

10Gbps XFP SR MM 850nm 300m Optical Transceiver XFP-10G85-3M-xx



Features

- Support of IEEE 802.3ae 10GBASE-SR at 10.3125 Gbit/s
- Support of IEEE 802.3ae 10GBASE-SW at 9.953 Gbit/s
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- Vertical Cavity Surface Emitting Laser at 850nm(VCSEL)
- Transmission distance up to
 - 300m with OM3 MMF
 - 82m with OM2 MMF
 - 33m with OM1 MMF
- Low power consumption 1.5W(typ.)
- Wide operating temperature range:
 - Standard: 0 to °C +70°C
 - Extended: -20°C to +85°C
 - Industrial: -40 to + °C 85°C

Applications

- 10GBASE-SR/SW 10G Ethernet
- 1200-Mx-SN-I 10G Fiber Channel
- Other optical links

Description

The XFP-10G85-3M-xx transceiver is a multi-purpose optical transceiver module for 10Gbit/s data transmission applications at 850nm. It is ideally suited for 10 GbE datacom (belly-to-belly for high density applications) and storage area network(SAN/NAS) applications based on the IEEE 802.3ae and Fibre Channel standards. Designed for short range distances, the transceiver module comprises a transmitter with a vertical cavity surface emitting laser (VCSEL) and a receiver with a PIN photodiode. Transmitter and receiver are separate within a wide temperature range and offers optimum heat dissipation and excellent electromagnetic shielding thus enabling high port densities for 10 GbE systems.

Specifications

Table 1 - Absolute Maximum Ratings

Rating	Conditions	Symbol	Min	Max	Units
Storage Ambient Temperature Range			-40	+85	°C
Powered Case Temperature Range	XFP-10G85-3M-xx	T_A	0	+70	°C
	XFP-10G85-3ME-xx		-20	+85	
	XFP-10G85-3MI-xx		-40	+85	
Operating Relative Humidity		RH	8	80	%
Supply Voltage Range @ 5.0V		VCC5	0.5	6.0	V
Supply Voltage Range @ 3.3V		VCC3	0.5	3.6	V
Open Drain VCC level		VOD		4.0	V
Static Discharge Voltage on XFI High	HBM human body model per JEDEC JESD22-A114-B			500	V
Static Discharge Voltage excluding XFI High Speed Pins	HBM human body model			2,000	V
Static Discharge Voltage on XFP Module	EN61000-4-2 Criterion B: Air Discharge Direct Contact discharge			15,000	V
				8,000	V

Table 2 - Recommended Operating Conditions

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Operating Case Temperature Range	XFP-10G85-3M-xx	T_A	0		+70	°C
	XFP-10G85-3ME-xx		-20		+85	
	XFP-10G85-3MI-xx		-40		+85	
Transceiver total Power Consumption		P_{TOT}		1.5	2.3	W
Power Supply Voltage @ 3.3V		V_{CC3}	3.135	3.300	3.465	V
Supply Current	@ V_{CC3}	I_{VCC3}		325	600	mA

Table 3-High Speed Line Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Baud Rate nominal			9.95		10.71	Gbd
Baud Rate Tolerance			-100		+100	ppm

Table 4-High Speed Line Output-DC Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Single Ended Output Impedance		Z_{SE}	40	50	60	Ω
Differential Output Impedance		Z_{OD}	80	100	120	Ω

Table 5-High Speed Line Output-AC Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Differential Output Amplitude		V_{OSPP}	340		850	mV
Output Common Mode		V_{CM}	0		3.6	V
Transition Time Low to High		t_r	24			PS
Transition Time High to Low		t_f	24			PS
Differential Output Return Loss	0.05—0.1GHz 0.1—5.5GHz 5.5—12GHz		20 8 See1			dB dB
Common Mode Output	0.1—15GHz	SCC 22	3			dB
Return Loss See 2 Loss2)						
Total Peak-to-peak Jitter		D_j			0.34	UI
Output AC Common Mode Voltage					15	mV (RMS)

1) $SDD22(dB)=8-20.66 \log_{10}(f/15.5)$ with f in GHz

2) Common mode reference impedance is 25N. Common mode return loss helps absorb reflection and noise improving EMI

