10Gbps 10km XFP Transceiver

Features

- Up to 11.1Gbps data link(CTR3310x)
  Or up to 11.3Gbps data link (CTR3410x)
- Typical 10km link length @G.652 SMF
- 1310nm uncooled DFB LD and PIN PD
- No Reference Clock required
- Built-in DDM functions
- Soft Transmitted disable monitor and control
- Support XFP loopback
- Single +3.3V power supply,
  and low power dissipation (≤2W)
- Operation temperature range: 0°C to 70°C or -5°C to 85°C
- Hot-pluggable XFP footprint
- XFP MSA package with duplex LC connector
- RoHS Compliance

Applications

- SONET OC-192 SR-1 & SDH STMI-64.1
- 10GBASE-LR/LW 10Gigabit Ethernet and FEC
- 1200-SM-LL-L 10Gigabit Fiber Channel and FEC
- ITU-T G.709 and G.975
- Other optical links

Standard

XFP MSA (INF-8077i v4.5)
SFF-8472 v10.3
IEEE 802.3ae-2002
10GFC and FC-PI-3
EN 60825-1,2 and CDRH 21 CFR1040.10
RoHS
MIL-STD-883E
IEC 61000-4-2 and GR-1089-CORE
FCC 47 CFR Part 15, class B
IEC 61000-4-3
Telcordia GR-468-CORE

General

The optical transceiver is compliant with the XFP MSA and SFF-8472 specification. This module is for 10km data link. The transceiver consists of two sections: The transmitter side is used a 1310nm uncooled DFB-LD, a high speed laser driver and a retiming CDR. The receiver side is used a high sensitivity PIN PD integrated with a transimpedance amplifier and a limiting amplifier plus CDR. It's High quality performance, low power consumption, cost effective module. It's designed for 10 Gigabit Ethernet, 10G FC and SONET/SDH applications, and provides a digital diagnostic monitor interface via the 2-wire I2C protocol. The transceiver is RoHS compliant.

We have two series XFP products for 10km data link. CTR3310x is for datacom application. CTR3410x is for telecom application.

Performance Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	85	℃
Operating Case Temperature 1	Tc	0	70	℃
Operating Case Temperature 2	Tc	-5	85	℃
Power Supply Voltage	Vcc	-0.5	4	V
Operating Relative Humidity		5	90	%
Input Optical Power	Pin		5	dBm

Recommended Operation Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	Vcc	3.13		3.47	V
Power Supply Current	Icc			600	mA
Power Dissipation	P			2	W
Data Rate(CTR3310x)		9.953		11.1	Gbps
Data Rate(CTR3410x)		9.953		11.3	Gbps

Electrical/Optical characteristics

Parameter		Symbol	Min	Typ	Max	Unit	Ref
Transmitter							
Electrical Characteristics							
Input differential impedance		Zin	80	100	120	Ω	
Differential data input swing		Vin,pp	120		1000	mV	3
Transmit Disable Voltage		VD	2.0		Vcc	V	
Transmit Enable Voltage		VEN	0		0.8	V	
TX Disable Assert Time		T_off			10	us	
TX Disable Negate Time		T_on			2	ms	
Time to initialize		T_init			300	ms	
CDR Lock Time				10	20	ms	
Optical Characteristics							
Output Opt. Power		Po	-6		-1	dBm	1
Optical Wavelength		λc	1290	1310	1330	nm	
Spectral Width(-20dB)		Δλ			1	nm	
Extinction Ratio	CTR3310x	Ex	5			dB	2
	CTR3410x		6				
Optical Rise/Fall Time		tr/tf		30/40	50	ps	20% - 80%
Side Mode Suppression Ratio		SMSR	30			dB	
Dispersion Penalty		DP			1	dB	2
Eye Diagram		Complies with ITU-T G.691 eye mask and IEEE802.3ae eye mask					
Receiver							
Electrical Characteristics							
Differential Data Output Swing		Vout,pp	600		800	mV	3
Data Output Rise/Fall time		Tr/Tf	24		34	ps	20% - 80%

