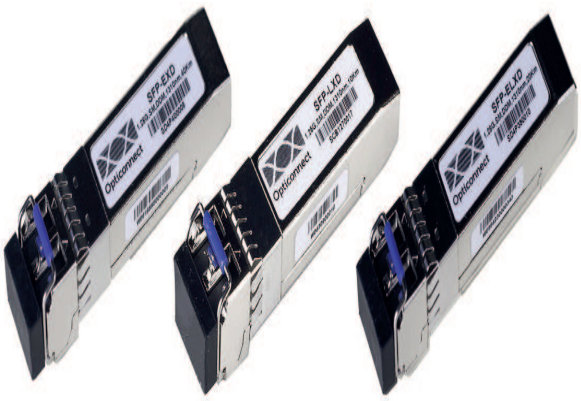
SFP-LX, ELX and EX series

SFP Single-Mode, Dual Fiber Transceiver
for 1.25Gbps FC/GBE



Features

- Operating Data Rate up to 1.25Gbps
- 10km with 9/125 µm SMF
- 20km with 9/125 µm SMF
- 40Km with 9/125 µm SMF
- Compliant with MSA SFP Specification
- Compliant with SFF-8472

Applications

- Gigabit Ethernet
- Fiber Channel
- Other Optical Links

Product Description

The SFP-LX, -ELX and -EX series single-mode transceivers are small form factor pluggable module for bi-directional serial optical data communications such as Gigabit Ethernet 1000BASE-LX and Fiber Channel 1x SM-LC-L FC-PI. It is with the SFP 20-pin connector to allow hot plug capability. This module is designed for single mode fiber and operates at a nominal wavelength of 1310nm.
The transmitter section uses a multiple quantum well 1310nm laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.
The SFP-LX, -ELX and -EX series are designed to be compliant with SFF-8472 SFP Multi-source Agreement.

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Opticonnect SYSTEMS B.V., an Optical Networking vendor with its headquarters in the Netherlands, provides Optical Transport solutions and Optical Transceivers at the best price performance ratio possible. Our goal is to simplify the planning, deployment and maintenance of complex Optical Networks. This is achieved by our user friendly planning apps and information, sophisticated products and transparent support. Relying on our superior product quality, all items are supplied with life time warranty.

Ordering Information

Part No.	Data Rate	Fiber	Distance*(note2)	Interface	Temperature	DDMI
SFP-LX*(note1)	1.25Gbps	SMF	10km	LC	Standard	NO
SFP-LXD	1.25Gbps	SMF	10km	LC	Standard	YES
SFP-ELX*(note1)	1.25Gbps	SMF	20km	LC	Standard	NO
SFP-ELXD	1.25Gbps	SMF	20km	LC	Standard	YES
SFP-EX*(note1)	1.25Gbps	SMF	40km	LC	Standard	NO
SFP-EXD	1.25Gbps	SMF	40km	LC	Standard	YES

Note1: Standard version
Note2: 10km /20km/40Km with 9/125 μm SMF

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the Enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compliant 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.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/ receiver performance is detectable between these limits.
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. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards*note3

Note3: For update of the equipments and strict control of raw materials, OPTICONNECT has the ability to supply the customized products since Jan 1st, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union. In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes. In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for Opticonnect's transceivers, because Opticonnect's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.
(MSA).

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	+85	°C
Supply Voltage	V_{CC}	-0.5	3.6	V
Operating Relative Humidity		-	95	%

*Exceeding any one of these values may destroy the device immediately.

Recommended Operating Conditions

Parameter	Symbol		Min.	Typical	Max.	Unit
Operating Temperature	T_A	SFP-LX, -ELX and -EX	0		+70	°C
		SFP-LX, -ELX and -EX	-40		+85	
Power Supply Voltage	V_{CC}		3.15	3.3	3.45	V
Power Supply Current	I_{CC}				300	mA
Date Rate	GBE			1.25		Gbps
	FC			1.063		

