



**Features**

- XFP MSA Rev 4.5 compliant
- Support multi-rate from 9.95G to 11.3G
- Up to 10km transmission on SMF
- 1310nm DFB and PIN receiver
- XFI high speed electrical interface
- 2-wire interface with integrated Digital Diagnostic monitoring
- XFP MSA package with duplex LC connector
- +3.3V power supply
- Power consumption less than 2.5 W
- Operating case temperature: -40~+85°C

**Regulatory Compliance**

Table 1 - Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000V for SFI pins, >2000V for other pins.)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Immunity	IEC 61000-4-3	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class I laser product.
RoHS	2011/65/EU	Compliant with standards

## Absolute Maximum Ratings

Table 2 - Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T <sub>S</sub>	-40	-	+85	°C	
Supply Voltage	V <sub>CC3</sub>	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-	-	+85	%	

## Recommended Operating Conditions

Table 3 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T <sub>C</sub>	-40	-	+85	°C	
Power Supply Voltage	V <sub>CC3</sub>	3.14	3.3	3.46	V	
Power Supply Current	I <sub>CC3</sub>	-	-	720	mA	
Power Dissipation	P <sub>D</sub>	-	-	2.5	W	
Bit Rate	BR	9.95	-	11.3	Gbps	
Transmission Distance	TD	2	-	10,000	m	1

Note 1: Measured with G.652 SMF.

## Optical Characteristics

Table 4 – Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength Range	λ <sub>C</sub>	1290	-	1330	nm	
Average Output Power	P <sub>OUT</sub>	-6	-	-1	dBm	1
Average Output Power (Laser Off)	P <sub>OUT-OFF</sub>	-	-	-30	dBm	1
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Spectral Width (-20dB)	Δλ	-	-	1	nm	
Extinction Ratio	ER	6	-	-	dB	2
Optical Eye Mask	Compliant with ITU-T G.691-2006					2
Receiver						
Center Wavelength Range	λ <sub>C</sub>	1290	-	1330	nm	
Receiver Sensitivity	P <sub>IN-SENS</sub>	-	-14	-11	dBm	3
Receiver Overload	P <sub>IN-OL</sub>	-1	-	-	dBm	3
Receiver Reflectance	Ref	-	-	-14	dB	
Optical Path Penalty	OPP	-	-	1	dB	

LOS Assert	LOS <sub>A</sub>	-25	-	-	dBm	
LOS Deassert	LOS <sub>D</sub>	-	-	-15	dBm	
LOS Hysteresis	LOS <sub>H</sub>	0.5	-	4	dB	

## Notes:

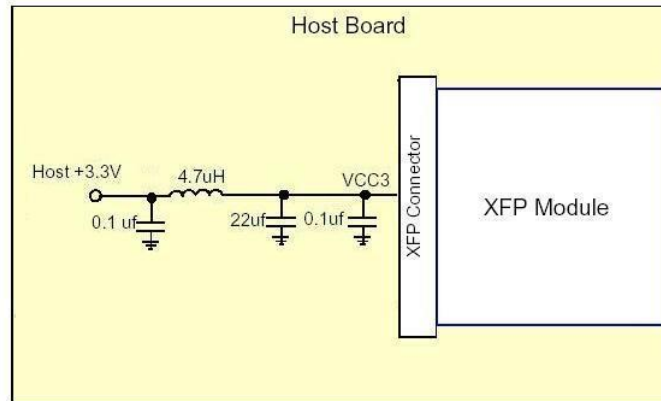
1. The optical power is launched into SMF.
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @9.953Gbps.
3. Measured with a PRBS 2<sup>31</sup>-1 test pattern @9.953Gbps, BER≤10<sup>-12</sup>.

