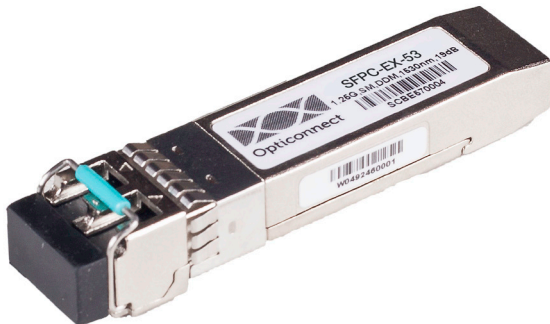


SFPC-EX Series

SFP Single-Mode, Dual Fiber transceiver for CWDM application up to 1.25Gbps with Digital Diagnostic function



Product description

The SFPC-EX series single-mode transceiver is small form factor pluggable module for serial optical data communications such as Gigabit Ethernet 1000BASE-ZX 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 CWDM wavelength. A guaranteed minimum optical link budget of 41dB is offered. The transmitter section uses a multiple quantum well CWDM DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs Avalanche photodetector preamplifier mounted in an optical header and a limiting post-amplifier IC. The SFP-EX series are designed to be compliant with SFF-8472 Multi-Source Agreement (MSA).

Features

- Data Rate 1.25 Gbps
- Up to 41 DB link budget
- 8-Wavelengths CWDM
- 1470nm to 1610nm,
- 20nm Spacing
- Hot Pluggable
- Duplex LC Connector
- MSA Compliant
- Digital Diagnostics

Applications

- Fiber Channel Links
- Gigabit Ethernet Links
- Fast Ethernet Links
- Other Optical Links



All product specifications are subject to change without notice to improve reliability, function or design or otherwise.

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	Link Budget	Interface	Temperature	DDMI
SFPC-EX-xx* ^{Note1}	1.25Gbps	SMF	19dB	LC	Standard	YES
SFPC-ZX-xx	1.25Gbps	SMF	24dB	LC	Standard	YES
SFPC-EZX-xx	1.25Gbps	SMF	34dB	LC	Standard	YES
SFPC-XZX-xx	1.25Gbps	SMF	41dB	LC	Standard	YES

Note1: xx refers to CWDM Wavelength range 1470nm to 1610nm;

CWDM* Wavelength (0~70°C)

Band	Nomenclature	Wavelength(nm)		
		Min.	Typ.	Max.
S-band Short Wavelength	K	1464	1470	1477.5
	L	1484	1490	1497.5
	M	1504	1510	1517.5
	N	1524	1530	1537.5
C-band Conventional	O	1544	1550	1557.5
L-band Long Wavelength	P	1564	1570	1577.5
	Q	1584	1590	1597.5
	R	1604	1610	1617.5

Regulatory compliance

Feature	Standard	Performance
Electrostatic discharge (ESD) to the electrical pins	MIL-STD-883G Method 3015.7	Class 1C (>1000V)
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

Feature	Standard	Performance
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*note2

Note 2: 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, Item 13: 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.

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 case temperature	T_C SFPC-EX Series	0	-	+70	°C
Power supply voltage	V_{CC}	3.15	3.3	3.45	V
Power supply current	I_{CC}	-	-	300	mA
Data Rate	GbE	-	1.25	-	Gbps
	1GFC	-	1.063	-	

Performance specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
LVPECL inputs(Differential)	V_{in}	400	-	2000	mVpp	AC coupled inputs*(note5)
Input impedance (Differential)	Z_{in}	85	100	115	ohm	$R_{in} > 100 \text{ kohm}$ @ DC
TX_Dis	Disable	2	-	$V_{CC}+0.3$	V	
	Enable	0	-	0.8		
TX_FAULT	Fault	2	-	$V_{CC}+0.3$	V	
	Normal	0	-	0.8		

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Receiver						
LVPECL outputs (Differential)	Vout	400	-	2000	mVpp	AC coupled outputs ^{*(note5)}
Output impedance (Differential)	Zout	85	100	115	ohm	
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
SFPC-EX-xx, 19dB

Parameter	Symbol	Min.	Typical	Max.	Unit
Link budget		19	-	-	dB
Data rate		-	1.063/1.25	-	Gbps
Transmitter					
Center wavelength	λ_c	λ_c-6	λ_c	$\lambda_c+7.5$	nm
Spectral width (-20dB)	$\Delta\lambda$	-	-	1	nm
Average output power ^{*(note3)}	Pout	-5	-	0	dBm
Side mode suppression ratio	SMSR	30	-	-	dB
Extinction ratio ^{*(note4)}	ER	8.2	-	-	dB
Rise/Fall time(20%~80%)	tr/tf	-	-	0.26	ns
Total jitter	TJ	-	-	56.5	ps
Output optical eye ^{*(note4)}	Compatible with IEEE 802.3ah-2004 ^{*(note8)}				
TX_Disable assert time	t_off	-	-	10	μ s
P _{out} @TX Disable asserted	Pout	-	-	-45	dBm
Receiver					
Center wavelength	λ_c	1260	-	1600	nm
Receiver sensitivity ^{*(note6)}	Pmin	-	-	-24	dBm
Receiver overload	Pmax	-3	-		dBm
Return loss		12	-	-	dB
Optical path penalty ^{*(note7)}		-	-	1	dB
LOS De-Assert	LOSD	-	-	-25	dBm
LOS assert	LOSA	-42	-	-	dBm
LOS hysteresis ^{*(note9)}		0.5	-	-	dB

