

### 10.3Gb/s SFP+ BiDi Transceiver

#### 10G-BSxxxx-ELR

##### ■ Product Features

- ✓ Single LC connector
- ✓ Hot-pluggable SFP footprint
- ✓ Uncooled DFB laser
- ✓ RoHS compliant and Lead Free
- ✓ Distance up to 20Km on 9/125um SMF
- ✓ Metal enclosure for lower EMI
- ✓ Power dissipation <1.0W (0~70℃)  
<1.2W(-40~85℃)
- ✓ Commercial and industrial operating temperature optional
- ✓ SFP MSA SFF-8472 SFF-8431 SFF-8432 Compliant



##### ■ Applications

- ✓ 10GBASE-LR/LW
- ✓ 10G Fibre Channel

##### ■ General

Fiberend's 10G-BSxxxx-ELR Small Form Factor Pluggable (SFP+) transceivers are compatible with SFF-8431, SFF-8432 and support 10G Ethernet LR and 10G Fibre Channel. It is designed for use in 10G-Gigabit multi-rate links up to 20km of G.652. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

##### ■ Product Selection

| Part Number     | Wavelength        | Operating Case temperature |
|-----------------|-------------------|----------------------------|
| 10G-BS2733-ELR  | Tx-1270 / Rx-1330 | Commercial                 |
| 10G-BS3327-ELR  | Tx-1330 / Rx-1270 | Commercial                 |
| 10G-BS2733-ELRI | Tx-1270 / Rx-1330 | Industrial                 |
| 10G-BS3327-ELRI | Tx-1330 / Rx-1270 | Industrial                 |

### ■ Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHS compliant with RoHS 2 (2011/65/EU)

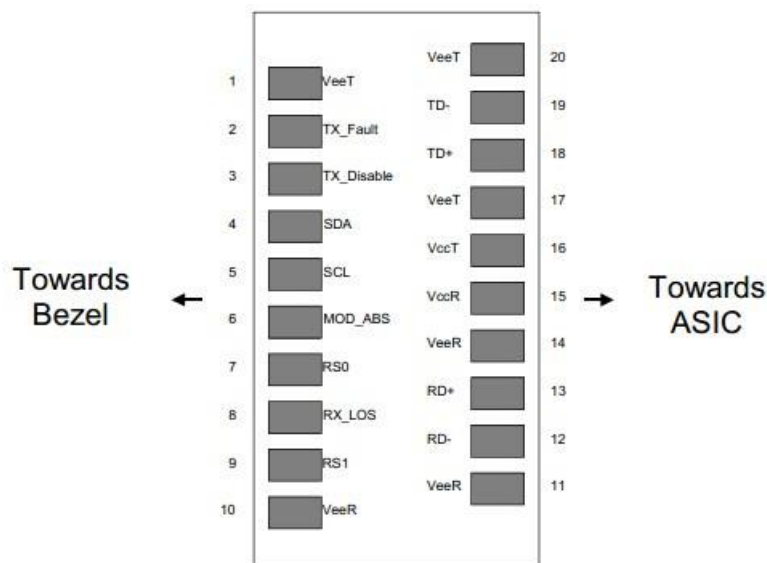
### ■ Pin Descriptions

| Pin | Symbol     | Name/Description                                                              | Ref. |
|-----|------------|-------------------------------------------------------------------------------|------|
| 1   | VeeT       | Transmitter Ground (Common with Receiver Ground)                              | 1    |
| 2   | TX Fault   | Transmitter Fault. LVTTTL-O                                                   | 2    |
| 3   | TX Disable | Transmitter Disable. Laser output disabled on high or open.<br>LVTTTL-I       | 3    |
| 4   | SDA        | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I/O | 2    |
| 5   | SCL        | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I   | 2    |
| 6   | Mod_ ABS   | Module Absent, Connect to VeeT or VeeR in Module.                             | 2    |
| 7   | RS0        | Rate Select 0, optionally controls SFP+ module receiver<br>LVTTTL-I           | 4    |
| 8   | LOS        | Loss of Signal indication. Logic 0 indicates normal operation.<br>LVTTTL-O    | 5    |
| 9   | RS1        | Rate Select 1, optionally controls SFP+ module transmitter.<br>LVTTTL-I       | 4    |
| 10  | VeeR       | Receiver Ground (Common with Transmitter Ground)                              | 1    |
| 11  | VeeR       | Receiver Ground (Common with Transmitter Ground)                              | 1    |
| 12  | RD-        | Receiver Inverted DATA out. AC Coupled. CML-O                                 |      |
| 13  | RD+        | Receiver Non-inverted DATA out. AC Coupled. CML-O                             |      |
| 14  | VeeR       | Receiver Ground (Common with Transmitter Ground)                              | 1    |

