

## GPON OLT Class B+/C+/C++/D Optical Transceiver



### Product Features

- Support ITU-T G.984.2 GPON OLT B+/C+/C++/D application
- Single fiber bi-directional data links with symmetric 2.488Gbps Tx and 1.244Gbps Rx
- 1490nm continuous-mode transmitter with DFB LD
- 1310nm burst-mode receiver with APD-TIA
- 2-wire interface for integrated digital diagnostic Monitoring
- Receiver RESET, Signal Detect, RSSI function indication (RESET, RX\_SD, RSSI)
- SFP package with SC/UPC receptacle optical interface
- Single +3.3V power supply
- Operation case temperature 0~70°C
- RoHS compliance, and Class 1 laser safety

### Operating Conditions

| Parameter                   | Unit | Min.  | Typical | Max.  |
|-----------------------------|------|-------|---------|-------|
| Storage Temperature         | °C   | -40   |         | 85    |
| Operating Case Temp         | °C   | 0     |         | 70    |
| Operating Relative Humidity | %    | 5     |         | 85    |
| Storage Relative Humidity   | %    | 5     |         | 90    |
| Power Supply Voltage        | V    | 3.135 | 3.3     | 3.465 |
| Power Supply Current        | mA   |       |         | 500   |
| Bit Rate for Tx             | Gbps | 2.488 |         |       |
| Bit Rate for Rx             | Gbps | 1.244 |         |       |