Table 6 - High Speed Line Input-DC Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Differential Output Impedance		R_{IND}	80	100	120	Ω
Input AC Common Mode Input Voltage			0		25	mV (RMS)
Source to Sink DC Potential Difference		V_{CM}	0		3.6	V

Table 7- High Speed Line Input-AC Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Differential input Voltage Swing		V_{ID}	120 See 2			mV
Differential Return Loss	0.05—0.1GHz z 0.1—5.5GHz 5.5—12GHz	SDD11	20 8 See 1			dB
Common Mode Return Loss	0.1—15GHz	SCC11	3			dB
Total Jitter		T_j			TBD	UI

- 1) $SDD11(dB)=8-20.66 \log_{10}(f/15.5)$ with f in GHz
- 2) Beneath this level the signal can't meet the specification

Table 8- Optical Transmitter

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Nominal Wavelength		λ_{TRP}	840	850	860	nm
Spectral Width		$\Delta\lambda$		0.4	0.45	nm
Operating Range	62.5/125 μ m MMF, 160 MHz*km				26	m

	50/125μm MMF, 400 MHz*km				66	
	62.5/125μm MMF, 200 MHz*km				33	
	50/125μm MMF, 500 MHz*km				82	
	50/125μm MMF, 2000MHz*km				300	
Nominal Signalling Speed		f_{OPT}	9.95		10.71	Gbps
Average Launch Power		P_o	-7.3	-2.6	-1	dBm
Extinction Ratio		ER	3.5	5.5		dB
Transmitter and Dispersion Penalty		TDP			3.9	dB
Relative Intensity Noise		RIN			-128	dB/Hz

Table 9- Optical Receiver

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Center Wavelength		λ_C	840	850	860	nm
Receiver Sensitivity	BER 10^{-12} @ $2^{31} - 1$	P_{IN}		-13.5	-11.1	dBm
Stressed Receiver Sensitivity		P_{IN}			-7.5	dBm
Saturation Input Power SAT		P_{SAT}	1			dBm

1) With ideal transmitter

Note: The specified characteristics are met within the recommended range of operating conditions and under the default settings of output power and modulation amplitude. A change in setting of the optical output power influences especially the dynamic behavior of the output signal. Unless otherwise noted typical data are quoted at nominal voltages and +25 °C ambient temperature.

