

TITLE**1Gbps SFP Bi-Directional Transceiver, 20km Reach
1550nm TX / 1310 nm RX****1. SCOPE**

The ZFTBBCB5531A2ST 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 plug ability, these modules offer an easy way to be installed into SFP MSA compliant ports at any time without the interruption of the host equipment operating online. The 1G BiDi SFP transceivers using a long wavelength (1550nm) DFB laser diode enable data transmission up to 20km on a single-mode (9/125µm) optical fiber.

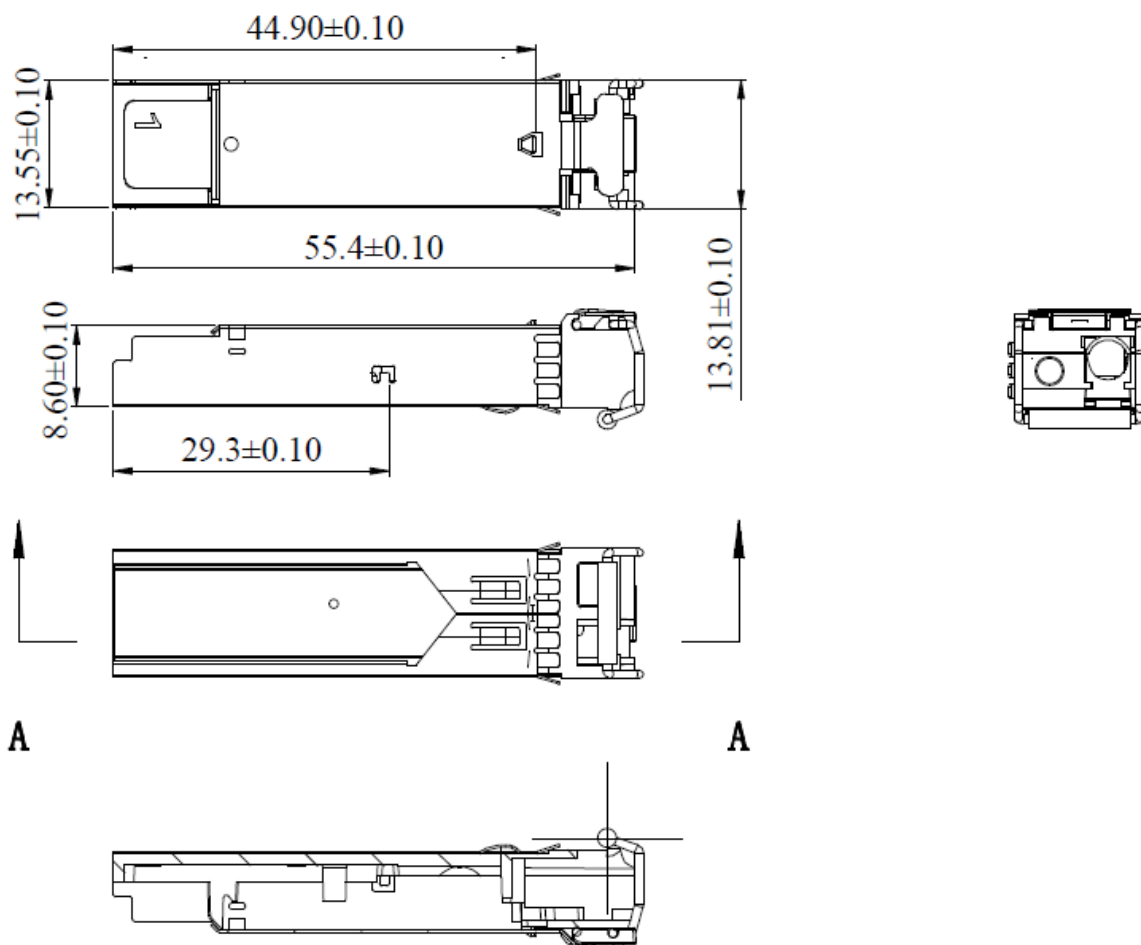
2. PRODUCT DESCRIPTION**2.1 PRODUCT NAME AND SERIES NUMBER(S)****SFP 1G BiDi Transceiver**

| Part Number | Data Rate | Wavelength (nm) | Distance | Media | Power (dBm) | Sen. (dBm) | Connector | Tem. |
|-----------------|-----------|-----------------|----------|-------|-------------|------------|-----------|------|
| ZFTBBCB5531A2ST | 1G | 1550 | 20 km | SMF | -9~-3 | -23 | LC | C |

