TRPBFELX

Single Fiber Bi-Directional Fast Ethernet SFP Single Mode Transceivers



Features

- ☑ *Compatible with SFP MSA*
- ☑ *Compliant with IEEE 802.3ah Draft 3.3 Fast Ethernet 100BASE-BX10 PMD Specifications*
- ☑ *1310nm and 1550nm Wavelengths*
- ☑ *Distances up to 10km over Single Mode Fiber*
- ☑ *-40°C to +85°C Operating Temperature Range Option*
- ☑ *Eye Safe (Class I Laser Safety)*
- ☑ *Duplex LC Optical Interface*
- ☑ *Hot-pluggable*
- ☑ *TX Fault & Loss of Signal Outputs*
- ☑ *TX Disable Input*
- ☑ *Single +3.3V Power Supply*

Description

The TRPBFELX modules are single fiber, bi-directional SFP transceivers that provide a quick and reliable interface for 100BASE-BX10-D/U Fast Ethernet applications.

Two types of modules are available: the 1310nm Fabry Perot laser-based transceiver (BX10-U) and the 1550nm Fabry Perot laser-based transceiver (BX10-D). All modules meet Class I Laser Safety requirements in accordance with the U.S. and international standards as described in the FDA/CDRH and IEC-60825 documents, respectively.

The TRPBFELX transceivers connect to standard 20-pad SFP connectors for hot plug capability. This allows the system designer to make configuration or maintenance changes by simply plugging in different types of transceivers without removing the power supply from the host system.

The transceivers have color-coded latches that identify the TX wavelength. The MSA compliant latch offers an easy and convenient way to release the module.

The transmitter and receiver DATA interfaces are AC-coupled internally. LV-TTL Transmitter Disable control input and Loss of Signal output interfaces are also provided.

The transceivers operate from a single +3.3V power supply over an operating case temperature range of -5°C to +70°C (“B” option) or -40°C to +85°C (“A” option). The package is made of metal.

Absolute Maximum Ratings

Parameter		Symbol	Minimum	Maximum	Units
Storage Temperature		T_{st}	- 40	+ 85	°C
Operating Case Temperature[1]	"B" option	T_{op}	- 5	+ 70	°C
	"A" option		- 40	+ 85	
Supply Voltage		V_{CC}	0	+ 4.5	V
Input Voltage		V_{in}	0	V_{CC}	V

[1]Measured on top side of SFP module at the front center vent hole of the cage.

Transmitter Performance Characteristics (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)

All parameters guaranteed only at typical data rate

Parameter		Symbol	Minimum	Typical	Maximum	Units
Operating Data Rate[1]		B	-	125	-	Mb/s
Optical Output Power[2]		P_o	- 14.0	-	- 8.0	dBm
Center Wavelength	BX10-U	λ_c	1260	1310	1360	nm
	BX10-D		1480	1550	1580	
Spectral Width (RMS)	BX10-U	$\Delta\lambda_{RMS}$	-	-	7.7	nm
	BX10-D		-	-	4.6	nm
Extinction Ratio		P_{hi}/P_{lo}	6.6	-	-	dB
Optical Modulation Amplitude		OMA	- 12.9	-	-	dBm
Optical Output Power of OFF Transmitter		P_{OFF}	-	-	- 45	dBm
Optical Return Loss Tolerance		$ORLT$	-	-	12	dB
Transmitter Dispersion Penalty		-	-	-	4.5	dB
Transmitter Output Eye		Compliant with Eye Mask Defined in IEEE 802.3ah/D3.3 Standard				

[1]Data rate ranges from 50Mb/s to 200Mb/s. However, some degradation may be incurred in overall performance.
[2]Measured average power coupled into single mode fiber. The minimum power specified is at Beginning-of-Life.

Receiver Performance Characteristics (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)

All parameters guaranteed only at typical data rate

Parameter		Symbol	Minimum	Typical	Maximum	Units
Operating Data Rate[1]		B	-	125	-	Mb/s
Receiver Sensitivity (10^{-12} BER)[2]		P_{min}	- 28.2	-	-	dBm
Receiver Sensitivity as OMA		$P_{OMA,\ min}$	- 27.1	-	-	dBm
Maximum Input Optical Power (10^{-12} BER)[2]		P_{max}	- 8.0	-	-	dBm
LOS Thresholds	Increasing Light Input	P_{los+}	-	-	- 29.2	dBm
	Decreasing Light Input	P_{los-}	- 45.0	-	-	
LOS Hysteresis[2]		-	0.5	-	-	dB
Wavelength of Operation	BX10-D	λ	1260	-	1360	nm
	BX10-U		1480	-	1600	
Receiver Reflectance		-	-	-	- 12	dB

[1]Data rate ranges from 50Mb/s to 200Mb/s. However, some degradation may be incurred in overall performance.
[2]Specified in average optical input power and measured at 125Mb/s with 2^{23}-1 PRBS, and with 1310nm & 1550nm wavelengths.

