SFP modules

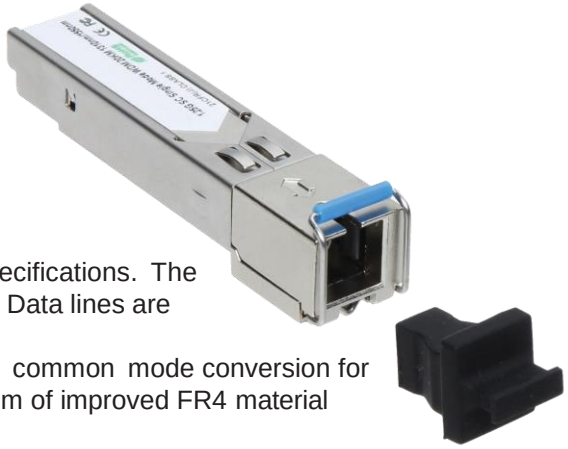
The MSA Compliant Small Form-Factor Pluggable (SFP) modules allows for an optical or electrical interface when using a managed switch, unmanaged switch or media converter. These interchangeable SFP modules are available for use with copper media, multimode optical fiber or single mode optical fiber. The optical fiber SFP modules are available in Fast Ethernet one and two fiber versions and Gigabit Ethernet one and two fiber versions. They also are available with LC or SC optical connectors. SFP modules offer different wavelengths and optical power budget to allow distances from 300 meters to 120 kilometers. These SFP modules are industrially rated to perform in the most difficult operating environments.
SFP transceivers are available with a variety of transmitter and receiver types, allowing users to select the appropriate transceiver for each link to provide the required optical reach over the available optical fiber type (e.g. multi-mode fiber or single-mode fiber). Optical SFP modules are commonly available in several different categories:

- for multimode fiber, with black or beige extraction lever
  SX - 850 nm, for a maximum of 550 m at 1.25 Gbit/s (gigabit Ethernet) or 150m at 4.25 Gbit/s
- for single mode fiber, with blue extraction lever
  LX - 1310 nm, for distances up to 10 km
  EX - 1310 nm, for distances up to 40 km
  ZX - 1550 nm, for distances up to 80 km, with green extraction lever (see GLC-ZX-SM1)
  EZX - 1550 nm, for distances up to 160 km
  BX - 1490 nm/1310 nm, Single Fiber Bi-Directional Gigabit SFP Transceivers, paired as **BS-U** and **BS-D** for Uplink and Downlink respectively, also for distances up to 10 km. Variations of bidirectional SFPs are also manufactured which use 1550 nm in one direction.
  1550 nm 40 km (**XD**), 80 km (**ZX**), 120 km **(EX** or **EZX**)
  SFSW – Single Fiber Single Wavelength transceivers, for bi-directional traffic on a single fiber. Coupled with CWDM, these double the traffic density of fiber links.
  CWDM and DWDM transceivers at various wavelengths achieving various maximum distances
- for copper twisted pair cabling
  1000BASE-T - these modules incorporate significant interface circuitry and can only be used for gigabit Ethernet, as that is the interface they implement.

SFP+

The enhanced small form-factor pluggable (SFP+) is an enhanced version of the SFP that supports data rates up to 16 Gbit/s. The SFP+ specification was first published on May 9, 2006, and version 4.1 published on July 6, 2009. SFP+ supports 8 Gbit/s Fiber Channel, 10 Gigabit Ethernet and Optical Transport Network standard OTU2. It is a popular industry format supported by many network component vendors.
Although the SFP+ standard does not include mention of 16G Fiber Channel it can be used at this speed. Besides the data rate, the big difference between 8G Fiber Channel and 16G Fiber Channel is the encoding method. 64b/66b encoding used for 16G is a more efficient encoding mechanism than 8b/10b used for 8G, and allows for the data rate to double without doubling the line rate. The result is the 14.025 Gbit/s line rate for 16G Fiber Channel.
In comparison to earlier XENPAK or XFP modules, SFP+ modules leave more circuitry to be implemented on the host board instead of inside the module.
Consideration has to be given to whether the module is linear or limiting. Linear SFP+ modules are most appropriate for 10GBASE-LRM; otherwise, limiting modules are preferred.
SFP+ also introduces Direct Attach for connecting two SFP+ ports without dedicated transceivers.

SFP+ modules (10G)



Description

This 1310 nm DFB 10Gigabit SFP+ transceiver is designed to transmit and receive optical data over Single mode and Multimode optical fiber for link length up to 80km.
The SFP+ module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled.
The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI. SFI typically operates over 200 mm of improved FR4 material or up to about 150mm of standard FR4 with one connector.

Features:

- Optical interface compliant to IEEE 802.3ae
- Electrical interface compliant to SFF-8431
- Hot Pluggable
- 1310nm DFB transmitter, PIN photo-detector Operating case temperature: 0 to 70 °C
- Low power consumption
- All-metal housing for superior EMI performance
- Advanced firmware allow customer system encryption information to be stored in transceiver
- Cost effective SFP+ solution, enables higher port densities and greater bandwidth

Part number	Data rate	Media type	Wavelength	Connector	Distance
Optical 10G twisted pair					
SFPCRJ4510GG	10 G	Twisted pair	-	RJ45	30m
SFPCRJ4510G-90M	10 G	Twisted pair	-	RJ45	90m
Optical 10G double fiber SFP+ modules					
SFP*2F10GM853	10 G	MMF	850	LC Duplex	300 m
SFP*2F10GM132	10 G	MMF	1310	LC Duplex	220 m
SFP*2F10GS1310	10 G	SMF	1310	LC Duplex	10 km
SFP*2F10GS1320	10 G	SMF	1310	LC Duplex	20 km
SFP*2F10GS1540	10 G	SMF	1550	LC Duplex	40 km
SFP*2F10GS1580	10 G	SMF	1550	LC Duplex	80 km
Optical 10G BiDirectional SFP+ modules					
SFP*1F10GS1310	10 G	SMF	1310/1270	SC / LC simplex	10 km
SFP*1F10GS1210	10 G	SMF	1270/1310	SC / LC simplex	10 km
SFP*1F10GS1320	10 G	SMF	1310/1270	SC / LC simplex	20 km
SFP*1F10GS1220	10 G	SMF	1270/1310	SC / LC simplex	20 km
SFP*1F10GS1340	10 G	SMF	1310/1270	SC / LC simplex	40 km
SFP*1F10GS1240	10 G	SMF	1270/1310	SC / LC simplex	40 km
SFP*1F10GS1360	10 G	SMF	1310/1270	SC / LC simplex	60 km
SFP*1F10GS1260	10 G	SMF	1270/1310	SC / LC simplex	60 km

* H – HP; C- Cisco; I – Intel compatible. Usually all other vendors are compatible with Cisco configuration.