XFP-BIDI-xx-10D

10Gbps XFP Bi-Directional Transceiver, 10km Reach

Features

- Supports 9.95Gb/s to 10.5Gb/s data rates
- Power budget 9dB at least
- Two types:
  1270nm DFB Transmitter/ 1330nm Receiver
  1330nm DFB Transmitter/ 1270nm Receiver
- LC Connector
- +3.3V power supply only
- Power dissipation <2W
- Built-in Digital Diagnostic Functions
- Operating Case Temperature Standard : 0°C to +70°C
- Complaint with XFP MSA
- Complaint with IEEE 802.3ae 10GBASE-LR/LW
- Complaint with 10GFC 1200-SM-LL-L

Applications

- 10GBASE-LR 10G Ethernet at 10.3125Gbps
- 10GBASE-LW 10G Ethernet at 9.953Gbps
- 1200-SM-LL-L 10G Fiber Channel at 10.51875Gbps

Description

The XFP-BIDI-xx-10D series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-LR/LW defined by IEEE 802.3ae and 10G Fiber Channel 1200-SM-LL-L. It is with the XFP 30-pin connector to allow hot plug capability.

The XFP-BIDI-12-10D module is designed for single mode fiber and operates at a nominal wavelength of 1270nm; XFP-BIDI-13-10D module is designed for single mode fiber and operates at a nominal wavelength of 1330nm. The transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings*Note

Parameter	Symbol	Min	Max	Unit
Maximum Supply Voltage	Vcc	-0.5	4.0	V
Operating Relative Humidity	RH		80	%
Storage Temperature	Ts	-40	+85	°C

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

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Current	Icc			580	mA
Supply Voltage	Vcc	3.13		3.45	V

Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Input Differential Impedance	Rin	90	100	110	Ω	
Differential Data Input Swing	Vin,pp	120		820	mV	1
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	
Receiver						
Differential Data Output Swing	Vout,pp	340	650	850	mV	1
Rise Time (20– 80%)	tr			38	ps	
Fall Time (20– 80%)	tf			38	ps	
LOS Fault	$V_{LOS\ fault}$	2.4		Vcc	V	
LOS Normal	$V_{LOS\ norm}$	GND		GND+0.5	V	

Note1: After internal AC coupling

Optical Characteristics

(XFP-BIDI-12-10D, 1270nm DFB & PIN/TIA)

Parameter		Symbol	Min	Typical	Max	Unit
Power Budget			9			dB
Data Rate				9.953/10.3125		Gbps
Transmitter						
Centre Wavelength		λc	1260	1270	1280	nm
Spectral Width (-20dB)		Δλ			1	nm
Average Output Power *note1		$P_{out, AVG}$	-6		-1	dBm
Extinction Ratio		ER	3.5			dB
Side Mode Suppression Ratio		SMSR	30			dB
Transmitter and Dispersion Penalty		TDP			2	dB
Average Power of OFF Transmitter					-30	dBm
Relative Intensity Noise		RIN			-128	dB/Hz
Input Differential Impedance		Z_{IN}	90	100	110	Ω
TX Disable	Disable		2.0		Vcc+0.3	V
	Enable		0		0.8	V
TX Fault	Fault		2.0		Vcc+0.3	V
	Normal		0		0.8	V
TX Disable Assert Time		t_off			10	us
Receiver						
Centre Wavelength		λc	1320		1340	nm
Receiver Sensitivity *note2		P_{IN}			-15	dBm
Receiver Overload		P_{MAX}	0.5			dBm
Output Differential Impedance		P_{IN}	90	100	110	dB
LOS De-Assert		LOS_D			-16	dBm
LOS Assert		LOS_A	-28			dBm
LOS	High		2.0		Vcc+0.3	V
	Low		0		0.8	V

(XFP-BIDI-13-10D, 1330nm DFB & PIN/TIA)

