

### 10.3Gb/s XFP Transceiver

#### 10G-X-LR

##### ■ Product Features

- ✓ Duplex LC connector
- ✓ Hot-pluggable XFP footprint
- ✓ 1310nm DFB laser
- ✓ RoHS compliant and Lead Free
- ✓ Distance up to 10KM for single mode fiber
- ✓ Metal enclosure for lower EMI
- ✓ +3.3V power supply and power dissipation <1.5W
- ✓ XFP MSA INF-8077I Compliant
- ✓ Compliant with IEEE 802.3ae



##### ■ Applications

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

##### ■ General

Fiberend's 10G-X-LR Small Form Factor 10Gb/s XFP transceivers are compatible with XFP MSA Specification. It is designed for use in 10G-Gigabit links up to 10km of G.652. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA.

##### ■ Product Selection

| Part Number | Operating Case temperature | DDMI |
|-------------|----------------------------|------|
| 10G-X-LR    | Commercial (0~70℃)         | Yes  |
| 10G-X-LRI   | Industrial (-40~85℃)       | Yes  |

##### ■ 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

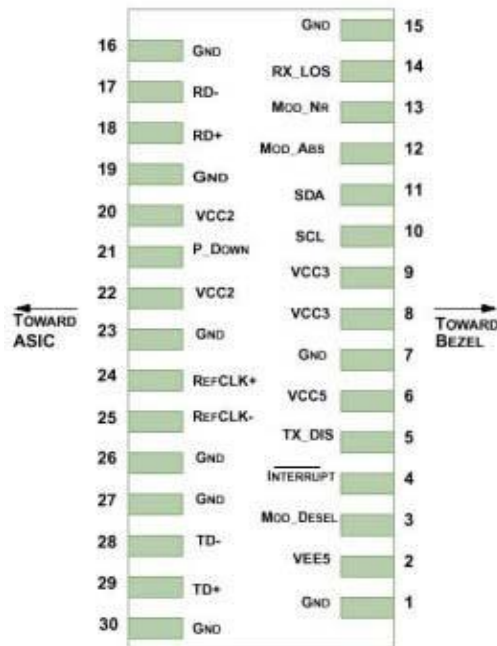
| Pin | Symbol     | Name/Description                                                                                                   | Ref. |
|-----|------------|--------------------------------------------------------------------------------------------------------------------|------|
| 1   | GND        | Module Ground                                                                                                      |      |
| 2   | VEE5       | Optional-5.2 Power Supply-not required                                                                             |      |
| 3   | MOD_DESEL  | Module De-select; When held low allows the module to respond to 2-wire serial interface. LVTTL-I                   |      |
| 4   | /INTERRUPT | Interrupt; Indicates presence of an important condition which can be read via the 2-wire serial interface. LVTTL-O | 2    |
| 5   | TX_DIS     | Transmitter Disable. Logic1 indicates laser output disabled, LVTTL-I                                               |      |
| 6   | VCC5       | +5V Power Supply                                                                                                   |      |
| 7   | GND        | Module Ground                                                                                                      | 1    |
| 8   | VCC3       | +3.3V Power Supply                                                                                                 |      |
| 9   | VCC3       | +3.3V Power Supply                                                                                                 |      |
| 10  | SCL        | 2-Wire Serial Interface Clock. LVTTL-I                                                                             | 2    |
| 11  | SDA        | 2-Wire Serial Interface Data Line. LVTTL-I/O                                                                       | 2    |
| 12  | MOD_Abs    | Indicates Module is not present. Grounded in the Module. LVTTL-O                                                   | 2    |
| 13  | MOD_NR     | Module Not Ready; Indicating Module Operational Fault. Open-collector. LVTTL-O                                     | 2    |
| 14  | RX_LOS     | Loss of Signal indication. Logic 1 indicates loss of Signal. Open-collector. LVTTL-O                               | 2    |
| 15  | GND        | Module Ground                                                                                                      | 1    |
| 16  | GND        | Module Ground                                                                                                      | 1    |
| 17  | RD-        | Receiver Inverted Data Output. CML-O                                                                               |      |
| 18  | RD+        | Receiver Non-Inverted Data Output. CML-O                                                                           |      |
| 19  | GND        | Module Ground                                                                                                      | 1    |

