5	SMF	9/125	20 km (12.43 miles)
SFP-XG-PRX30-U-SM1310	• Transmitting end (TX): 1310 • Receiving end (RX): 1577.5	SMF	9/125	20 km (12.43 miles)

Table 46 Specifications for SFP+ optical transceiver modules (SC) (2)

Model	Data rate (Gbps)		Optical parameters (dBm)	
	Transmitting end (TX)	Receiving end (RX)	Transmit power	Receive power
SFP-XG-PR30-U-SM1270	10.3125	10.3125	+4 to +9	–10 to –28.5
SFP-XG-PRX30-U-SM1310	1.25	10.3125	+0.62 to +5.62	–10 to –28.5

10G EPON OLT SFP+ optical transceiver modules (SC)

A 10G EPON OLT SFP+ optical transceiver module uses an SC connector.

Figure 33 10G EPON OLT SFP+ optical transceiver module (SC)

Models and specifications

Table 47 Specifications for 10G EPON OLT SFP+ optical transceiver modules (SC) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance

SFP-XG-PR30-D-SM1577-A (end of sale)	• **Tx/Rx rate**—10.3125 Gbps
	  ○ Tx: 1577.5
	  ○ Rx: 1270
		SMF	9/125	20 km (12.43 miles)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance

	• **Tx/Rx rate**—1.25 Gbps
	  ○ Tx: 1490
	  ○ Rx: 1310			

SFP-XG-PR30-D-SM1577-C	• **Tx/Rx rate**—10.3125 Gbps
	  ○ Tx: 1577.5
	  ○ Rx: 1270
	• **Tx/Rx rate**—1.25 Gbps
	  ○ Tx: 1490
	  ○ Rx: 1310
		SMF	9/125	20 km (12.43 miles)

SFP-XG-PR40-D-SM1577-A (end of sale)	• **Tx/Rx rate**—10.3125 Gbps
	  ○ Tx: 1577.5
	  ○ Rx: 1270
	• **Tx/Rx rate**—1.25 Gbps
	  ○ Tx: 1490
	  ○ Rx: 1310
		SMF	9/125	20 km (12.43 miles)

SFP-XG-PR40-D-SM1577-C	• **Tx/Rx rate**—10.3125 Gbps
	  ○ Tx: 1577.5
	  ○ Rx: 1270
	• **Tx/Rx rate**—1.25 Gbps
	  ○ Tx: 1490
	  ○ Rx: 1310
		SMF	9/125	20 km (12.43 miles)

Table 48 Specifications for 10G EPON OLT SFP+ optical transceiver modules (SC) (2)

Model	Data rate (Gbps)		Optical parameters (dBm)	
	Tx	Rx	Tx power	Rx power
SFP-XG-PR30-D-SM1577-A	10.3125	10.3125	+2 to +5	–6 to –28
	1.25	1.25	+3 to +7	–9.38 to –29.78
SFP-XG-PR30-D-SM1577-C	10.3125	10.3125	+2 to +5	–6 to –28
	1.25	1.25	+3 to +7	–9.38 to –29.78
SFP-XG-PR40-D-SM1577-A	10.3125	10.3125	+5 to +9	–9 to –29
	1.25	1.25	+4 to +10	–12 to –32
SFP-XG-PR40-D-SM1577-C	10.3125	10.3125	+5 to +9	–9 to –29
	1.25	1.25	+4 to +10	–12 to –31

NOTE:

The optical power budget is 29 dBm for the SFP-XG-PR30-D-SM1577-A and SFP-XG-PR30-D-SM1577-C transceiver modules and 33 dBm for the SFP-XG-PR40-D-SM1577-A and SFP-XG-PR40-D-SM1577-C transceiver modules.

SFP+ copper transceiver modules

Figure 34 SFP+ copper transceiver module

Models and specifications

Table 49 SFP+ copper transceiver module specifications

Model	Transmission distance	Data rate	Cable type	Connector type
SFP-10GE-T	30 m (98.43 ft)	10 Gbps	Category 6a STP or Category 7 STP	RJ-45
	100 m (328.08 ft)	1000/100 Mbps	Category 5e UTP/STP	

NOTE:

Support for data rate autonegotiation of depends on the device model.