Parameter	Symbol	Min	Typical	Max	Unit
Power Budget		9			dB
Data Rate			9.953/10.3125		Gbps
Transmitter					
Centre Wavelength	λc	1320	1330	1340	nm
Spectral Width (-20dB)	Δλ			1	nm
Average Output Power *note1	$P_{out, AVG}$	-6		-1	dBm

Extinction Ratio		ER	3.5			dB
Side Mode Suppression Ratio		SMSR	30			dB
Transmitter and Dispersion Penalty		TDP			2	dB
Average Power of OFF Transmitter					-30	dBm
Relative Intensity Noise		RIN			-128	dB/Hz
Input Differential Impedance		Z_{IN}	90	100	110	Ω
TX Disable	Disable		2.0		Vcc+0.3	V
	Enable		0		0.8	V
TX Fault	Fault		2.0		Vcc+0.3	V
	Normal		0		0.8	V
TX Disable Assert Time		t_off			10	us
Receiver						
Centre Wavelength		λc	1260		1280	nm
Receiver Sensitivity *note2		P_{IN}			-15	dBm
Receiver Overload		P_{MAX}	0.5			dBm
Output Differential Impedance		P_{IN}	90	100	110	dB
LOS De-Assert		LOS_D			-16	dBm
LOS Assert		LOS_A	-28			dBm
LOS	High		2.0		Vcc+0.3	V
	Low		0		0.8	V

Note1: Output is coupled into a 9/125um SMF.

Note2: Measured with a PRBS 2 31 -1 test pattern @10.3125Gbps.

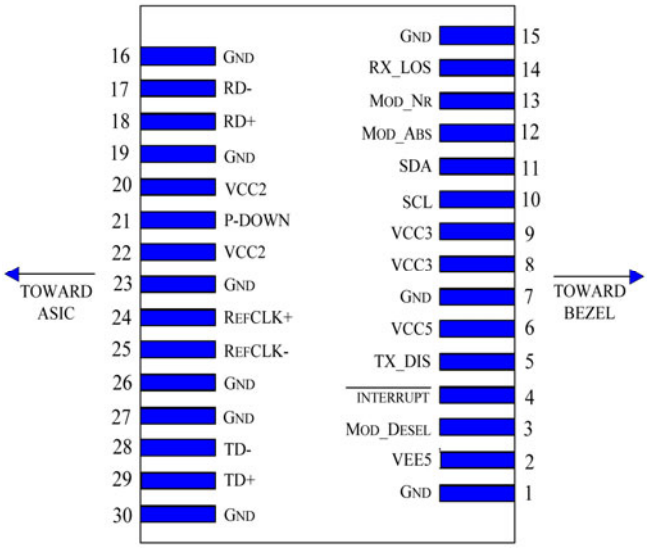
Pin Descriptions

Pin	Logic	Symbol	Name/Description	Note
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	
4	LVTTL-O	INTb	Interrupt; Indicates presence of an important condition which can be read via the 2-wire serial interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Turns off transmitter laser output	
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/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	RDN	Receiver Inverted Data Output	
18	CML-O	RDP	Receiver Non-Inverted Data Output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply (Not required).	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 the2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply (Not required)	3
23		GND	Module Ground	1
24	PECL-I	REFCLKP	Not used, internally terminated to 50ohm (100ohm diff).	4
25	PECL-I	REFCLKN	Not used, internally terminated to 50ohm (100ohm diff).	4
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TDN	Transmitter Inverted Data Input	
29	CML-I	TDP	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. Open collector; shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.6V on the host board.
3. The pins are open within module.
4. Reference Clock is not required.

