

### 1.25 Gb/s SFP BIDI Transceiver

#### 1G-BS3149-SX

##### ■ Product Features

- ✓ Up to 1.25Gb/s data links
- ✓ Single LC connector
- ✓ Hot-pluggable SFP footprint
- ✓ 1310nm FP laser transmitter
- ✓ RoHS compliant and Lead Free
- ✓ Up to 3Km on 9/125um SMF
- ✓ Metal enclosure for lower EMI
- ✓ Single +3.3V power supply
- ✓ Power dissipation <800mW (0~70°C), <1000mW (-40~85°C)
- ✓ Commercial and industrial operating temperature optional
- ✓ SFP MSA SFF-8074i Compliant



##### ■ Applications

- ✓ Gigabit Ethernet

##### ■ General

Fiberend's 1G-BS3149-SX Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The SFP transceivers are high performance, cost effective modules supporting Gigabit Ethernet and 3km transmission distance with SMF. They are RoHS compliant and lead-free.

##### ■ Product Selection

| Part Number   | Operating temperature | DDMI |
|---------------|-----------------------|------|
| 1G-BS3149-SX  | Commercial            | Yes  |
| 1G-BS3149-SXI | Industrial            | Yes  |

### ■ Regulatory Compliance

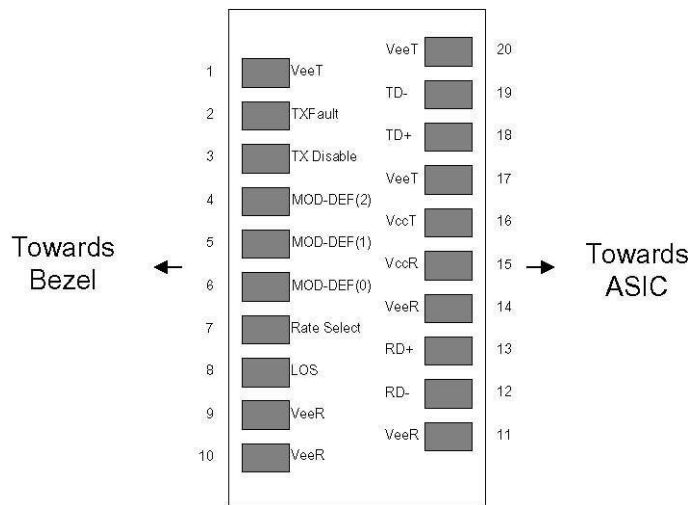
- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Single LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 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.   |      |
| 3   | TX Disable  | Transmitter Disable. Laser output disabled on high or open.    | 2    |
| 4   | MOD_DEF(2)  | Module Definition 2. Data line for Serial ID.                  | 3    |
| 5   | MOD_DEF(1)  | Module Definition 1. Clock line for Serial ID.                 | 3    |
| 6   | MOD_DEF(0)  | Module Definition 0. Grounded within the module.               | 3    |
| 7   | Rate Select | No connection required   |      |
| 8   | LOS         | Loss of Signal indication. Logic 0 indicates normal operation. | 4    |
| 9   | VeeR        | Receiver Ground (Common with Transmitter Ground)               | 1    |
| 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                         |      |
| 13  | RD+         | Receiver Non-inverted DATA out. AC Coupled                     |      |
| 14  | VeeR        | Receiver Ground (Common with Transmitter Ground)               | 1    |
| 15  | VccR        | Receiver Power Supply  |      |
| 16  | VccT        | Transmitter Power Supply                                       |      |
| 17  | VeeT        | Transmitter Ground (Common with Receiver Ground)               | 1    |
| 18  | TD+         | Transmitter Non-Inverted DATA in. AC Coupled.                  |      |
| 19  | TD-         | Transmitter Inverted DATA in. AC Coupled.                      |      |
| 20  | VeeT        | Transmitter Ground (Common with Receiver Ground)               | 1    |