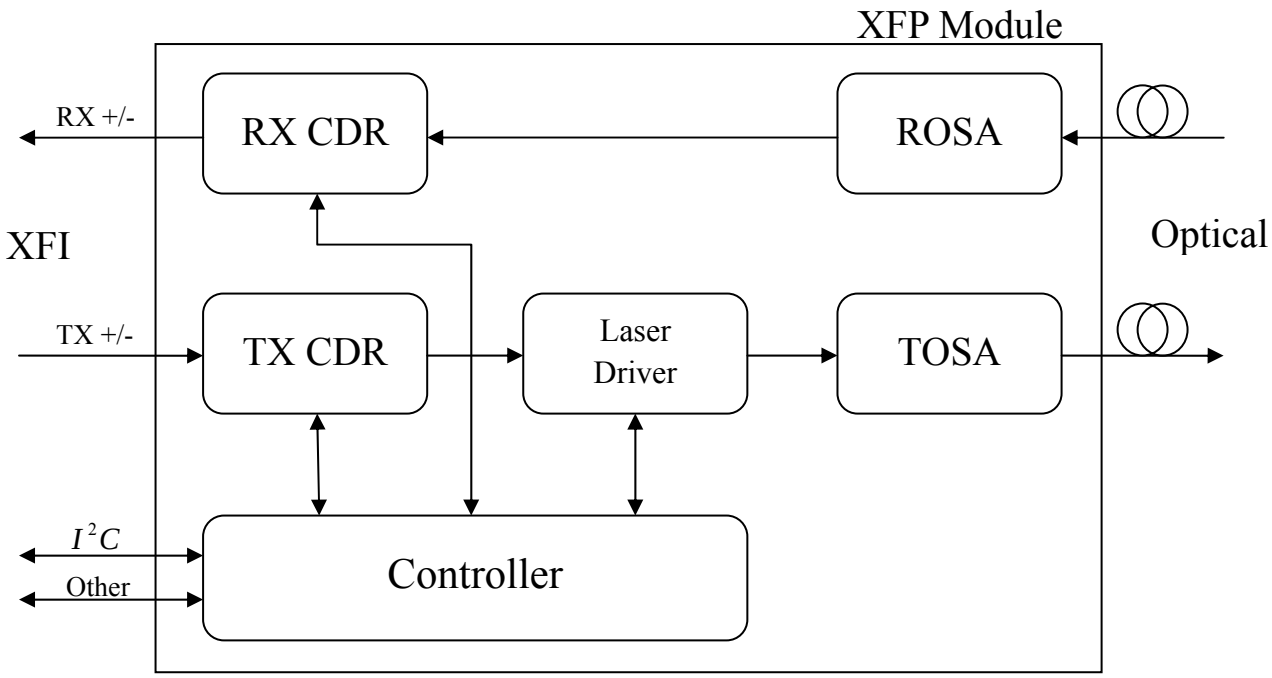
LOS Fault	VLOS fault	Vcc-0.5		VccHOST	V	
LOS Normal	VLOS norm	0		0.4	V	
LOS Assert delay	T_loss_on			100	us	
LOS Deassert delay	T_loss_off			100	us	
CDR Lock Time			10	20	ms	
Optical Characteristics						
Receiver Sensitivity	S		-18	-14	dBm	2
Overload Input Optical Power	Pmax	0			dBm	2
Optical Center Wavelength	λc	1270		1600	nm	
Optical Return Loss		27			dB	
LOS De-Assert	LOSp			-18	dBm	
LOS Assert	LOSa	-32			dBm	
LOS Hysteresis		0.5		5	dB	

Note 1: With 10km G.652 SMF

Note 2: Measured with 10.3Gbps, Ber<10^{-12}, $2^{31}-1$ PRBS NRZ, Duty Cycle = 50%, 1310nm, ER=6dB