Host board Connector Pin out

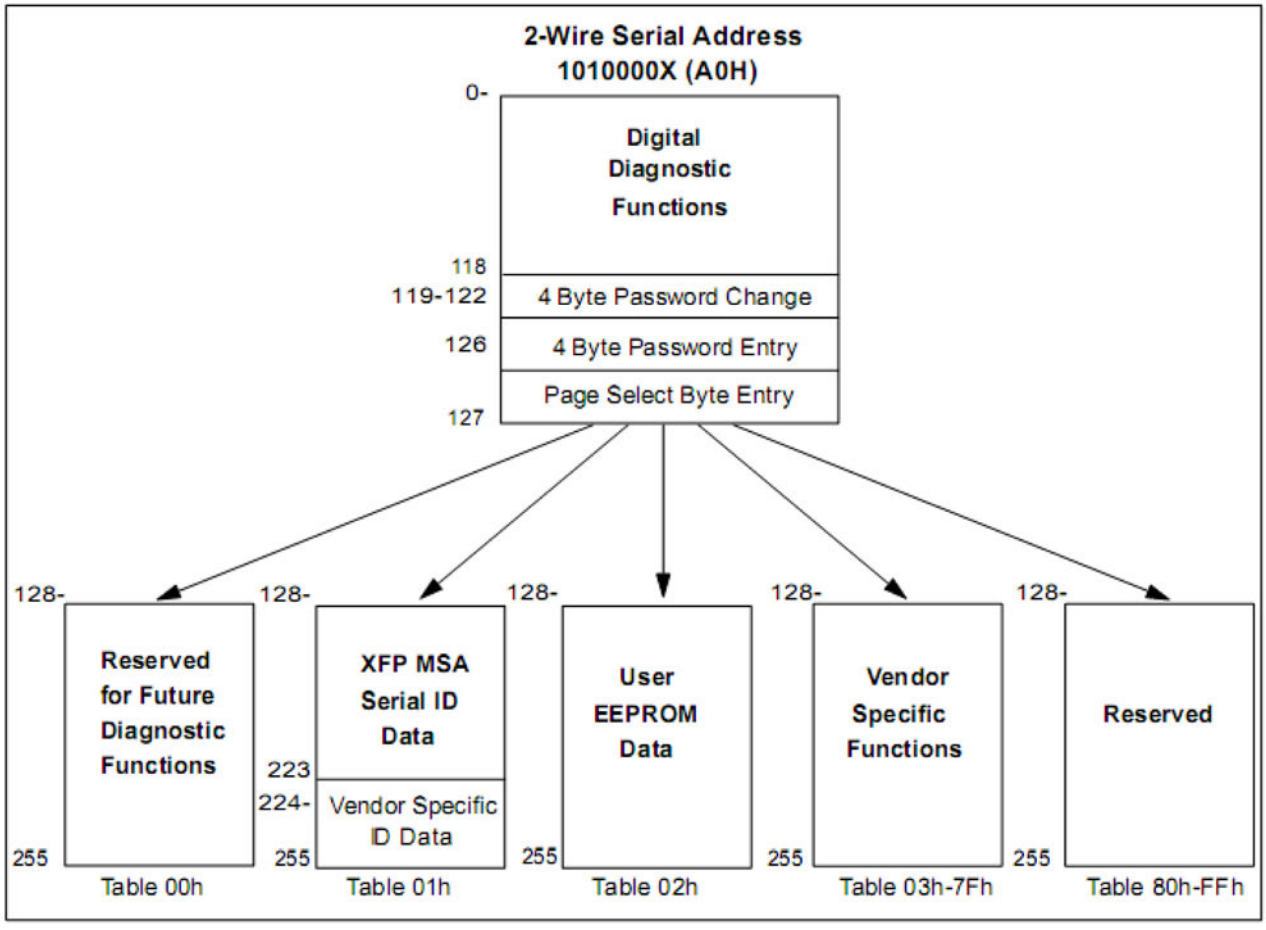


Management Interface

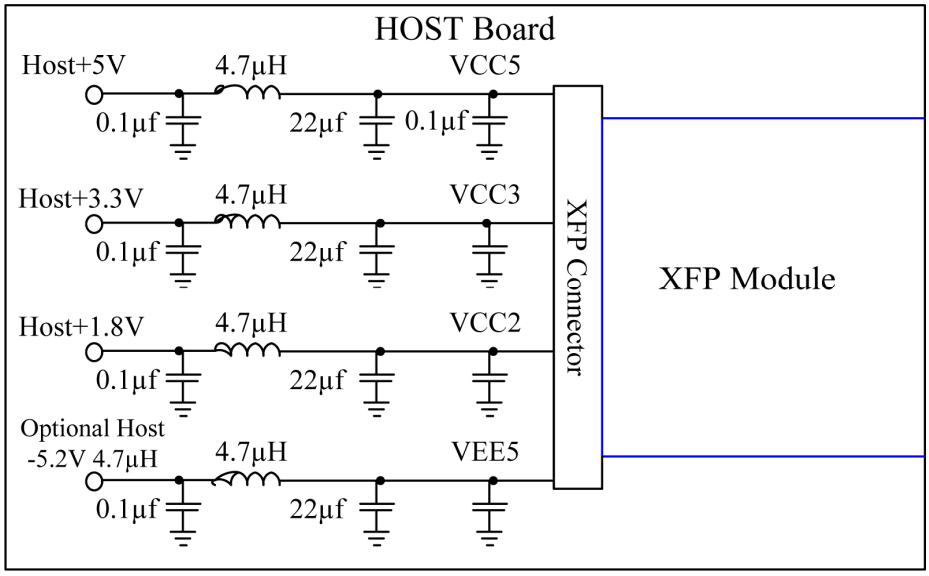
