

EOLX-1396-10-X

**1310nm XFP single-Mode for 10GbE/10GFC/SDH/SONET
Duplex XFP Transceiver
RoHS6 Compliant**

Features

- ◆ Supports 9.95Gb/s to 11.3Gb/s bit rates
- ◆ Hot-pluggable XFP footprint
- ◆ Link length up to 10km
- ◆ Uncooled 1310nm DFB laser
- ◆ Duplex LC connector
- ◆ Power dissipation <2.5W
- ◆ Built-in digital diagnostic functions
- ◆ Case Operating Temperature:
 - Standard: 0°C to 70°C
 - Industrial: -40 to 85°C
- ◆ Complaint with XFP MSA
- ◆ Complaint with IEEE 802.3ae
10GBASE-LR/LW
- ◆ Complaint with 10GFC 1200-SM-LL-L



Applications

- ◆ SONET OC-192 SR-1, SDH STM I-64.1
at 9.953Gbps
- ◆ 10GBASE-LR/LW 10G Ethernet
- ◆ 1200-SM-LL-L 10G Fiber Channel
- ◆ 10GE over G.709 at 11.09Gbps
- ◆ OC192 over FEC at 10.709Gbps

Ordering information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temp.
EOLX-1396-10	11.3Gbps	DFB	SMF	10km	LC	Standard
EOLX-1396-10-I	11.3Gbps	DFB	SMF	10km	LC	Industrial

*The product image only for reference purpose.

Regulatory Compliance*

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

*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.

Absolute Maximum Ratings*^{Note1}

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc3	-0.5		4.0	V	
Storage Temperature	T _s	-40		85	°C	
Case Operating Temperature	T _c	0		70	°C	EOLX-1396-10
	T _c	-40		85	°C	EOLX-1396-10-I

Note1: Exceeding any one of these values may destroy the device permanently.

Recommend operating condition

Parameter	Symbol	Min	Typ	Max	Units
Supply Voltage	Vcc3	3.13		3.45	V
Case Operating Temperature	EOLX-1396-10	0		70	°C
	EOLX-1396-10-I	-40		85	°C

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	Vcc3	3.13		3.45	V
Supply Current	Icc3			720	mA
Transmitter					
Module total power	P			2.5	W
Input differential impedance	R _{in}		100		Ω
Differential data input swing ^{*2}	V _{in,pp}	120		820	mV
Transmit Disable Voltage	V _D	2.0		Vcc	V
Transmit Enable Voltage	V _{EN}	GND		GND+ 0.8	V
Transmit Disable Assert Time				10	us
Tx Rise time (20 – 80%)	t _r		40		ps

Tx Fall time (20 – 80%)	tf		50		ps
Receiver					
Differential data output swing ^{*2}	Vout,pp	340	650	850	mV
Rx Rise time (20 – 80%)	tr			38	ps
Rx Fall time (20 – 80%)	tf			38	ps
LOS Fault ^{*3}	V _{LOS fault}	V _{cc} – 0.5		V _{cc} HOST	V
LOS Normal ^{*3}	V _{LOS norm}	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 – 10kohm resistor to 3.15 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Transmitter					
Optical output Power	P _O	-6		0	dBm
Optical Wavelength	λ _c	1290		1330	nm
Optical Extinction Ratio(for SDH)	ER	6			dB
Optical Extinction Ratio(for Ethernet)	ER	3.5			dB
Side Mode Suppression ratio	SSRmin	30			dB
Average Launch power of OFF transmitter	P _{OFF}	-30			dBm
Tx Jitter	T _{xj}	Compliant with each standard requirements			
Receiver					
Receiver Sensitivity @ 10.7Gb/s	P _{min}			-14.5	dBm
Maximum Input Power	P _{max}	+0.5			dBm
Optical Center Wavelength	λ _c	1270		1600	nm
Receiver Reflectance	R _{rx}			-14	dB
LOS De-Assert	LOSD			-16.5	dBm
LOS Assert	LOSA	-28.5			dBm
LOS Hysteresis		1			dB

