

## XFP-ER

XFP Single-Mode, Dual Fiber transceiver for 10GbE/10GFC/SDH/SONET  
RoHS6 compliant



### Product description

The XFP-ER series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-ER/EW defined by IEEE 802.3ae. It is with the XFP 30-pin connector to allow hot plug capability.

This module is designed for single mode fiber and operates at a nominal wavelength of 1550 nm. The transmitter section uses a 1550nm EML, which is 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.

### Features

- Data Rate 9.95Gb/s to 11.3Gb/s
- Maximum Link length up to 40km
- Hot-pluggable
- Duplex LC connector
- Temperature-Stabilized EML transmitter
- Power dissipation <3.5W
- Digital Diagnostics

### Applications

- 10GBASE-ER/EW 10G Ethernet
- 1200-SM-LL-L 10G Fiber Channel
- SONET OC-192 IR-2
- SDH STM S-64.2b
- SONET OC-192 IR-3
- SDH STM S-64.3b
- ITU-T G.709



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	Laser	Fiber type	Distance	Temp.
XFP-ER	Up to 11.3Gbps	EML	SMF	40km	Standard
XFP-ER-I	Up to 11.3Gbps	EML	SMF	40km	Industrial

## 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	Compatible with standards
Electromagnetic interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI 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.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compatible 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*note2

Note1: For update of the equipments and strict control of raw materials, Opticonnect has the ability to supply the customized products since Jan 1, 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.

## Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Maximum Supply Voltage 1	$V_{cc3}$	-0.5		4.0	V
Maximum Supply Voltage 2	$V_{cc5}$	-0.5		6.0	V
Storage Temperature	$T_s$	-40		85	°C

## Recommended operating condition

Parameter	Symbol	Min	Typ	Max	Units	
Operating Case Temperature	T <sub>c</sub>	XFP-ER	0		70	°C
		XFP-ER-I	-40		85	
Supply Voltage 1	V <sub>cc3</sub>	3.13	3.3	3.45	V	
Supply Voltage 2	V <sub>cc5</sub>	4.75	5	5.25	V	

## Electrical characteristics (TOP = -40 to 85°C, VCC5 = 4.75 to 5.25 Volts)

Parameter	Symbol	Min	Typ	Max	Unit
Main supply voltage	V <sub>cc5</sub>	4.75		5.25	V
Supply voltage #2	V <sub>cc3</sub>	3.13		3.45	V
Supply current – V <sub>cc5</sub> supply	I <sub>cc5</sub>			370	mA
Supply current – V <sub>cc3</sub> supply	I <sub>cc3</sub>			500	mA
Module Total Power	P			3.5	W
Transmitter					
Input Differential Impedance*Note2	R <sub>in</sub>		100		Ω
Differential Data Input Swing	V <sub>in,pp</sub>	120		820	mV
Transmit Disable Voltage	V <sub>D</sub>	2.0		V <sub>cc</sub>	V
Transmit Enable Voltage	V <sub>EN</sub>	GND		GND+ 0.8	V
Transmit Disable Assert Time				10	μs
Receiver					
Differential Data Output Swing	V <sub>out,pp</sub>	340	650	850	mV
Rise Time (20– 80%)*Note3	t <sub>r</sub>			38	ps
Fall Time (20– 80%)*Note3	t <sub>f</sub>			39	ps
LOS Fault*Note4	V <sub>LOS fault</sub>	V <sub>cc</sub> – 0.5		V <sub>cc</sub> HOST	V
LOS Normal*Note4	V <sub>LOS norm</sub>	GND		GND+0.5	V

Note2: After internal AC coupling

Note3: Loss Of Signal is open collector to be pulled up with a 4.7k – 10k ohm resistor to 3.15 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Note4: Per Section 2.7.1. in the XFP MSA Specification.

**Optical characteristics** (TOP = -40 to 85°C, VCC5 = 4.75 to 5.25 Volts)

Parameter	Symbol	Min	Typ	Max	Unit
Date Rate	BR	9.95	10.3	11.3	Gbps
Transmitter					
Optical modulation amplitude	P	-2.1			dBm
Output Opt. Pwr: 9/125 SMF	P <sub>out</sub>	0		+4	dBm
Optical wavelength	$\lambda_c$	1530		1565	nm
Optical Extinction Ratio@10.3Gb/s	ER	8.2			dB
Transmitter and Dispersion Penalty	TDP			2	dB
Average Launch Power of OFF Transmitter	P <sub>OFF</sub>			-30	dBm
TX Jitter Generation (Peak-to-Peak)	TXj			0.1	UI
TX Jitter Generation (RMS)	TXjRMS			0.01	UI
Receiver					
Receiver Sensitivity@10.3Gb/s	P <sub>min</sub>			-16	dBm
Maximum Input Power	P <sub>max</sub>	0			dBm
Optical Center Wavelength	$\lambda_c$	1270	1550	1600	nm
Receiver Reflectance	R <sub>rx</sub>			-27	dB
LOS De-Assert	LOSD			-18	dBm
LOS Assert	LOSA	-30			dBm
LOS Hysteresis		1			dB