

FEATURES

- Supports 9.95Gb/s to 11.3Gb/s bit rates
- 0 to 70°C operating case temperature
- XFP package with duplex LC receptacle connector
- Hot-pluggable capability
- Single 3.3V power supply
- CWDM DFB transmitter and high performance PIN receiver
- Up to 10km transmission distance over SMF
- Low power dissipation with build-in CDR in both transmitter and receiver
- XFI loopback mode
- No Reference Clock required
- Low EMI and excellent ESD protection
- Built-in Digital Diagnostic Monitoring (DDM) function
- Class I laser safety standard IEC-60825 compliant
- RoHS-6 compliance

APPLICATIONS

- 10GBASE-LR/LW
- 10Gb/s Fiber Channel

STANDARDS

- Complies with INF-8077i
- Complies with IEEE 802.3ae
- Complies with FCC 47 CFR Part 15, Class B
- Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

ABSOLUTE MAXIMUM RATING						
Parameter	Symbol	Min.	Max.	Unit	Notes	
Storage Ambient Temperature	T _{STG}	-40	85	°C		
Operating Case Temperature	T _c	0	70	°C		
Operating Humidity	OH	5	95	%		
Power Supply Voltage	V _{CC}	-0.5	3.6	V		

RECOMMENDED OPERATING CONDITION						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T _c	0		70	°C	
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Consumption	P			1.5	W	
Date Rate		9.95	10.3	11.3	Gbps	
Data Rate Drift		-100		+100	PPM	

TRANSMITTER OPTICAL CHARACTERISTICS						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Centre Wavelength	λ _c	λ-6.5	λ	λ+6.5	nm	
Spectral Width (-20dB)	Δ λ			1	nm	
Average Output Power	P _{OUT}	-2		+3	dBm	Launched into SMF Fiber
Average Power of OFF Transmitter	P _{OUT-OFF}			-30	dBm	
Extinction Ratio	ER	3.5			dB	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			3.2	dB	10km SMF

TRANSMITTER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Input Differential Swing		180		700	mV	
Input Differential Impedance		85	100	115	Ω	
TX Disable	Disable	2		VCC+0.3	V	
	Enable	-0.3		0.8	V	

RECEIVER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength	λ_c	1260		1620	nm	
Sensitivity	SEN			-15	dBm	PRBS2 ³¹ -1@10.3Gbps BER $\leq 1 \times 10^{-12}$
Saturation Optical Power	SAT	0.5			dBm	
LOS De-Assert	LOS _D			-18	dBm	
LOS Assert	LOS _A	-32			dBm	
LOS Hysteresis	HYS	0.5		5	dB	

RECEIVER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Differential data output swing	Vout	350		850	mV	
Rx_LOS Output Voltage - High	High	2.4		VCC _{HOST}	V	
Rx_LOS Output Voltage - Low	Low	-0.3		0.4	V	
Output Rise Time, 20%~80%	TR	28			ps	
Output Fall Time, 20%~80%	TF	28			ps	

PIN DEFINITION				
Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V Power Supply, Not Required	
3	LVTTTL-I	Mod_DeSel	Module De-select; When held low allows module to respond to 2-wire serial	
4	LVTTTL-O	Interrupt	Interrupt; Indicates presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTTL-I	TX_DIS	Transmitter Disable; Turns off transmitter laser output	
6		VCC5	+5V Power Supply, Not Required	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTTL-I/O	SCL	2-Wire Serial Interface Clock	2
11	LVTTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
12	LVTTTL-O	Mod_Abs	Indicates Module is not present. Grounded in the Module	2
13	LVTTTL-O	Mod_NR	Module Not Ready; Indicating Module Operational Fault	2
14	LVTTTL-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, Not Required	
21	LVTTTL-I	P_Down/RST		
22		VCC2	+1.8V Power Supply, Not Required	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Not Required	
25	PECL-I	RefCLK-	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-10Kohms to a voltage between 3.15V and 3.45V on the host board.