Laser Safety: All transceivers are Class I Laser products per FDA/CDRH and IEC-60825 standards. They must be operated under specified operating conditions.

Optical Communication Products, Inc.
DATE OF MANUFACTURE:

MANUFACTURED IN THE USA
This product complies with
21 CFR 1040.10 and 1040.11
Meets Class I Laser Safety Requirements

Transmitter Electrical Interface (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Input Voltage Swing (TD+ & TD-)[1]	V_{PP-DIF}	0.25	-	2.4	V
Input HIGH Voltage (TX Disable)[2]	V_{IH}	2.0	-	V_{CC}	V
Input LOW Voltage (TX Disable)[2]	V_{IL}	0	-	0.8	V
Output HIGH Voltage (TX Fault)[3]	V_{OH}	2.0	-	V_{CC} + 0.3	V
Output LOW Voltage (TX Fault)[3]	V_{OL}	0	-	0.8	V

[1]Differential peak-to-peak voltage.
[2]There is an internal 4.7 to 10kΩ pull-up resistor to *VccT*.
[3]Open collector compatible, 4.7 to 10kΩ pull-up resistor to *Vcc* (Host Supply Voltage).

Receiver Electrical Interface (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Output Voltage Swing (RD+ & RD-)[1]	V_{PP-DIF}	0.6	-	2.0	V
Output HIGH Voltage (LOS)[2]	V_{OH}	2.0	-	V_{CC} + 0.3	V
Output LOW Voltage (LOS)[2]	V_{OL}	0	-	0.5	V

[1]Differential peak-to-peak voltage across external 100Ω load.
[2]Open collector compatible, 4.7 to 10kΩ pull-up resistor to *Vcc* (Host Supply Voltage).

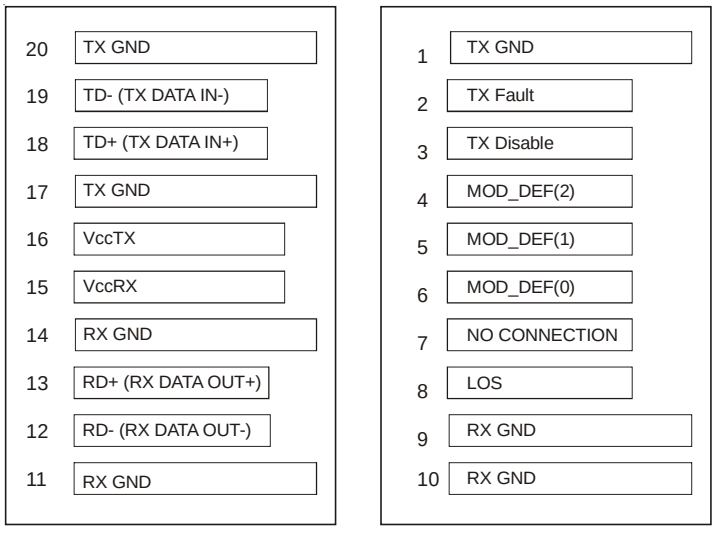
Electrical Power Supply Characteristics (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Voltage	*Vcc*	3.13	3.3	3.47	V
Supply Current	*Icc*	-	175	245	mA

Module Definition

MOD_DEF(0) pin 6	MOD_DEF(1) pin 5	MOD_DEF(2) pin 4	Interpretation by Host
TTL LOW	SCL	SDA	Serial module definition protocol