Note 3: Internally AC coupled

Block Diagram



Pin Definitions and Descriptions

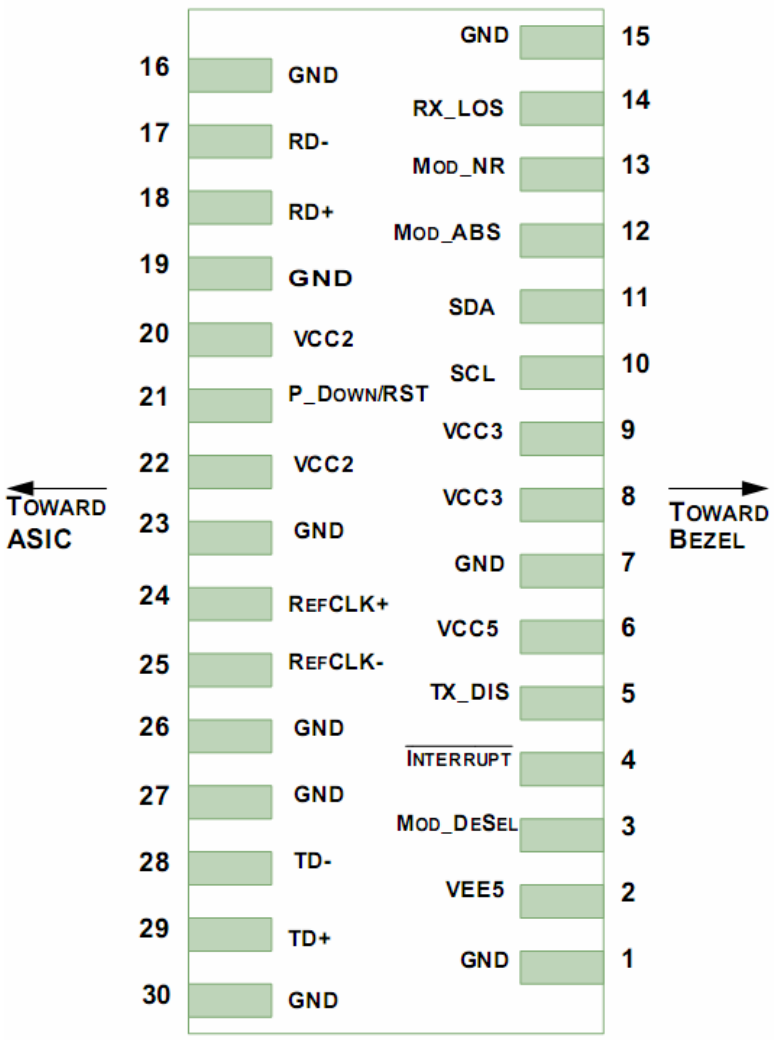


Diagram of host board connector block pin numbers and name

Pin Num.	Name	Logic	Function	Plug Seq.	Notes
1	GND		Module Ground	1	1
2	VEE5		Optional -5.2V Power Supply – **Not required**	2	
3	Mod_DeSel	LVTTL-I	Module De-select; When held low allows module to respond to 2-wire serial interface	3	
4	$\overline{Interrupt}$	LVTTL-O	Indicates presence of an important condition which can be read over the 2-wire serial interface	3	2
5	TX_DIS	LVTTL-I	Transmitter Disable; Turns off transmitter laser output	3	
6	VCC5		+5V Power Supply – **Not required**	2	
7	GND		Module Ground	1	1
8	VCC3		+3.3V Power Supply	2	
9	VCC3		+3.3V Power Supply	2	
10	SCL	LVTTL-I	2-Wire Serial Interface Clock	3	2
11	SDA	LVTTL-I/O	2-Wire Serial Interface Data Line	3	2

12	Mod_Abs	LVTTL-O	Indicates Module is not present. Grounded in the Module	3	2
13	Mod_NR	LVTTL-O	Module Not Ready; Indicating Module Operational Fault	3	2
14	RX_LOS	LVTTL-O	Receiver Loss Of Signal Indicator	3	2
15	GND		Module Ground	1	1
16	GND		Module Ground	1	1
17	RD-	CML-O	Receiver Inverted Data Output	3	
18	RD+	CML-O	Receiver Non-Inverted Data Output	3	
19	GND		Module Ground	1	1
20	VCC2		+1.8V Power Supply – **Not required**	2	
21	P_Down/RST	LVTTL-I	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	3	
22	VCC2		+1.8V Power Supply – **Not required**	2	
23	GND		Module Ground	1	1
24	RefCLK+	PECL-I	Reference Clock Non-Inverted Input, AC coupled on the host board – **Not required**	3	3
25	RefCLK-	PECL-I	Reference Clock Inverted Input, AC coupled on the host board – **Not required**	3	3
26	GND		Module Ground	1	1
27	GND		Module Ground	1	1
28	TD-	CML-I	Transmitter Inverted Data Input	3	
29	TD+	CML-I	Transmitter Non-Inverted Data Input	3	
30	GND		Module Ground	1	1

Plug Seq.: Pin engagement sequence during hot plugging.

Note 1: Module ground pins Gnd are isolated from the module case and chassis ground within the module.

Note 2: Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

Note 3: A Reference Clock input is not required.

