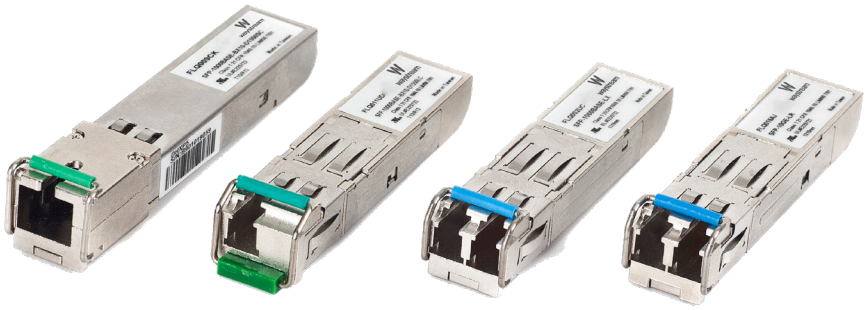
SFP/SFP+

SFP and SFP+ modules with ultra low power consumtion



High quality optical tranceivers for FTTx

SFP and SFP+ modules, with low power consumption for optical connections - everything you need to connect network equipment at high speed.

All accessories comply with the IEEE Gigabit Ethernet standard 802.3 and SFF-8472 specification.

BENEFITS

- **Ultra low power consumption**
- **Gigabit Ethernet and 10 Gigabit Ethernet SFP optics**
- **Multi-rate models**
- **5 year warranty**

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Product overview

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.

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

5 year warranty

All Waystrem SFP/SFP+ accessories are sold with a 5-year warranty.

Attenuators

You may need attenuators if the fiber distance is short, to avoid too strong input signal on the receiver side. A rule of thumb is for the link to have at least 8dB of signal degradation over the distance. If the loss is less than that, then an attenuator should be considered.

Technical Specifications

Ultra Low Power SFP

The ultra low power power SFP modules from Waystream reduce power consumption, by up to 70%. For example BX models perform at 0.3-0.4W compared to a normal consumption in the range of 0.8-1W. This enable saving as much as 20-25% of the overall power consumption of a typical 24-port FTTH switch.

ULTRA LOW POWER **1GBIT/S SFP BIDIRECTIONAL**

Model	Description	Connector	Nominal wavelength	Launch optical power	Receiver sensitivity	Range	Link budget	Temp
SFP-1000BASE-BX20-D1550LCULP	Bidirectional, single mode, multi-rate	1xLC	1550/1310nm	-11 dBm	-22 dBm	20 km	11 dB	0-70 -40 to 85
SFP-1000BASE-BX20-U1550LCULP	Bidirectional, single mode, multi-rate	1xLC	1310/1550nm	-11 dBm	-22 dBm	20 km	11 dB	0-70 -40 to 85
SFP-1000BASE-BX20-U-ULP	Bidirectional, single mode, multi-rate	1xLC	1310/1490nm	-11 dBm	-22 dBm	20km	11 dB	
SFP-1000BASE-BX20-D-ULP	Bidirectional, single mode, multi-rate	1xLC	1490/1310nm	-11 dBm	-22 dBm	20km	11 dB	

ULTRA LOW POWER **10GBIT/S SFP BIDIRECTIONAL**

Model	Description	Connector	Nominal wavelength	Launch optical power	Receiver sensitivity	Range	Link budget
SFP-10GE-BX15-U1550LCULP	Bidirectional, single mode, multi-rate	1xLC	310/1550nm	-6 dBm	-14.4 dBm	15 km	8 dB
SFP-10GE-BX15-D1550LCULP	Bidirectional, single mode, multi-rate	1xLC	1550/1310nm	-6 dBm	-14.4 dBm	15 km	8 dB
SFP-10GE-BX20-DULP	Bidirectional, single mode	1xLC	1330/1270nm	-3 dBm	-14.4 dBm	20 km	11 dB
SFP-10GE-BX20-UULP	Bidirectional, single mode	1xLC	1270/1330nm	-3 dBm	-14.4 dBm	20 km	11 dB

DETAILS **BIDIRECTIONAL** SFP:S **1GBIT**

ABSOLUTE MAXIMUM RATING

Parameter	Condition	Unit	Min.	Typ.	Max.
Supply Voltage		V	-0.5	-	3.6
Storage Temperature	Case Temperature	Celsius	-5	-	75
Relative Humidity, Storage	None Condensing	%	5		95
Rx Total Optical Power	Damage Threshold	dBm	-	-	3