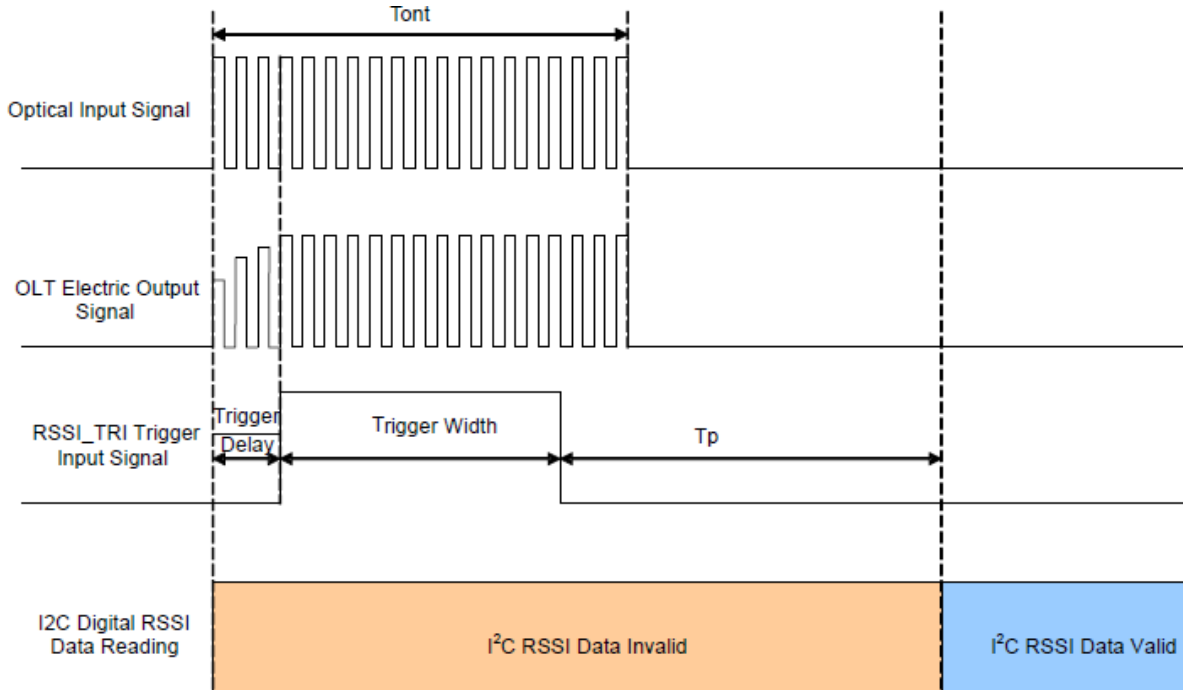
## Characteristics

All performance is specified at whole working temperature and conditions

| Parameter   | Unit                         | Min. | Typical | Max. |
|---|------------------------------|------|---------|------|
| <b>Transmitter</b>  |                              |      |         |      |
| TX Central Wavelength   | nm                           | 1480 | 1490    | 1500 |
| Spectral Width (-20dB)  | nm                           |      |         | 1    |
| Side Mode Suppression Ratio (SMSR)  | dB                           | 30   |         |      |
| Mean Launched Power (B+)  | dBm                          | 1.5  |         | 5    |
| Mean Launched Power (C+)  | dBm                          | 3    |         | 7    |
| Mean Launched Power (C++)   | dBm                          | 4.5  |         | 10   |
| Mean Launched Power (D)   | dBm                          | 6    |         | 10   |
| Mean Launched Power (TX Off)  | dBm                          |      |         | -45  |
| Extinction Ratio  | dB                           | 8.2  |         |      |
| Optical Return Loss Tolerance   | dB                           | -15  |         |      |
| Transmitter and dispersion Penalty  | dB                           |      |         | 1    |
| Transmitter Mask(PRBS2 <sup>23</sup> -1@2.488G)                                   | Compliant With ITU-T G.984.2 |      |         |      |
| <b>Receiver</b>   |                              |      |         |      |
| Receive Wavelength  | nm                           | 1290 | 1310    | 1330 |
| Sensitivity (B+)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-10</sup> )  | dBm                          |      |         | -28  |
| Sensitivity (C+)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-10</sup> )  | dBm                          |      |         | -30  |
| Sensitivity (C+)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-4</sup> )   | dBm                          |      |         | -32  |
| Sensitivity (C++)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-10</sup> ) | dBm                          |      |         | -31  |
| Sensitivity (C++)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-4</sup> )  | dBm                          |      |         | -33  |
| Sensitivity (D)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-10</sup> )   | dBm                          |      |         | -33  |
| Sensitivity (D)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-4</sup> )    | dBm                          |      |         | -35  |
| Overload (B+)<br>( PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-10</sup> )    | dBm                          | -8   |         |      |
| Overload (C+)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-10</sup> )     | dBm                          | -12  |         |      |

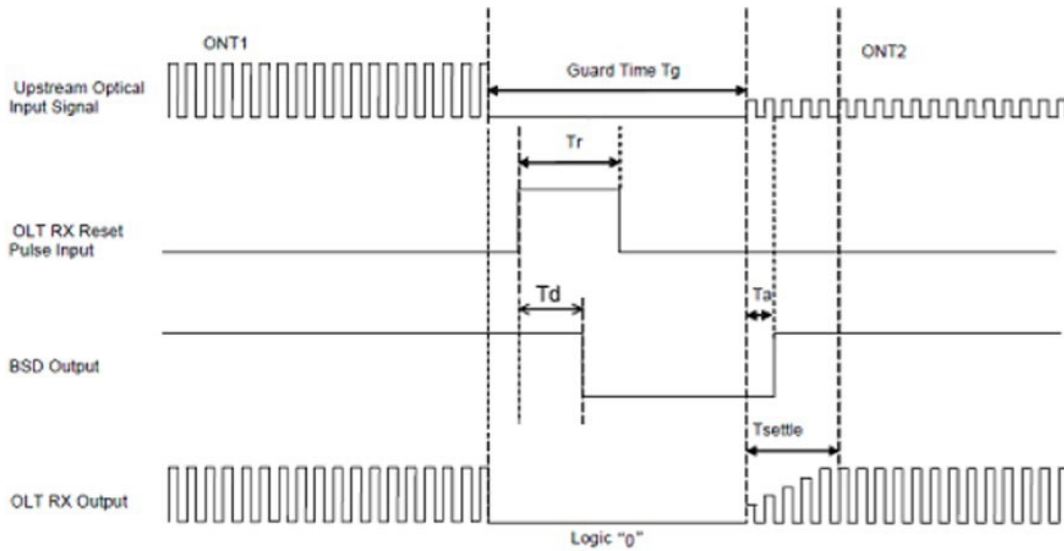
|  |     |     |     |                      |
|--|-----|-----|-----|----------------------|
| Overload (C++)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-10</sup> ) | dBm | -12 |     |                      |
| Overload (D)<br>(PRBS2 <sup>23</sup> -1@1.244G,ER=10,BER<10 <sup>-10</sup> )   | dBm | -15 |     |                      |
| Receiver Burst Mode Dynamic Range  | dB  | 15  |     |                      |
| SD Assert Level  | dBm |     |     | -34                  |
| SD De-assert Level   | dBm | -45 |     |                      |
| SD Hysteresis  | dB  | 0.5 |     | 6                    |
| WDM Filter isolation to 1550nm   | dB  | 38  |     |                      |
| WDM Filter isolation to 1650nm   | dB  | 35  |     |                      |
| <b>Electrical Interface Characteristics</b>                                    |     |     |     |                      |
| Data Input Swing Differential/TX   | mV  | 600 | -   | 1600                 |
| Data Output Swing Differential/RX  | mV  | 400 |     | 1600                 |
| Data Differential Impedance  | Ω   | 90  | 100 | 110                  |
| LVTTTL Output High   | V   | 2.4 |     | V <sub>cc</sub>      |
| LVTTTL Output Low  | V   | 0   |     | 0.4                  |
| LVTTTL Input High  | V   | 2.0 |     | V <sub>cc</sub> +0.3 |
| LVTTTL Input Low   | V   | 0   |     | 0.8                  |
| <b>Timing Characteristics</b>  |     |     |     |                      |
| RSSI Trigger Delay (T <sub>td</sub> )  | ns  | 25  |     |                      |
| RSSI Trigger Pulse Width (T <sub>w</sub> )                                     | ns  | 500 |     |                      |
| Internal I2C Delay (T <sub>wait</sub> )  | us  |     |     | 500                  |