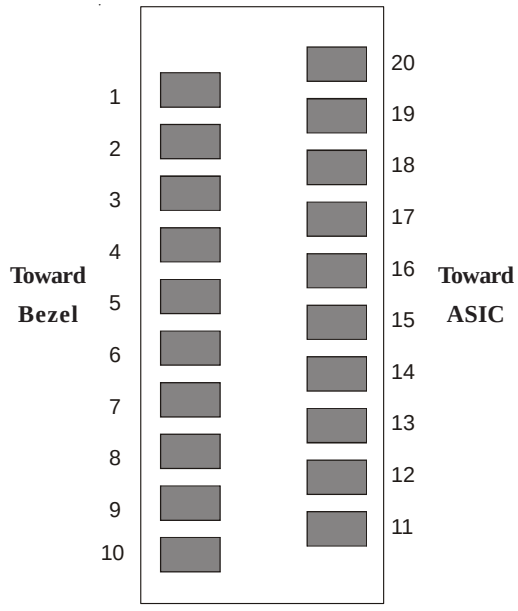
Electrical Pad Layout



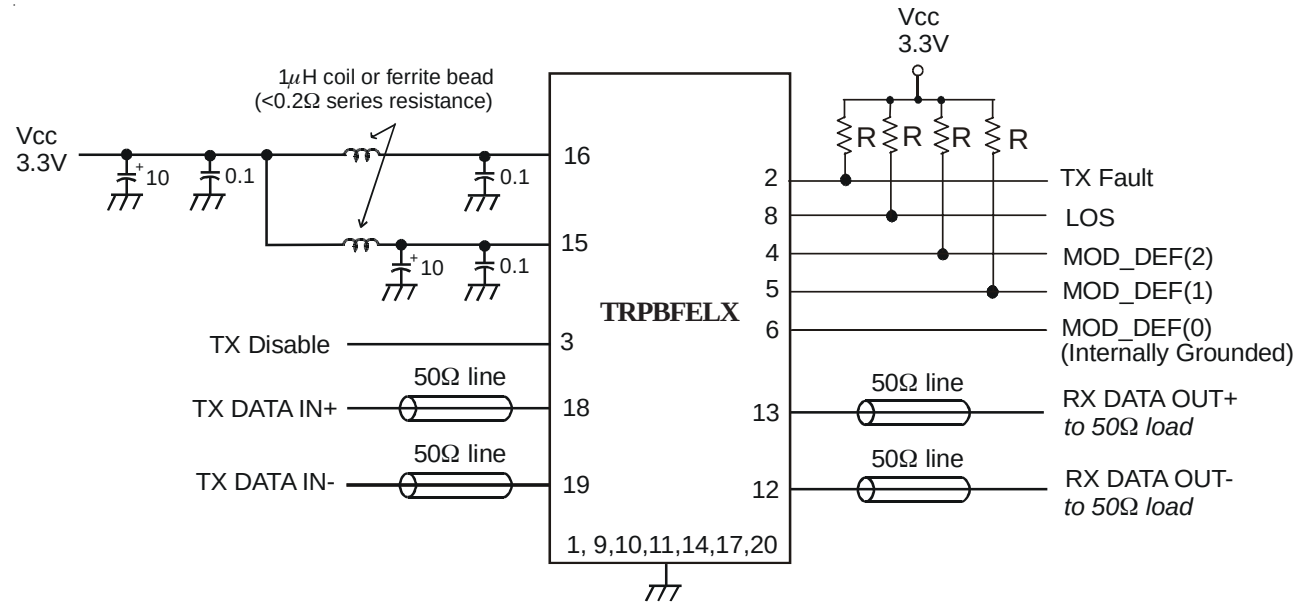
Top of Board

Bottom of Board (as viewed thru top of board)

Host Board Connector Pad Layout



Example of SFP host board schematic



R: 4.7 to 10kΩ

Application Notes

Electrical interface: All signal interfaces are compliant with the SFP MSA specification. The high speed DATA interface is differential AC-coupled internally with 1μF and can be directly connected to a 3.3V SERDES IC. All low speed control and sense output signals are open collector TTL compatible and should be pulled up with a 4.7 - 10kΩ resistor on the host board.

Loss of Signal (LOS): The Loss of Signal circuit monitors the level of the incoming optical signal and generates a logic HIGH when an insufficient photocurrent is produced.

TX Fault: The output indicates LOW when the transmitter is operating normally, and HIGH with a laser fault including laser end-of-life. TX Fault is an open collector/drain output and should be pulled up with a 4.7 - 10kΩ resistor on the host board. TX Fault is non-latching (automatically deasserts when fault goes away).

TX Disable: When the TX Disable pin is at logic HIGH, the transmitter optical output is disabled (less than -45dBm).