|    |      |                                                      |   |
|----|------|------------------------------------------------------|---|
| 15 | VccR | Receiver Power Supply                                | 6 |
| 16 | VccT | Transmitter Power Supply                             | 6 |
| 17 | VeeT | Transmitter Ground (Common with Receiver Ground)     | 1 |
| 18 | TD+  | Transmitter Non-Inverted DATA in. AC Coupled. CML- I |   |
| 19 | TD-  | Transmitter Inverted DATA in. AC Coupled. CML- I     |   |
| 20 | VeeT | Transmitter Ground (Common with Receiver Ground)     | 1 |

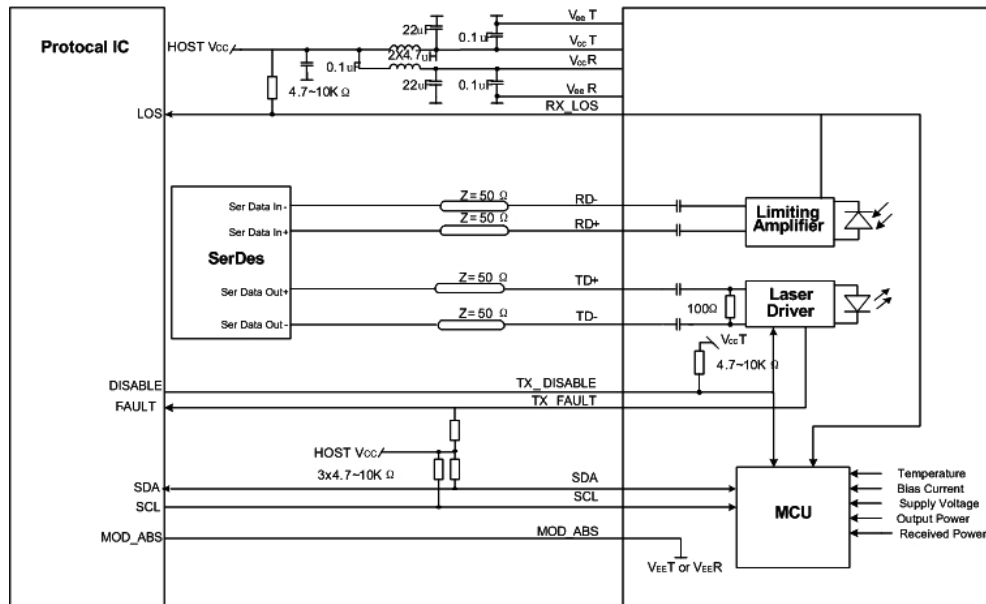
### Notes:

1. Circuit ground is internally isolated from chassis ground.
2. TX Fault is an open collector/drain output .which should be pulled up with a 4.7K – 10K Ohms resistor on the host board if intended for use .Pull up voltage should be between 2.0V to Vcc+0.3V.A high output indicates a transmitter fault caused by either the tx bias current or the tx output power exceeding the preset alarm thresholds .A low output indicates normal operation .In the low state, the output is pulled to <0.8V.
3. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable<0.8V.
4. Internally pulled down per SFF-8431 Rev4.1.
5. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. Internally connected



**Pin-out of Connector Block on Host Board**

### Recommend Circuit Schematic



### Absolute Maximum Ratings

| Parameter              | Symbol | Min  | Typ | Max  | Unit | Ref. |
|------------------------|--------|------|-----|------|------|------|
| Maximum Supply Voltage | Vcc    | -0.5 |     | +4.0 | V    |      |
| Storage Temperature    | TS     | -40  |     | +85  | °C   |      |
| Operating Humidity     | RH     | 0    |     | 85   | %    |      |

