CISCO SYSTEMS

DATA SHEET

CISCO SFP OPTICS FOR GIGABIT ETHERNET APPLICATIONS

The industry-standard Cisco® Small Form-factor Pluggable (SFP) Gigabit Interface Converter is a hot-swappable input/output device that plugs into a Gigabit Ethernet port or slot, linking the port with the network (Figure 1). SFPs can be used and interchanged on a wide variety of Cisco Systems® products and can be intermixed in combinations of 1000BASE-SX, 1000BASE-LX/LH, 1000BASE-ZX, or 1000BASE-BX10-D/U on a port-by-port basis.

Figure 1. Gigabit Ethernet SFP

1000BASE-SX SFP FOR MULTIMODE FIBER ONLY

The 1000BASE-SX SFP, compatible with the IEEE 802.3z 1000BASE-SX standard, operates on 50 μm multimode fiber links up to 550 m and on 62.5 μm FDDI-grade multimode fibers up to 220 m.

1000BASE-LX/LH SFP FOR BOTH MULTIMODE AND SINGLE-MODE FIBERS

The 100BASE-LX/LH SFP, compatible with the IEEE 802.3z 1000BASE-LX standard, operates on standard single-mode fiber-optic link spans of up to 10 km and up to 550 m on any multimode fibers.

1000BASE-ZX SFP FOR LONG-REACH SINGLE-MODE FIBERS

The 1000BASE-ZX SFP operates on standard single-mode fiber-optic link spans of up to approximately 70 km in length. The SFP provides an optical link budget of 23 dB, but the precise link span length depends on multiple factors such as fiber quality, number of splices, and connectors.

When shorter distances of single-mode fiber are used, it may be necessary to insert an inline optical attenuator in the link to avoid overloading the receiver. A 10-dB inline optical attenuator should be inserted between the fiber-optic cable plant and the receiving port on the SFP at each end of the link whenever the fiber-optic cable span loss is less than 8 dB.

1000BASE-BX10-D AND 1000BASE-BX10-U SFP FOR SINGLE-FIBER BIDIRECTIONAL APPLICATIONS

The 1000BASE-BX-D and 1000BASE-BX-U SFPs, compatible with the IEEE 802.3ah 1000BASE-BX10-D and 1000BASE-BX10-U standards, operate on a single strand of standard single-mode fiber.

A 1000BASE-BX10-D device is always connected to a 1000BASE-BX10-U device with a single strand of standard single-mode fiber with an operating transmission range up to 10 km.

The communication over a single strand of fiber is achieved by separating the transmission wavelength of the two devices as depicted in Figure 2: 1000BASE-BX10-D transmits a 1490 nm channel and receives a 1310 nm signal, whereas 1000BASE-BX10-U transmits at a 1310 nm wavelength and receives a 1490 nm signal. Note in Figure 2 the presence of a wavelength-division multiplexing (WDM) splitter integrated into the SFP to split the 1310 nm 1490 nm light paths.

Figure 2. Bidirectional Transmission of a Single Strand of Single Mode Fiber
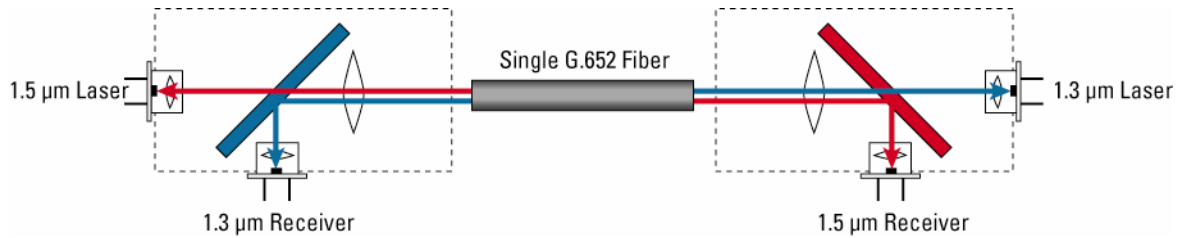
The GLC-BX-D and GLC-BX-U SFPs also support digital optical monitoring (DOM) functions according to the industry-standard SFF-8724 Multi Source Agreement (MSA). This feature gives the end user the ability to monitor real-time parameters of the SFP, such as optical output power, optical input power, temperature, laser bias current, and transceiver supply voltage.

TECHNICAL SPECIFICATIONS

Platform Support

The Cisco SFPs are supported across a variety of Cisco switches, routers, and optical transport devices. For more details refer to the document *SFP Compatibility Matrix*.