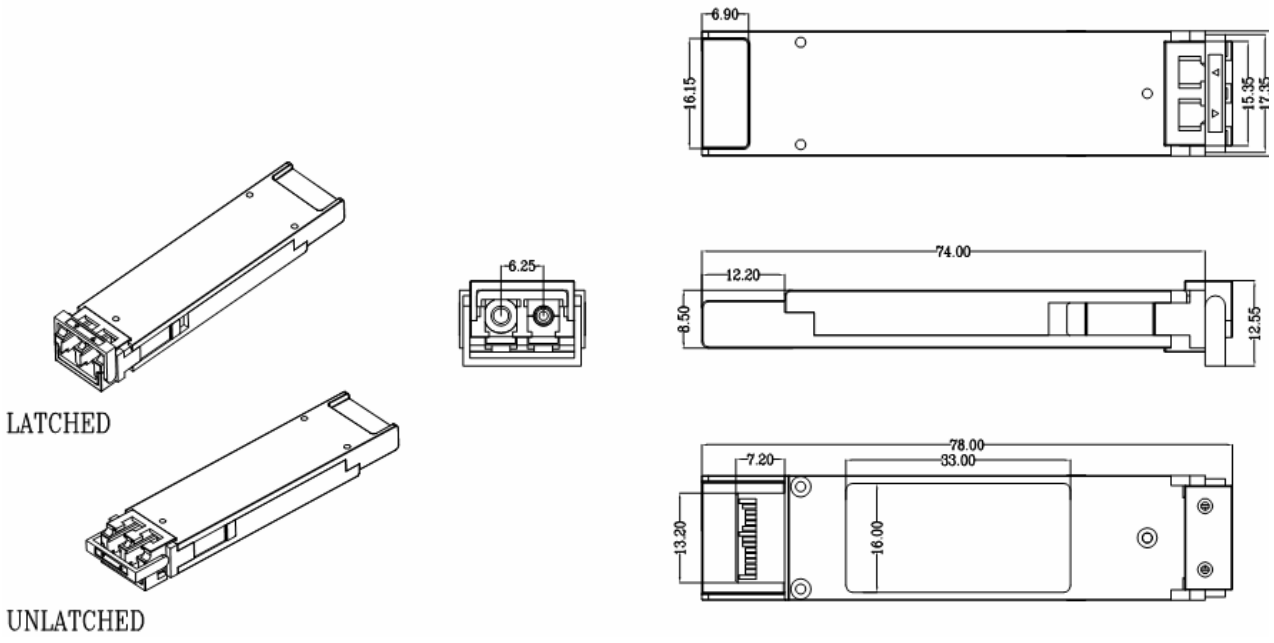
Digital Diagnositc Functions

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

- Transceiver temperature monitor
- Transceiver 3.3V supply voltage monitor
- Transceiver not-ready monitor
- Laser bias current monitor
- Transmitted optical power monitor
- Transmitted fault monitor
- Transmitted disable monitor
- Received optical power monitor
- Soft Transmitted disable monitor and control
- Soft XFI loopback control

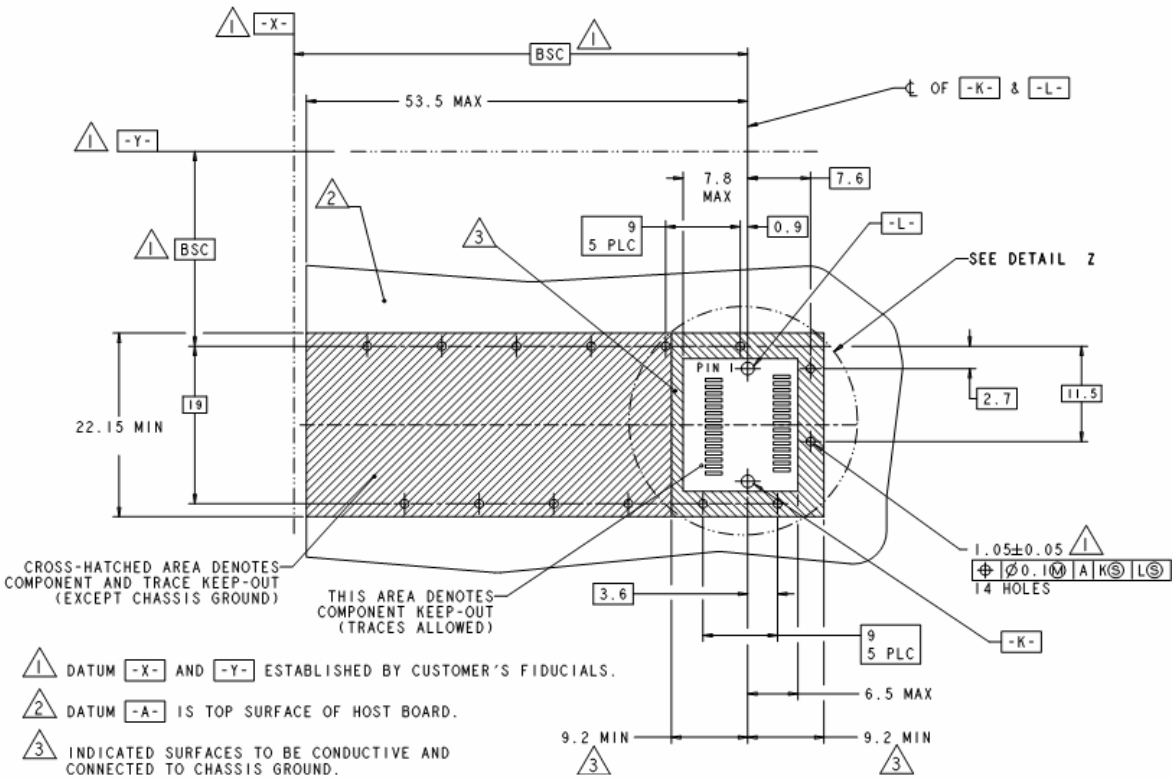
For more information including memory map definitions and contents, please refer INF-8077i(Revision 4.5).

