

**TITLE****Transceiver 1G SFP EX****1. SCOPE**

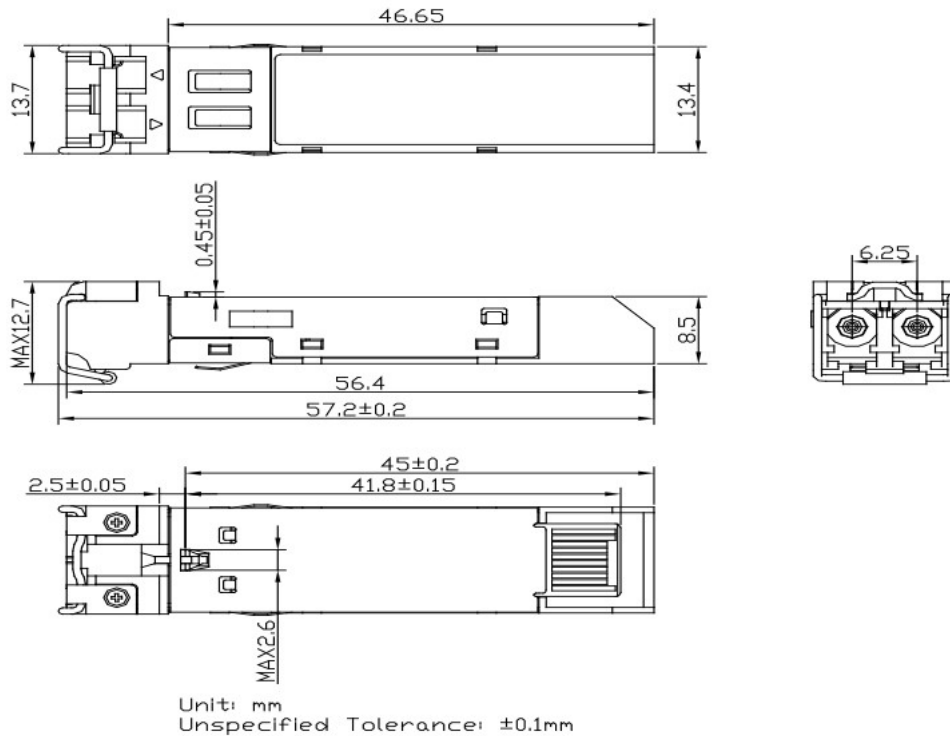
The ZFTBEXB1550A1ST family of Small Form Factor Pluggable (SFP) transceiver module is specifically designed for the high performance integrated duplex data link over single-mode. These transceiver modules are compliant with the SFP Multisource Agreement (MSA). With the hot pluggability, these modules offer an easy way to be installed into SFP MSA compliant ports at any time without the interruption of the host equipments operating online. The 1G EX SFP transceivers using a long wavelength (1550nm) DFB laser diode enable data transmission up to 40km on a single-mode (9/125 $\mu$ m) optical fiber.

**2. PRODUCT FEATURES**

- Up to 1.25Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- Uncooled 1310nm DFB laser transmitter
- Duplex LC connector
- RoHS compliant and Lead Free
- Up to 40 km on 9/125 $\mu$ m SMF
- Metal enclosure, for lower EMI
- Single 3.3V power supply
- Low power dissipation < 1W typical
- Extended operating temperature range: -10°C to 70°C

**3. PRODUCT DESCRIPTION****3.1 PRODUCT NAME AND SERIES NUMBER(S)****SFP 1G EX Transceiver**

Part Number	Data Rate	Wavelength (nm)	Distance	Media	Power (dBm)	Sen. (dBm)	Connector	Tem.
ZFTBEXB1550A1ST	1G	1550	40 km	SMF	-5~0	-25	LC	C

**TITLE****Transceiver 1G SFP EX****3.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKING****4. APPLICABLE DOCUMENTS AND SPECIFICATIONS**

- Compliant with SFP MSA
- 1.0625Gbps Fibre Channel FC-PI
- 100-SM-LC-L compliant
- 1.25Gbps IEEE 802.3 1000BASE-EX

**5. QUALIFICATION**

- Electrostatic Discharge (ESD) to the Electrical Pins
- Electrostatic Discharge (ESD) to the Duplex LC Receptacle
- RoHS compliance

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**6. Absolute Maximum Ratings & Recommended Operating Conditions**

**Absolute Maximum Ratings**

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	+85	°C
Supply Voltage	VCC3	3.1	3.5	V
Relative Humidity(Non-condensing)	RH	5	95	%

**Recommended Operating Conditions**

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature(I-temp)	TI	-40		85	°C
Operating Case Temperature(C-temp)	TC	0		70	°C
Power Supply Voltage	VCC	3.1	3.3	3.5	V
Data Rate			1.25		Gbps
Transmission Distance	SMF			40	km