SFP+ copper cables

Figure 35 SFP+ copper cable

Models and specifications

Table 50 Specifications for SFP+ copper cables

Model	Length	Data rate
LSWM1STK	0.65 m (2.13 ft)	10.31 Gbps
LSWM2STK	1.2 m (3.94 ft)	
LSWM3STK	3 m (9.84 ft)	
SFP-XG-CAB-3M-CM	3 m (9.84 ft)	
LSTM1STK	5 m (16.40 ft)	

Model	Length	Data rate
LSTM1STK-S	5 m (16.40 ft)	
SFP-XG-CAB-5M-CM	5 m (16.40 ft)	
LSTM2STK	7 m (22.97 ft)	

SFP+ optical cables

Figure 36 SFP+ optical cable

Models and specifications

Table 51 Specifications for SFP+ optical cables

Model	Length	Data rate
SFP-XG-D-AOC-7M	7 m (22.97 ft)	10.31 Gbps
SFP-XG-D-AOC-10M	10 m (32.81 ft)	
SFP-XG-D-AOC-20M	20 m (65.62 ft)	

XFP modules

XFP optical transceiver modules (dual LC)

Figure 37 XFP optical transceiver module (dual LC)

Models and specifications

Table 52 Specifications for XFP optical transceiver modules (dual LC) (1)

Model	Central wavelength (nm)	Data rate (Gbps)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
XFP-SX-MM850	850	9.95 to 10.31	MMF	50/125	4700	400 m (1312.34 ft)
					2000	300 m (984.25 ft)
					500	82 m (269.03 ft)
					400	66 m (216.54 ft)
				62.5/125	200	33 m (108.27 ft)
					160	26 m (85.30 ft)
XFP-SX-MM850-D	850	9.95 to 10.31	MMF	50/125	4700	400 m (1312.34 ft)
					2000	300 m (984.25 ft)
					500	82 m (269.03 ft)
					400	66 m (216.54 ft)
				62.5/125	200	33 m (108.27 ft)
					160	26 m (85.30 ft)
XFP-LX-SM1310	1310	9.95 to 10.31	SMF	9/125	N/A	10 km (6.21 miles)
XFP-LX-SM1310-D	1310	9.95 to 10.31	SMF	9/125	N/A	10 km (6.21 miles)
XFP-POS-LH10-SM1310	1310	9.95 to 11.3	SMF	9/125	N/A	10 km (6.21 miles)
XFP-LH40-SM1550 (end of sale)	1550	9.95 to 10.7	SMF	9/125	N/A	40 km (24.86 miles)
XFP-LH40-SM15	1550	9.95 to	SMF	9/125	N/A	40 km (24.86

Model	Central wavelength (nm)	Data rate (Gbps)	Fiber mode	Fiber diameter (µm)	Modal bandwidth (MHz*km)	Transmission distance
50-D		10.7				miles)
XFP-LH40-SM1550-F1	1550	9.95 to 10.7	SMF	9/125	N/A	40 km (24.86 miles)
XFP-LH80-SM1550	1550	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LH80-SM1550-D	1550	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1530.33 (end of sale)	1530.33	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1531.12 (end of sale)	1531.12	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1531.90 (end of sale)	1531.90	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1532.68 (end of sale)	1532.68	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1534.25 (end of sale)	1534.25	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1535.04 (end of sale)	1535.04	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1535.82 (end of sale)	1535.82	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1536.61 (end of sale)	1536.61	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1538.19 (end of sale)	1538.19	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1538.98 (end of sale)	1538.98	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1539.77 (end of sale)	1539.77	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1540.56 (end of sale)	1540.56	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1542.14 (end of sale)	1542.14	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1542.94 (end of sale)	1542.94	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1543.73 (end of sale)	1543.73	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1544.53 (end of sale)	1544.53	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1546.12 (end of sale)	1546.12	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1546.92 (end of sale)	1546.92	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1547.72 (end of sale)	1547.72	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)

Model	Central wavelength (nm)	Data rate (Gbps)	Fiber mode	Fiber diameter (μm)	Modal bandwidth (MHz*km)	Transmission distance
XFP-LX-SM1548.51 (end of sale)	1548.51	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1550.12 (end of sale)	1550.12	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1550.92 (end of sale)	1550.92	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1551.72 (end of sale)	1551.72	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1552.52 (end of sale)	1552.52	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1554.13 (end of sale)	1554.13	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1554.94 (end of sale)	1554.94	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1555.75 (end of sale)	1555.75	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1556.55 (end of sale)	1556.55	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1558.17 (end of sale)	1558.17	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1558.98 (end of sale)	1558.98	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1559.79 (end of sale)	1559.79	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)
XFP-LX-SM1560.61 (end of sale)	1560.61	9.95 to 10.31	SMF	9/125	N/A	80 km (49.71 miles)

Table 53 Specifications for XFP optical transceiver modules (dual LC) (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
XFP-SX-MM850	–7.3 to –1.08	–9.9 to –1
XFP-SX-MM850-D	–7.3 to –1.08	–9.9 to –1
XFP-LX-SM1310	–8.2 to +0.5	–14.4 to +0.5
XFP-LX-SM1310-D	–8.2 to +0.5	–14.4 to +0.5
XFP-POS-LH10-SM1310	–6 to –1	–10.3 to +0.5
XFP-LH40-SM1550	–1 to +2	–14 to –1
XFP-LH40-SM1550-D	–1 to +2	–14 to –1
XFP-LH40-SM1550-F1	–1 to +2	–14.1 to –1
XFP-LH80-SM1550	0 to +4	–24 to –7
XFP-LH80-SM1550-D	0 to +4	–24 to –7
XFP-LX-SM1530.33	–1 to +3	–24 to –7