SFPC-ZX-xx, 24dB

Parameter	Symbol	Min.	Typical	Max.	Unit
Link budget		24	-	-	dB
Data rate		-	1.063/1.25	-	Gbps
Transmitter					
Center wavelength	λ_c	λ_c-6	λ_c	$\lambda_c+7.5$	nm
Spectral width (-20dB)	$\Delta\lambda$	-	-	1	nm
Average output power*(note3)	P _{out}	0	-	5	dBm
Side mode suppression ratio	SMSR	30	-	-	dB
Extinction ratio*(note4)	ER	8.2	-	-	dB
Rise/Fall time (20%~80%)	tr/tf	-	-	0.26	ns
Total jitter	TJ	-	-	56.5	ps
Output optical eye*(note4)	Compatible with IEEE 802.3ah-2004*(note8)				
TX_Disable assert time	t _{off}	-	-	10	μs
P _{out} @TX Disable asserted	P _{out}	-	-	-45	dBm
Receiver					
Center wavelength	λ_c	1260	-	1600	nm
Receiver sensitivity*(note6)	P _{min}	-	-	-24	dBm
Receiver overload	P _{max}	-3	-	-	dBm
Return loss		12	-	-	dB
Optical path penalty*(note7)		-	-	1	dB
LOS De-assert	LOSD	-	-	-25	dBm
LOS assert	LOSA	-42	-	-	dBm
LOS hysteresis*(note9)		0.5	-	-	dB

SFPC-EZX-xx, 34dB

Parameter	Symbol	Min.	Typical	Max.	Unit
Link budget		34	-	-	dB
Data rate		-	1.063/1.25	-	Gbps
Transmitter					
Center wavelength	λ_c	λ_c-6	λ_c	$\lambda_c+7.5$	nm
Spectral width (-20dB)	$\Delta\lambda$	-	-	1	nm
Average output power*(note3)	P _{out}	2	-	7	dBm
Side mode suppression ratio	SMSR	30	-	-	dB
Extinction ratio*(note4)	ER	8.2	-	-	dB
Rise/Fall time(20%~80%)	tr/tf	-	-	0.26	ns
Total jitter	TJ	-	-	56.5	ps
Output optical eye*(note4)	Compatible with IEEE 802.3ah-2004*(note8)				

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable assert time	t_off	-	-	10	µs
P _{out} @TX Disable asserted	P _{out}	-	-	-45	dBm
Receiver					
Center wavelength	λ _c	1260	-	1600	nm
Receiver sensitivity ^{*(note6)}	P _{min}	-	-	-32	dBm
Receiver overload	P _{max}	-10	-	-	dBm
Return loss		12	-	-	dB
Optical path penalty ^{*(note7)}		-	-	1	dB
LOS De-assert	LOSD	-	-	-33	dBm
LOS assert	LOSA	-42	-	-	dBm
LOS hysteresis ^{*(note9)}		0.5	-	-	dB

SFPC-XZX-xx, 41dB

Parameter	Symbol	Min.	Typical	Max.	Unit
Link budget		41	-	-	dB
Data rate		-	1.063/1.25	-	Gbps
Transmitter					
Center wavelength	λ _c	λ _c -6	λ _c	λ _c +7.5	nm
Spectral width (-20dB)	Δλ	-	-	1	nm
Average output power ^{*(note3)}	P _{out}	4	-	7	dBm
Side mode suppression ratio	SMSR	30	-	-	dB
Extinction ratio ^{*(note4)}	ER	8.2	-	-	dB
Rise/Fall time(20%~80%)	tr/tf	-	-	0.26	ns
Total jitter	TJ	-	-	56.5	ps
Output optical eye ^{*(note4)}	Compatible with IEEE 802.3ah-2004 ^{*(note8)}				
TX_Disable assert time	t_off	-	-	10	µs
P _{out} @TX Disable asserted	P _{out}	-	-	-45	dBm
Receiver					
Center wavelength	λ _c	1260	-	1600	nm
Receiver sensitivity ^{*(note6)}	P _{min}	-	-	-37	dBm
Receiver overload	P _{max}	-10	-	-	dBm
Return loss		12	-	-	dB
Optical path penalty ^{*(note7)}		-	-	1	dB
LOS De-assert	LOSD	-	-	-38	dBm
LOS assert	LOSA	-45	-	-	dBm
LOS hysteresis ^{*(note9)}		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

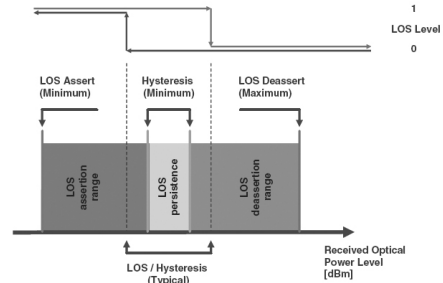
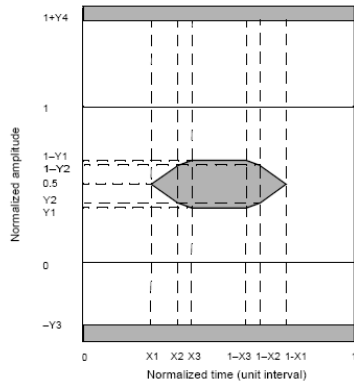
Note5: LVPECL logic, internally AC coupled.

Note6: Minimum average optical power measured at BER less than $1E-12$, with a 2^7-1 PRBS and ER=9dB.

Note7: Measured with a PRBS 2^7-1 test pattern @1.25Gbps, BER $\leq 1 \times 10^{-12}$.

Note8: Eye Pattern Mask

Note9: LOS Hysteresis



Functional description of transceiver