PIN OUT DRAWING

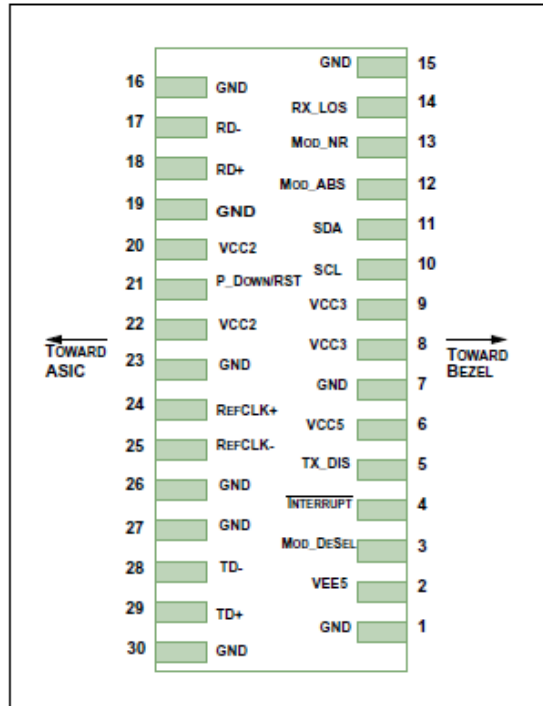


Figure 1 Host PCB XFP Pinout Top View

Host Board Supply Filtering Network

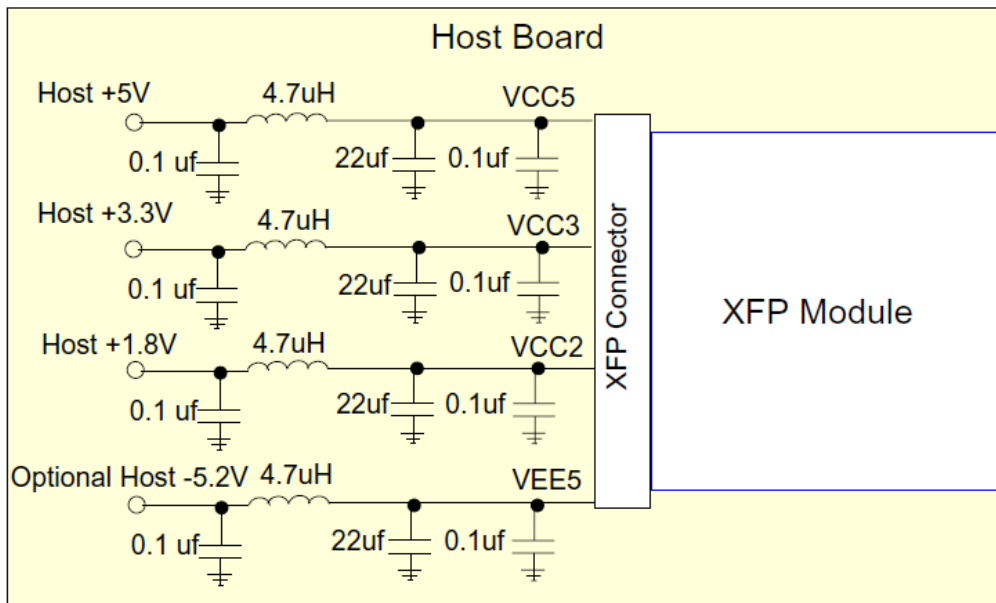


Figure 2 Host Board Supply Filtering Network

TYPICAL INTERFACE CIRCUIT

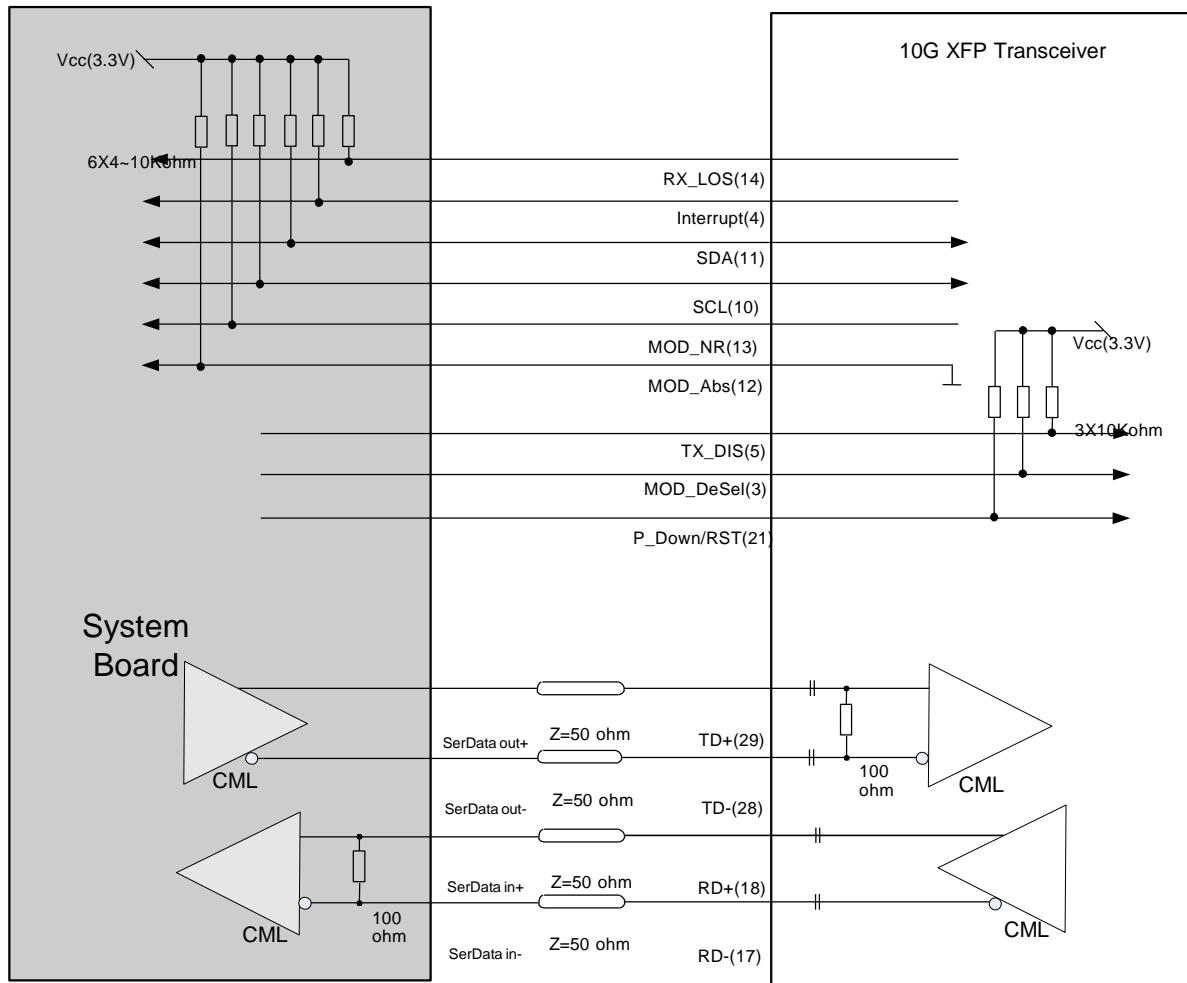


Figure 3 Typical Interface Circuit

