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1.25G SFP BIDI 1310nm/1550nm Transceiver

TVASFPBD-X-X

Features

- Compliant with IEEE Std 802.3-2005,1000BASE-BX-U
- Compliant with SFF-8074i and SFF-8472
- Compliant with SFP MSA Specification
- Digital Diagnostic Monitoring available
- Uncooled 1310nm Fabry-Perot (FP) Laser
- 1.0625Gb/s and 1.25Gb/s bi-directional data links
- Up to 20km on 9/125μm SMF
- Simplex LC connector compliant
- Single +3.3V DC power supply
- Hot-pluggable SFP footprint
- Class 1 laser safety certified
- Low power dissipation
- Operating temperature Options：+0 ~ +70°C
- RoHS compliance

Applications

- 1000BASE-BX-U
- Gigabit Ethernet
- 1.0625Gb/s Fiber Channel
- Other Optical Links

Compliance

- Compliant with SFP MSA/FC-PI-4 V8.0
- Compliant with SFF-8472 v10.5
- RoHS compliance

Description

TVASFPBD-X-X is a high performance, cost effective module, which is optimized for 1000BASE and FC, and a transmission distance up to 20km. The transceiver consists of two sections:
The transmitter of TVASFPBD-X-A section incorporates a 1310nm FP driver.
The transmitter of TVASFPBD-X-B section incorporates a 1550nm DFB driver.
The receiver section consists of a PIN photodiode integrated with a transimpedance preamplifier (TIA). The module is hot pluggable into the 20-pin connector.

The high-speed electrical interface is based on low voltage logic, with nominal 100 Ohms differential impedance and AC coupled in the module. The optical output can be disabled by LVTTL logic high-level input of TX_DIS. Loss of signal (RX_LOS) output is provided to indicate the loss of an input optical signal of receiver.

Ordering Information

Part No.	Specification								
	Pack	Rate	Tx	Pout	Rx	Sen	Temp	Reach	Others
TVASFPBD-1-A	SFP	1.25G	1310nm FP	-9 ~ -3dBm	PIN	<-23dBm	0 ~ 70℃	10km	DDM/RoHS
TVASFPBD-1-B	SFP	1.25G	1550nm DFB	-9 ~ -3dBm	PIN	<-23dBm	0 ~ 70℃	10km	DDM/RoHS
TVASFPBD-2-A	SFP	1.25G	1310nm FP	-9 ~ -3dBm	PIN	<-23dBm	0 ~ 70℃	20km	DDM/RoHS
TVASFPBD-2-B	SFP	1.25G	1550nm DFB	-9 ~ -3dBm	PIN	<-23dBm	0 ~ 70℃	20km	DDM/RoHS

About BIDI optical module: BIDI optical module is a single fiber bi-directional optical module, using WDM technology, transmitting and receiving two different directions of the center wavelength, to achieve bi-directional transmission of optical signals on a fiber. Optical modules generally have two ports: transmitting port (TX) and receiving port (RX), while BIDI optical module has only one port, through the filter in the optical module for filtering, while completing the transmission of one wavelength optical signal and the reception of another wavelength optical signal (BIDI optical module wavelengths are combined form). Therefore, BIDI optical module must be used in pairs (A and B), as its biggest advantage is to save fiber resources.

Specification

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	+85	℃
Supply Voltage	V_{CC3}	3.1	3.6	V
Relative Humidity(Non-condensing)	RH	5	85	%
RX Input Average Power	Pmax	-	-3	dBm

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Temperature	T_C	0		70	℃
Power Supply Voltage	V_{CC3}	3.135	3.3	3.465	V
	I_{CC3}	–	–	300	mA
Power Dissipation	P_D	–	–	1	W
Data Rate	–	–	1.25/1.0625	–	Gbps
Transmission Distance	–	–	–	10、20	km