## Timing Sequence for RSSI

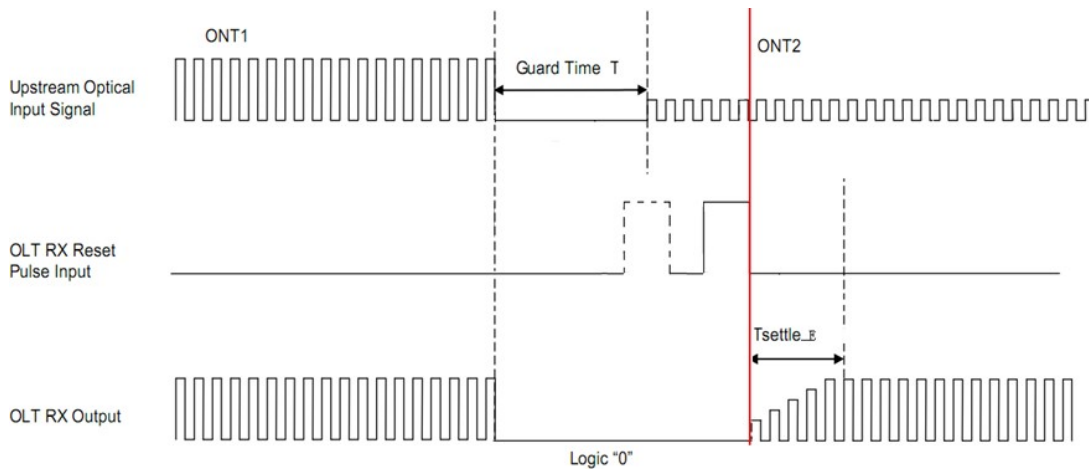


| Parameter                                 | Unit | Min. | Typical | Max.               |
|---|------|------|---------|--------------------|
| RSSI Timing Characteristics               |      |      |         |                    |
| ONU Package Length ( $T_{ont}$ )          | ns   | 300  |         |                    |
| RSSI Trigger Delay ( $T_{td}$ )           | ns   | 0    |         | 3000               |
| RSSI Trigger Pulse Width ( $T_w$ )        | ns   | 300  |         | $T_{ont} - T_{td}$ |
| Internal I <sup>2</sup> C Delay ( $T_p$ ) | us   |      |         | 500                |
| Input Power Range (B+, $P_{mon}$ )        | dBm  | -30  |         | -10                |
| Input Power Range (C+, $P_{mon}$ )        | dBm  | -32  |         | -10                |
| RSSI Monitoring Error                     | dB   | +/-3 |         |                    |

