10Gbps 10km Bi-Directional Simplex LC XFP Transceiver
PXP96-B7310 & PXP96-B3710

Features

- ✓ Supports 9.95Gb/s to 10.5Gb/s bit rates
- ✓ Uncooled 1270nm DFB Laser and PIN photo-detector for PXP96-B7310
- ✓ Uncooled 1330nm DFB Laser and PIN photo-detector for PXP96-B3710
- ✓ Up to 10km on 9/125μm SMF
- ✓ Simplex LC receptacle optical interface compliant
- ✓ Hot pluggable
- ✓ All-metal housing for superior EMI performance
- ✓ RoHS6 compliant (lead free)
- ✓ Power dissipation <2.5W
- ✓ No Reference Clock required
- ✓ Built-in digital diagnostic functions
- ✓ Operating case temperature:
  Commercial: -5°C to +70°C

Applications

- ✓ 10GBASE-LR/LW 10G Ethernet
- ✓ 1200-SM-LL-L 10G Fibre Channel

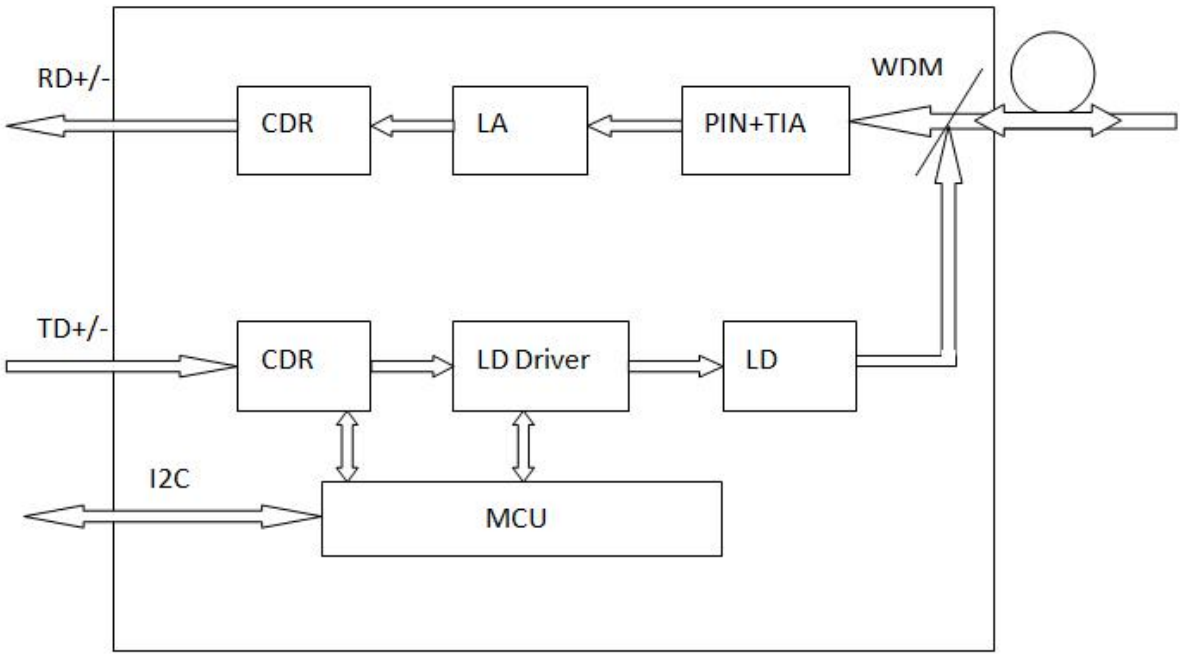
Standards

- ✓ Fully compliant to XFP MSA Rev.4.5
- ✓ Compatible with IEEE802.3ae 2002

Description

Small Form Factor 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. They comply with 10-Gigabit Ethernet 10GBASE-LR/LW per IEEE 802.3ae and 10G Fibre Channel 1200-SM-LL-L. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA.