Connectors and Cabling

Connectors include the following:

- Dual LC/PC connector (1000BASE-SX, 1000BASE-LX/LH, and 1000BASE-ZX)
- Single LC/PC connector (1000BASE-BX-D and 1000BASE-BX-U)

Note: Only connections with patch cords with PC or UPC connectors are supported. Patch cords with APC connectors are not supported.

Table 1 provides cabling specifications for the SFPs that you install in the Gigabit Ethernet port. Note that all SFP ports have LC-type connectors, and the minimum cable distance for all SFPs listed (multimode fiber [MMF] and single-mode fiber [SMF]) is 6.5 feet (2 m).

Table 1. SFP Port Cabling Specifications

Product	Wavelength (nm)	Fiber Type	Core Size (μm)	Modal Bandwidth (MHz* Km)	Operating Distance (m)
1000BASE-SX	850	MMF	62.5	160	220 (722 ft)
			62.5	200	275 (902 ft)
			50	400	500 (1,640 ft)
			50	500	550 (1,804 ft)

Product	Wavelength (nm)	Fiber Type	Core Size (μm)	Modal Bandwidth (MHz* Km)	Operating Distance (m)
1000BASE-LX/LH	1300	MMF*	62.5	500	550 (1,804 ft)
			50	400	550 (1,804 ft)
			50	500	550 (1,804 ft)
		SMF	–**	–	10,000 (32,8210 ft)
1000BASE-ZX	1550	SMF	–	–	Approximately 70 km depending on link loss
1000BASE-BX-D	1310	SMF	–**	–	10,000 (32,821 ft)
1000BASE-BX-U	1490	SMF	–**	–	10,000 (32,821 ft)

* A mode-conditioning patch cord, as specified by the IEEE standard, is required regardless of the span length. Note how the mode conditioning patch cord for 62.5 μm fibers has a different specification from the mode-conditioning patch cord for 50 μm fibers.

** ITU-T G.652 SMF as specified by the IEEE 802.3z standard.

Optical Specifications

Table 2 gives optical parameters for the SFPs.

Table 2. Main Optical Parameters

Product	Transmit Power (dBm)	Receive Power Range (dBm)
1000BASE-SX	–4 to –9.5	0 to –17
1000BASE-LX/LH	–3 to –9.5	–3 to –20
1000BASE-ZX	+5 to 0	0 to –23
1000BASE-BX10-D 1000BASE-BX10-U	–3 to –9	–3 to –19.5

Dimensions

Dimensions (H x W x D): 8.5 x 13.4 x 56.5 mm

Environmental Conditions and Power Requirements

Operating temperature range:

- Commercial temperature range (COM): 0 to 70°C (32 to 158°F)
- Extended temperature range (EXT): –5°C to 85°C (23 to 185°F)
- Storage temperature range: –40 to 85°C (–40 to 185°F)

Table 3 gives electrical parameters and Table 4 gives temperature range and DOM support information for the SFPs.

Table 3.   Electrical Parameters

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Current	I_s	–	200	300	mA
Surge Current	I_{Surge}	–	–	30	mA
Input Voltage	V_{cc}	3.1	3.3	3.5	V

Table 4.   Temperature Range and DOM Support

Product Number	Temperature Range	DOM
GLC-SX-MM	COM	No
GLC-LH-SM	COM	No
GLC-ZX-SM	COM	No
GLC-BX-U	COM	Yes
GLC-BX-D	COM	Yes
SFP-GE-S	EXT	Yes
SFP-GE-L	EXT	Yes
SFP-GE-Z	EXT	Yes

WARRANTY

- Standard warranty: 90 days
- Extended warranty (option): Available under a Cisco SMARTnet® support contract for the Cisco switch or router chassis

REGULATORY AND STANDARD COMPLIANCE

Safety:

- Laser Class I 21CFR1040 LN#50 7/2001
- Laser Class I IEC 60825-1

Standards:

- IEEE 802.3z
- IEEE 802.3ah

ORDERING INFORMATION

To place an order, visit the [Cisco Ordering Home Page](#) or refer to Table 5.

Table 5.　Ordering Information

Product Description	Product Number
1000BASE-SX short wavelength; without DOM	**GLC-SX-MM**
1000BASE-LX/LH long-wavelength/long haul; without DOM	**GLC-LH-SM**
1000BASE-ZX extended distance; without DOM	**GLC-ZX-SM**
1000BASE-BX10-D downstream bidirectional single fiber; with DOM	**GLC-BX-D**
1000BASE-BX10-U upstream bidirectional single fiber; with DOM	**GLC-BX-U**
1000BASE-SX short wavelength; with DOM	**SFP-GE-S**
1000BASE-LX/LH short wavelength; with DOM	**SFP-GE-L**
1000BASE-ZX; with DOM	**SFP-GE-Z**

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