Model	Optical parameters (dBm)	
	Transmit power	Receive power
XFP-LX-SM1531.12	–1 to +3	–24 to –7
XFP-LX-SM1531.90	–1 to +3	–24 to –7
XFP-LX-SM1532.68	–1 to +3	–24 to –7
XFP-LX-SM1534.25	–1 to +3	–24 to –7
XFP-LX-SM1535.04	–1 to +3	–24 to –7
XFP-LX-SM1535.82	–1 to +3	–24 to –7
XFP-LX-SM1536.61	–1 to +3	–24 to –7
XFP-LX-SM1538.19	–1 to +3	–24 to –7
XFP-LX-SM1538.98	–1 to +3	–24 to –7
XFP-LX-SM1539.77	–1 to +3	–24 to –7
XFP-LX-SM1540.56	–1 to +3	–24 to –7
XFP-LX-SM1542.14	–1 to +3	–24 to –7
XFP-LX-SM1542.94	–1 to +3	–24 to –7
XFP-LX-SM1543.73	–1 to +3	–24 to –7
XFP-LX-SM1544.53	–1 to +3	–24 to –7
XFP-LX-SM1546.12	–1 to +3	–24 to –7
XFP-LX-SM1546.92	–1 to +3	–24 to –7
XFP-LX-SM1547.72	–1 to +3	–24 to –7
XFP-LX-SM1548.51	–1 to +3	–24 to –7
XFP-LX-SM1550.12	–1 to +3	–24 to –7
XFP-LX-SM1550.92	–1 to +3	–24 to –7
XFP-LX-SM1551.72	–1 to +3	–24 to –7
XFP-LX-SM1552.52	–1 to +3	–24 to –7
XFP-LX-SM1554.13	–1 to +3	–24 to –7
XFP-LX-SM1554.94	–1 to +3	–24 to –7
XFP-LX-SM1555.75	–1 to +3	–24 to –7
XFP-LX-SM1556.55	–1 to +3	–24 to –7
XFP-LX-SM1558.17	–1 to +3	–24 to –7
XFP-LX-SM1558.98	–1 to +3	–24 to –7
XFP-LX-SM1559.79	–1 to +3	–24 to –7
XFP-LX-SM1560.61	–1 to +3	–24 to –7

10G EPON OLT XFP optical transceiver modules (SC)

Figure 38 10G EPON OLT XFP optical transceiver module (SC)

Models and specifications

Table 54 Specifications for 10G EPON OLT XFP optical transceiver modules (SC) (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance

XFP-PR30-D-SM1577	• Data rate of 10.3125 Gbps at both the transmitting end (TX) and receiving end (RX)
	  ○ TX: 1577.5
	  ○ RX: 1270
	• Data rate of 1.25 Gbps at both the TX and RX
	  ○ TX: 1490
	  ○ RX: 1310
		SMF	9/125	20 km (12.43 miles)

XFP-PRX30-D-SM1577	• Data rate of 10.3125 Gbps at the TX and 1.25 Gbps at the RX
	  ○ TX: 1577.5
	  ○ RX: 1310
	• Data rate of 1.25 Gbps at both the TX and RX
	  ○ TX: 1490
	  ○ RX: 1310
		SMF	9/125	20 km (12.43 miles)

Table 55 Specifications for 10G EPON OLT XFP optical transceiver modules (SC) (2)

Model	Data rate (Gbps)		Optical parameters (dBm)	
	Transmitting end (TX)	Receiving end (RX)	Transmit power	Receive power
XFP-PR30-D-SM1577	10.3125	10.3125	+2 to +5	–6 to –28
	1.25	1.25	+3 to +7	–9.38 to –29.8
XFP-PRX30-D-SM1577	10.3125	1.25	+2 to +5	–9.38 to –29.8
	1.25		+3 to +7	

NOTE:

To accurately measure the optical power of 10G EPON OLT or ONU ports, use an optical power meter specially designed for 10G EPON, for example VIAVI OLP-87 used by Intelbras,

CX4 cables

Figure 39 CX4 cable

Models and specifications

Table 56 Specifications for CX4 cables

Model	Length	Data rate	Type
LSPM2STKA	0.5 m (1.64 ft)	12 Gbps	CX4 cable
LSPM2STKB	1 m (3.28 ft)		
LSPM2STKC	3 m (9.84 ft)		

SFP modules

2.5-Gigabit SFP optical transceiver modules

Figure 40 2.5-Gigabit/Gigabit/622-Megabit/100-Megabit SFP optical transceiver module

Models and specifications

2.5-Gigabit SFP optical transceiver modules use a dual LC connector.

