

## EOLX-8596-02-X

**850nm XFP Multi-Mode for 10GbE/10GFC  
Duplex XFP Transceiver  
RoHS6 Compliant**



### Features

- ◆ Fully compliant to XFP MSA Rev.4.5
- ◆ Supports 9.95Gb/s to 11.3Gb/s data rates
- ◆ Compliance to Fibre Channel
  - 1200-M5-SN-I, 1200-M5E-SN-I,
  - 1200-M6-SN-I at 10.51875Gbit/s
- ◆ Transmission distance up to
  - 300m with OM3 MMF
  - 82m with OM2 MMF
  - 33m with OM1 MMF
- ◆ Low power consumption 1.5W(typ.)
- ◆ Wide operating temperature range:
  - Standard: 0°C to +70°C
- ◆ Laser Class 1M compliant
- ◆ Vertical Cavity Surface Emitting Laser at 850nm(VCSEL)
- ◆ LC duplex connector
- ◆ XFI loopback supported
- ◆ Lead free and RoHS Compliant
- ◆ Excellent EMI performance
- ◆ High reliability

### Ordering information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temperature range
EOLX-8596-02	10G	VCSEL	MMF	300m	LC	0°C~70°C

## Regulatory Compliance\*<sup>Note2</sup>

Product Certificate	Certificate Number	Applicable Standard
TUV	R50135086	EN 60950-1:2006+A11+A1+A12+A2
		EN 60825-1:2014
		EN 60825-2:2004+A1+A2
UL	E317337	UL 60950-1
		CSA C22.2 No. 60950-1-07
EMC CE	AE 50285865 0001	EN 55022:2010
		EN 55024:2010
FCC	WTF14F0514417E	47 CFR PART 15 OCT., 2013
FDA	/	CDRH 1040.10
ROHS	/	2011/65/EU

Note2: The above certificate number updated to June 2014, because some certificate will be updated every year, such as FDA and ROHS. For the latest certification information, please check with Eoptolink.

## General Description and Applications

The EOLX-8596-02 is a multi-purpose optical transceiver module for 10Gbit/s data transmission applications at 850nm. It is ideally suited for 10 GbE datacom (belly-to-belly for high density applications) and storage area network(SAN/NAS) applications based on the IEEE 802.3ae and Fibre Channel standards. Designed for short range distances, the transceiver module comprises a transmitter with a vertical cavity surface emitting laser (VCSEL) and a receiver with a PIN photodiode. Transmitter and receiver are separate within a wide temperature range and offers optimum heat dissipation and excellent electromagnetic shielding thus enabling high port densities for 10 GbE systems.

Standard	Description	Nominal Baud Rate	Unit
IEEE 802.3ae-2002	10 GBASE-SW	9.953	GBd
IEEE 802.3ae-2002	10 GBASE-SR	10.3125	GBd
1200-Mxx-SN-I	10G Fiber Channel	10.51875	GBd

## Absolute Maximum Ratings

Rating	Conditions	Symbol	Min	Max	Units
Storage Ambient Temperature Range			-40	+85	°C
Operating Relative Humidity		RH	8	80	%
Supply Voltage Range @ 5.0V		$V_{CC5}$	0.5	6.0	V
Supply Voltage Range @ 3.3V		$V_{CC3}$	0.5	3.6	V
Open Drain VCC level		$V_{OD}$		4.0	V

Static Discharge Voltage on XFI High	HBM human body model per JEDEC JESD22-A114-B			500	V
Static Discharge Voltage excluding XFI High Speed Pins	HBM human body model			2,000	V
Static Discharge Voltage on XFP Module	EN61000-4-2 Criterion B: Air Discharge Direct Contact discharge			15,000 8,000	V V

Any stress beyond the maximum ratings can result in permanent damage. The device specifications are guaranteed only under the recommended operating conditions

## Recommend operating condition

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Operating Case Temperature	EOLX-8596-02	$T_c$	0		+70	°C
Transceiver total Power Consumption		$P_{TOT}$		1.5	2.3	W
Power Supply Voltage @ 3.3V		$V_{CC3}$	3.135	3.300	3.465	V
Supply Current	@ $V_{CC3}$	$I_{VCC3}$		325	600	mA

## High Speed Line Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Baud Rate nominal			9.95		11.3	Gbd
Baud Rate Tolerance			-100		+100	ppm