Transmitter Operating Characteristic: Optical, Electrical

Parameter		Symbol	Min.	Typical	Max.	Unit	Note
Center Wavelength		λ_C	1260	1310	1360	nm	C08
Center Wavelength		λ_C	1520	1550	1580	nm	C09
Laser Off Power		Poff	-	-	-30	dBm	
Average Optical Power		Pavg	-9	-	-3	dBm	10km/20km
RMS spectral width		–	–	–	4	nm	C08
Spectral Width (-20dB)		–	–	–	1	nm	C09
Extinction Ratio		ER	9	-	-	dB	
Operating Data Rate		–	–	1.25/ 1.0625	–	Gbps	
Optical Eye Diagram		IEEE Std 802.3-2005 1000BASE-BX-U compatible					
Tx Input Diff Swing		VI	300	–	1800	mV	
Tx_Disable	Disable	–	2	–	VCC	V	
	Enable	–	VEE	–	VEE+ 0.8	V	

Receiver Operating Characteristic: Optical, Electrical						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Note**
Center Wavelength	λr	1260	1310	1360	nm	Rx1310nm
Center Wavelength	λr	1520	1550	1580	nm	Rx1550nm
Receiver Sensitivity (OMA)	–	–	–	-23	dBm	Note1
LOS Assert	LOS A	-35	–	–	dBm	
LOS Dessert	LOS D	–	–	-24	dBm	
LOS Hysteresis	LOSH	0.5	–	6	dB	
Overload	Pin	-3	–	–	dBm	
Return Loss of Receiver	–	12	–	–	dB	
Operating Data Rate	–	–	1.25/ 1.0625	–	Gbps	
Rx Output Diff Swing	Vo	400	–	1800	mV	

Note1:Measured at all data rates specified in data rate table with ER=9 dB,2^7-1 PRBS data pattern,BER<1E-12

Control and Status I/O Timing Characteristics					
Parameter	**Symbol**	**Min.**	**Max.**	**Unit**	**Note**
TX Disable Assert Time	t_off	–	100	μs	Note1
TX Disable Negate Time	t_on	–	2	ms	Note2
Time to initialize including reset of TX_Fault	t_init	–	300	ms	Note3
TX Fault Assert Time	t_fault	–	1	ms	Note4
Tx_Fault Reset	t_reset	10	–	μs	Note5
LOS Assert Time	t_loss_on	–	100	μs	Note6
LOS Deassert Time	t_loss_off	–	100	μs	Note7
Serial ID Clock Rate	f_serial_clock	100	400	kHz	Note8

Notes:

[1] Time from rising edge of TX Disable to when the optical output falls below 10% of nominal

[2] Time from falling edge of TX Disable to when the modulated optical output rises above 90% of nominal

[3] From power on or negation of TX Fault using TX Disable

[4] Time from fault to TX fault on

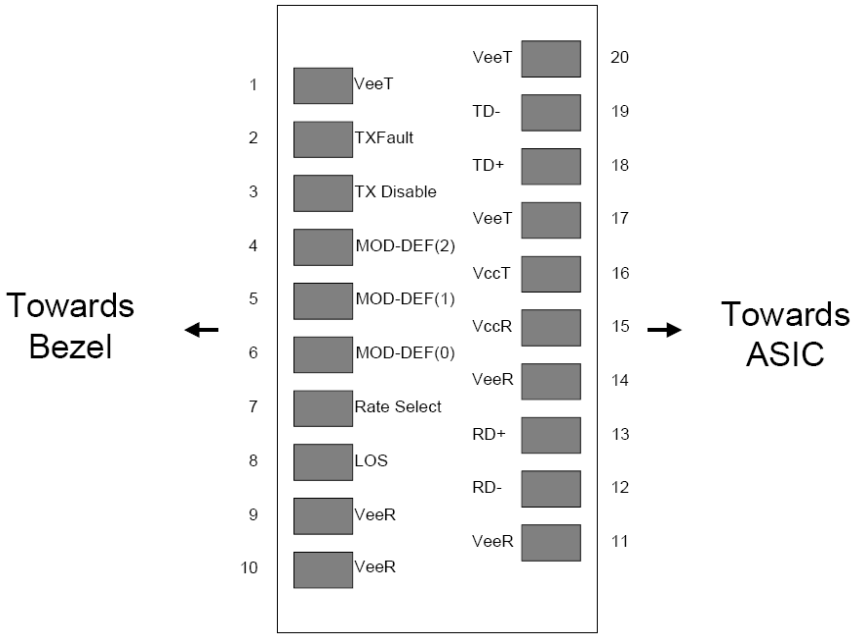
[5] Time TX Disable must be held high to reset TX_fault