OPERATING ENVIRONMENT

Parameter	Condition	Unit	Min.	Typ.	Max.
Power Supply Voltage	+3.3v Supply Voltage	V	3.13	3.3	3.47
Power Dissipation	Standard	W	-	-	0.3
Operating Case Temperature	Standard	Celsius	0		70

OPTICAL CHARACTERISTICS: SFP 1.25G 1310nm/1550nm & 1310nm/1490nm,20Km (BX-U)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Optical transmitter Characteristics						
Data Rate	BR	Gbps	-	1.25	-	
Distance	L	Km		-	20	1
Center Wavelength Range	λc	nm	1260	1310	1360	
Spectral Width(-20dBm)	Δλ	nm	-	-	1	
Launch Optical Power	P0	dBm	-11	-	-3	1
Extinction Ratio	ER	dB	8.2	-	-	2
Eye Diagram	Compliant with ITU-T G.957					
Optical receive Characteristics						
Data Rate	BR	Gbps	-	1.25	-	
Operating Wavelength	Λc	nm	1500	1550	1600	
			1440	1490	1540	
Receiver Sensitivity	Sens	dBm	·		-22	1,3
Saturated optical power	PSAT	dBm	-3	-	-	
LOS	LOSA	dBm	-40	-	·	
	LOSD	dBm	-	-	-23	
LOS Hysteresis		dB	0.5	-	-	

OPTICAL CHARACTERISTICS: SFP 1.25G 1550nm/1310nm & 1490nm/1310nm, 20Km (BX-D)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Optical transmitter Characteristics						
Data Rate	BR	Gbps	-	1.25	-	
Distance	L	Km		-	20	1
Center Wavelength Range	λc	nm	1500	1550	1600	
			1440	1490	1540	
Spectral Width(-20dBm)	Δλ	nm	-	-	1	
Launch Optical Power	P0	dBm	-11	-	-3	1
Extinction Ratio	ER	dB	8.2	-	-	2
Eye Diagram	Compliant with ITU-T G.957					
Optical receive Characteristics						
Data Rate	BR	Gbps	-	1.25	-	
Operating Wavelength	Λc	nm	1260	1310	1360	
Receiver Sensitivity	Sens	dBm	·		-22	1,3
Saturated optical power	PSAT	dBm	-3	-	-	
LOS	LOSA	dBm	-40	-	·	
	LOSD	dBm	-	-	-23	
LOS Hysteresis		dB	0.5	-	-	

Note:

1.Coupled into 9/125μm SMF

2.Filtered, measured with a PRBS 27-1 test pattern @1.25Gbps

3.Minimum average optical power at BER less than 1E-12, with a 27-1 NRZ PRBS and ER=9 dB.

DETAILS **BIDIRECTIONAL** SFP:S **10GBIT**

ABSOLUTE MAXIMUM RATING

Parameter	Condition	Unit	Min.	Typ.	Max.
Supply Voltage		V	-0.5	-	3.6
Storage Temperature	Case Temperature	Celsius	-5	-	75
Relative Humidity, Storage	None Condensing	%	5		95
Rx Total optical Power	Damaget Threshold	dBm	·	·	3

OPERATING ENVIRONMENT

Parameter	Condition	Unit	Min.	Typ.	Max.
Power Supply Voltage	+3.3v Supply Voltage	V	3.13	3.3	3.47
Power Dissipation	Standard	W	-	-	0.55
Operating Case Temperature	Standard	Celsius	0		70

OPTICAL CHARACTERISTICS: SFP 10G 1310nm/1550nm ,15Km (BX-U)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Optical transmitter Characteristics						
Data Rate	BR	Gbps	9.953	10.3125	11.3	
Distance	L	Km		-	15	1
Center Wavelength Range	λc	nm	1300	1310	1320	
Spectral Width(-20dBm)	Δλ	nm	-	-	1	
Launch Optical Power	P0	dBm	-6	-	1	1
Extinction Ratio	ER	dB	3.5	-	-	2
Eye Diagram	Compliant with IEEE802.3-2005					
Optical receive Characteristics						
Operating Wavelength	Λc	nm	1540	1550	1560	
Receiver Sensitivity	Sens	dBm	·		-14.4	3
Saturated optical power	PSAT	dBm	0.5	-	-	
LOS	LOSA	dBm	-30	-	·	
	LOSD	dBm	-	-	-16	
LOS Hysteresis		dB	0.5	-	-	