Table 57 Specifications for 2.5-Gigabit SFP optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-2.5G-LX-SM1310	1310	SMF	9/125	2 km (1.24 miles)
*SFP-2.5G-LX10-SM1310-DR-I	1310	SMF	9/125	10 km (6.21 miles)
SFP-2.5G-LH15-SM1310	1310	SMF	9/125	15 km (9.32 miles)
SFP-2.5G-LH40-SM1310 (end of sale)	1310	SMF	9/125	40 km (24.86 miles)
SFP-2.5G-LH80-SM1550 (end of sale)	1550	SMF	9/125	80 km (49.71 miles)

Table 58 Specifications for 2.5-Gigabit SFP optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-2.5G-LX-SM1310	–10 to –3	–18 to –3
*SFP-2.5G-LX10-SM1310-DR-I	–5 to –0.5	–14.4 to –0.5
SFP-2.5G-LH15-SM1310	–5 to 0	–18 to 0
SFP-2.5G-LH40-SM1310	–2 to +3	–27 to –9
SFP-2.5G-LH80-SM1550	–20 to –14	–31 to –12

SFP GPON ONU optical transceiver modules (SC)

Figure 41 SFP GPON ONU optical transceiver module

Models and specifications

Gigabit GPON ONU optical transceiver modules provide a transmission rate of 1250 Mbps and use an SC connector.

Table 59 Specifications for SFP GPON ONU optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
*SFP-GPON-ONU-STICK-BP-SM1310-I	TX: 1310 RX: 1490	SMF	9/125	20 km (12.43 miles)

Table 60 Specifications for SFP GPON ONU optical transceiver modules (2)

Model	Transmission rate (Gbps)		Optical parameters (dBm)	
	Tx	Rx	Transmit power	Receive power
*SFP-GPON-ONU-STICK-BP-SM1310-I	1.25	2.5	+0.5 to +5	–27 to –8

IMPORTANT:

- The SFP-GPON-ONU-STICK-BP-SM1310-I is a Class B+ GPON ONU optical transceiver module. As a best practice, use it in pair with a Class B+ GPON OLT transceiver module.
- The optical power budget for the SFP-GPON-ONU-STICK-BP-SM1310-I transceiver module is 28 dBm.

SFP GPON OLT optical transceiver modules (SC)

Figure 42 SFP GPON OLT optical transceiver module

Models and specifications

Gigabit GPON OLT optical transceiver modules provide a transmission rate of 1250 Mbps and use an SC connector.

Table 61 Specifications for SFP GPON OLT optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-GPON-ONU-STICK-BP-SM1310-I	TX: 1490 RX: 1310	SMF	9/125	20 km (12.43 miles)
SFP-GPON-C+-D-SM1490	TX: 1490 RX: 1310	SMF	9/125	20 km (12.43 miles)
SFP-GPON-C++-D-SM1490	TX: 1490 RX: 1310	SMF	9/125	20 km (12.43 miles)

Table 62 Specifications for SFP GPON OLT optical transceiver modules (2)

Model	Transmission rate (Gbps)		Optical parameters (dBm)	
	Tx	Rx	Transmit power	Receive power
SFP-GPON-B+-D-SM1490	2.5	1.25	+1.5 to +5	–8 to –28
SFP-GPON-C+-D-SM1490	2.5	1.25	+3 to +7	–12 to –30
SFP-GPON-C++-D-SM1490	2.5	1.25	+6 to +10	–12 to –33

IMPORTANT:

- The SFP-GPON-B+-D-SM1490 is a Class B+ GPON OLT optical transceiver module. As a best practice, use it in pair with a Class B+ GPON ONU transceiver module.
- The SFP-GPON-C+-D-SM1490 is a Class C+ GPON OLT optical transceiver module.

- The SFP-GPON-C++-D-SM1490 is a Class C++ GPON OLT optical transceiver module.
- The optical power budget for an SFP-GPON-B+-D-SM1490 transceiver is 28 dBm.
- The optical power budget for an SFP-GPON-C+-D-SM1490 transceiver is 32 dBm.
- The optical power budget for an SFP-GPON-C++-D-SM1490 transceiver is 33 dBm.

Gigabit SFP optical transceiver modules

See Figure 40 for a view of the Gigabit SFP optical transceiver module.

Models and specifications

Gigabit SFP optical transceiver modules provide a transmission rate of 1250 Mbps and use a dual LC connector.