Module Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage1	V_{CC3}	0		3.6	V
Power Supply Voltage2	V_{CC5}	0		6	V
Storage Temperature	Ts	-40		+85	°C
Relative Humidity	RH	0		85	%
RX Input Average Power	P_{max}	-		1.5	dBm

Recommended Operating Environment

Parameter	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage1	V_{CC3}	3.13	3.3	3.46	V
Power Supply Voltage2	V_{CC5}	4.75	5	5.25	V
Module Total Power	P			2.5	W
Operating Case Temperature	T_C	-5		+70	°C
Data Rate		9.9		10.5	Gbps

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section						
Input Differential Impedance	R_{in}	90	100	110	Ω	
Differential Data Input Swing	$V_{in\ PP}$	120		820	mV	1
Transmit Disable Voltage	V_D	V_{CC3} – 1.3		V_{CC3}	V	
Transmit Enable Voltage	V_{EN}	V_{ee}		V_{ee}+ 0.8	V	
Receiver Section						
Differential Data Output Swing	$V_{out\ PP}$	340		850	mV	
LOS Fault	$V_{los\ fault}$	V_{CC3} – 0.5		V_{CC_host}	V	2
LOS Normal	$V_{los\ norm}$	V_{ee}		V_{ee}+0.5	V	2

Notes:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.

Optical Parameters

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section						
Centre Wavelength	λc	1260	1270	1280	nm	PXP96-B7310
		1320	1330	1340		PXP96-B3710
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power (avg.)	P_{out}	-8.2		0.5	dBm	1
Laser Off Power	P_{off}	-	-	-30	dBm	
Extinction Ratio	ER	3.5	-	-	dB	2
Relative Intensity Noise	RIN	-	-	-128	dB/Hz	
Optical Rise/Fall Time	t_r / t_f		-	50	ps	3
Optical Return Loss Tolerance		-	-	12	dB	
Output Optical Eye	Compliant with IEEE802.3ae eye masks when filtered					2
Receiver Section						
Receiver Center Wavelength	λc	1320	1330	1340	nm	PXP96-B7310
		1260	1270	1280		PXP96-B3710
Receiver Sensitivity in Average Power	Sen	-14.4		-3	dBm	4
Los Assert	LOS_A	-25	-	-	dBm	
Los Dessert	LOS_D	-	-	-16	dBm	
Los Hysteresis	LOS_H	0.5	-	5	dB	
Overload	$P_{in\text{-}max}$	-	-	-3	dBm	4
Receiver Reflectance		-	-	-12	dB	
Receiver Power (damage)		-	-	1.5	dBm	

Notes:

1. The optical power is launched into 9/125μm SMF.
2. Measured with a PRBS 2^{31}-1 test pattern @10.3125Gbps.
3. Unfiltered, 20-80%. Measured with a PRBS 2^{31}-1 test pattern @10.3125Gbps.
4. Measured with a PRBS 2^{31}-1 test pattern @10.3125Gbps, ER=4dB, BER <10^{-12}.

Timing Characteristics:

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_off			10	us
TX_Disable Negate Time	t_on			2	ms
Time to Initialize	t_init			300	ms
P_Down/RST Assert Delay	P_Down/RST_on			100	us
P-Down Reset Time	t_reset	10			us
RX_LOS Assert Delay	t_loss_on			100	us
RX_LOS Negate Delay	t_loss_off			100	us
Clock Frequency	f_{SCL}			400	kHz

Digital Diagnostic Monitor Characteristics (DDM)

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8077i with internal calibration mode. For external calibration mode please contact our sales stuff.