|    |            |                                                                                                                                                                   |   |
|----|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 20 | VCC2       | +1.8V Power Supply (Not required).                                                                                                                                | 3 |
| 21 | P_DOWN/RST | Power down; When high, requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low power mode. LVTTL-I |   |
|    |            | Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle. LVTTL-I                      |   |
| 22 | VCC2       | +1.8V Power Supply (Not required)                                                                                                                                 | 3 |
| 23 | GND        | Module Ground                                                                                                                                                     | 1 |
| 24 | REFCLK+    | Reference Clock (Not required)                                                                                                                                    |   |
| 25 | REFCLK-    | Reference Clock (Not required)                                                                                                                                    |   |
| 26 | GND        | Module Ground                                                                                                                                                     | 1 |
| 27 | GND        | Module Ground                                                                                                                                                     | 1 |
| 28 | TD-        | Transmitter Inverted Data Input. CML-I                                                                                                                            |   |
| 29 | TD+        | Transmitter Non-Inverted Data Input. CML-I                                                                                                                        |   |
| 30 | GND        | Module Ground                                                                                                                                                     | 1 |

### Notes:

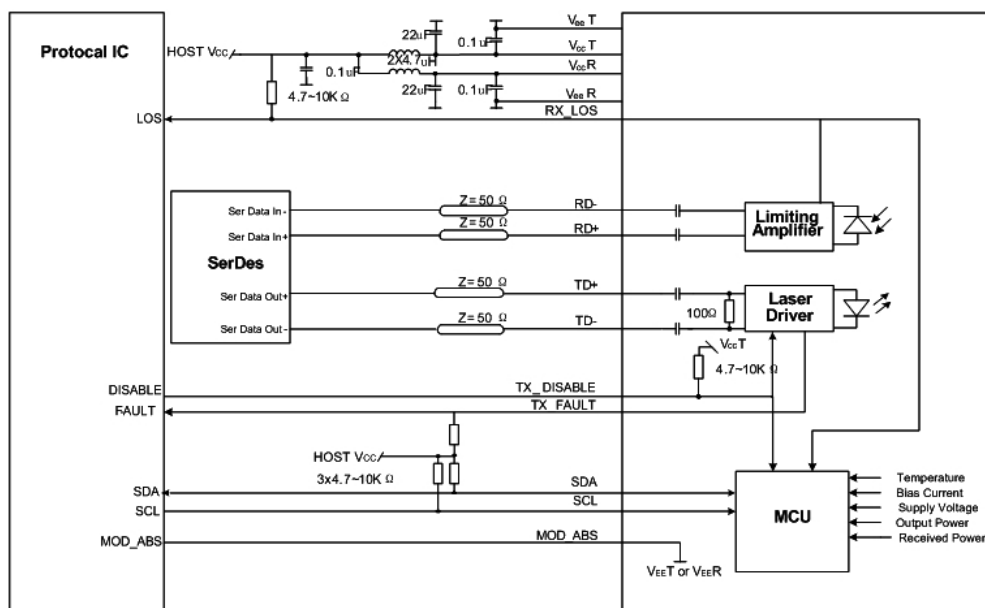
1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Open collector, Should be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.6V on the host board.
3. The pins are open within module.

### ■ Pin-out Connector Block on Host Board



Pin-out of Connector Block on Host Board

### Recommend Circuit Schematic



### Absolute Maximum Ratings

| Parameter              | Symbol | Min  | Typ | Max  | Unit | Ref. |
|------------------------|--------|------|-----|------|------|------|
| Maximum Supply Voltage | Vcc3   | -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       | Vcc3   | 3.13 | 3.30 | 3.47 | V    |            |
| Power Supply Current       | Icc3   |      |      | 430  | mA   |            |
| Case Operating Temperature | Tc     | 0    |      | +70  | °C   | Commercial |
|                            | Tl     | -40  |      | +85  |      | Industrial |
| Bit Rate                   | Br     |      | 10.3 |      | Gbps |            |
| 9/125um G.652 SMF          | Lmax   |      |      | 10   | 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 %