Host Board Connector Pinout

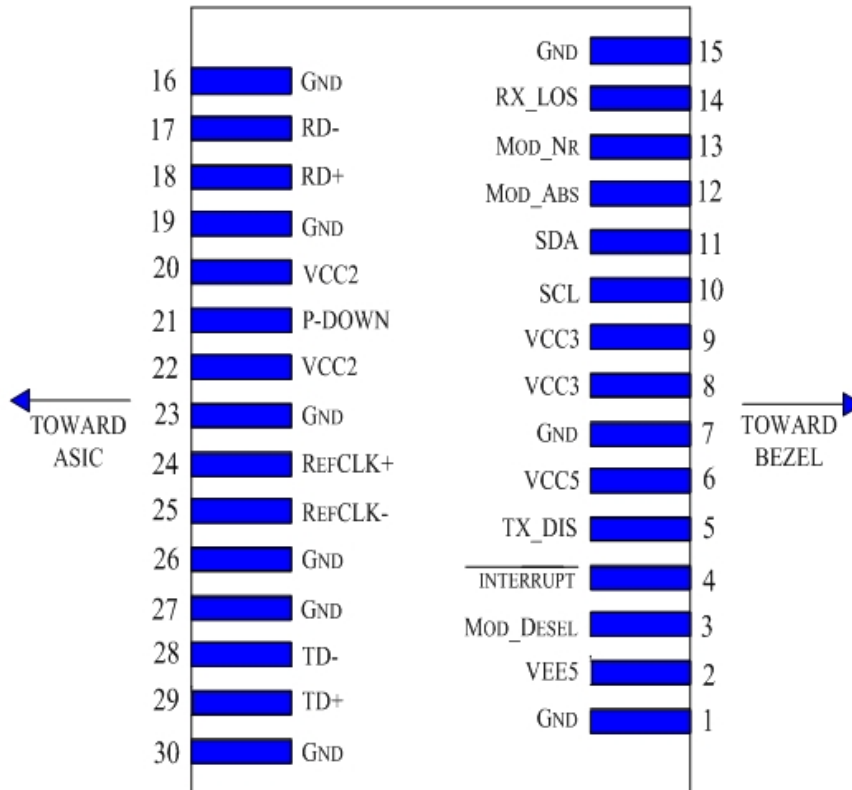


Table 10- Electrical Pin Definition

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	Mode De-select; When held low allows module to 2-wire serial interface commands	
4	LVTTTL-O	Interrupt	Interrupt(inverted); Indicates Presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTTL-I	TX_DS	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 line	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 Power Supply-Not Required	
21	LVTTTL-O	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		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	
25	PECL-I	RefCLK-	Reference Clock Inverted Input; AC coupled on the host board-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 N-10 KN to a voltage between 3.15V and 3.45V on the host board.

Digital Diagnostic Functions

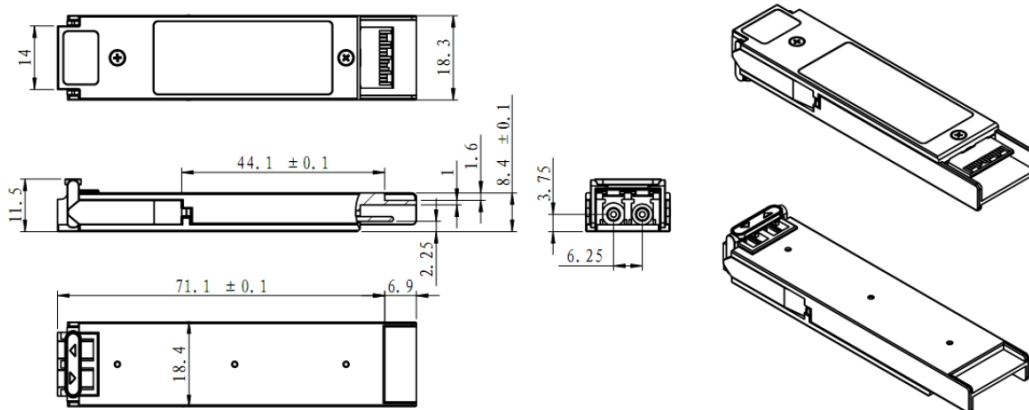
FiberStore’s Small Form Factor 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification Rev 4.5. As defined by the XFP MSA, FiberStore XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- ✧ Transceiver temperature
- ✧ Laser bias current
- ✧ Transmitted optical power
- ✧ Received optical power
- ✧ Transceiver supply voltage

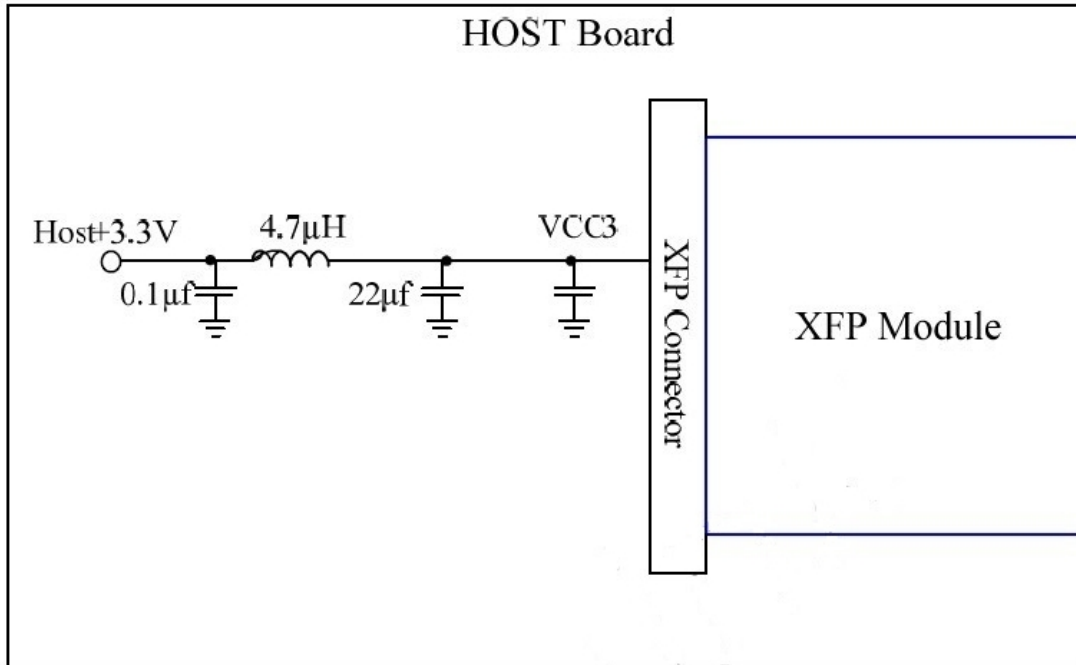
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range. The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the XFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the XFP transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory.