## Timing Sequence for Ranging Mode



## Timing Sequence for Working Mode



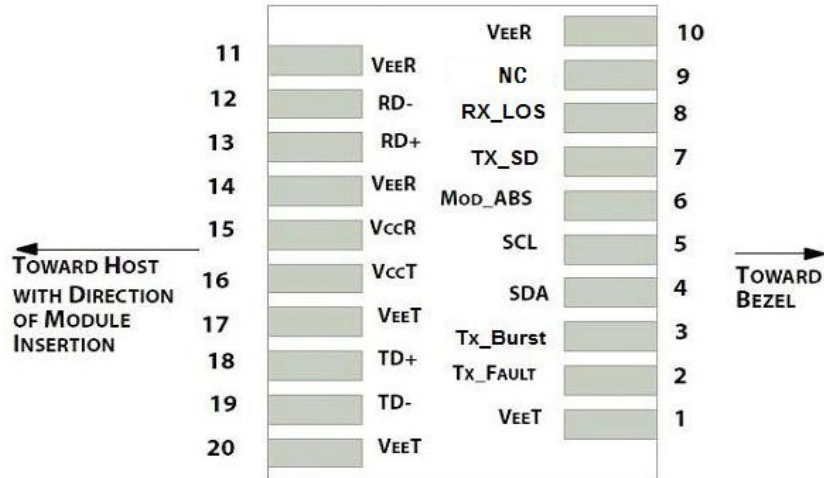
| Parameter                         | Unit | Min.         | Typical | Max. |
|-----------------------------------|------|--------------|---------|------|
| Burst Timing Characteristics      |      |              |         |      |
| Guard Time ( $T_g$ )              | ns   | 25.6 (4Byte) |         |      |
| Settling Time ( $T_{settle}$ )    | ns   | 19.2 (24Bit) |         |      |
| Settling Time ( $T_{settle\_E}$ ) | ns   | 12.8 (16Bit) |         |      |

|                          |    |              |  |    |
|--------------------------|----|--------------|--|----|
| Reset Pulse Width (Tr)   | ns | 12.8 (16bit) |  |    |
| RxSD Assert Time (Ta)    | ns |              |  | 25 |
| RxSD De-assert Time (Td) | ns |              |  | 10 |

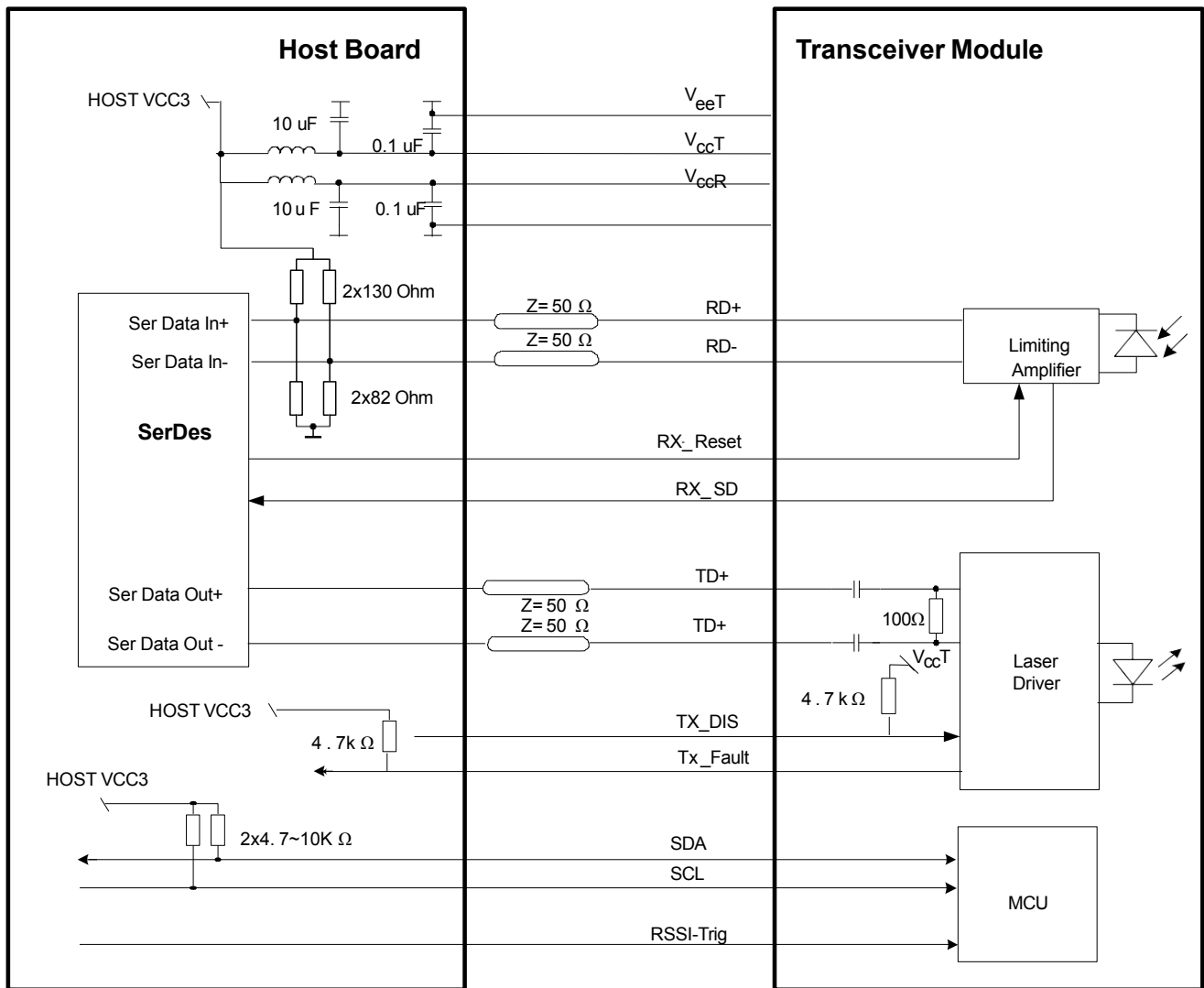
Note : the RxSD signal should be pulled low just followed the RxReset, and hold high before the next RxReset take place.