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2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKING



3. APPLICABLE DOCUMENTS AND SPECIFICATIONS

- Compliant with SFP MSA
- SONET OC-24-LR-1

4. QUALIFICATION

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

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5. Absolute Maximum Ratings & Recommended Operating Conditions

Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit |
|-----------------------------------|--------|------|------|------|
| Storage Temperature | TS | -40 | +85 | °C |
| Supply Voltage | VCC3 | -0.5 | 4 | V |
| Relative Humidity(Non-condensing) | RH | 5 | 95 | % |

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|------------------------------------|--------|------|---------|------|------|
| Operating Case Temperature(I-temp) | Tl | -40 | | 85 | °C |
| Operating Case Temperature(I-temp) | Tc | 0 | | 70 | °C |
| Power Supply Voltage | VCC3 | 3.1 | 3.3 | 3.5 | V |
| Power Supply Current | Icc | | | 300 | mA |
| Data Rate | | | 1.25 | | Gbps |
| Transmission Distance | SMF | | | 20 | km |

Transmitter Operating Characteristic-Optical, Electrical

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|----------------------------------|-------------|------|---------|------|------|-------|
| Center Wavelength | λ_C | 1530 | 1550 | 1570 | nm | Note1 |
| Laser Off Power | Poff | - | - | -30 | dBm | |
| Average Optical Power | Pavg | -9 | - | -3 | dBm | |
| RMS spectral width | | | | 4 | nm | |
| Optical Rise/Fall Time (20%~80%) | tr/tf | | | 0.26 | ns | |
| Extinction Ratio | ER | 9 | - | 0 | dB | |
| Transmitter Dispersion Penalty | TDP | - | - | 1 | dB | |
| Operating Data Rate | | | 1.25 | | Gbps | |

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| | | | | | | | |
|-------------------------|---------|----|-----|--|----------|----|--|
| Optical Eye Mask Margin | | | 5 | | | % | |
| Tx Input Diff Swing | | VI | 400 | | 1800 | mV | |
| 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 | λ_r | 1290 | 1310 | 1330 | nm | |
| Receiver Sensitivity (OMA) | | | | -23 | dBm | 1 |
| LOS Assert | LOS A | -30 | | - | 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 | | Gbps | |
| Rx Output Diff Swing | Vo | 400 | | 1800 | mV | |

Notes:

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

Control and Status I/O Timing Characteristics

| Parameter | Symbol | Min. | Max. | Unit | Note |
|------------------------------------------------|--------|------|------|---------|-------|
| TX Disable Assert Time | t_off | | 100 | μ s | Note1 |
| TX Disable Negate Time | t_on | | 2 | ms | Note2 |
| Time to initialize including reset of TX_Fault | t_init | | 300 | ms | Note3 |

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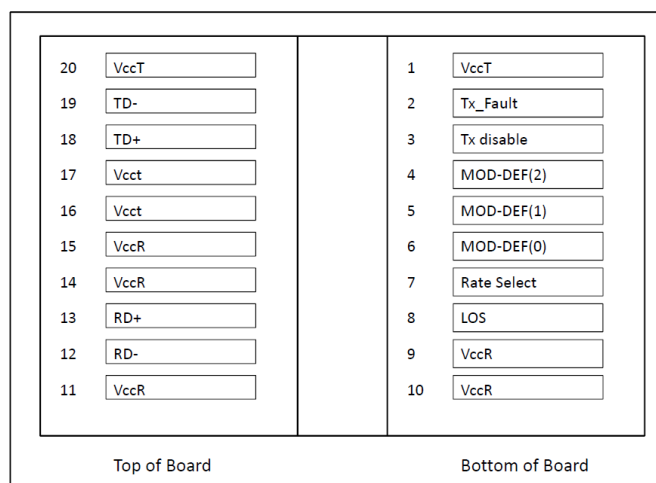
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| | | | | | |
|----------------------|----------------|-----|-----|-----|-------|
| TX Fault Assert Time | t_fault | | 1 | ms | Note4 |
| Tx_Fault Reset | t_reset | 10 | | µs | Note5 |
| LOS Assert Time | t_loss_on | | 100 | µs | Note6 |
| LOS Deassert Time | t_loss_off | | 100 | µs | Note7 |
| Serial ID Clock Rate | f_serial_clock | 100 | 400 | kHz | |