Table 63 Specifications for Gigabit SFP optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth at 850 nm (MHz*km)	Transmission distance
SFP-GE-SX-MM850-A	850	MMF	50/125	500	550 m (1804.46 ft)
				400	500 m (1640.42 ft)
			62.5/125	200	275 m (902.23 ft)
				160	220 m (721.78 ft)
SFP-GE-SX-MM850-CM	850	MMF	50/125	500	550 m (1804.46 ft)
				400	500 m (1640.42 ft)
			62.5/125	200	275 m (902.23 ft)
				160	220 m (721.78 ft)
SFP-GE-SX-MM850-D	850	MMF	50/125	500	550 m (1804.46 ft)
				400	500 m (1640.42 ft)
			62.5/125	200	275 m (902.23 ft)
				160	220 m (721.78 ft)
SFP-GE-SX-MM850-S	850	MMF	50/125	500	550 m (1804.46 ft)
				400	500 m (1640.42 ft)
			62.5/125	200	275 m (902.23 ft)
				160	220 m (721.78 ft)
SFP-GE-LX-SM1310-A	1310	SMF	9/125	N/A	10 km (6.21 miles)
		MMF	50/125	500 or 400	550 m (1804.46 ft)
			62.5/125	500	550 m (1804.46 ft)
SFP-GE-LX-SM1310-C	1310	SMF	9/125	N/A	10 km (6.21 miles)
SFP-GE-LX-SM1310-D	1310	SMF	9/125	N/A	10 km (6.21 miles)
SFP-GE-LX-SM1310-S	1310	SMF	9/125	N/A	10 km (6.21 miles)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Modal bandwidth at 850 nm (MHz*km)	Transmission distance
*SFP-GE-LX10-SM1310	1310	SMF	9/125	N/A	10 km (6.21 miles)
SFP-GE/FE-LX10-SM1310	1310	SMF	9/125	N/A	10 km (6.21 miles)
*SFP-GE-LH20-SM1310-I	1310	SMF	9/125	N/A	20 km (12.43 miles)
*SFP-GE-LH40-SM1310-I	1310	SMF	9/125	N/A	40 km (24.86 miles)
SFP-GE-LH40-SM1310	1310	SMF	9/125	N/A	40 km (24.86 miles)
SFP-GE-LH40-SM1310-D	1310	SMF	9/125	N/A	40 km (24.86 miles)
SFP-GE-LH40-SM1310-S	1310	SMF	9/125	N/A	40 km (24.86 miles)
SFP-GE-LH40-SM1550	1550	SMF	9/125	N/A	40 km (24.86 miles)
SFP-GE-LH40-SM1550-S	1550	SMF	9/125	N/A	40 km (24.86 miles)
SFP-GE-LH80-SM1550	1550	SMF	9/125	N/A	80 km (49.71 miles)
SFP-GE-LH80-SM1550-D	1550	SMF	9/125	N/A	80 km (49.71 miles)
SFP-GE-LH100-SM1550	1550	SMF	9/125	N/A	100 km (62.14 miles)

Table 64 Specifications for Gigabit SFP optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-GE-SX-MM850-A	–9.5 to 0	–17 to –3
SFP-GE-SX-MM850-CM	-9.5 to 0	-17 to –3
SFP-GE-SX-MM850-D	–9.5 to 0	–17 to –3
SFP-GE-SX-MM850-S	–9.5 to 0	–17 to –3
SFP-GE-LX-SM1310-A	–9.5 to –3	–20 to –3
SFP-GE-LX-SM1310-C	–9.5 to –3	–20 to –3
SFP-GE-LX-SM1310-D	–9.5 to –3	–20 to –3
SFP-GE-LX-SM1310-S	–9.5 to –3	–20 to –3
*SFP-GE-LX10-SM1310	–11 to –3	–19 to –3
SFP-GE/FE-LX10-SM1310	–9.5 to –3	–22 to –3
*SFP-GE-LH20-SM1310-I	–8 to –3	–23 to –3
*SFP-GE-LH40-SM1310-I	–5 to 0	–23 to –3

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-GE-LH40-SM1310	–5 to +5	–22 to –3
SFP-GE-LH40-SM1310-D	–5 to +5	–22 to –3
SFP-GE-LH40-SM1310-S	–5 to +5	–22 to –3
SFP-GE-LH40-SM1550	–4 to +1	–21 to –3
SFP-GE-LH40-SM1550-S	–4 to +1	–21 to –3
SFP-GE-LH80-SM1550	–4 to +5	–22 to –3
SFP-GE-LH80-SM1550-D	–4 to +5	–22 to –3
SFP-GE-LH100-SM1550	0 to +5	–30 to –9

NOTE:

The transmission distance of the SFP-GE-LH80-SM1550 and SFP-GE-LH80-SM1550-D transceiver modules might be displayed as 70 km (43.50 miles) on Intelbras devices with old software versions. Devices with upgraded software versions can correctly display the distance. The actual transmission distance is 80 km (49.71 miles).