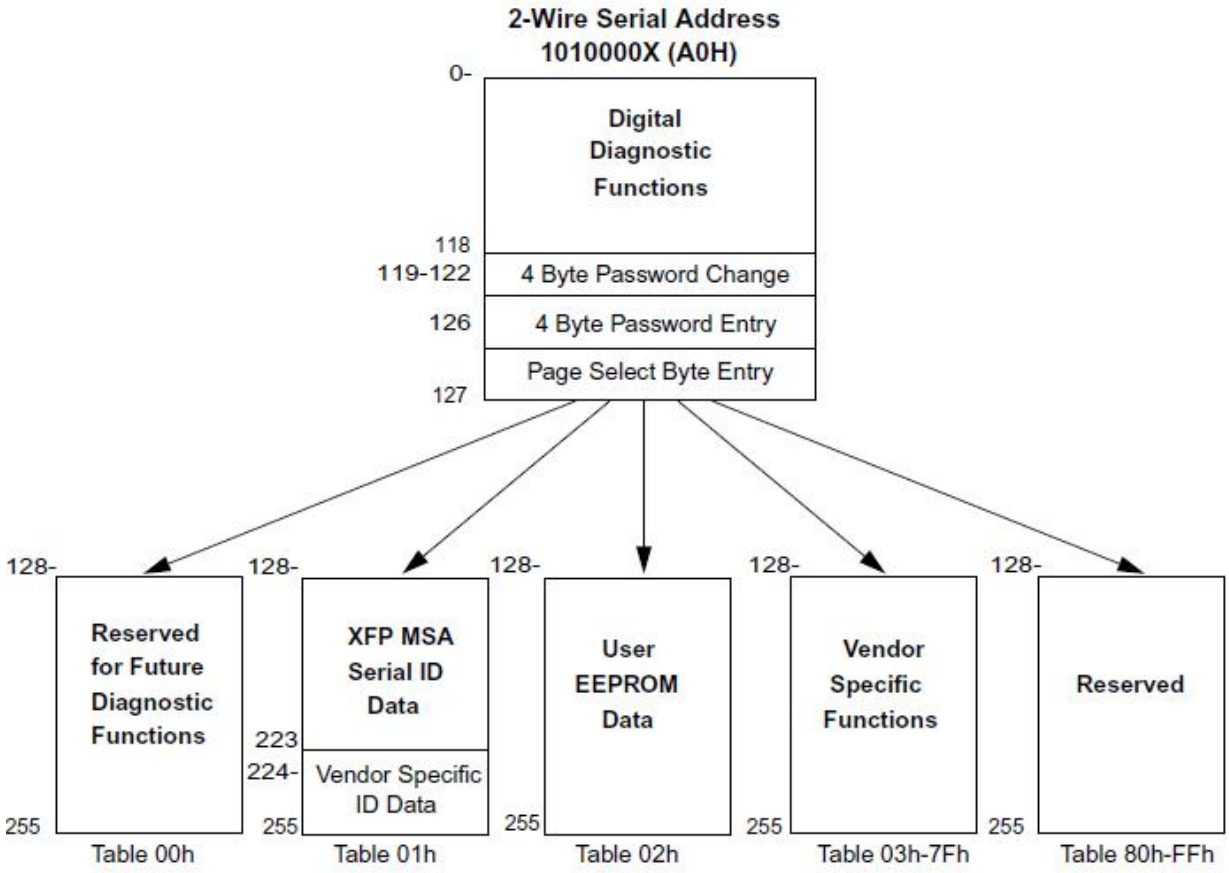
Parameter	Symbol	Min.	Max.	Unit
Temperature Monitor Absolute Error	DMI_Temp	-3	3	°C
Laser Power Monitor Absolute Error	DMI_TX	-3	3	dB
RX Power Monitor Absolute Error	DMI_RX	-3	3	dB
Supply Voltage Monitor Absolute Error	DMI_VCC	-3%	3%	V
Bias Current Monitor Absolute Error	DMI_Ibias	-10%	10%	mA

Digital Diagnostic Memory Map (Compliant with SFF-8077i)

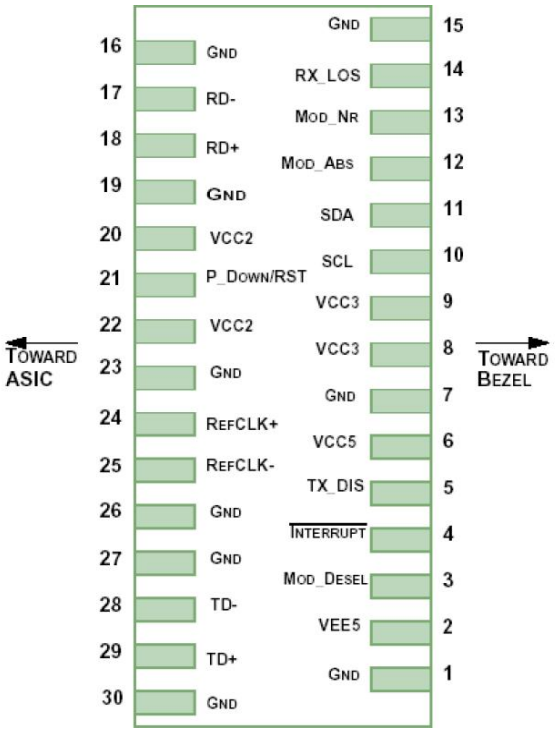
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following (For further information, please refer to SFF-8077i).