### Recommended Operating Conditions

| Parameter                   | Symbol | Min  | Typ  | Max  | Unit | Ref.       |
|-----------------------------|--------|------|------|------|------|------------|
| Power Supply Voltage        | Vcc    | 3.13 | 3.30 | 3.47 | V    |            |
| Power Supply Current        | Icc    |      |      | 300  | mA   | Commercial |
|                             | Icc    |      |      | 350  | mA   | Industrial |
| Case Operating Temperature  | Tc     | 0    |      | +70  | °C   | Commercial |
|                             | Tl     | -40  |      | +85  |      | Industrial |
| Data Rate(Gigabit Ethernet) | BR     |      | 10.3 |      | Gbps |            |
| 9/125um G.652 SMF           | Lmax   |      |      | 20   | km   |            |

### ■ Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

| Parameter                      | Symbol   | Min       | Typ | Max      | Unit | Ref. |
|--------------------------------|----------|-----------|-----|----------|------|------|
| <b>Transmitter</b>             |          |           |     |          |      |      |
| Input differential impedance   | Rin      | 80        | 100 | 120      | Ω    | 1    |
| Differential data input swing  | Vin, pp  | 120       |     | 850      | mV   |      |
| TX Disable-High                |          | Vcc – 0.8 |     | Vcc      | V    |      |
| TX Disable-Low                 |          | Vee       |     | Vee+ 0.8 | V    |      |
| TX Fault-High                  |          | Vcc-0.8   |     | Vcc      | V    |      |
| TX Fault-Low                   |          | Vee       |     | Vee+0.8  | V    |      |
| <b>Receiver</b>                |          |           |     |          |      |      |
| Single ended data output swing | Vout, pp | 300       |     | 850      | mV   | 2    |
| Data output rise time          | Tr       | 30        |     |          | ps   | 3    |
| Data output fall time          | Tf       | 30        |     |          | ps   | 3    |
| LOS-High                       |          | Vcc – 0.8 |     | Vcc      | V    |      |
| LOS-Low                        |          | Vee       |     | Vee+0.8  | V    |      |

#### **Notes:**

1. AC coupled.
2. Into 100 ohm differential termination.
3. 20 – 80 %

### ■ Optical Characteristics (TOP=25°C, Vcc=3.3 Volts)

| Parameter                   | Symbol | Min  | Typ  | Max  | Unit | Ref. |
|-----------------------------|--------|------|------|------|------|------|
| <b>Transmitter</b>          |        |      |      |      |      |      |
| Output Opt. Power           | PO     | -2   |      | +3   | dBm  |      |
| Optical Wavelength          | λ      | 1260 | 1270 | 1280 | nm   |      |
|                             |        | 1320 | 1330 | 1340 | nm   |      |
| Side-Mode Suppression Ratio | SMSR   | 30   |      |      | dB   |      |
| Spectral Width(-20dB)       | Δλ     |      |      | 1    | nm   |      |
| Optical Extinction Ratio    | ER     | 3.5  |      |      | dB   |      |