622-Megabit SFP optical transceiver modules

See Figure 40 for a view of the 622-Megabit SFP optical transceiver module.

Models and specifications

622-Megabit SFP optical transceiver modules use a dual LC connector.

Table 65 Specifications for 622-Megabit SFP optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-622M-LX-SM1310	1310	SMF	9/125	15 km (9.32 miles)
SFP-622M-LH40-SM1310	1310	SMF	9/125	40 km (24.86 miles)
SFP-622M-LH80-SM1550	1550	SMF	9/125	80 km (49.71 miles)

Table 66 Specifications for 622-Megabit SFP optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-622M-LX-SM1310	–15 to –8	–28 to –8
SFP-622M-LH40-SM1310	–3 to +2	–28 to –8
SFP-622M-LH80-SM1550	–3 to +2	–28 to –8

100-Megabit SFP optical transceiver modules

See Figure 40 for a view of the 100-Megabit SFP optical transceiver module.

Models and specifications

100-Megabit SFP optical transceiver modules provide a maximum transmission rate of 155 Mbps and use a dual LC connector.

Table 67 Specifications for 100-Megabit SFP optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-FE-SX-MM1310-A	1310	MMF	50/125	2 km (1.24 miles)
			62.5/125	
SFP-FE-SX-MM1310-GE (end of sale)	1310	MMF	50/125	2 km (1.24 miles)
			62.5/125	
SFP-GE/FE-LX10-SM1310	1310	SMF	9/125	10 km (6.21 miles)
SFP-FE-LX-SM1310-A	1310	SMF	9/125	15 km (9.32 miles)
SFP-FE-LX-SM1310-D	1310	SMF	9/125	15 km (9.32 miles)
*SFP-FE-BX15-U-SM1310	1310	SMF	9/125	15 km (9.32 miles)
SFP-FE-LH40-SM1310	1310	SMF	9/125	40 km (24.86 miles)
SFP-FE-LH80-SM1550	1550	SMF	9/125	80 km (49.71 miles)

Table 68 Specifications for 100-Megabit SFP optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-FE-SX-MM1310-A	–19 to –14	–30 to –14
SFP-FE-SX-MM1310-GE	–20 to –14	–31.5 to –8
SFP-GE/FE-LX10-SM1310	–15 to –8	–28 to –8
SFP-FE-LX-SM1310-A	–15 to –8	–28 to –7
SFP-FE-LX-SM1310-D	–15 to –8	–28 to –7
*SFP-FE-BX15-U-SM1310	–15 to –8	–28 to –8
SFP-FE-LH40-SM1310	–5 to 0	–34 to –9
SFP-FE-LH80-SM1550	–5 to 0	–34 to –10

Gigabit BIDI optical transceiver modules

Figure 43 Gigabit/100-Megabit BIDI optical transceiver module

Models and specifications

Gigabit BIDI optical transceiver modules provide a transmission rate of 1250 Mbps and use a dual LC connector.

Table 69 Specifications for Gigabit BIDI optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-GE-LX-SM1310-BIDI	• Transmitting end (TX): 1310 • Receiving end (RX): 1490	SMF	9/125	10 km (6.21 miles)
SFP-GE-LX-SM1310-BIDI-S	• Transmitting end (TX): 1310 • Receiving end (RX): 1490	SMF	9/125	10 km (6.21 miles)
*SFP-GE-LX-SM1310-BIDI-I	• Transmitting end (TX): 1310 • Receiving end (RX): 1490	SMF	9/125	10 km (6.21 miles)
SFP-GE-LX-SM1490-BIDI	• Transmitting end (TX): 1490 • Receiving end (RX): 1310	SMF	9/125	10 km (6.21 miles)
SFP-GE-LX-SM1490-BIDI-S	• Transmitting end (TX): 1490 • Receiving end (RX): 1310	SMF	9/125	10 km (6.21 miles)
*SFP-GE-LX-SM1490-BIDI-I	• Transmitting end (TX): 1490 • Receiving end (RX): 1310	SMF	9/125	10 km (6.21 miles)
SFP-GE-LH40-SM1310-BIDI	• Transmitting end (TX): 1310 • Receiving end (RX): 1550	SMF	9/125	40 km (24.86 miles)
SFP-GE-LH40-SM1550-BIDI	• Transmitting end (TX): 1550 • Receiving end (RX): 1310	SMF	9/125	40 km (24.86 miles)
SFP-GE-LH70-SM1490-BIDI	• Transmitting end (TX): 1490 • Receiving end (RX): 1550	SMF	9/125	70 km (43.50 miles)
SFP-GE-LH70-SM1550-BIDI	• Transmitting end (TX): 1550 • Receiving end (RX): 1490	SMF	9/125	70 km (43.50 miles)