Mechanical Specifications

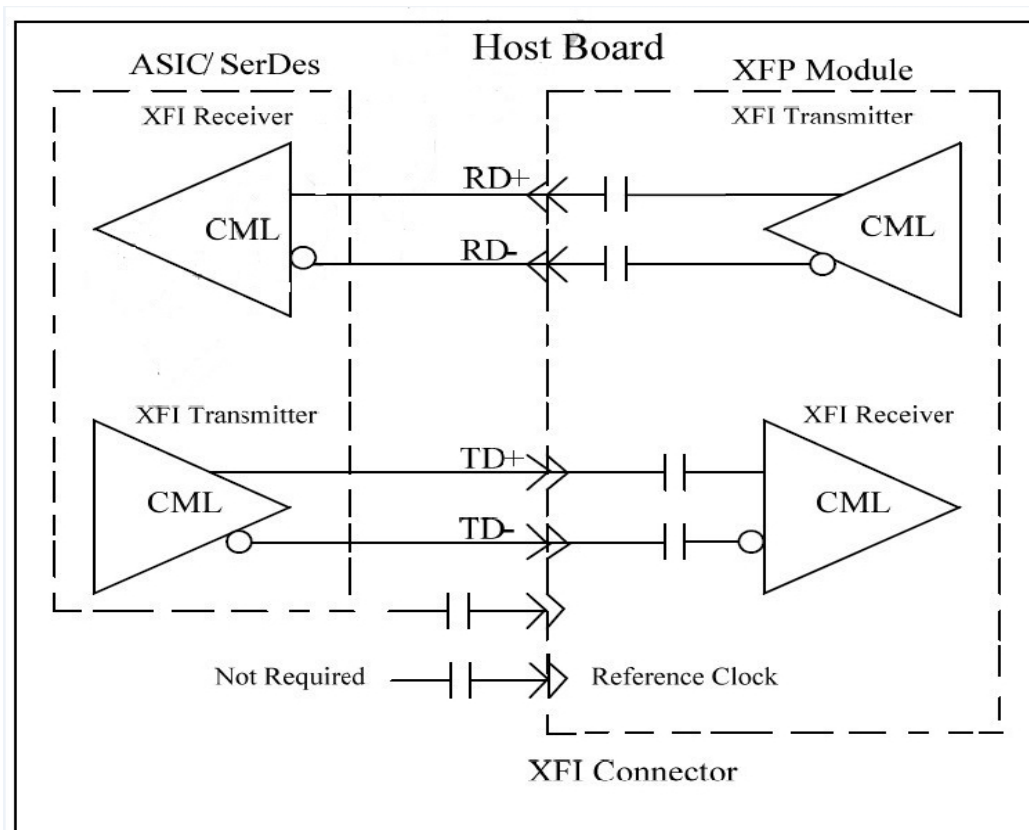
FiberStore’s XFP transceivers are compliant with the dimensions defined by the XFP Multi-Sourcing Agreement (MSA).



Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit



Ordering Information

Part No.	Data Rate (Gbps)	Wavelength (nm)	Connector Type	Transmission Distance (m)	Operating case temperature (°C)	Digital Diagnostics
XFP-10G85-3M-xx	10.3125	850	LC	Up to 300	0 to +70	Yes
XFP-10G85-3ME-xx	10.3125	850	LC	Up to 300	-20 to +85	Yes
XFP-10G85-3MI-xx	10.3125	850	LC	Up to 300	-40 to +85	Yes

Notes:

xx means compatible brand. (For example: CO= Cisco, JU=Juniper, FD=Foundry, EX=Extreme, NE=Netgear, etc.)

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