[6] Time from LOS state to RX LOS assert

[7] Time from non-LOS state to RX LOS deassert.

[8] Time from rising or falling edge of Rate Select input until receiver bandwidth is in conformance with appropriate specification

Pin-Out Definition



Pin Assignment

Pin	Logic	Symbol	Name/Description	Note
1		VeeT	Module Transmitter Ground	Note1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	Note2
3	LVTTL-I	TX_Disable	Transmitter Disable; Turns off transmitter laser output	Note3
4	LVTTL-I/O	SDA	2-wire Serial Interface Data Line (Same as MOD-DEF2 as defined in the INF-8074i)	Note4
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock (Same as MOD-DEF1 as defined in the INF-8074i)	Note4
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	Note5
7	LVTTL-I	RS	Rate Select, optionally controls SFP module receiver. When High input data rate 10.3GBd and when LOW input data rate 1.25GBd.	Note6
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication (In FC designated as RX_LOS, in SONET designated as LOS, and in Ethernet designated at Signal Detect)	Note2
9		VeeR	Module Receiver Ground	Note1
10		VeeR	Module Receiver Ground	Note1
11		VeeR	Module Receiver Ground	Note1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	

14		VeeR	Module Receiver Ground	Note1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Transmitter 3.3 V Supply	
17		VeeT	Module Transmitter Ground	Note1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	Note1

Notes:

[1] The module signal ground pins, VeeR and VeeT, shall be isolated from the module case.

[2] This pin is an open collector/drain output pin and shall be pulled up with 4.7k-10kohms to Host_Vcc on the host board. Pull ups can be connected to multiple power supplies, however the host board design shall ensure that no module pin has voltage exceeding module VccT/R + 0.5 V.

[3] This pin is an open collector/drain input pin and shall be pulled up with 4.7k-10kohms to VccT in the module.

[4] See sff-8472 4.2 2-wire Electrical Specifications.

[5] This pin shall be pulled up with 4.7k-10kohms to Host_Vcc on the host board.

[6] If implementing SFF-8079 pin 7 are used for RS0.