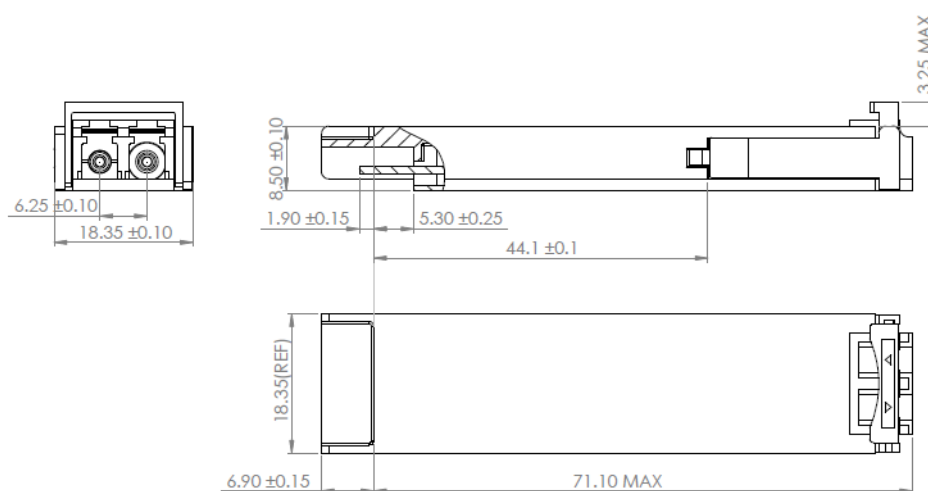
### ■ Optical Characteristics (TOP=25°C, Vcc=3.3 Volts)

| Parameter                      | Symbol          | Min  | Typ | Max   | Unit | Ref. |
|--------------------------------|-----------------|------|-----|-------|------|------|
| <b>Transmitter</b>             |                 |      |     |       |      |      |
| Output Opt. Power              | PO              | -6   |     | -1    | dBm  |      |
| Optical Wavelength             | $\lambda$       | 1260 |     | 1355  | nm   |      |
| Side Mode Suppression Ratio    | SMSR            | 30   |     |       | dB   |      |
| Spectral Width                 | $\Delta\lambda$ |      |     | 1     | nm   |      |
| Optical Extinction Ratio       | ER              | 3.5  |     |       | dB   |      |
| Average Launch power of OFF TX | Poff            |      |     | -40   | dBm  |      |
| <b>Receiver</b>                |                 |      |     |       |      |      |
| RX Sensitivity @10.3Gb/s       | SENS            |      |     | -14.4 | dBm  | 1,2  |
| Receiver Overload              |                 | 0,5  |     |       | dBm  |      |
| Optical Center Wavelength      | $\lambda_C$     | 1260 |     | 1610  | nm   |      |
| LOS De-Assert                  | LOSD            | -    |     | -15   | dBm  |      |
| LOS Assert                     | LOSA            | -30  |     |       | dBm  |      |
| LOS Hysteresis                 |                 | 0.5  |     |       | dB   |      |

### Notes:

1. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
2. Measured with PRBS 2<sup>31</sup>-1 at 10<sup>-12</sup> BER.

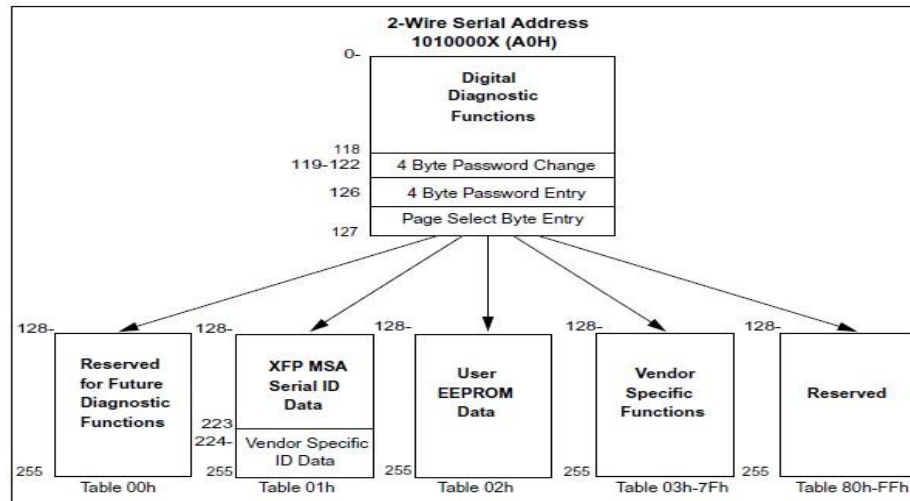
### ■ Mechanical Specifications



**10G-X-LR(dimensions are in mm)**

### ■ 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     | -6 to -1dBm      | ±3dB     | Internal    |
| RX Power     | -14.4 to 0.5dBm  | ±3dB     | Internal    |