Table 70 Specifications for Gigabit BIDI optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-GE-LX-SM1310-BIDI	–9 to –3	–18.7 to –3
SFP-GE-LX-SM1310-BIDI-S		
SFP-GE-LX-SM1490-BIDI		
SFP-GE-LX-SM1490-BIDI-S		
*SFP-GE-LX-SM1310-BIDI-I	–9 to –3	–20 to –3
*SFP-GE-LX-SM1490-BIDI-I		
SFP-GE-LH40-SM1310-BIDI	–5 to 0	–23 to –3
SFP-GE-LH40-SM1550-BIDI		
SFP-GE-LH70-SM1490-BIDI	–3 to +5	–23 to –3
SFP-GE-LH70-SM1550-BIDI		

NOTE:

- BIDI optical transceiver modules use different central wavelengths in transmit and receive directions, in order to implement bidirectional transmission of optical signals over the same fiber.
- You must use the SFP-GE-LX-SM1310-BIDI and SFP-GE-LX-SM1490-BIDI transceiver modules in pairs.

100-Megabit BIDI optical transceiver modules

See Figure 43 for a view of the 100-Megabit BIDI optical transceiver module.

Models and specifications

100-Megabit BIDI optical transceiver modules provide a transmission rate of 155 Mbps and use a dual LC connector.

Table 71 Specifications for 100-Megabit BIDI optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-FE-LX-SM1310-BIDI	• Transmitting end (TX): 1310 • Receiving end (RX): 1550	SMF	9/125	15 km (9.32 miles)
SFP-FE-LX-SM1550-BIDI	• Transmitting end (TX): 1550 • Receiving end (RX): 1310	SMF	9/125	15 km (9.32 miles)

Table 72 Specifications for 100-Megabit BIDI optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-FE-LX-SM1310-BIDI	–15 to –8	–31 to –3
SFP-FE-LX-SM1550-BIDI		

NOTE:

- BIDI optical transceiver modules use different central wavelengths in transmit and receive directions, in order to implement bidirectional transmission of optical signals over the same fiber.
- You must use the SFP-FE-LX-SM1310-BIDI and SFP-FE-LX-SM1550-BIDI transceiver modules in pairs.

BIDI GEPON OLT optical transceiver modules (SC)

Figure 44 BIDI GEPON OLT optical transceiver module

Models and specifications

BIDI GEPON OLT optical transceiver modules provide a transmission rate of 1250 Mbps and use an SC connector.

Table 73 Specifications for BIDI GEPON OLT optical transceiver modules (1)

External model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-GE-PX10-D-SM1490-A (end of sale)	• Transmitting end (TX): 1490 • Receiving end (RX): 1310	SMF	9/125	10 km (6.21 miles)
SFP-GE-PX20-D-SM1490-A (end of sale)	• Transmitting end (TX): 1490 • Receiving end (RX): 1310	SMF	9/125	20 km (12.43 miles)
SFP-GE-PX20-D-SM1490-M	• Transmitting end (TX): 1490 • Receiving end (RX): 1310	SMF	9/125	20 km (12.43 miles)

Table 74 Specifications for BIDI GEPON OLT optical transceiver modules (2)

External model	Connector index (dBm)		
	Output fiber power	Receiving sensitivity	Fiber saturation
SFP-GE-PX10-D-SM1490-A	–3 to +2	≤ –24	≤ –3
SFP-GE-PX20-D-SM1490-A	+2 to +7	≤ –30	≤ –10
SFP-GE-PX20-D-SM1490-M	+2 to +7	≤ –28	≤ –6

NOTE:

- BIDI GEPON OLT optical transceiver module is a kind of Gigabit SFP module specially used for EPON OLT end devices. The fiber signals transmitted through SFP-GE-PX10-D-SM1490-A module can be used for only the ONU devices with a transmission distance of 10 km (6.2 miles).
- When testing the fiber power of EPON OLT and ONU ports, please use the fiber power meter dedicated for EPON (the fiber power meter model used in Intelbras is JDSU OLP-57) to ensure the correctness of the test result.

Gigabit CWDM optical transceiver modules (LC)

Figure 45 Gigabit CWDM optical transceiver module

Models and specifications

Gigabit CWDM optical transceiver modules provide a transmission rate of 1250 Mbps and use a dual LC connector.