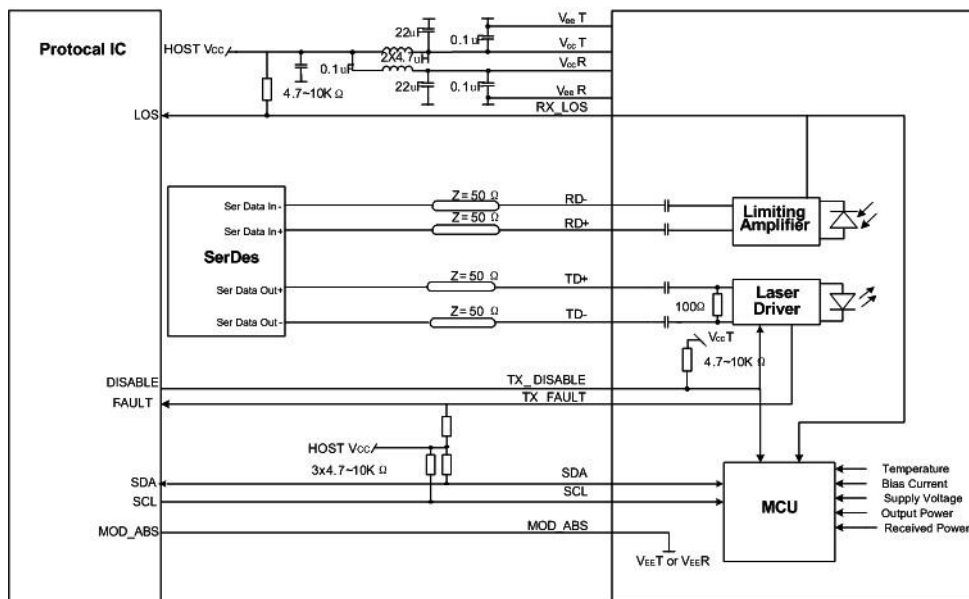
### Notes:

1. Circuit ground is internally isolated from chassis ground.
  2. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable <0.8V.
  3. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V.
- MOD\_DEF (0) pulls line low to indicate module is plugged in.
4. 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.



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    |      |      | 250  | mA   | Commercial |
|                             | Icc    |      |      | 300  | mA   | Industrial |
| Case Operating Temperature  | Tc     | 0    |      | +70  | °C   | 1          |
|                             | Tl     | -40  |      | +85  |      | 2          |
| Data Rate(Gigabit Ethernet) |        |      | 1.25 |      | Gbps |            |
| 9/125um G.652 SMF           | Lmax   |      |      | 3    | km   |            |

### Notes:

1. For commercial class product.
2. For industrial class product.

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

| Parameter                     | Symbol  | Min       | Typ | Max      | Unit | Ref. |
|-------------------------------|---------|-----------|-----|----------|------|------|
| <b>Transmitter</b>            |         |           |     |          |      |      |
| Input differential impedance  | Rin     | -         | 100 | -        | Ω    | 1    |
| Single ended data input swing | Vin, pp | 250       | -   | 1200     | mV   |      |
| TX Disable-High               | -       | Vcc – 1.3 | -   | Vcc      | V    |      |
| TX Disable-Low                | -       | Vee       | -   | Vee+ 0.8 | V    |      |
| TX Fault-High                 | -       | Vcc-0.5   | -   | Vcc      | V    |      |
| TX Fault-Low                  | -       | Vee       | -   | Vee+0.5  | V    |      |
| <b>Receiver</b>               |         |           |     |          |      |      |

|                                |          |           |     |         |    |   |
|--------------------------------|----------|-----------|-----|---------|----|---|
| Single ended data output swing | Vout, pp | 300       | 400 | 800     | mV | 2 |
| Data output rise time          | tr       | -         | -   | 300     | ps | 3 |
| Data output fall time          | tf       | -         | -   | 300     | ps | 3 |
| LOS-High                       | -        | Vcc – 0.5 | -   | Vcc     | V  |   |
| LOS-Low                        | -        | Vee       | -   | Vee+0.5 | V  |   |