## Electrical Characteristics

**Table 5 – Electrical Characteristics**

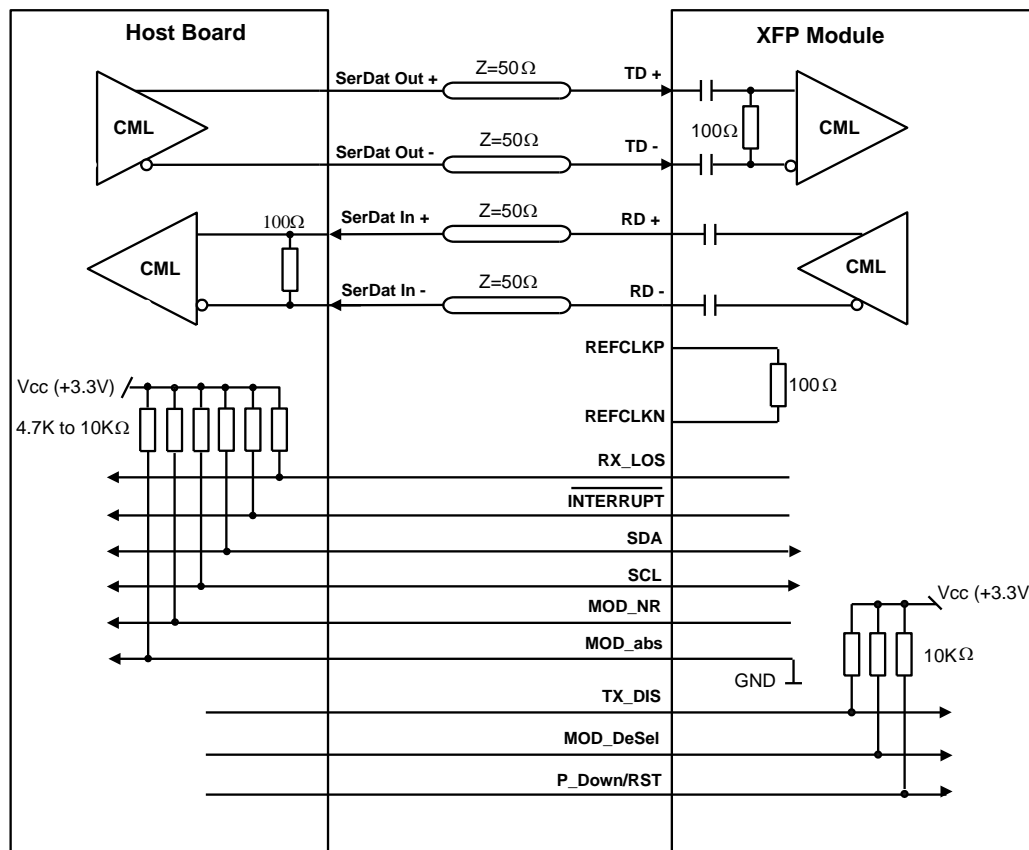
Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Differential Data Input Amplitude	V <sub>IN,P-P</sub>	120	-	820	mVpp	
Input Differential Impedance	Z <sub>IN</sub>	85	100	115	Ω	
Tx_Disable, P_Down/RST	V <sub>IL</sub>	-0.3	-	0.8	V	
	V <sub>IH</sub>	2.0	-	V <sub>CC</sub> +0.3	V	
Receiver						
Differential Date Output Amplitude	V <sub>OUT,P-P</sub>	340	-	850	mVpp	
Output Differential Impedance	Z <sub>d</sub>	80	100	120	Ω	
Output Rise Time, 20%~80%	T <sub>R</sub>	24	-	-	ps	
Output Fall Time, 20%~80%	T <sub>F</sub>	24	-	-	ps	
Rx_LOS, Mod_NR, Interrupt	V <sub>OL</sub>	0	-	0.4	V	
	V <sub>OH</sub>	V <sub>CC</sub> -0.5	-	V <sub>CC</sub> +0.3	V	