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented.

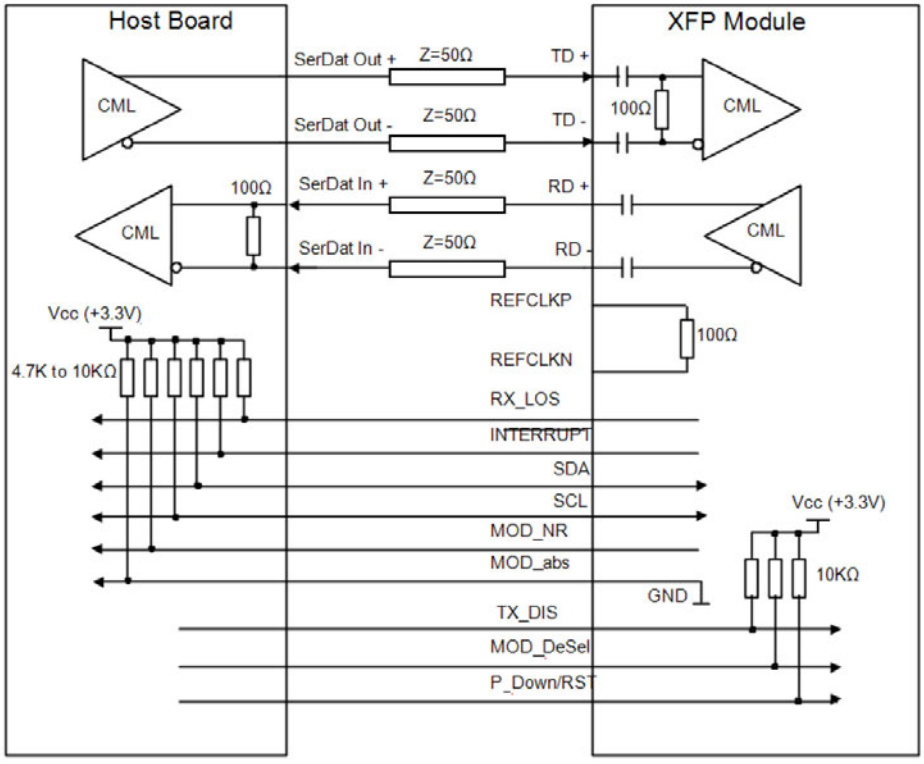
The digital diagnostic memory map specific data field defines as following.