OPTICAL CHARACTERISTICS: SFP 10G 1550nm/1310nm ,15Km (BX-D)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Optical transmitter Characteristics						
Data Rate	BR	Gbps	9.953	10.3125	11.3	
Distance	L	Km		-	15	1
Center Wavelength Range	λc	nm	1540	1550	1560	
Spectral Width(-20dBm)	Δλ	nm	-	-	1	
Launch Optical Power	P0	dBm	-6	-	1	1
Extinction Ratio	ER	dB	3.5	-	-	2
Eye Diagram	Compliant with IEEE802.3-2005					
Optical receive Characteristics						
Operating Wavelength	Λc	nm	1300	1310	1320	
Receiver Sensitivity	Sens	dBm	·		-14.4	3
Saturated optical power	PSAT	dBm	0.5	-	-	
LOS	LOSA	dBm	-30	-	·	
	LOSD	dBm	-	-	-16	
LOS Hysteresis		dB	0.5	-	-	

OPTICAL CHARACTERISTICS: SFP 10G 1330nm/1270nm , 20Km (BX-U)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Optical transmitter Characteristics						
Data Rate	BR	Gbps	9.953	10.3125	11.3	
Distance	L	Km		-	20	1
Center Wavelength Range	λc	nm	1320	1330	1340	
Spectral Width(-20dBm)	Δλ	nm	-	-	1	
Launch Optical Power	P0	dBm	-3	-	2	1
Extinction Ratio	ER	dB	3.5	-	-	2
Eye Diagram	Compliant with IEEE802.3-2005					
Optical receive Characteristics						
Operating Wavelength	Λc	nm	1260	1270	1280	
Receiver Sensitivity	Sens	dBm	·		-14.4	3
Saturated optical power	PSAT	dBm	0.5	-	-	
LOS	LOSA	dBm	-30	-	·	
	LOSD	dBm	-	-	-16	
LOS Hysteresis		dB	0.5	-	-	

OPTICAL CHARACTERISTICS: SFP 10G 1270nm/1330nm ,20Km (BX-D)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Optical transmitter Characteristics						
Data Rate	BR	Gbps	9.953	10.3125	11.3	
Distance	L	Km		-	20	1
Center Wavelength Range	λc	nm	1260	1270	1280	
Spectral Width(-20dBm)	Δλ	nm	-	-	1	
Launch Optical Power	P0	dBm	-3	-	2	1
Extinction Ratio	ER	dB	3.5	-	-	2
Eye Diagram	Compliant with IEEE802.3-2005					
Optical receive Characteristics						
Operating Wavelength	Λc	nm	1320	1330	1340	
Receiver Sensitivity	Sens	dBm	·		-14.4	3
Saturated optical power	PSAT	dBm	0.5	-	-	
LOS	LOSA	dBm	-30	-	·	
	LOSD	dBm	-	-	-16	
LOS Hysteresis		dB	0.5	-	-	

Note:

1.Coupled into 9/125μm SMF

2.Filtered, measured with a PRBS 2^31-1 test pattern @10Gbps

3.Minimum average optical power at BER less than 1E-12, with a 2^31-1 NRZ PRBS and ER=4.5 dB.

ULTRA LOW POWER **1GBIT/S SFP LX**

Model	Description	Connector	Nominal wavelength	Launch optical power	Receiver sensitivity	Range	Link budget	Temp
SFP-1000BASE-LX20-MULP	Single-mode, multi-rate	2xLC	1310nm	-11	-22 dBm	20km	11 dB	

ULTRA LOW POWER **10GBIT/S SFP LR**

Model	Description	Connector	Nominal wavelength	Launch optical power	Receiver Sensitivity	Range	Link budget	Temp
SFP-10GE-LR20ULP	Single-mode, multi-rate	2xLC	1310nm	-3 dBm	-14,4 dBm	20km	11 dB	

DETAILS **LX/LR** SFP:S

ABSOLUTE MAXIMUM RATINGS

Parameter	Condition	Unit	Min.	Typ.	Max.
Supply Voltage		V	-0.5	-	3.6
Storage Temperature	Case Temperature	Celsius	-5	-	75
Relative Humidity, Storage	None Condensing	%	5		95
Rx Total Optical Power	Damage Threshold	dBm	-	-	3

OPERATING ENVIRONMENT

Parameter	Condition	Unit	Min.	Typ.	Max.
Power Supply Voltage	+3.3v Supply Voltage	V	3.13	3.3	3.47
Power Dissipation	10GE SFP	W	-	-	0.55
	1GE SFP	W			0.35
Operating Case Temperature	Standard	Celsius	0		70