**Recommended Host Board Power Supply Circuit**



**Figure 1, Recommended Host Board Power Supply Circuit**

**Recommended Interface Circuit**



**Figure 2, Recommended Interface Circuit**

Pin Definitions

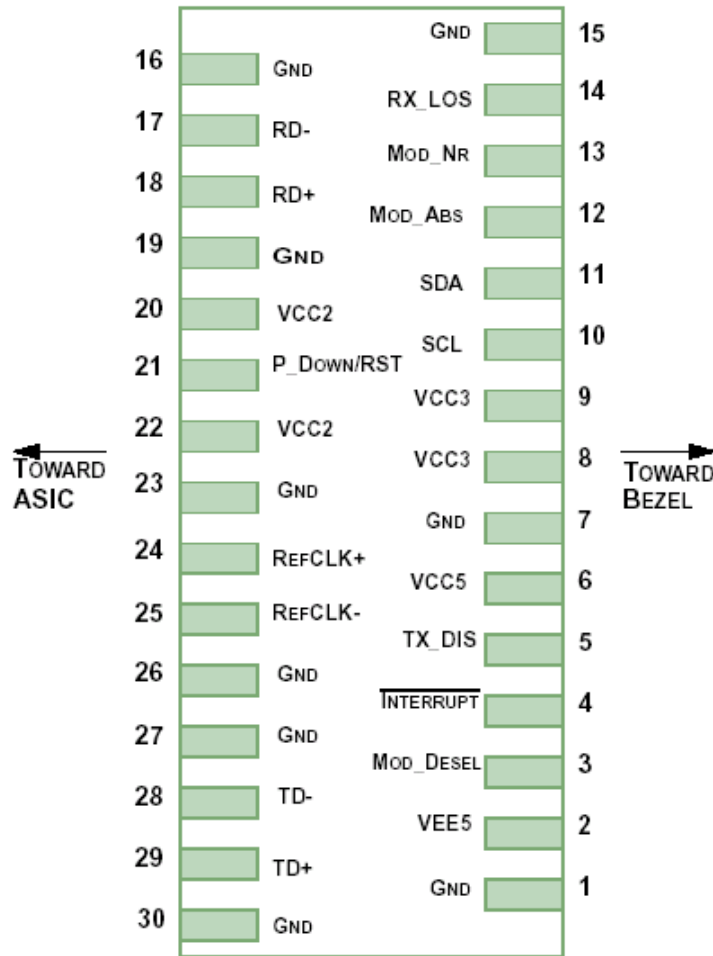


Figure 3, Pin View

Table 6 – Electrical Characteristics

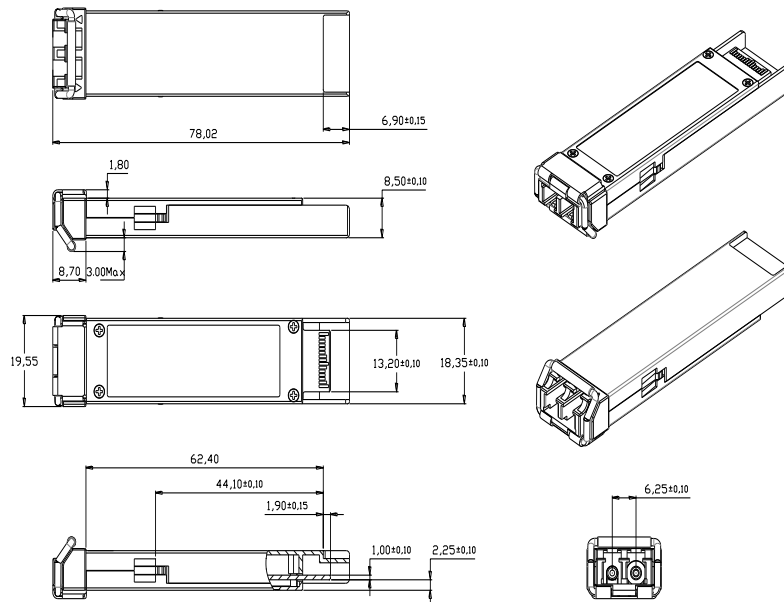
Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		V <sub>EE5</sub>	Optional -5.2V Power Supply (Not implemented)	3
3	LVTTL-I	Mod_Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface	
4	LVTTL-O	<u>Interrupt</u>	<u>Interrupt</u> ; Indicates presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Turns off transmitter laser output	
6		V <sub>CC5</sub>	+5V Power Supply	
7		GND	Module Ground	1
8		V <sub>CC3</sub>	+3.3V Power Supply	
9		V <sub>CC3</sub>	+3.3V Power Supply	
10	LVTTL-I/O	SCL	2-Wire Serial Interface Clock	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 Operational Fault	2
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		V <sub>CC2</sub>	+1.8V Power Supply (Not implemented).	3
21	LVTTL-I	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		V <sub>CC2</sub>	+1.8V Power Supply (Not implemented)	3
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Not used, internally terminated to 50ohm (100ohm diff).	4
25	PECL-I	RefCLK-	Not used, internally terminated to 50ohm (100ohm diff).	4
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

Notes:

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-10Kohms to a voltage between 3.15V and 3.45V on the host board.
3. The pins are open within module.
4. Reference Clock is not required

## Mechanical Diagram



**Figure 4, Mechanical Diagram of XFP**

## Order Information

**Table 7 – Order Information**

Part No.	Application	Data Rate	Laser Source	Fiber Type
XP-MR-01-IDFG	I-64.1 10GBASE-LR	9.95G~11.3G	1310nm DFB	SMF

## Warnings

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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