## 10G-BSxxxx-ELR

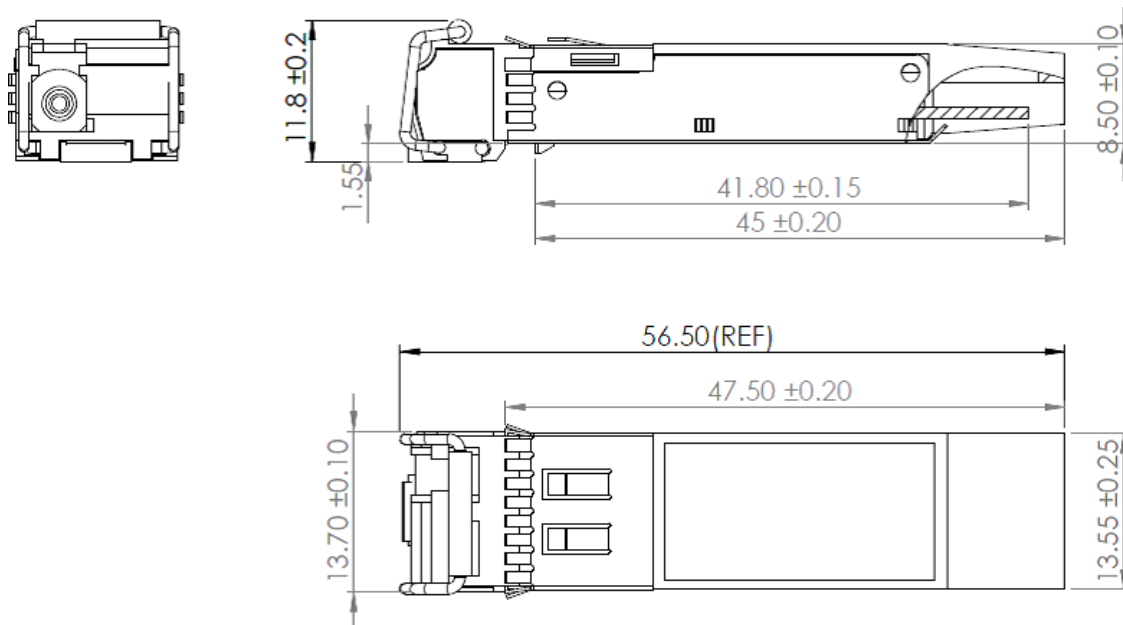
| Receiver                  |             |      |      |      |     |     |
|---------------------------|-------------|------|------|------|-----|-----|
| RX Sensitivity @10.3Gb/s  | SENS1       |      |      | -13  | dBm | 1,2 |
| Receiver Overload         |             | 0.5  |      |      | dBm |     |
| Optical Center Wavelength | $\lambda$ C | 1320 | 1330 | 1340 | nm  |     |
|                           |             | 1260 | 1270 | 1280 | nm  |     |
| LOS De-Assert             | LOSD        |      |      | -15  | dBm |     |
| LOS Assert                | LOSA        | -30  |      |      | dBm |     |
| LOS Hysteresis            |             | 0.5  |      | 5    | dB  |     |

### Notes:

1. Measured with conformance signals defined in FC-P1-2 Rev. 10.0 specifications.
2. Measured with PRBS  $2^{31}-1$  at  $10^{-12}$  BER.

### Mechanical Specifications

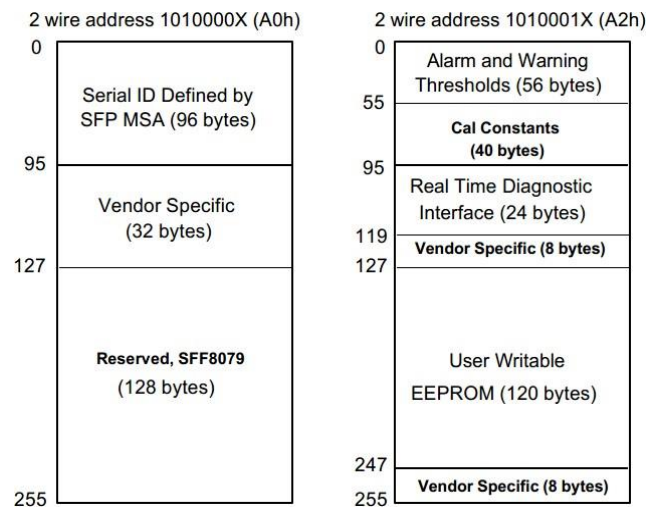
Fiberend's Small Form Factor Pluggable (SFP+) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA), dimensions are in mm.



10G-BSxxxx-ELR

### EEPROM Information

EEPROM memory map specific data field description is as below:



### ■ Digital Diagnostic Monitoring Interface

Five transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

| Parameter    | Range            | Accuracy | Calibration |
|--------------|------------------|----------|-------------|
| Temperature  | 0 to +70°C (C)   | ±3°C     | Internal    |
|              | -40 to +85°C (I) |          |             |
| Voltage      | 2.97 to 3.63V    | ±3%      | Internal    |
| Bias Current | 0 to 100mA       | ±10%     | Internal    |
| TX Power     | -2 to +3dBm      | ±3dB     | Internal    |
| RX Power     | -13 to 0.5dBm    | ±3dB     | Internal    |