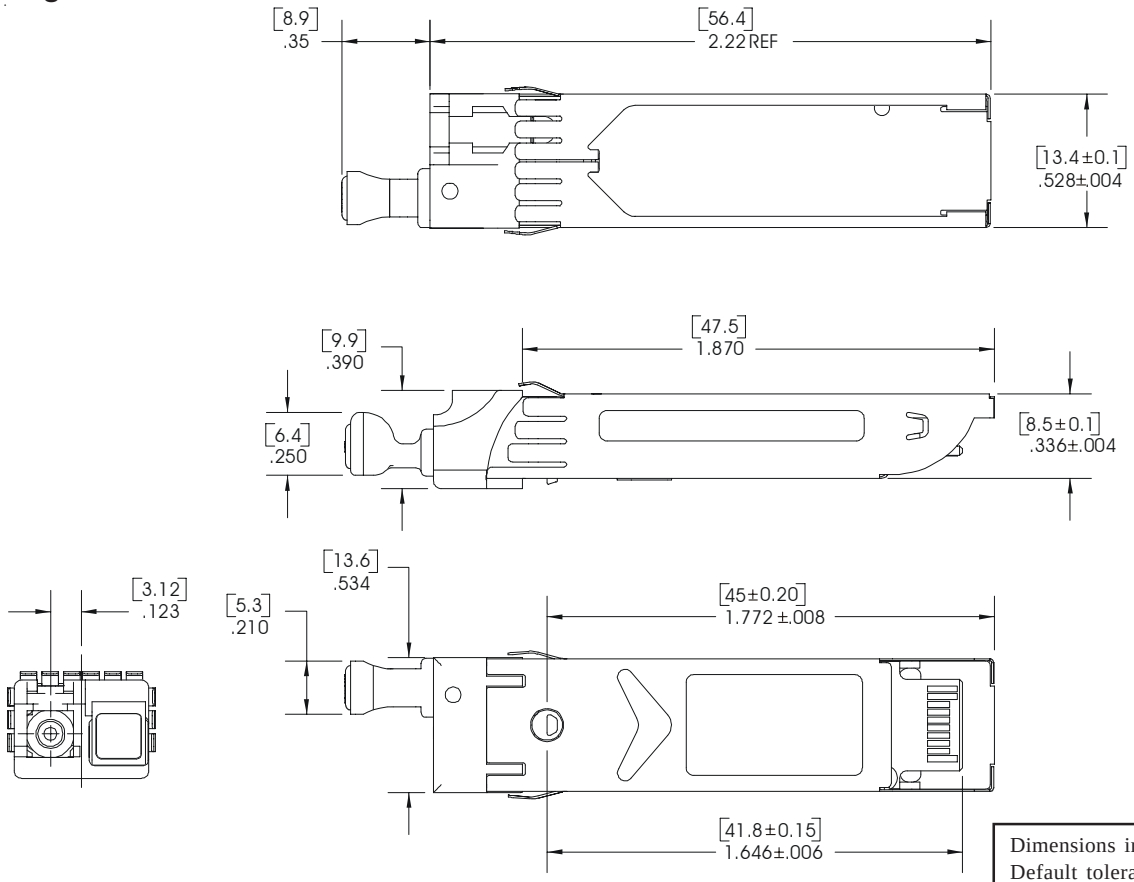
Serial Identification: The module definition of SFP is indicated by the three module definition pins, MOD_DEF(0), MOD_DEF(1) and MOD_DEF(2). Upon power up, MOD_DEF(1:2) appear as NC (no connection), and MOD_DEF(0) is TTL LOW. When the host system detects this condition, it activates the serial protocol (standard two-wire I^2C serial interface) and generates the serial clock signal (SCL). The negative edge clocks data from the SFP EEPROM.

The serial data signal (SDA) is for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation.

The data transfer protocol and the details of the mandatory and vendor specific data structures are defined in the SFP MSA. EEPROM ID is per SFF-8472, Rev. 9.4.

Power supply and grounding: The power supply line should be well-filtered. All 0.1μF power supply bypass capacitors should be as close to the transceiver module as possible.

Package Outline



Dimensions in inches [mm]
Default tolerances:
.xxx = ± .005", .xx = ± .01"

Ordering Information

Model Name	Temperature Range	Latch Color	Typical Wavelength	
			Tx	Rx
TRPBFELXTBOSH	- 5°C to +70°C	Orange	1310nm	1550nm
TRPBFELXTBYS5	- 5°C to +70°C	Yellow	1550nm	1310nm
TRPBFELXTAOSH	- 40°C to +85°C	Orange	1310nm	1550nm
TRPBFELXTAYS5	- 40°C to +85°C	Yellow	1550nm	1310nm

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