## Pin Definitions

| Pin No. | Symbol    | Level / Logic | Description   |
|---------|-----------|---------------|---|
| 1       | VeeT      |               | Module Transmitter Ground   |
| 2       | Tx_Fault  | LVTTTL-O      | Module Transmitter Fault  |
| 3       | Tx_DIS    | LVTTTL-I      | Laser output is disabled when this pin is asserted high or left unconnected |
| 4       | SDA       | LVTTTL-I      | 2-Wire Serial Interface Data Line   |
| 5       | SCL       | LVTTTL-I/O    | 2-Wire Serial Interface Clock   |
| 6       | MOD_ABS   | LVTTTL-O      | Module Absent, connected to ground in the module                            |
| 7       | RX_Reset  | LVTTTL-I      | Receiver RESET signal   |
| 8       | RX_SD     | LVTTTL-O      | Receiver Signal Detected Indication   |
| 9       | RSSI_TRIG | LVTTTL-I      | Receiver RSSI Trigger signal  |
| 10      | VeeR      |               | Module Receiver Ground  |
| 11      | VeeR      |               | Module Receiver Ground  |
| 12      | RD-       | LVPECL-O      | Receiver Inverted Data Output   |
| 13      | RD+       | LVPECL-O      | Receiver Non-Inverted Data Output   |
| 14      | VeeR      |               | Module Receiver Ground  |
| 15      | VccR      |               | Module Receiver 3.3V Supply   |
| 16      | VccT      |               | Module Transmitter 3.3V Supply  |
| 17      | VeeT      |               | Module Transmitter Ground   |
| 18      | TD+       | LVPECL-I      | Transmitter Non-Inverted Data Input   |
| 19      | TD-       | LVPECL-I      | Transmitter Inverted Data Input   |
| 20      | VeeT      |               | Module Transmitter Ground   |