PACKAGE OUTLINE

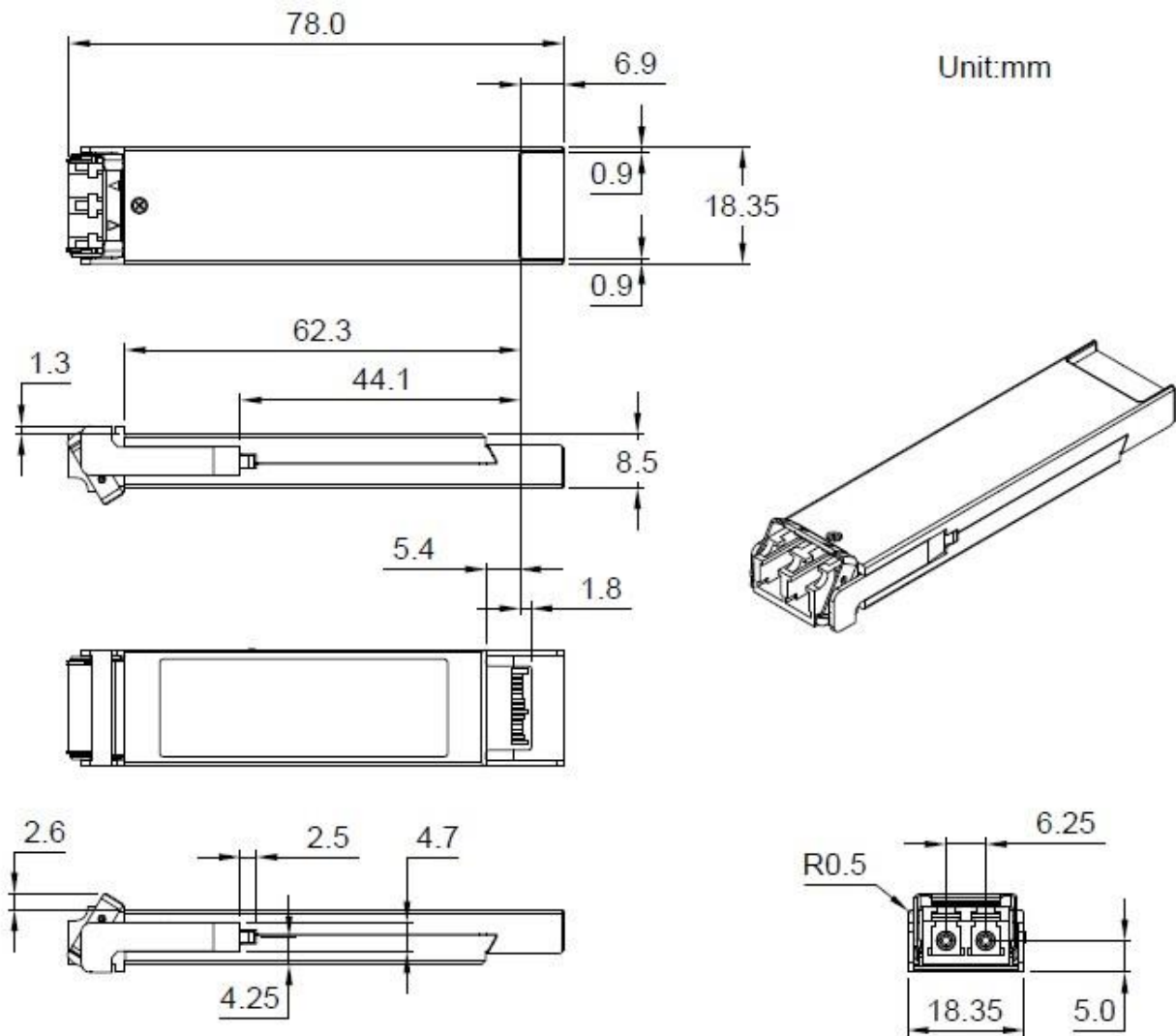


Figure 4 Package Outline

EEPROM INFORMATION

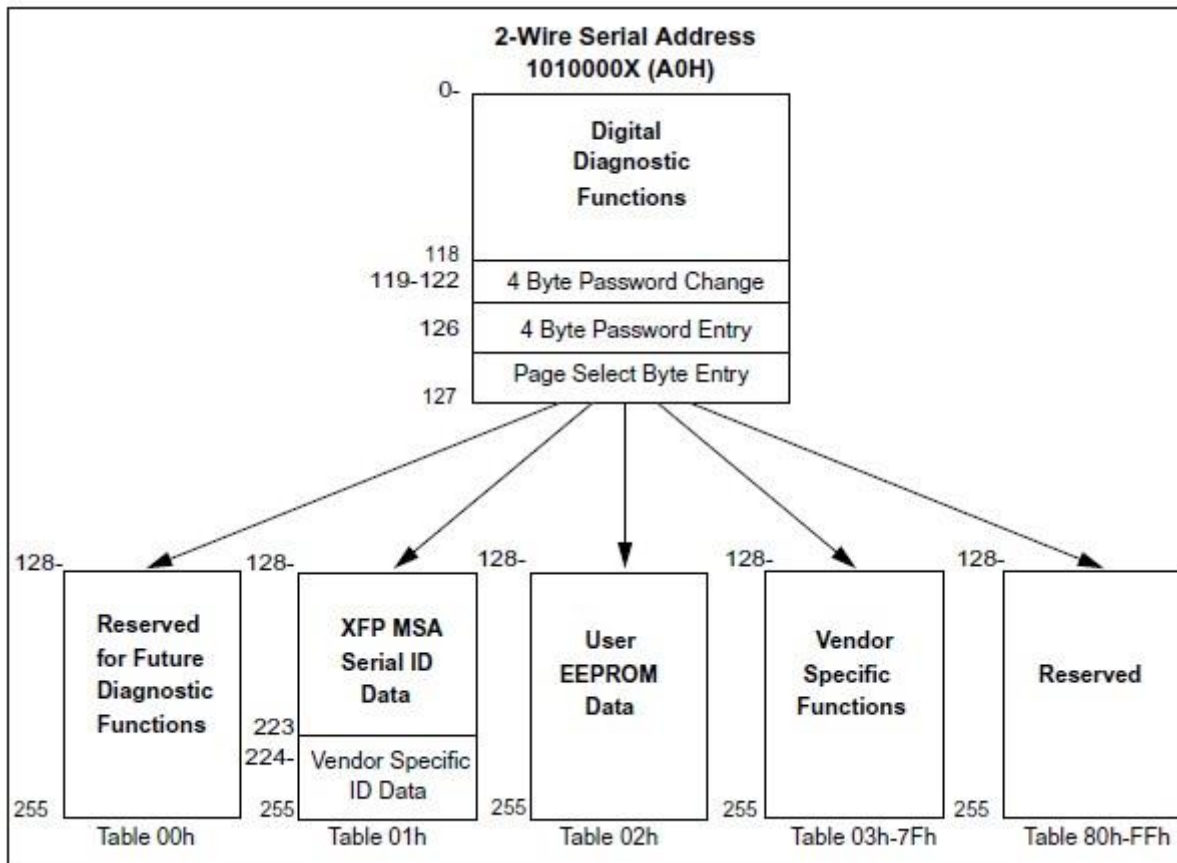


Figure 5 EEPROM Memory Map Specific Data Field Descriptions

DIGITAL DIAGNOSTIC MONITORING INTERFACE

Parameter	Range	Accuracy	Calibration	NOTES
Temperature	-5 to 70°C	±5°C	Internal	LSB: 1/256C
Voltage	2.97 to 3.63V	±3%	Internal	LSB: 0.1mV
Bias Current	0 to 100mA	±10%	Internal	LSB: 2uA
TX Power	-3 to +4dBm	±3dB	Internal	LSB: 0.1uW
RX Power	-16 to +1dBm	±3dB	Internal	LSB: 0.1uW

Part No.	Tx/Rx	Data Rate	Operating Temp	Distance
HOLS-XPCxx1099-LD-CE	DFB/PIN	9.95G~11.3G	0 to +70°C	10km
HOLS-XPCxx1099-LD-IE	DFB/PIN	9.95G~11.3G	-40 to +85°C	10km

Note:

XX is CWDM wavelength code as in the table below:

Center Wavelength(nm)	Code	Center Wavelength(nm)	Code
1271	27	1471	47
1291	29	1491	49
1311	31	1511	51
1331	33	1531	53
1351	35	1551	55
1371	37	1571	57
1391	39	1591	59
1411	41	1611	61

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.