Table 75 Specifications for Gigabit CWDM optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
SFP-GE-LH70-SM1470-CW (end of sale)	1470	SMF	9/125	70 km (43.50 miles)
SFP-GE-LH70-SM1490-CW (end of sale)	1490	SMF	9/125	70 km (43.50 miles)
SFP-GE-LH70-SM1510-CW (end of sale)	1510	SMF	9/125	70 km (43.50 miles)
SFP-GE-LH70-SM1530-CW (end of sale)	1530	SMF	9/125	70 km (43.50 miles)
SFP-GE-LH70-SM1550-CW (end of sale)	1550	SMF	9/125	70 km (43.50 miles)
SFP-GE-LH70-SM1570-CW (end of sale)	1570	SMF	9/125	70 km (43.50 miles)
SFP-GE-LH70-SM1590-CW (end of sale)	1590	SMF	9/125	70 km (43.50 miles)
SFP-GE-LH70-SM1610-CW (end of sale)	1610	SMF	9/125	70 km (43.50 miles)

Table 76 Specifications for Gigabit CWDM optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
SFP-GE-LH70-SM1470-CW	0 to +5	–23 to –3
SFP-GE-LH70-SM1490-CW		
SFP-GE-LH70-SM1510-CW		
SFP-GE-LH70-SM1530-CW		
SFP-GE-LH70-SM1550-CW		
SFP-GE-LH70-SM1570-CW		
SFP-GE-LH70-SM1590-CW		
SFP-GE-LH70-SM1610-CW		

NOTE:

- Gigabit CWDM optical transceiver modules adopt the CWDM technology that uses wavelength division multiplexers to multiplex optical signals with different wavelengths for transmission over a single optical fiber, thereby saving optical fiber resources. The receiving end uses a wavelength division demultiplexer to demultiplex the multiplexed optical signals.
- The most recent software version of Intelbras networking devices might display the transmission distance of the Gigabit CWDM optical transceiver module as 80 km (49.71 miles). The CWDM optical transceiver module can transmit data over 80 km (49.71 miles) when the fiber link meets the budget.

Gigabit SFP copper transceiver modules

Figure 46 Gigabit SFP copper transceiver module

Models and specifications

Table 77 Specifications for Gigabit SFP copper transceiver modules

Model	Transmission distance	Data rate	Connector type
SFP-GE-T	100 m (328.08 ft)	1250 Mbps	RJ-45
SFP-GE-T-CM	100 m (328.08 ft)	1250 Mbps	RJ-45
SFP-GE-T-D	100 m (328.08 ft)	1250 Mbps	RJ-45

IMPORTANT:

As a best practice, use shielded twisted pair (STP) cables for Gigabit SFP copper transceiver

modules for better transmission performance.

Gigabit SFP copper cables

Figure 47 Gigabit SFP copper cable

Models and specifications

Table 78 Specifications for Gigabit SFP copper cables

Model	Transmission distance	Data rate	Cable type
SFP-STACK-Kit	1.5 m (4.92 ft)	1250 Mbps	UTP/STP
SFP-STACK-Kit-S	1.5 m (4.92 ft)	1250 Mbps	UTP/STP

PoE optical transceiver modules

To transmit data and supply or receive power, use PoE optical transceiver modules together with the photoelectric hybrid cables.

SFP+ PoE optical transceiver modules

Figure 48 SFP+ PoE optical transceiver module (dual PELC connectors)

Models and specifications

SFP+ PoE optical transceiver modules use PELC connectors and provide a transmission rate of 10 Gbps, 5 Gbps, 2.5 Gbps, or 1 Gbps.

Table 79 Specifications for SFP+ PoE optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
*SFP-XG-POE-MR	1310	SMF	9/125	1.4 km (0.87 miles)

Table 80 Specifications for SFP+ PoE optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
*SFP-XG-POE-MR	–8.2 to +0.5	–12.6 to +0.5

SFP PoE optical transceiver modules

Figure 49 SFP PoE optical transceiver module (dual PELC connectors)

Models and specifications

SFP PoE optical transceiver modules provide a transmission rate of 1250 Mbps and use PELC connectors.

Table 81 Specifications for SFP PoE optical transceiver modules (1)

Model	Central wavelength (nm)	Fiber mode	Fiber diameter (μm)	Transmission distance
*SFP-GE-POE	1310	SMF	9/125	10 km (6.21 miles)

Table 82 Specifications for SFP PoE optical transceiver modules (2)

Model	Optical parameters (dBm)	
	Transmit power	Receive power
*SFP-GE-POE	–9 to –1	–18.7 to –3

Fiber PoE patch cords

Figure 50 Fiber PoE patch cord

Models and specifications

Table 83 Specifications for fiber PoE patch cords

Model	Length
PoE-PELC-PELC-0.3	0.3 m (0.98 ft)
PoE-PELC-PELC-1.5	1.5 m (4.92 ft)
PoE-PELC-PELC-3.0	3.0 m (9.84 ft)

Fiber PoE pigtail

Figure 51 Fiber PoE pigtail

Models and specifications

Table 84 Specifications for fiber PoE pigtails

Model	Length
PoE-PELC-ODF-0.4m	0.4 m (1.31 ft)
PoE-PELC-ODF-1.2m	1.2 m (3.94 ft)