Performance Specifications - Electrical

Parameter		Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter							
LVPECL Inputs(Differential)		Vin	400		2000	mVpp	AC coupled inputs*(note5)
Input Impedance (Differential)		Zin	85	100	115	ohms	Rin > 100 kohms @ DC
Tx_Dis	Disable		2		Vcc	V	
	Enable		0		0.8		
Tx_FAULT	Fault		2		Vcc+0.3	V	
	Normal		0		0.5		
Receiver							
LVPECL Outputs (Differential)		Vout	400		2000	mVpp	AC coupled outputs*(note5)
Output Impedance (Differential)		Zout	85	100	115	ohms	
Rx_LOS	LOS		2		Vcc+0.3	V	
	Normal		0		0.8	V	
MOD_DEF (0:2)		VoH	2.5			V	With Serial ID
		VoL	0		0.5	V	

Optical and Electrical Characteristics
SFP-LX(D), 10km

Parameter	Symbol	Min.	Typical	Max.	Unit
9µm Core Diameter SMF	L		10		km
Data Rate			1.063/1.25		Gbps
Transmitter					
Centre Wavelength	λ_C	1260	1310	1360	nm
Spectral Width (RMS)	Δλ			3	nm
Average Output Power*(note3)	Pout	-9.5		-3	dBm
Extinction Ratio*(note4)	ER	9			dB
Rise/Fall Time(20%～80%)	tr/tf			0.26	ns
Total Jitter	TJ			0.43	UI
Output Optical Eye*(note4)	Compliant with IEEE 802.3ah-2004*(note7)				
TX_Disable Assert Time	t_off			10	us
P_{out}@TX Disable Asserted	Pout			-45	dBm
Receiver					
Centre Wavelength	λ	1260		1600	nm
Receiver Sensitivity*(note6)	Pmin			-21	dBm
Receiver Overload	Pmax	-3			dBm
LOS De-Assert	LOSD			-22	dBm

LOS Assert	LOSA	-42			dBm
LOS Hysteresis*(note8)		0.5			dB

SFP-ELX(D), 20km

Parameter	Symbol	Min.	Typical	Max.	Unit
9μm Core Diameter SMF	L		20		km
Data Rate			1.063/1.25		Gbps
Transmitter					
Centre Wavelength	λ_C	1260	1310	1360	nm
Spectral Width (RMS)	Δλ			3	nm
Average Output Power*(note3)	Pout	-8		-3	dBm
Extinction Ratio*(note4)	ER	9			dB
Rise/Fall Time(20%～80%)	tr/tf			0.26	ns
Total Jitter	TJ			0.43	UI
Output Optical Eye*(note4)	Compliant with IEEE 802.3ah-2004*(note7)				
TX_Disable Assert Time	t_off			10	us
Pout@TX Disable Asserted	Pout			-45	dBm
Receiver					
Center Wavelength	λ	1260		1600	nm
Receiver Sensitivity*(note6)	Pmin			-22	dBm
Receiver Overload	Pmax	-3			dBm
LOS De-Assert	LOSD			-23	dBm
LOS Assert	LOSA	-42			dBm
LOS Hysteresis*(note8)		0.5			dB

SFP-EX(D), 40km

Parameter	Symbol	Min.	Typical	Max.	Unit
9μm Core Diameter SMF	L		40		km
Data Rate			1.063/1.25		Gbps
Transmitter					
Centre Wavelength	λ_C	1260	1310	1360	nm
Spectral Width (-20dB)	Δλ			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power*(note3)	Pout	-2		3	dBm
Extinction Ratio*(note4)	ER	9			dB
Rise/Fall Time(20%～80%)	tr/tf			0.26	ns
Total Jitter	TJ			0.43	UI
Output Optical Eye*(note4)	Compliant with IEEE 802.3ah-2004*(note7)				
TX_Disable Assert Time	t_off			10	us
Pout@TX Disable Asserted	Pout			-45	dBm
Receiver					
Centre Wavelength	λ	1260		1600	nm
Receiver Sensitivity*(note6)	Pmin			-24	dBm
Receiver Overload	Pmax	-3			dBm

LOS De-Assert	LOSD			-25	dBm
LOS Assert	LOSA	-42			dBm
LOS Hysteresis*(note8)		0.5			dB

Note3: Output is coupled into a 9/125µm single-mode fiber.
Note4: Filtered, measured with a PRBS 27-1 test pattern @1.25Gbps
Note5: LVPECL logic, internally AC coupled.
Note6: Minimum average optical power at BER less than 1E-12, with a 27-1 NRZ PRBS and ER=9 dB.
Note7: Eye pattern mask
Note8: LOS Hysteresis