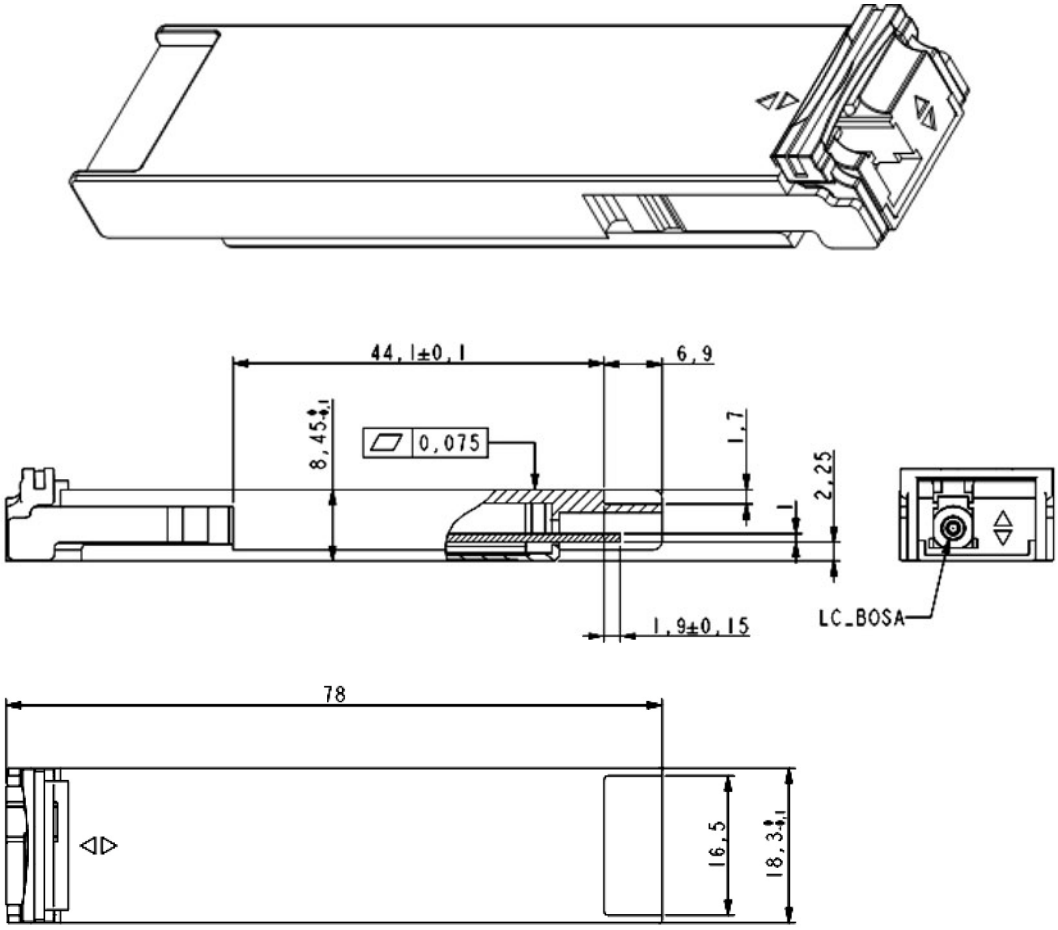
Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit



Package Dimensions



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.

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compliant with standards Noise frequency range: 30 MHz to 6 GHz. Good system EMI design practice required to achieve Class B margins. System margins depend on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1kHz sine-wave, 80% AM, from 80 MHz to 1 GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards *note

Note:

For update of the equipments and strict control of raw materials, OPTONE has the ability to supply the customized products since Jan 1st, 2007, which meets the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item 13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for Optone's transceivers, because Optone's transceivers use glass, which may contain Pb, for components such as lenses, isolators, and other electronic components.

Ordering information

Part Number	Product Description
XFP-BIDI-13-10D	Tx1330nm/Rx1270nm, 10Gbps, LC, 10km, 0°C~+70°C, With DDM
XFP-BIDI-12-10D	Tx1270nm/Rx1330nm, 10Gbps, LC, 10km, 0°C~+70°C, With DDM

Important Notice

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