Block Diagram of Transceiver

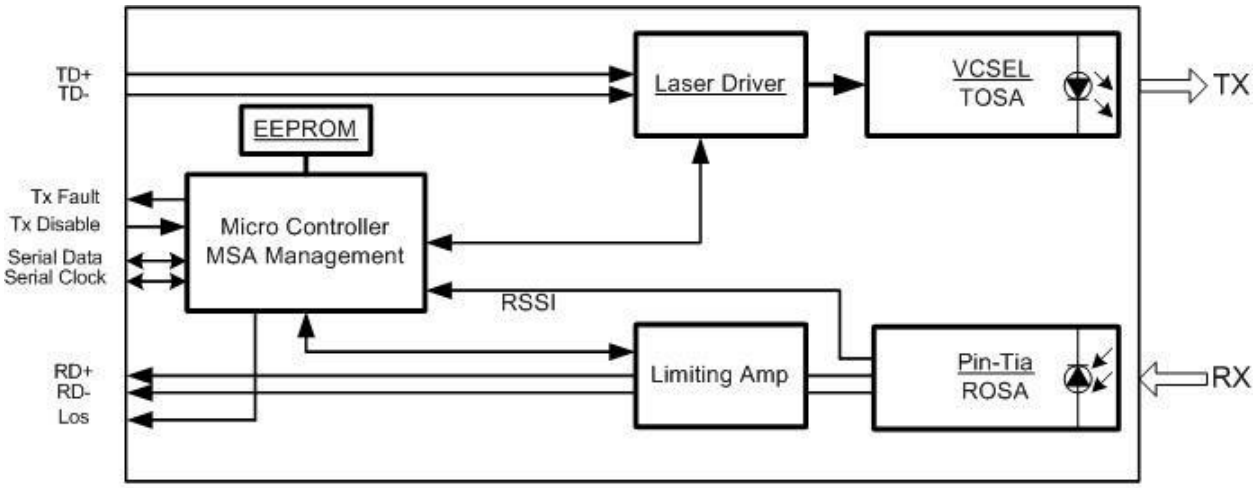


Figure2

Transmitter Section

The transmitter converts 1.25Gbit/s serial PECL or CML electrical data into serial optical data compliant with the 1000BASE standard and FC. An open collector compatible Transmit Disable (Tx_Dis) is provided. A logic “1,” or no connection on this pin will disable the laser from transmitting. A logic “0” on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault (Tx_Fault) is provided. TX_Fault is a module output contact that when high, indicates that the module transmitter has detected a fault

condition related to laser operation or safety. The TX_Fault output contact is an open drain/collector and shall be pulled up to the Vcc_Host in the host with a resistor in the range 4.7-10 kΩ. TX_Disable is a module input contact. When TX_Disable is asserted high or left open, the SFP module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor

Receiver Section

The receiver converts 1.25Gbit/s serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx_LOS contact is an open drain/collector output and shall be pulled up to Vcc_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. The Rx_LOS signal is intended as a preliminary indication to the system in which the SFP is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