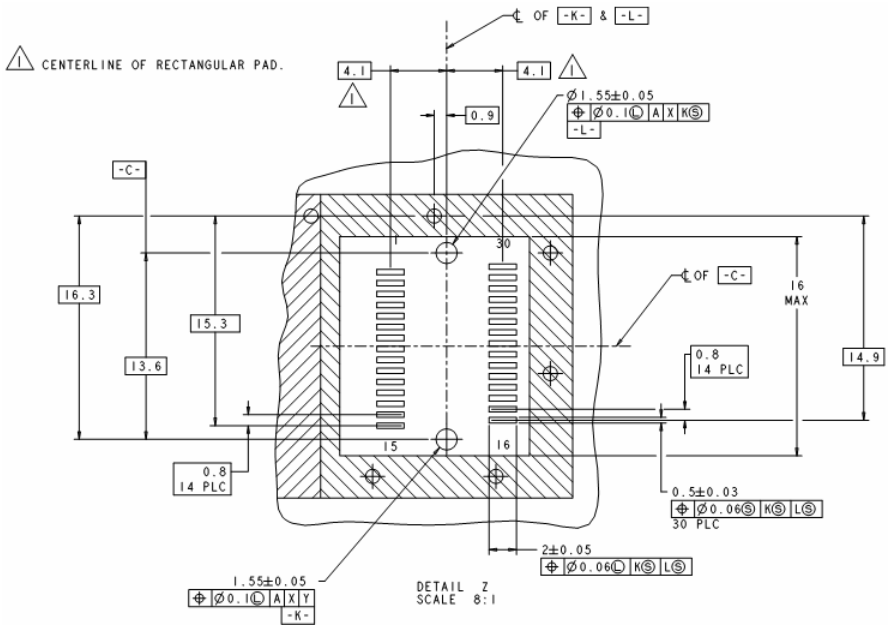
Package information



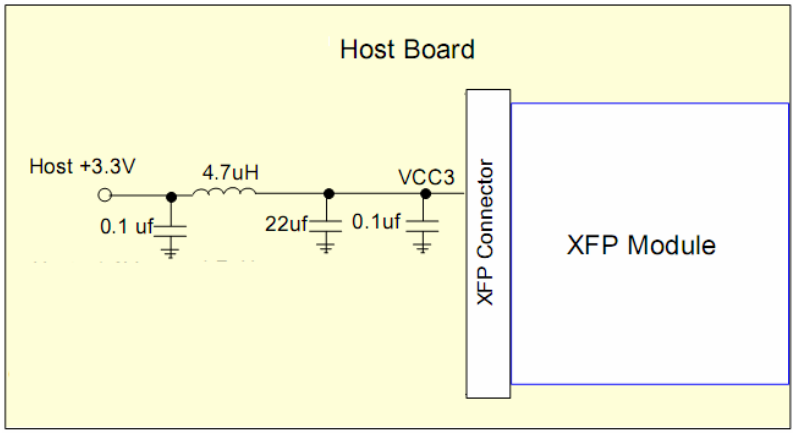
Package outline

XFP Host Board Mechanical Layout

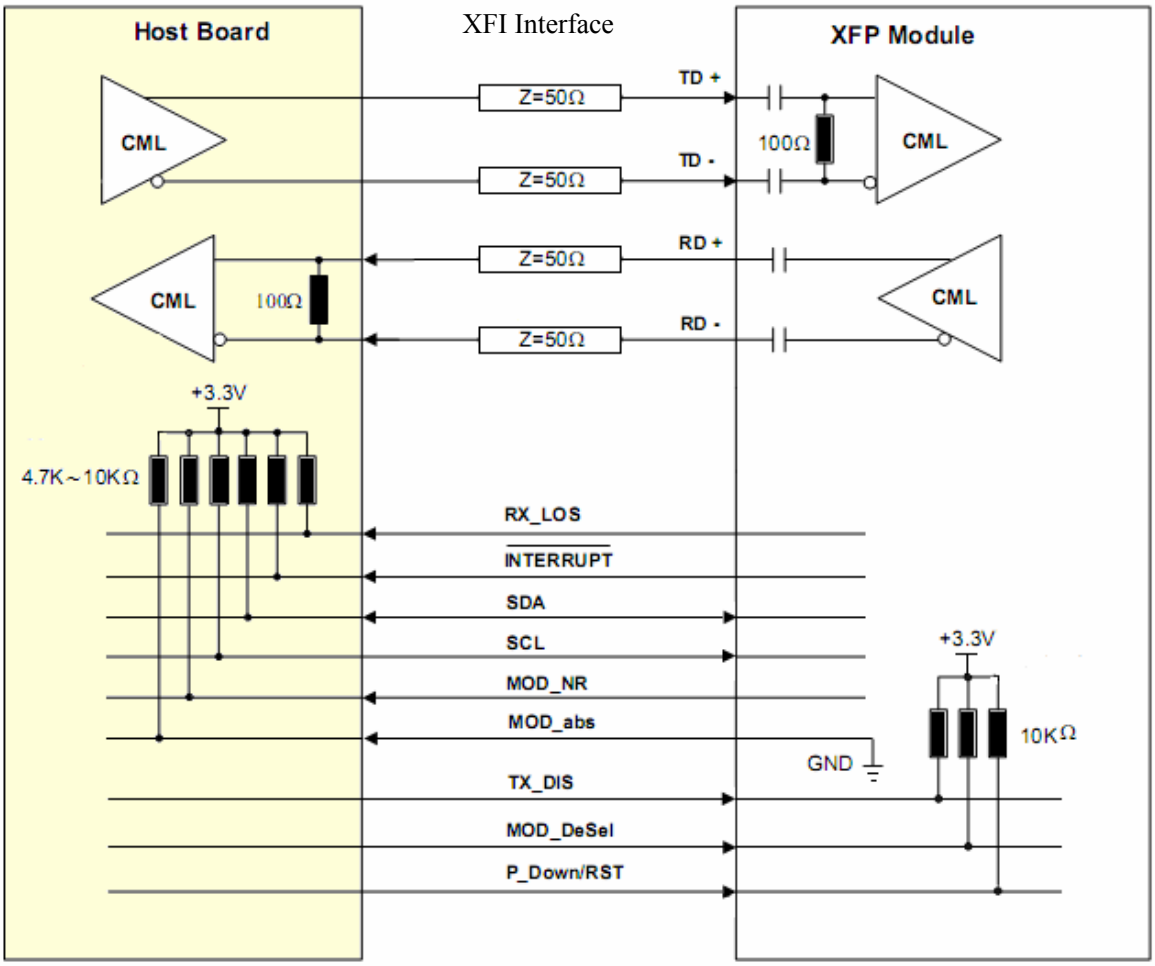




Recommended Circuit



Recommended Host Board Supply Filtering Network



Recommended Interface Circuit

Ordering information

Part No	Specifications								
	Pack	Rate (Gbps)	Tx	Po (dBm)	Rx	Sen (dBm)	Temp (℃)	Reach (km)	DDM
CTR3310C	XFP	9.95~11.1	1310nm DFB	-6~-1	PIN	-17	0~70	10	Yes
CTR3310E	XFP	9.95~11.1	1310nm DFB	-6~-1	PIN	-17	-5~85	10	Yes
CTR3410C	XFP	9.95~11.3	1310nm DFB	-6~-1	PIN	-18	0~70	10	Yes
CTR3410E	XFP	9.95~11.3	1310nm DFB	-6~-1	PIN	-18	-5~85	10	Yes