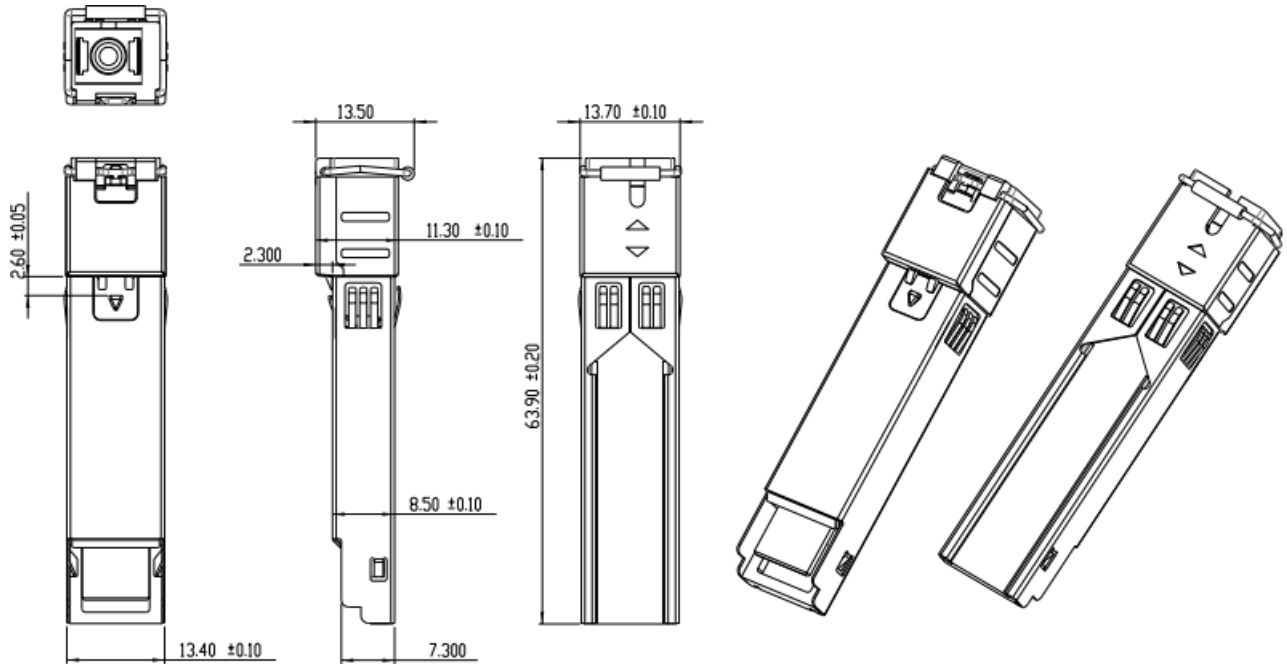


### Recommended Interface Circuit



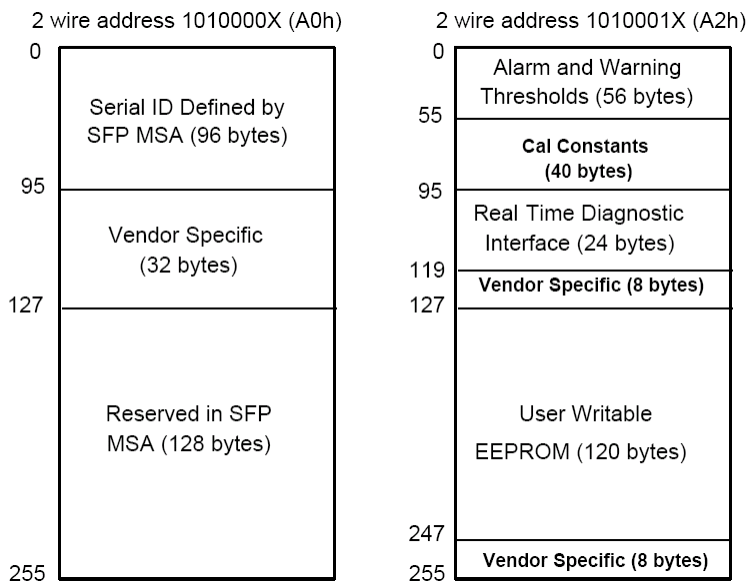
### Mechanical Diagram

For detail mechanical information, please refer to the related document of SFP MSA



### EEPROM Information

The digital diagnostic memory map specific data field define as following. For detail EEPROM information, please refer to the related document of SFF 8472 Rev 12.0.





## ESD

The SFP+ module and host SFI contacts (High Speed Contacts) shall withstand 1kV electrostatic discharge based on Human Body Model and all host contacts with exception of the SFI contacts (High Speed Contacts) shall withstand 2kV electrostatic discharge based on Human Body Model. The SFP+ module shall meet ESD requirements given in EN61000-4-2, criterion B test specification such that units are subjected to 15kV air discharges during operation and 8kV direct contact discharges to the case per section 2.9 in SFF-8431 REV4.1. However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

## Laser Safety

This is a Class 1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).