Pin Descriptions

Pin	Symbol	Name/Description	Note
1	GND	Module Ground	4
2	VEE5	Optional –5.2 Power Supply – Not required	
3	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire	5

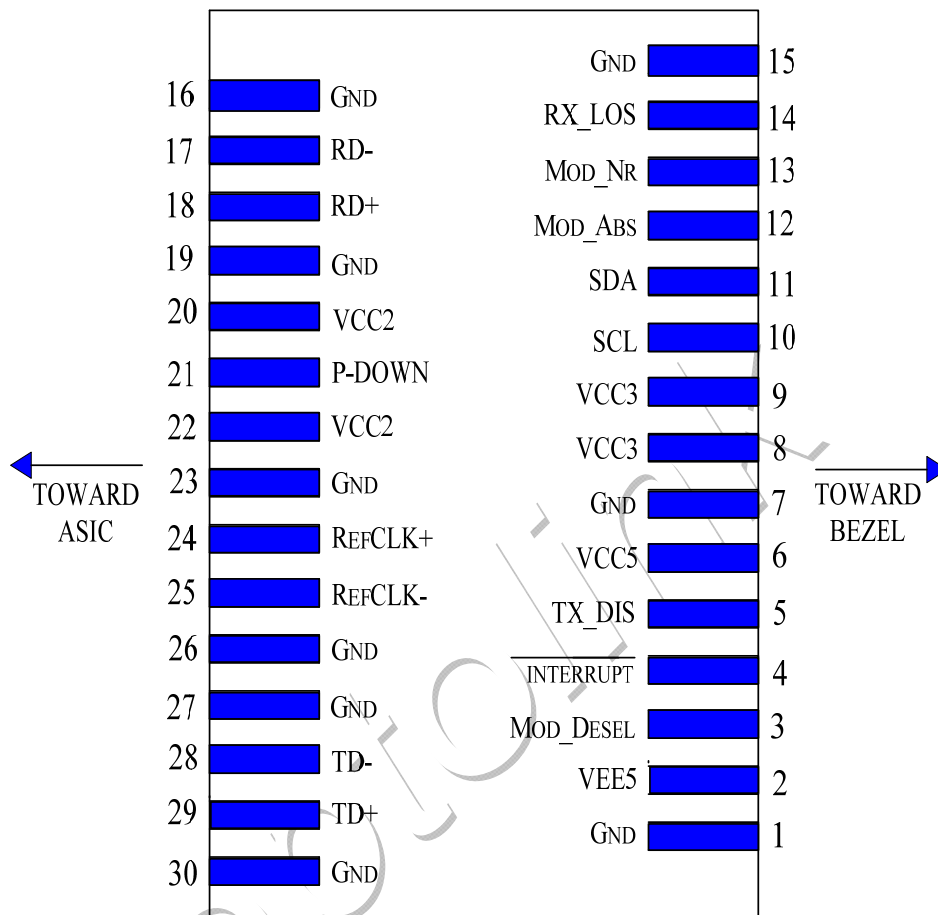
		interface	
5	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6	VCC5	+5 Power Supply – Not required	
7	GND	Module Ground	4
8	VCC3	+3.3V Power Supply	
9	VCC3	+3.3V Power Supply	
10	SCL	Serial 2-wire interface clock line	5
11	SDA	Serial 2-wire interface data line	5
12	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	5
13	Mod_NR	Module Not Ready;	5
14	RX_LOS	Receiver Loss of Signal indicator	5
15	GND	Module Ground	4
16	GND	Module Ground	4
17	RD-	Receiver inverted data output	
18	RD+	Receiver non-inverted data output	
19	GND	Module Ground	4
20	VCC2	+1.8V Power Supply – Not required	
21	P_Down/RST	Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset	
		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	4
24	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	6
25	RefCLK-	Reference Clock inverted input, AC coupled on the host board – Not required	6
26	GND	Module Ground	4
27	GND	Module Ground	4
28	TD-	Transmitter inverted data input	
29	TD+	Transmitter non-inverted data input	
30	GND	Module Ground	4

Note4. Module circuit ground is isolated from module chassis ground within the module.