Pin Definitions



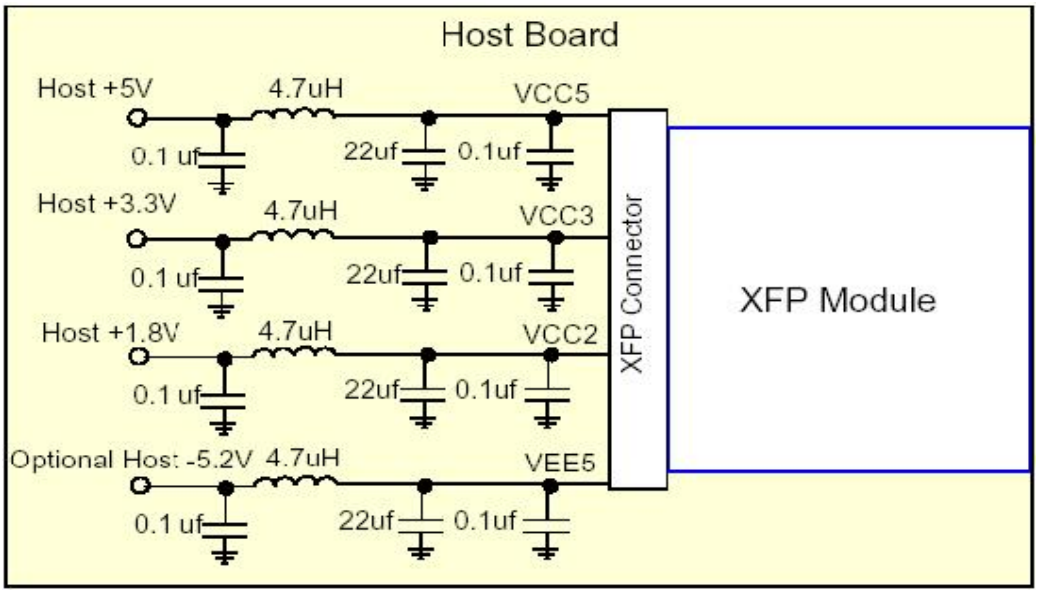
Pin Descriptions

Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Module Ground	1
2		VEE5	Optional –5.2V Power Supply – Not required	
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	LVTTL-O	$\overline{\text{Interrupt}}$	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6		VCC5	+5V Power Supply	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTL-I	SCL	Serial 2-Wire Interface Clock	2
11	LVTTL-I/O	SDA	Serial 2-Wire Interface Data Line	2
12	LVTTL-O	Mod_Abs	Module Absent; Indicates Module is not present. Grounded in the Module.	2
13	LVTTL-O	Mod_NR	Module Not Ready;	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		VCC2	+1.8V Power Supply – Not required	
21	LVTTL-I	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	1
24	PECL-I	RefCLK+	Reference Clock Non-Inverted Input, AC coupled on the host board – Not required	3
25	PECL-I	RefCLK-	Reference Clock Inverted Input, AC coupled on the host board – Not required	3
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

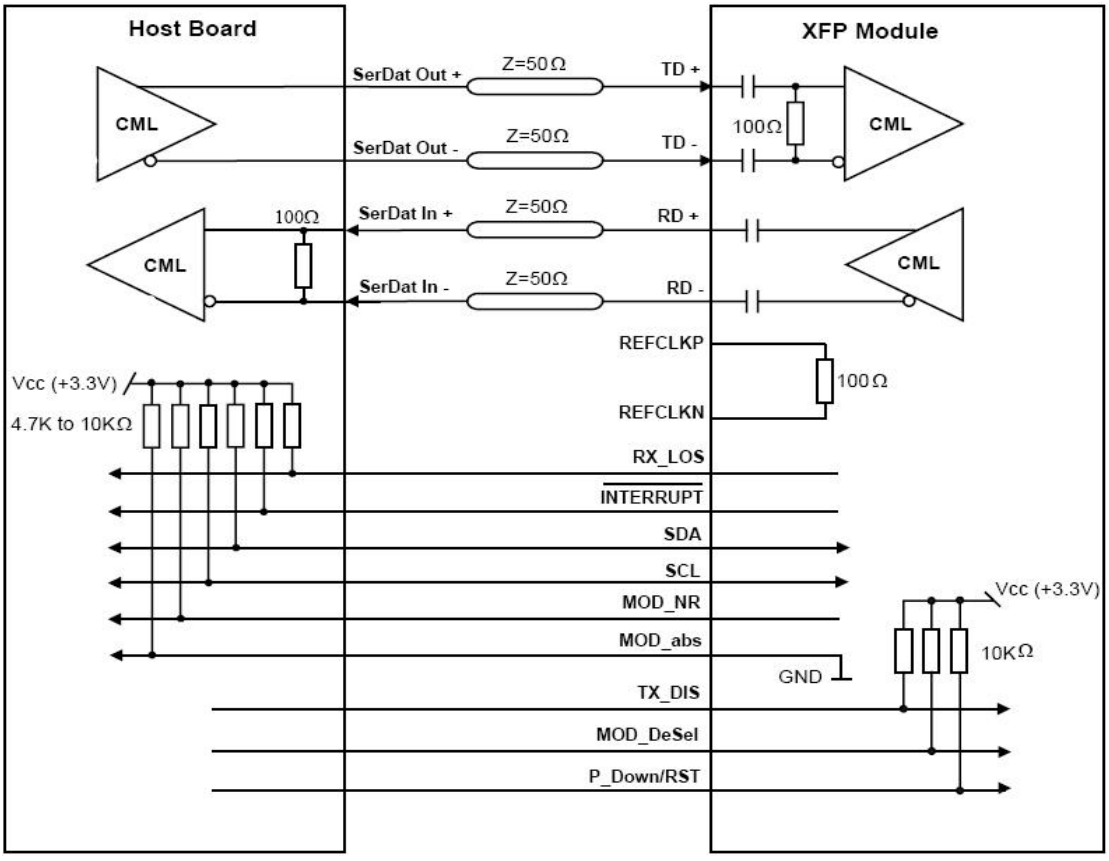
Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. It must be pulled up with 4.7k-10k ohms on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required.

