

2.488Gb/s SFP BIDI Transceiver

2G-BS5549-EX

■ Product Features

- ✓ Up to 2.488Gb/s data links
- ✓ Single LC connector
- ✓ Hot-pluggable SFP footprint
- ✓ 1550nm DFB laser transmitter
- ✓ RoHS compliant and Lead Free
- ✓ Up to 40Km 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

- ✓ SONET OC-48 / SDH STM-16
- ✓ Gigabit Ethernet

■ General

Fiberend's 2G-BS5549-EX 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 SONET OC-48 / SDH STM-16 and 40km transmission distance with SMF. They are RoHS compliant and lead-free.

■ Product Selection

| Part Number | Operating temperature | DDMI |
|---------------|-----------------------|------|
| 2G-BS5549-EX | Commercial | Yes |
| 2G-BS5549-EXI | Industrial | Yes |

■ Regulatory Compliance

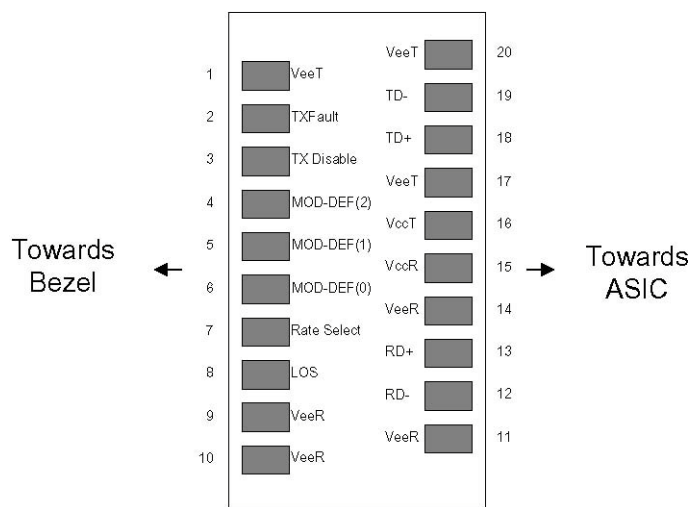
- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Single LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 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 |

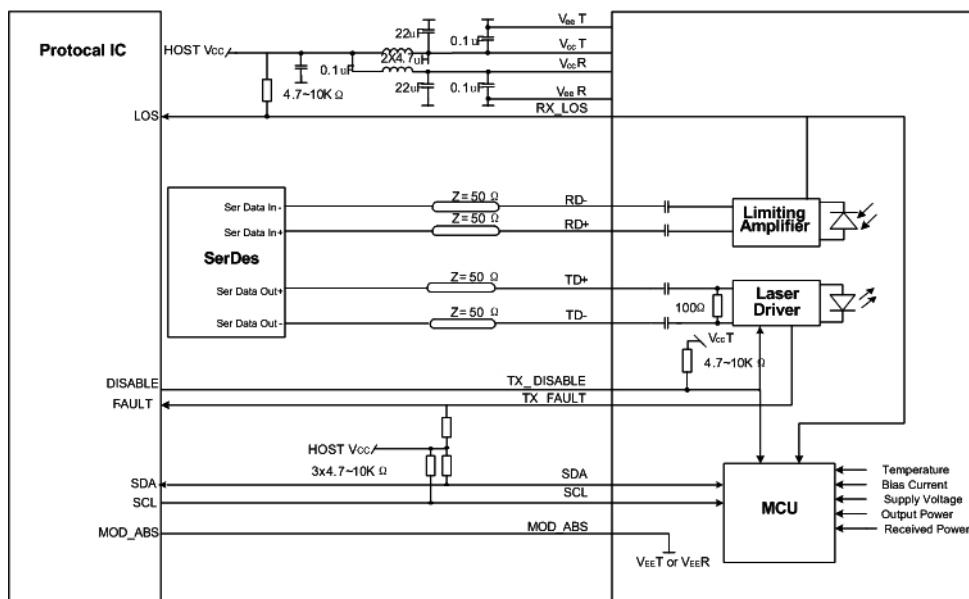
Notes:

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(SONET/SDH) | | | 2.488 | | Gbps | |
| 9/125um G.652 SMF | Lmax | | | 40 | 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. |
|-------------------------------|---------|-----------|-----|----------|------|------|
| Transmitter | | | | | | |
| 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 | |

| Receiver | | | | | | |
|--------------------------------|----------|-----------|-----|---------|----|---|
| Single ended data output swing | Vout, pp | 300 | 400 | 800 | mV | 2 |
| Data output rise time | tr | | | 175 | ps | 3 |
| Data output fall time | tf | | | 175 | 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. |
|-----------------------------|------------------|------|------|------|------|------|
| Transmitter | | | | | | |
| Output Opt. Power | PO | -2 | | +3 | dBm | 1 |
| Optical Wavelength | λ | 1530 | 1550 | 1570 | nm | |
| Spectral Width(-20dB) | $\Delta \lambda$ | | | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | - | dB | |
| Optical Rise/Fall Time | tr/tf | | | 160 | ps | 2 |
| Jitter Generation (RMS) | | | | 0.01 | UI | |
| Jitter Generation (pk-pk) | | | | 0.1 | UI | |
| Optical Extinction Ratio | ER | 8.2 | | | dB | |
| Receiver | | | | | | |
| RX Sensitivity @2.488Gb/s | SENS | | | -18 | dBm | 3, 4 |
| Receiver Overload | | 0 | | | dBm | |
| Optical Center Wavelength | λ_C | 1470 | 1490 | 1510 | nm | |
| LOS De-Assert | LOSD | | | -20 | dBm | |
| LOS Assert | LOSA | -40 | | | dBm | |
| LOS Hysteresis | | 0.5 | | 5 | dB | |

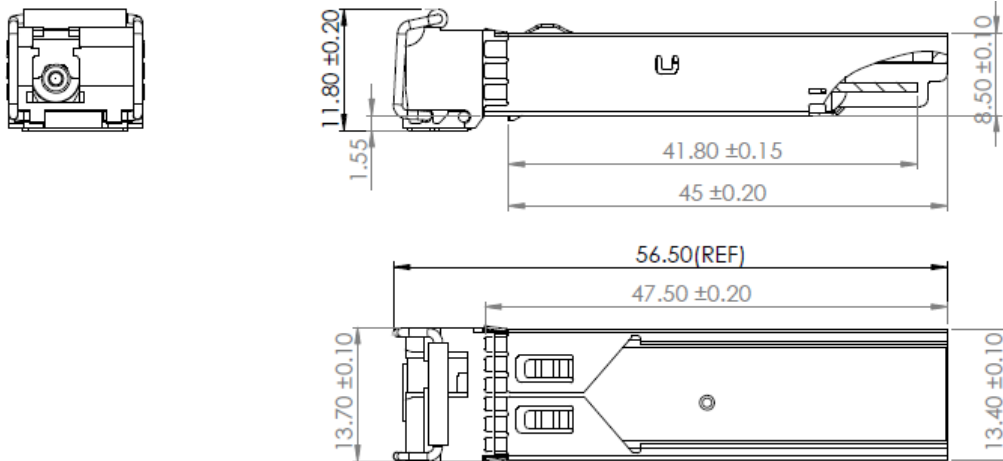
Notes:

1. Class 1 Laser Safety.
2. Unfiltered, 20-80%. Complies with OC-48 eye masks when filtered.

3. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
4. Measured with PRBS 2²³ -1 at 10⁻¹⁰ BER.

■ Mechanical Specifications

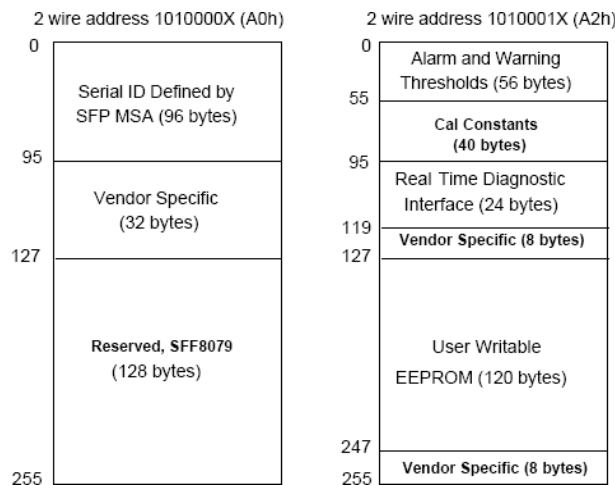
Fiberend's Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA), dimensions are in mm.



2G-BS5549-EX

■ 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 | -5 to 0dBm | ±3dB | Internal |
| RX Power | -18 to 0dBm | ±3dB | Internal |