## High Speed Line Output-DC Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Single Ended Output Impedance		$Z_{SE}$	40	50	60	$\Omega$
Differential Output Impedance		$Z_{OD}$	80	100	120	$\Omega$

## High Speed Line Output-AC Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Differential Output Amplitude		$V_{OSPP}$	340		850	mV
Output Common Mode		$V_{CM}$	0		3.6	V
Transition Time Low to High		$t_r$	24			ps

Transition Time High to Low		$t_f$	24			ps
Differential Output Return Loss	0.05—0.1GHz 0.1—5.5GHz 5.5—12GHz		20 8 See1			dB dB
Common Mode Output Return Loss See 2 Loss <sup>2</sup> )	0.1—15GHz	SCC 22	3			dB
Total Peak-to-peak Jitter		$D_j$			0.34	UI
Output AC Common Mode Voltage					15	mV (RMS)

- 1)  $SDD22(dB)=8-20.66 \log_{10}(f/15.5)$  with  $f$  in GHz
- 2) Common mode reference impedance is  $25\Omega$ . Common mode return loss helps absorb reflection and noise improving EMI.

## High Speed Line Input-DC Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Differential Output Impedance		$R_{IND}$	80	100	120	$\Omega$
Input AC Common Mode Input Voltage			0		25	mV (RMS)
Source to Sink DC Potential Difference		$V_{CM}$	0		3.6	V

## High Speed Line Input-AC Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Differential input Voltage Swing		$V_{ID}$	120 See 2			mV
Differential Return Loss	0.05—0.1GHz 0.1—5.5GHz 5.5—12GHz	SDD11	20 8 See 1			dB
Common Mode Return Loss	0.1—15GHz	SCC11	3			dB
Total Jitter		$T_j$			TBD	UI

- 1)  $SDD11(dB)=8-20.66 \log_{10}(f/15.5)$  with  $f$  in GHz
- 2) Beneath this level the signal can't meet the specification

**Optical Transmitter**

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Nominal Wavelength		$\lambda_{TRP}$	840	850	860	nm
Spectral Width		$\Delta\lambda$		0.4	0.45	nm
Operating Range	62.5/125 $\mu$ m MMF, 160 MHz*km				26	m
	50/125 $\mu$ m MMF, 400 MHz*km				66	
	62.5/125 $\mu$ m MMF, 200 MHz*km				33	
	50/125 $\mu$ m MMF, 500 MHz*km				82	
	50/125 $\mu$ m MMF, 2000MHz*km				300	
Nominal Signalling Speed		$f_{OPT}$	9.95		11.3	Gbps
Average Launch Power		$P_o$	-7.3	-2.6	-1	dBm
Extinction Ratio		ER	3.5	5.5		dB
Transmitter and Dispersion Penalty		TDP			3.9	dB
Relative Intensity Noise		RIN			-128	dB/Hz