Recommended Interface Circuit

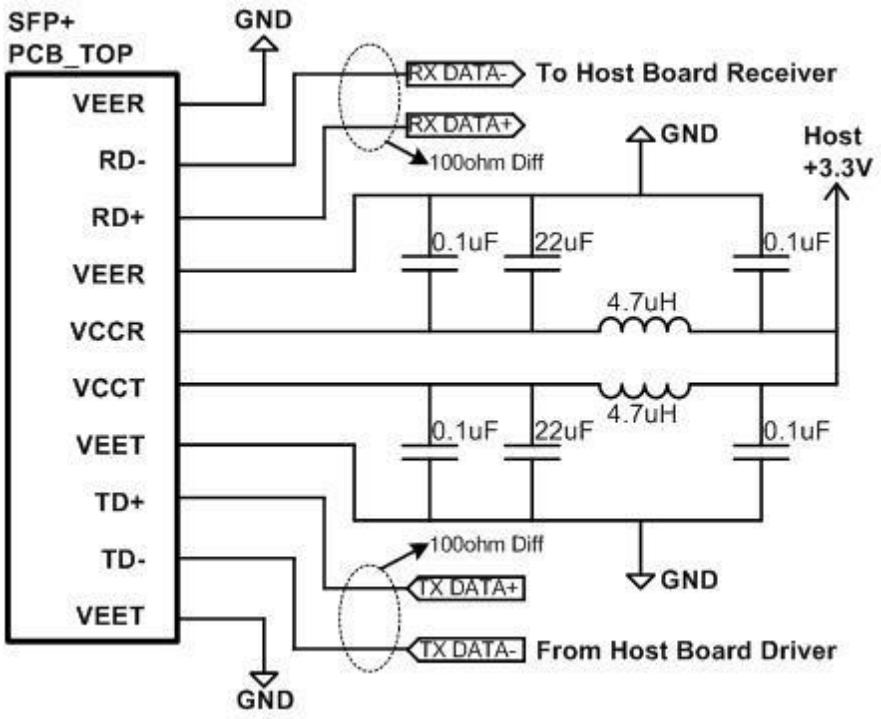
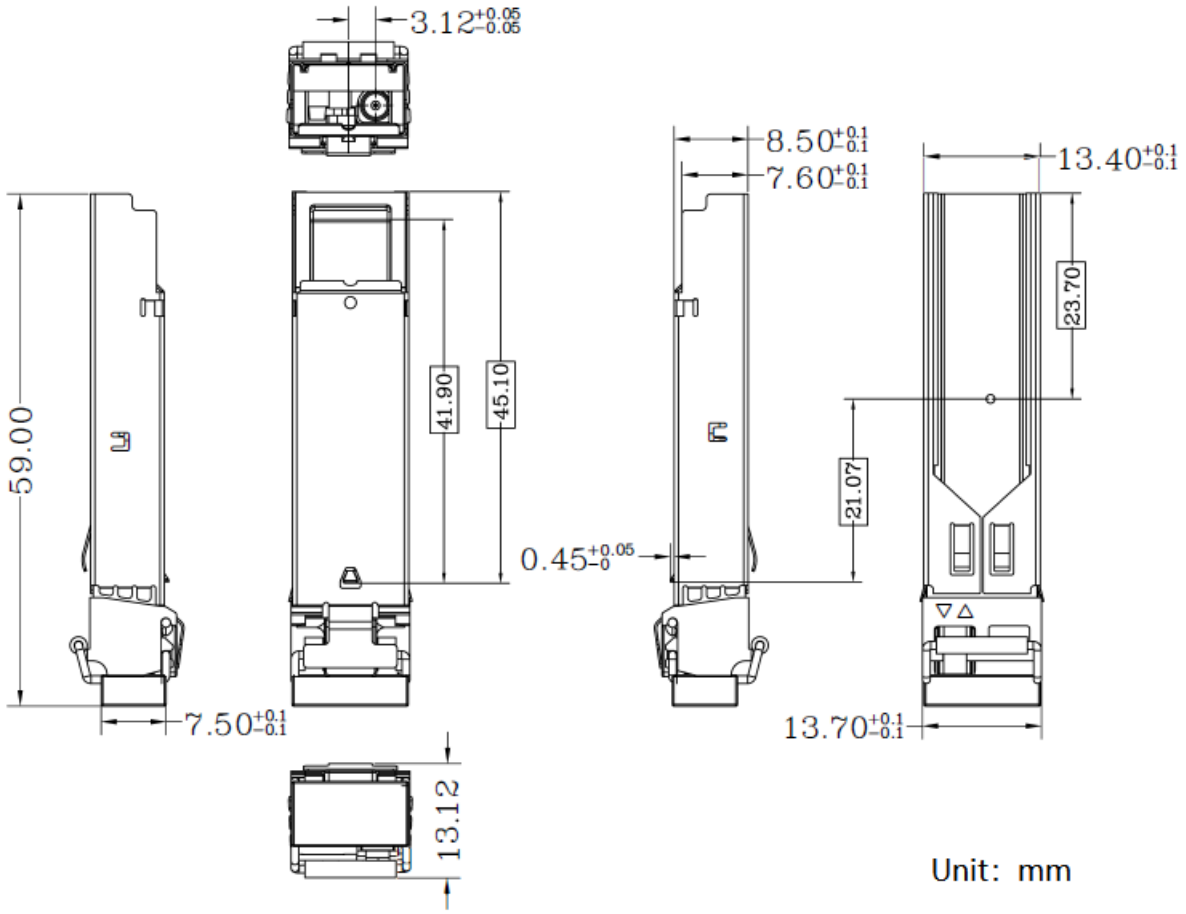


Figure3

Mechanical Specifications



Digital Diagnostic Memory Map