



## Optical Accessories

We offer a wide range of optical accessories for our products; SFP, SFP+ and XFPs.

All accessories comply with the IEEE Gigabit Ethernet standard 802.3 and are interchangeable between all Waystream equipment.

With competitive pricing and high performance, our products are a perfect fit for ultrafast networking.

- ☒ **Gigabit Ethernet and 10 Gigabit Ethernet**
- ☒ **High quality optical modules**
- ☒ **Compatible for all Waystream products**
- ☒ **RoHS compliant**
- ☒ **Multi-rate models**
- ☒ **EN 60825-1 Class 1 laser product**

## Small Form-factor Pluggables (SFP)

Our wide range of SFP modules comply with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA).

All SFPs support 2-wire serial communication protocol as defined in the SFP MSA, which provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and more.

All SFPs support enhanced Digital Diagnostic Monitoring function as defined in SFF-8472 with an extended memory map compared to SFP MSA. This allows real time monitoring of the device's operating parameters, such as temperature, voltage, optical power, alarm and warning, etc.

Some SFP models are bidirectional over one single fiber, which is achieved by using different wavelengths for transmitting and receiving.

Some models also support multirate mode, which allows the SFP be used both for Fast Ethernet (100 Mbit/s) and Gigabit Ethernet (1 Gbit/s).

### SFP Specification

Model	Description	Connector	Nominal wavelength	Minimum output	Minimum sensitivity	Range (optimal conditions)*	Link budget
SFP-1000BASE-T	Copper	RJ-45	N/A	N/A	N/A	100 m	N/A
SFP-100BASE-FX-1310	Multimode	2xLC	1310	-20 dBm	-30 dBm	2 km	10dB
SFP-1000BASE-SX	Multimode	2xLC	850nm	-9 dBm	-20 dBm	550 m	11 dB
SFP-1000BASE-LX20-M	Single mode, multi-rate 100/1000	2xLC	1310nm	-9.5 dBm	-20 dBm	20 km	10.5 dB
SFP-1000BASE-ZX-M	Multimode	2xLC	1550nm	0 dBm	-22 dBm	80 km	22 dB
SFP-1000BASE-ZX*	Single mode	2xLC	1550nm	0 dBm	-22 dBm	80 km	22 dB
SFP-1000BASE-BX-U	Bidirectional, single mode	1xLC	1310/1490nm	-9 dBm	-22 dBm	10 km	14dB
SFP-1000BASE-BX-D	Bidirectional, single mode	1xLC	1490/1310nm	-9 dBm	-22 dBm	10km	14 dB
SFP-1000BASE-BX20-U1550LC	Bidirectional, single mode, multi-rate	1xLC	1310/1550nm	-9 dBm	-21 dBm	20 km	12 dB
SFP-1000BASE-BX20-U1550SC	Bidirectional, single mode, multi-rate	1xSC	1550/1310nm	-9 dBm	-21 dBm	20 km	12 dB
SFP-1000BASE-BX20-D1550LC	Bidirectional, single mode, multi-rate	1xLC	1310/1550nm	-9 dBm	-21 dBm	20 km	12 dB
SFP-1000BASE-BX20-D1550SC	Bidirectional, single mode, multi-rate	1xSC	1550/1310nm	-9 dBm	-21 dBm	20 km	12 dB

\* Use a 10-dB inline optical attenuator between the fiber-optic cable plant and the SFP at each end if the fiber-optic cable span loss is less than 8 dB. This protects the receiver from overload.

### SFP+ Specification

Model	Description	Connector	Nominal wavelength	Minimum output	Minimum sensitivity	Range (optimal conditions)*	Link budget
SFP-10GE-SR	Multimode	2xLC	850nm	-7.3 dBm	-11.1 dBm	300m*	3.8 dB
SFP-10GE-LR	Single-mode	2xLC	1310nm	-8.2 dBm	-12.6 dBm	10 km	4.4 dB
SFP-10GE-CU-1M	Twinax cop per cable, 1m	N/A	N/A	N/A	N/A	1 meter	N/A
SFP-10GE-CU-3M	Twinax cop per cable, 3m	N/A	N/A	N/A	N/A	3 meter	N/A

\* Use a 10 dB inline optical attenuator between the fiber-optic cable and plant and the SFP at each end if the fiber-optic cable span loss is less than 8 dB. This protects the receiver from overload.

### XFP Specification

Model	Description	Connector	Nominal wavelength	Minimum output	Minimum sensitivity	Range (optimal conditions)*	Link budget
XFP-10GE-SR	Multimode	2xLC	850nm	-7.1 dBm	-9.9 dBm	33-82-300m*	2.8 dB
XFP-10GE-LR	Single-mode	2xLC	1310nm	-6 dBm	-14.4 dBm	10 km	8.4 dB

\* Values given for OM1-OM2-OM3 fiber

## SFP+

SFP+ are SFPs capable of 10Gbit/s speed. The ASR6000 uses SFP+ uplinks.

## XFP

We offer several different 10 Gigabit Small Form-factor Pluggables (XFP) models. XFPs are used for 10 Gigabit per second SONET/SDH, Fiber Channel, Gigabit Ethernet, 10 Gigabit Ethernet and other high-bandwidth applications.

The XFP modules feature a number of useful diagnostics and measurements. They allow for real time monitoring of for example the transceivers' transmitted optical power.

The XFP transceivers support the MSA 2-wire serial communication protocol to provide the operating platform with diagnostics information and control.