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 TXDisable
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

6. Pin-out Definition:



Pin Definitions

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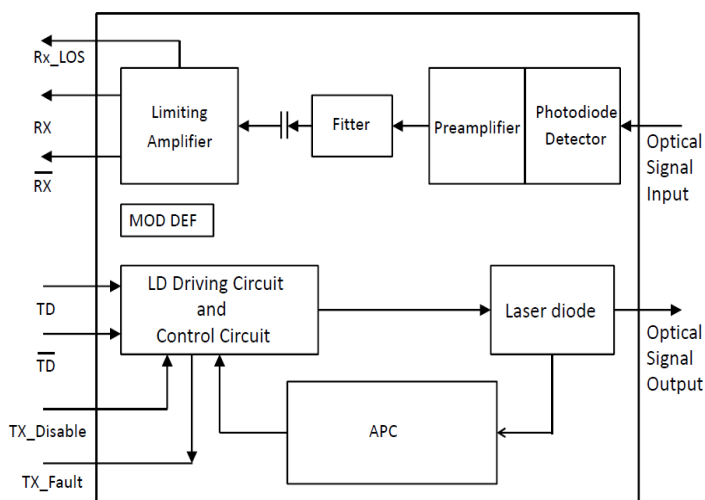
Pin Assignment

| Pin | Symbol | Name/Description | Note |
|-----|------------|------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 | VeeT | Module Transmitter Ground | 1 |
| 2 | TX_Fault | Module Transmitter Fault | 3 |
| 3 | TX_Disable | Transmitter Disable; Turns off transmitter laser output | 3 |
| 4 | SDA | 2-wire Serial Interface Data Line (Same as MOD-DEF2 as defined in the INF-8074i) | 3 |
| 5 | 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 | RS | Rate select, optionally controls SFP module receiver. When High input data rate 10.3GBd and when LOW data-rate 1.25GBd. | 3 |
| 8 | 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) | 3 |
| 9 | VeeR | Module Receiver Ground | 1 |
| 10 | VeeR | Module Receiver Ground | 1 |
| 11 | VeeR | Module Receiver Ground | 1 |
| 12 | RD- | Receiver Inverted Data Output | 3 |
| 13 | 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 | TD+ | Transmitter Non-Inverted Data Input | 3 |
| 19 | TD- | Transmitter Inverted Data Input | 3 |
| 20 | VeeT | Module Transmitter Ground | |

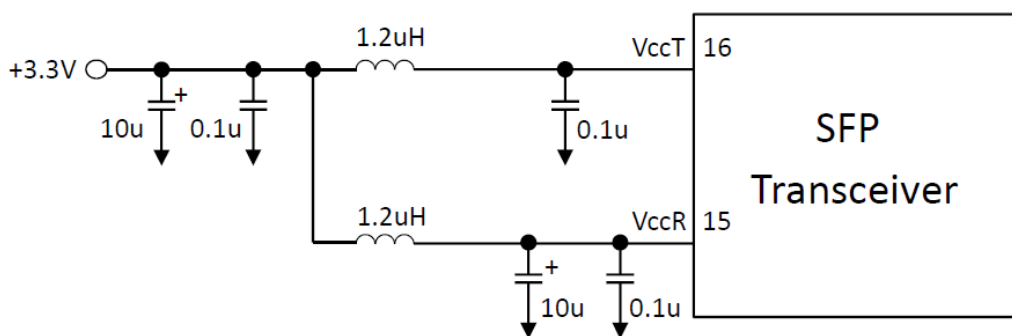
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Block Diagram of Transceiver



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Recommended Interface Circuit