**Notes:**

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

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

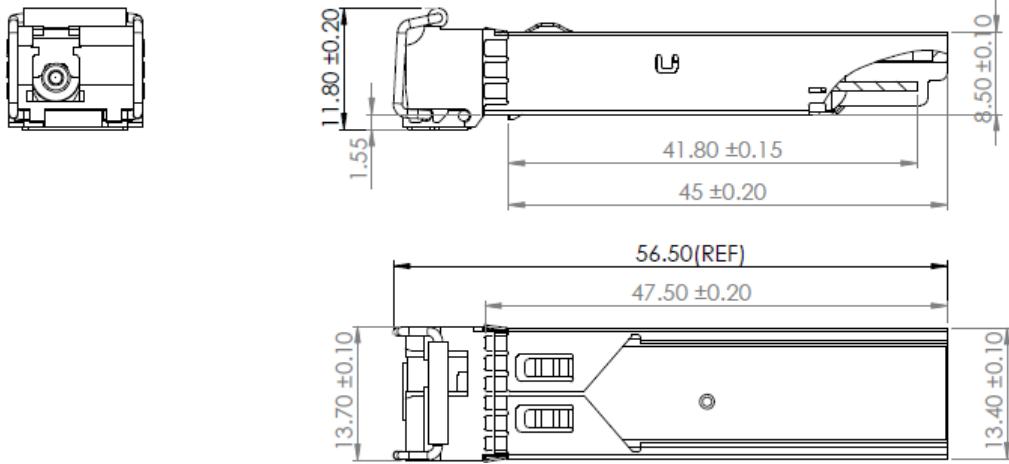
| Parameter                 | Symbol      | Min  | Typ  | Max  | Unit | Ref. |
|---------------------------|-------------|------|------|------|------|------|
| <b>Transmitter</b>        |             |      |      |      |      |      |
| Output Opt. Power         | PO          | -13  | -    | -6   | dBm  | 1    |
| Optical Wavelength        | $\lambda$   | 1275 | 1310 | 1350 | nm   |      |
| RMS Spectral Width        | $\sigma$    | -    | -    | 3.5  | nm   |      |
| Optical Rise/Fall Time    | tr/tf       | -    | -    | 260  | ps   | 2    |
| Total Jitter              | TJ          | -    | -    | 0.35 | UI   |      |
| Optical Extinction Ratio  | ER          | 9    | -    | -    | dB   |      |
| <b>Receiver</b>           |             |      |      |      |      |      |
| RX Sensitivity @1.25Gb/s  | SENS        | -    | -    | -22  | dBm  | 3, 4 |
| Receiver Overload         | -           | -2   | -    | -    | dBm  |      |
| Optical Center Wavelength | $\lambda_C$ | 1470 | -    | 1510 | nm   |      |
| LOS De-Assert             | LOSD        | -    | -    | -26  | dBm  |      |
| LOS Assert                | LOSA        | -40  | -    | -    | dBm  |      |
| LOS Hysteresis            | -           | 0.5  | -    | 5    | dB   |      |

**Notes:**

1. Class 1 Laser Safety.
2. Unfiltered, 20-80%. Complies with Gigabit Ethernet eye masks when filtered.
3. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
4. Measured with PRBS 2<sup>7</sup>-1 at 10<sup>-12</sup> 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.



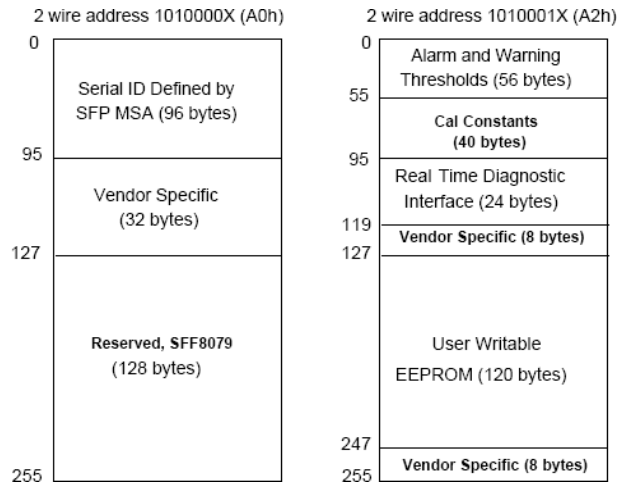
**1G-BS3149-SX**

### ■ EEPROM Information

EEPROM memory map specific data field description is as below:

| Addr. | Field Size (Bytes) | Name of Field   | Hex | Code Value                                    |
|-------|--------------------|-----------------|-----|---|
| 0     | 1                  | Identifier      | 03  | SFP transceiver                               |
| 1     | 1                  | Ext. Identifier | 04  | MOD_DEF4                                      |
| 2     | 1                  | Connector       | 07  | LC  |
| 3-10  | 8                  | Transceiver     | 00  |   |
|       |                    |                 | 00  |   |
|       |                    |                 | 00  |   |
|       |                    |                 | 40  | BASE-BX10                                     |
|       |                    |                 | 22  | Longwave laser (LC) intermediate distance (I) |
|       |                    |                 | 00  |   |
|       |                    |                 | 01  | Single Mode(SM)                               |
|       |                    |                 | 01  | 100 MBytes/sec                                |
| 11    | 1                  | Encoding        | 03  | NRZ   |
| 12    | 1                  | BR, Nominal     | 1D  | 1.25 Gb/s (0DH)                               |
| 13    | 1                  | Reserved        | 00  | Unspecified                                   |
| 14    | 1                  | Length (9um)-km | 03  | 3(km)   |
| 15    | 1                  | Length (9um)    | 1E  | (3000m)                                       |
| 16    | 1                  | Length (50um)   | 00  | 0m  |
| 17    | 1                  | Length (62.5um) | 00  | 0m  |

|         |    |                            |  |  |
|---------|----|----------------------------|--|--|
| 18      | 1  | Length (Copper)            | 00   | 0m   |
| 19      | 1  | Reserved                   | 00   | 0m   |
| 20-35   | 16 | Vendor name                | 49 69 62 65 72 65 6e 64<br>20 20 20 20 20 20 20 20 | "Fiberend "(ASC II)  |
| 36      | 1  | Transceiver                | 00   | Reserved   |
| 37-39   | 3  | Vendor OUI                 | 00   | 00   |
|         |    |                            | 00   | 00   |
|         |    |                            | 00   | 00   |
| 40-55   | 16 | Vendor PN                  | 31 47 2d 42 53 33 33 34<br>39 2d 53 52 20 20 20 20 | "1G-BS3149-SX" (ASCII)   |
| 56-59   | 4  | Vendor Rev                 | 41 20 20 20  | ASCII("41 20 20 20" means A Revision)  |
| 60-61   | 2  | Wavelength                 | 05 1E  | Tx Wavelength 1310nm:  |
| 62      | 1  | Reserved                   | 00   |  |
| 63      | 1  | CC_BASE                    | xx   | Check sum of byte 0-62   |
| 64-65   | 2  | Options                    | 00 1A  | RX_LOS, TX_Fault,  |
| 66      | 1  | BR, max                    | 00   | 0%   |
| 67      | 1  | BR, min                    | 00   | 0%   |
| 68-83   | 16 | Vendor SN                  | 20 20 20 20 20 20 20 20<br>20 20 20 20 20 20 20 20 | ASCII  |
| 84-91   | 8  | Date code                  | xx xx xx xx xx xx 20 20                            | Year(2 bytes),Month(2 bytes), Day(2 bytes)   |
| 92      | 1  | Diagnostic Monitoring Type | 68   | Average power<br>Internally calibrated<br>Digital diagnostic monitoring implemented  |
| 93      | 1  | Enhanced Options           | F0   | Optional soft RX_LOS monitoring implemented;<br>Optional soft TX_FAULT monitoring implemented;<br>Optional soft TX_DISABLE control and monitoring implemented;<br>Optional Alarm/warning flags implemented for all monitored quantities; |
| 94      | 1  | SFF-8472 Compliance        | 02   | Rev 9.5 of SFF-8472  |
| 95      | 1  | CC_EXT                     | xx   | Check sum of byte 64-94  |
| 96-103  | 8  | Vendor Specific            | xx xx xx xx xx xx xx xx                            |  |
| 104-116 | 13 |                            | xx xx xx xx xx xx xx xx<br>xx xx xx xx xx          |  |
| 117-126 | 10 |                            | xx xx xx xx xx xx xx xx<br>xx xx                   |  |
| 127     | 10 |                            | xx   | Check sum of byte 96-126   |



### ■ 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     | -13 to -6dBm     | ±3dB     | Internal    |
| RX Power     | -22 to -2dBm     | ±3dB     | Internal    |