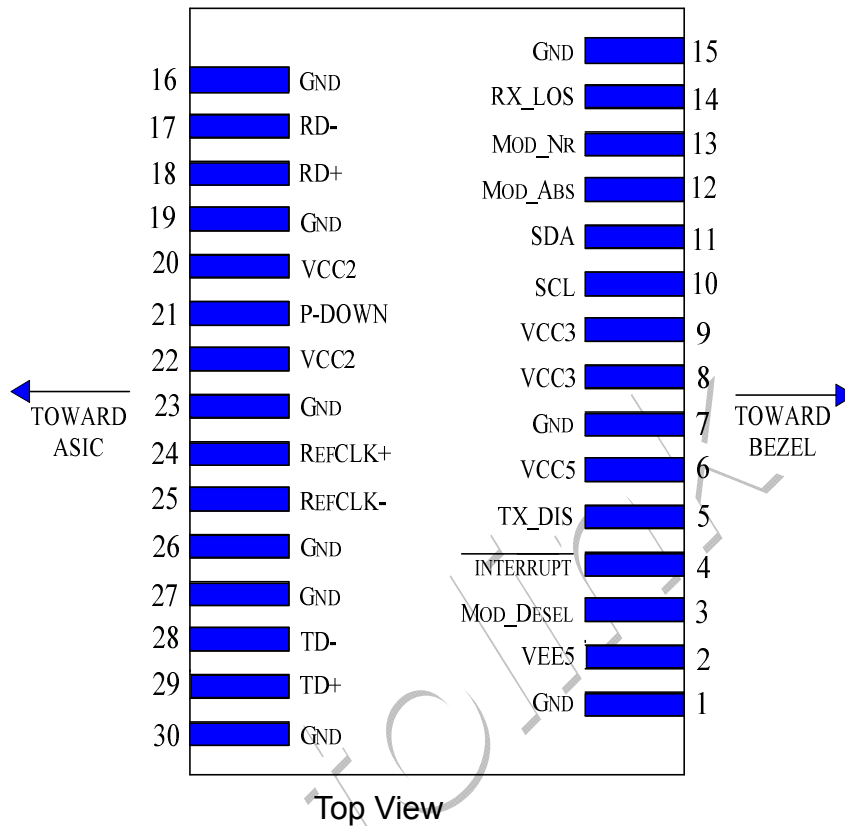
**Optical Receiver**

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Center Wavelength		$\lambda_c$	840	850	860	nm
Receiver Sensitivity	BER $10^{-12}$ @ $2^{31}-1^1$	$P_{IN}$		-13.5	-11.1	dBm
Receiver Sensitivity	in OMA				-11.1	
Stressed Receiver Sensitivity	in OMA	$P_{IN}$			-7.5	dBm
Saturation Input Power		$P_{SAT}$	1			dBm

1) With ideal transmitter

Note: The specified characteristics are met within the recommended range of operating conditions and under the default settings of output power and modulation amplitude. A change in setting of the optical output power influences especially the dynamic behavior of the output signal. Unless otherwise noted typical data are quoted at nominal voltages and +25°C ambient temperature.

## Hostboard Connector Pinout



## Electrical Pin Definition

PIN	Logic	Symbol	Name   Description	Note
1		GND	Module Ground	1
2		VEE5	Optional-5.2V Power Supply-Not Required.	
3	LVTTL-I	Mod_DeSel	Mode De-select; When held low allows module to 2-wire serial interface commands	
4	LVTTL-O	Interrupt	Interrupt(inverted); Indicates Presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTL-I	TX_DS	Transmitter Disable; Turns off transmitter laser output	
6		VCC5	+5V Power Supply-Not Required.	
7		GND	Module Ground	1
8		VCC3	+3.3Vpower Supply	
9		VCC3	+3.3Vpower Supply	
10	LVTTL-I/O	SCL	2-Wire Serial Interface Clock line	2
11	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
12	LVTTL-O	Mod_Abs	Indicates Module is not present. Grounded in the module	2
13	LVTTL-O	Mod_NR	Module Not Ready; Indicating module	2

			operational fault	
14	LVTTL-O	RX_LOS	Receiver Loss Of Signal Indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver Inverted Data Output	
18	CML-O	RD+	Receiver Non-Inverted Data Output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply-Not Required.	
21	LVTTL-O	P-Down/RST	Power Down; When high; requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low Power mode Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface; equivalent to a power cycle	
22		VCC2	+1.8V Power Supply-Not Required.	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock Non-Inverted Input; AC coupled on the host board-Not Required.	
25	PECL-I	RefCLK-	Reference Clock Inverted Input; AC coupled on the host board-Not Required.	
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter Inverted Data Input	
29	CML-I	TD+	Transmitter Non-Inverted Data Input	
30		GND	Module Ground	1

- 1) Module ground pins GND are isolated from the module case and chassis ground within the module.
- 2) Shall be pulled up with 4.7K  $\Omega$ -10 K $\Omega$  to a voltage between 3.15V and 3.45V on the host board.

## Digital Diagnostic Functions

Eoptolink's EOLX-8596-02 Small Form Factor 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification Rev 4.5.