Note5. Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

Note6. A Reference Clock input is not required.

Pin arrangement



Pin Numbers and Name

General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate	BR	9.95		11.3	Gb/s	1
Bit Error Ratio	BER			10 ⁻¹²		2
Max. Supported Link Length	LMAX		10		km	1

Notes:

1. SONET OC-192 SR-1, SDH STM I-64.1, 10GBASE-LR/LW, 1200-SM-LL-L
2. Tested with a 2³¹ - 1 PRBS

Digital Diagnostic Functions

Eoptolink's EOLX-1396-10 Small Form Factor 10Gbps (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification Rev 4.5.

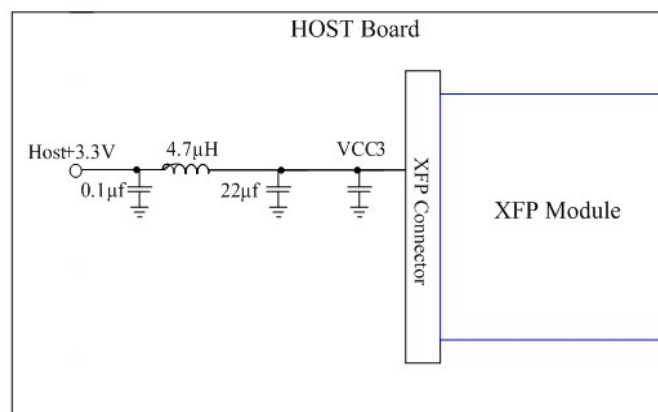
As defined by the XFP MSA, Eoptolink XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

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

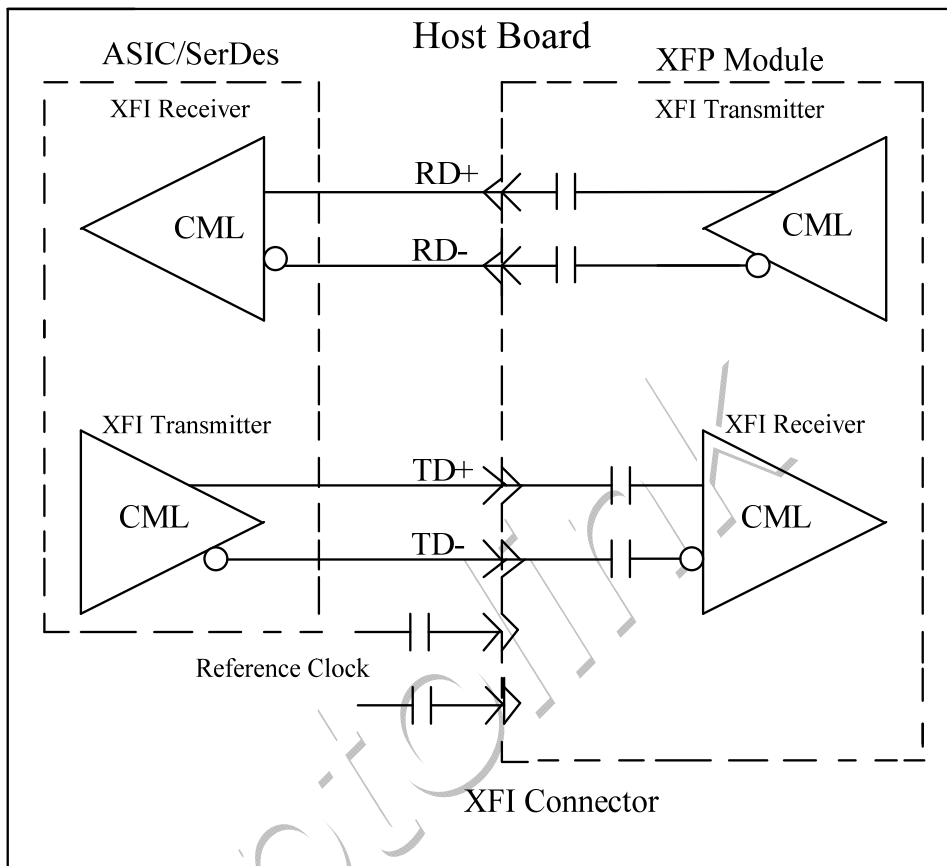
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