OPTICAL CHARACTERISTICS SFP 10GE 1310nm, 20Km (LR)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Optical transmitter Characteristics						
Data Rate	BR	Gbps	9.953	10.3125	11.3	
Distance	L	Km		-	20	1
Center Wavelength Range	λc	nm	1260	1310	1360	
Spectral Width(RMS)	Δλ	nm	-	-	1	
Launch Optical Power	P0	dBm	-3	-	4	1
Extinction Ratio	ER	dB	3.5	-	-	2
Eye Diagram	Compliant with IEEE802.3z					
Optical receive Characteristics						
Data Rate	BR	Gbps	-	10.3125	-	
Operating Wavelength	Λc	nm	1260		1600	
Receiver Sensitivity	Sens	dBm			-14.4	1,3
Saturated optical power	PSAT	dBm	0.5	-	-	
LOS	LOSA	dBm	-30	-		
	LOSD	dBm	-	-	-16	
LOS Hysteresis		dB	0.5	-	-	

OPTICAL CHARACTERISTICS SFP 1.25G 1310nm, 20Km (LX)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Optical transmitter Characteristics						
Data Rate	BR	Gbps	-	1.25	-	
Distance	L	Km		-	20	1
Center Wavelength Range	λc	nm	1260	1310	1360	
Spectral Width(-20dBm)	Δλ	nm	-	-	1	
Side Mode Suppression rate	SMSR	dB	30		-	
Launch Optical Power	P0	dBm	-11	-	-3	1
Extinction Ratio	ER	dB	8.2	-	-	5
Eye Diagram	Compliant with ITU-T G.957					
Optical receive Characteristics						

OPTICAL CHARACTERISTICS **SFP 1.25G 1310nm, 20Km (LX)** Continued

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Data Rate	BR	Gbps	-	1.25	-	
Operating Wavelength	λc	nm	1260		1360	
Receiver Sensitivity	Sens	dBm			-22	4
Saturated optical power	PSAT	dBm	-3	-	-	
LOS	LOSA	dBm	-40	-		
	LOSD	dBm	-	-	-23	
LOS Hysteresis		dB	0.5	-	-	

Note:

1.Coupled into 9/125μm SMF

2.Filtered, measured with a PRBS 27-1 test pattern @10Gbps

3.Minimum average optical power at BER less than 1E-12, with a 232-1 NRZ PRBS and ER=4.5 dB.

4.Minimum average optical power at BER less than 1E-12, with a 232-1 NRZ PRBS and ER=9 dB.

5.Filtered, measured with a PRBS 27-1 test pattern @1.25Gbps

List of Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883H Method 3015.8	Based on HBM
	IEC61000-4-2	8kV Contact Discharge 15kV Air Discharge
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2	Compatible with standards
	IEC-61000-4-2	
	GR-1089-CORE	
Electromagnetic Interference (EMI)	FCC Part 15 Class B	Compatible with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
	EN55022:2006	
	CISPR 22B :2006	
	VCCI Class B	
Immunity	EN 55024:1998+A1+A2	Compatible with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
	IEC 61000-4-3	
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product.
RoHS 2.0	2011/65/EU	Compliant with standards

Did you not find the right model?

Contact your Waystream reseller or Waystream directly on sales@waystream.com. This datasheet does not list all available models and variants.

Best fit for your network

Waystream optical modules are verified to work with Waystream equipment - protect your investment and get the best reliability and compability solution.

Our products use tier 1 laser optics for best performance and endurance. Our generous five year warranty proves that we trust our products. So can you.

Service and Support

Waystream provides several different support options with a defined Service Level Agreement (SLA) to give you the mix of technical support and hardware replacement services that best suits your needs. We are committed to help you protect your investment and our Technical Assistance Center team, or approved Partners, are ready to handle all your support issues.

Through our support web site, we provide software updates and upgrades, and has an extensive Knowledge Base for both general network topics and product specific questions. You will also find documentation, release notes, product specifications and other useful information to help you achieve the best results with our products.

Training

Waystream offers on-site and online training programs to enhance the skill and knowledge of your network engineering teams. For further details, please contact sales@waystream.com.

Purchase your SFP/SFP+ accessories

To find out how you can join the growing number of networks using the Waystream products, please contact your local parter or sales@waystream.com.

ABOUT WAYSTREAM

Waystream develops and sells high-quality and advanced digital infrastructure, such as routers and switches. With our products and expertise, we make it possible for telecom operators, service providers and city networks to offer reliable and user-centric network services with the best features. Our products are smart, simple to configure and maintain, and are designed to create the best end user experience.

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