As defined by the XFP MSA, Eoptolink XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

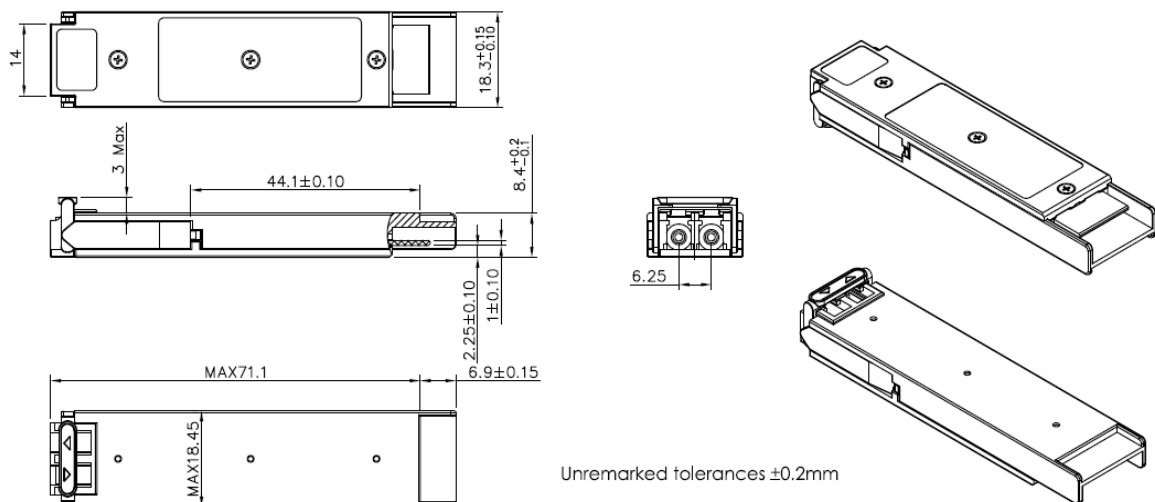
- ◆ Transceiver temperature
- ◆ Laser bias current
- ◆ Transmitted optical power
- ◆ Received optical power
- ◆ Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the XFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the XFP transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory.

## Mechanical Specifications

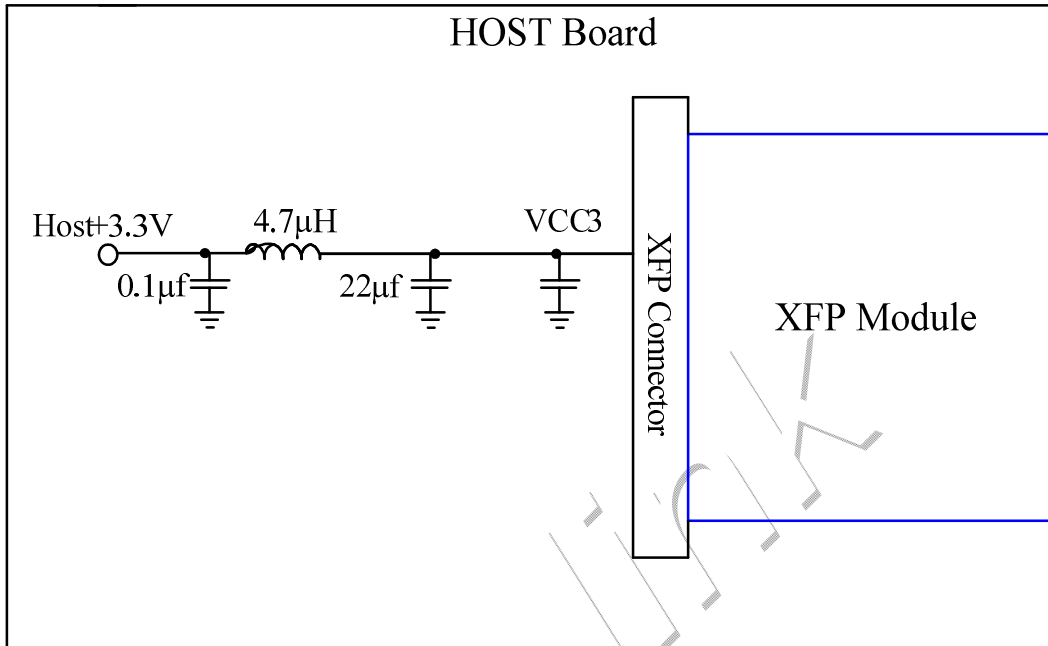
Eoptolink's XFP transceivers are compliant with the dimensions defined by the XFP Multi-Sourcing Agreement (MSA).