Recommended Interface Circuit

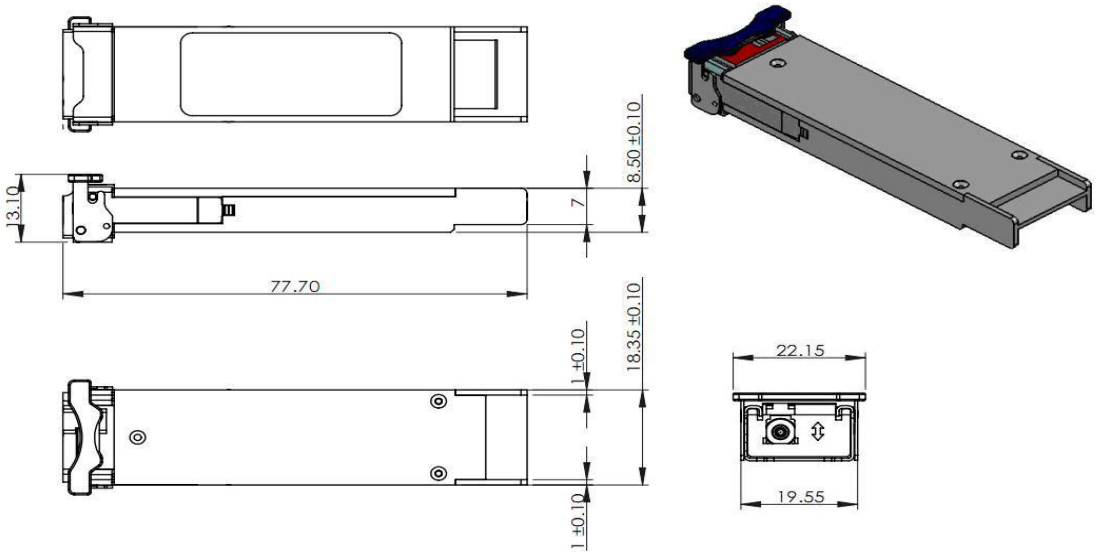


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

Mechanical Dimensions



Ordering information

Part Number	Product Description
PXP96-B7310	TX1270nm, RX1330nm, 10Gbps, 10km, Bi-Directional Simplex LC XFP Transceiver, -5ºC ~ +70ºC, With DDM.
PXP96-B3710	TX1330nm, RX1270nm, 10Gbps, 10km, Bi-Directional Simplex LC XFP Transceiver, -5ºC ~ +70ºC, With DDM.

References

1. 10 Gigabit Small Form Factor Pluggable Module (XFP) Multi-Source Agreement (MSA), Rev 4.5 – August 2005.
2. Telcordia GR-253-CORE Specifications.
3. “Diagnostic Monitoring Interface for Optical Transceivers” SFF-8077i.
4. IEEE802.3ae 2002.

Important Notice

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