**Transmitter Operating Characteristic-Optical, Electrical**

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Center Wavelength	$\lambda_C$	1530	1550	1570	nm	Note1
Laser Off Power	Poff	-	-	-30	dBm	
Average Optical Power	Pavg	-5	-	0	dBm	
RMS spectral width				4	nm	
Extinction Ratio	ER	9	-	-	dB	
Transmitter Dispersion Penalty	TDP	-	-	1	dB	
Operating Data Rate			1.25		Gbps	
Optical Eye Mask Margin		10			%	
Tx Input Diff Swing	VI	300		2200	mV	

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Tx_Disable	Disable		2		VCC	V	
	Enable		VEE		VEE+ 0.8	V	

Notes:

1. Average optical power shall be measured using the methods specified in TIA/EIA-455-95.

Receiver Operating Characteristic-Optical, Electrical						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Center Wavelength	$\lambda_r$	1530	1550	1570	nm	
Receiver Sensitivity (OMA)				-25	dBm	1
LOS Assert	LOS A	-35		-	dBm	
LOS Dessert	LOS D			-21	dBm	
LOS Hysteresis	LOSH	0.5		6	dB	
Overload	Pin	0			dBm	
Return Loss of Receiver		12			dB	
Operating Data Rate			1.25		Gbps	
Rx Output Diff Swing	Vo	500		1200	mV	

Notes:

1. Receiver sensitivity is informative. shall be measured with conformance test signal for BER =  $1 \times 10^{-12}$ .

Control and Status I/O Timing Characteristics					
Parameter	Symbol	Min.	Max.	Unit	Note
TX Disable Assert Time	t_off		100	$\mu$ s	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		$\mu$ s	Note5
LOS Assert Time	t_loss_on		100	$\mu$ s	Note6



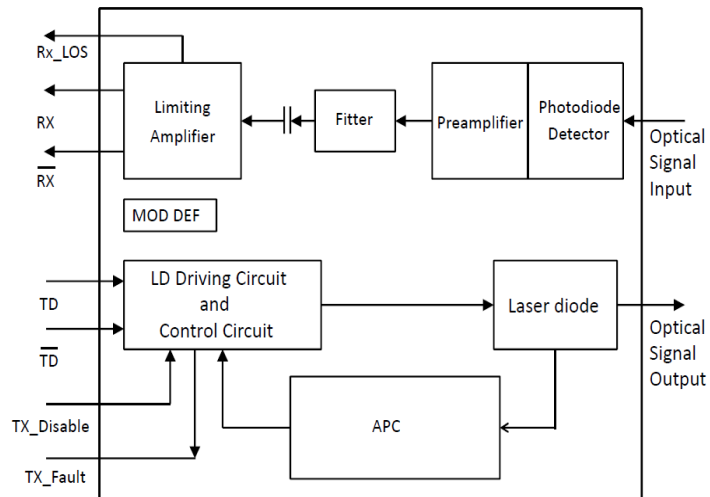
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Pin	Logic	Symbol	Name/Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	3
3	LVTTL-I	TX_Disable	Transmitter Disable; Turns off transmitter laser output	3
4	LVTTL-I/O	SDA	2-wire Serial Interface Data Line (Same as MOD-DEF2 as defined in the INF-8074i)	3
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock (Same as MOD-DEF1 as defined in the INF-8074i)	3
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	3
7	LVTTL-I	RS	Rate select, optionally controls SFP module receiver. When High input data rate 10.3Gb/s and when LOW data-rate 1.25Gb/s.	3
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 as Signal Detect)	3
9		VeeR	Module Receiver Ground	1
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	3
13	CML-O	RD+	Receiver Non-Inverted Data Output	3
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	2
16		VccT	Module Transmitter 3.3 V Supply	2
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	3
19	CML-I	TD-	Transmitter Inverted Data Input	3
20		VeeT	Module Transmitter Ground	

**Block Diagram of Transceiver**

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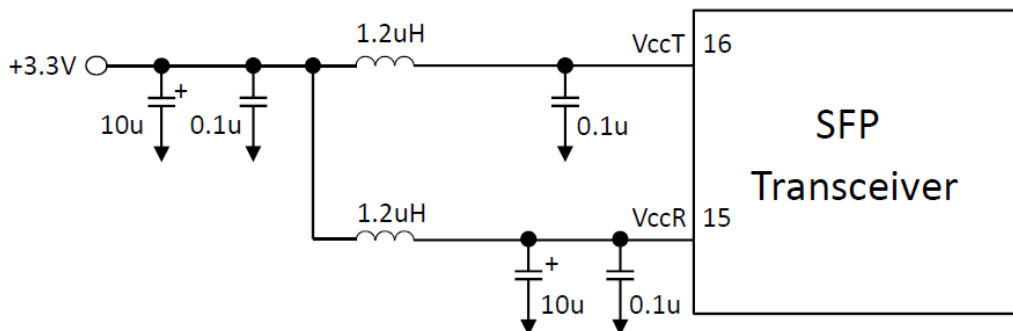
**Block Diagram of Transceiver**

**TITLE****Transceiver 1G SFP EX*****Transmitter Section***

The transmitter converts 1.25Gbit/s serial PECL or CML electrical data into serial optical data compliant with the 1G BASE standard. 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**