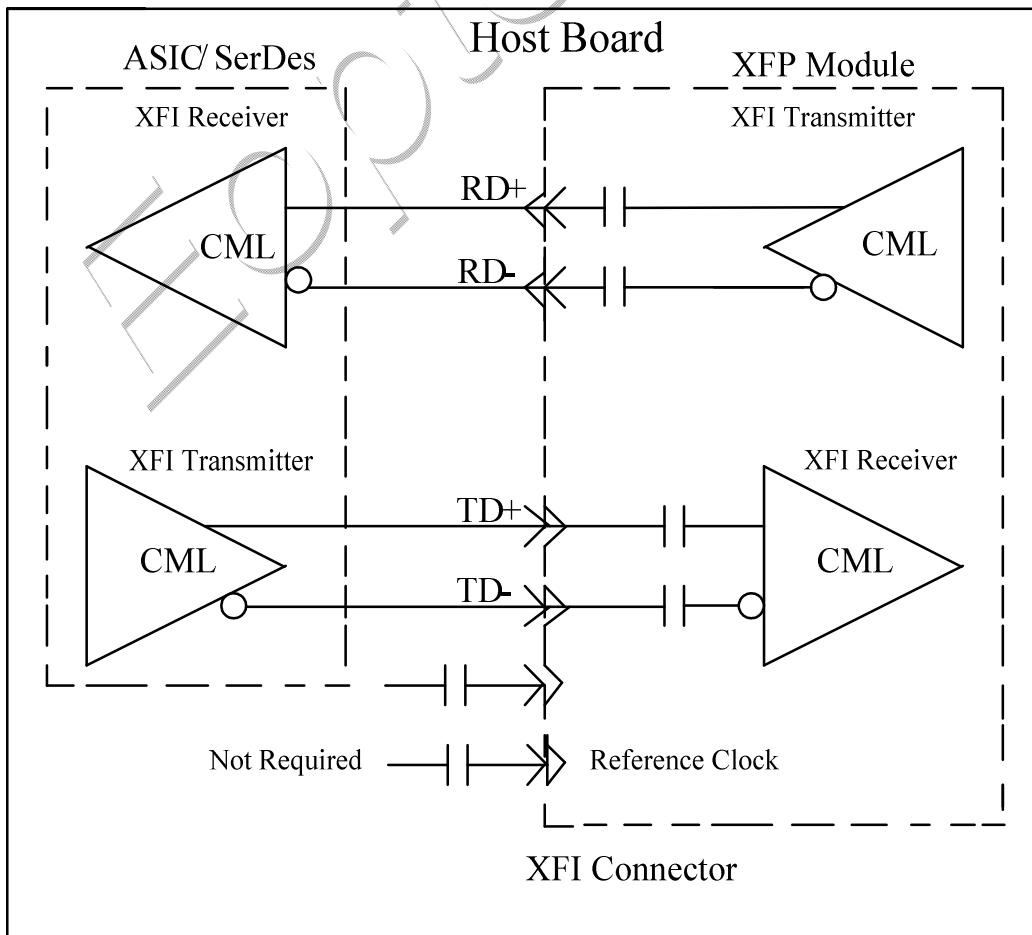


\*This 2D drawing only for reference, please check with Eoptolink before ordering.

### Recommended Host Board Power Supply Circuit



### Recommended High-speed Interface Circuit



## Eye Safety

This laser based multimode transceiver is a Class 1M product. It complies with IEC 60825-1 and FDA performance standards for laser products (21 CFR1040.10 and 1040.11)except for deviations pursuant to laser Notice 50.dated July 26.2001.

## Obtaining Document

You can visit our website:

<http://www.eoptolink.com>

Or contact Eoptolink Technology Inc., Ltd. Listed at the end of the documentation to get the latest documents.

## Revision History

Revision	Initiate	Review	Approve	Revision History	Last printed
V2.a	Kelly			Updating LOGO&PN, supply voltage, supply circuit and interface ircuit.	July 11, 2011
V3.0	Alex/Townie	Kelly		Updating photo and part name	Aug 10, 2011
V3.a	Kelly			Update 10GBASE-SW.	Mar 16, 2012
V3.b	Angela	Fing		Delete industrial temperature range, update the regulatory compliance and max data rate.	Nov 19,2014
V3.c	Angela	Kelly/Vina/Dean/Chao.Wang		Update the regulatory compliance and 2D drawing.	July 24, 2017

## Notice:

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