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.

Recommended Host Board Power Supply Circuit

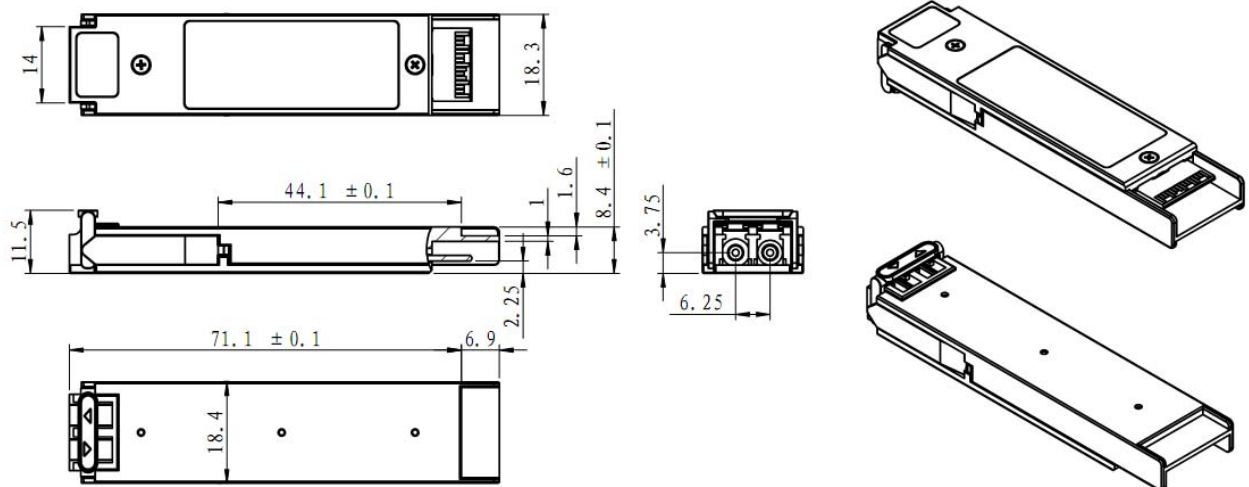


Recommended High-speed Interface Circuit



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.

Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

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	Release Date
V1.a	Tim	Johnny	Richard	Released.	July 4,2008
V1.b	Kelly			Delete item7 in note1.	July 8, 2009
V1.c	Kelly			Add the industrial product.	Nov. 18, 2009
V1.d	Kelly			Add the Tx rise/fall time.	Feb 1, 2010
V1.e	Kelly			Updating the mechanical graph.	Apr 15, 2010
V2.0	Alex/Townie	Kelly.cao		Updating photo and part name, correct some mistakes.	Aug 10, 2011
V2.a	Kelly			Update max. BR.	Oct 26, 2011
V2.b	Kelly			Update supply voltage.	Oct 27, 2011
V2.c	Kelly			Update SMSR.	Apr 20, 2012
V2.d	Abby	Kelly		Update LOS De-assert/Assert	Sep 3,2012
V2.e	Angela	Kelly/ Fing/Eason		Update the regulatory compliance, ER and contact.	Feb 06,2018

Notice:

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