

## 1. Feature:

- SFP package with LC connector
- 1490nm DFB Laser and 1550nm PIN photodetector
- 1550nm DFB Laser and 1490nm PIN photodetector
- Up to 60Km transmission on SMF
- +3.3V single power supply
- LVPECL compatible data input/output interface
- Low EMI and excellent ESD protection
- laser safety standard IEC-60825 compliant
- Compatible with RoHS

## 2. Application:

- Ethernet
- Telecom
- Fiber Channel

## 3. Absolute Maximum Ratings

| Parameter                   | Symbol | Minimum | Maximum | Units |
|-----------------------------|--------|---------|---------|-------|
| Storage Temperature         | Tst    | -40     | +85     | °C    |
| Supply Voltage              | Vcc    | 0       | +3.6    | V     |
| Operating Relative Humidity | RH     | 5       | 95      | %     |

#### 4. Operation Environment:

| Parameter                  |            | Symbol | Min  | Typical | Max  | Units |
|----------------------------|------------|--------|------|---------|------|-------|
| Supply Voltage             |            | Vcc    | 3.15 | 3.3     | 3.45 | V     |
| Operating Case Temperature | Commercial | Tc     | 0    |         | +70  | °C    |
|                            | Industrial |        | -40  |         | +85  |       |
| Power Dissipation          |            |        |      |         | 1    | W     |
| Data Rate                  |            |        |      | 1.25    |      | Gbps  |

#### 5. Optical Characteristics:

(Ambient Operating Temperature 0°C to +70°C, Vcc =3.3 V)

| Parameter                  |         | Symbol  | Min. | Typ. | Max. | Units |
|----------------------------|---------|---|------|------|------|-------|
| <b>Transmitter Section</b> |         |   |      |      |      |       |
| Center Wavelength          | Tx 1490 | $\lambda_o$                                   | 1480 | 1490 | 1500 | nm    |
|                            | Tx 1550 |   | 1540 | 1550 | 1560 |       |
| Spectral Width(RMS)        | Tx 1490 | $\Delta\lambda$                               | -    | -    | 1    | nm    |
|                            | Tx 1550 |   |      |      | 1    |       |
| Average Output Power       | Tx 1490 | Po  | -5   | -    | 0    | dBm   |
|                            | Tx 1550 |   | -5   |      | 0    |       |
| Extinction Ratio           |         | Er  | 10   | -    | 15   | dB    |
| Rise/Fall Time(20%~80%)    |         | Tr/Tf   |      |      | 0.26 | ns    |
| Total jitter               |         | Tj  |      |      | 0.43 | UI    |
| Optical Eye Diagram        |         | IEEE 802.3z and ANSI Fibre Channel Compatible |      |      |      |       |
| <b>Receiver Section</b>    |         |   |      |      |      |       |

|                      |         |                  |      |      |      |     |
|----------------------|---------|------------------|------|------|------|-----|
| Center Wavelength    | Rx 1550 | $\lambda_0$      | 1500 | 1550 | 1600 | nm  |
|                      | Rx 1490 |                  | 1440 | 1490 | 1540 |     |
| Receiver Sensitivity |         | R <sub>sen</sub> |      |      | -24  | dBm |
| Receiver Overload    |         | R <sub>ov</sub>  | -3   |      |      | dBm |
| Return Loss          |         |                  | 12   |      |      | dB  |
| LOS Assert           |         | LOS <sub>A</sub> | -36  |      |      | dBm |
| LOS Dessert          |         | LOS <sub>D</sub> |      |      | -24  | dBm |
| LOS Hysteresis       |         |                  | 0.5  |      | 5    |     |

## 6. Electrical Characteristics:

(Ambient Operating Temperature 0°C to +70°C, V<sub>cc</sub> =3.3 V)

| Parameter                     | Symbol           | Min. | Typ. | Max.            | unit |
|-------------------------------|------------------|------|------|-----------------|------|
| <b>Transmitter Section</b>    |                  |      |      |                 |      |
| Input Differential Impedence  | Z <sub>in</sub>  | 90   | 100  | 110             | Ohm  |
| Data Input Swing Differential | V <sub>in</sub>  | 500  |      | 2400            | mV   |
| TX Disable                    | Disable          | 2.0  |      | V <sub>cc</sub> | V    |
|                               | Enable           | 0    |      | 0.8             | V    |
| TX Fault                      | Assert           | 2.0  |      | V <sub>cc</sub> | V    |
|                               | Deassert         | 0    |      | 0.8             | V    |
| <b>Receiver Section</b>       |                  |      |      |                 |      |
| Output differential impedance | Z <sub>out</sub> |      | 100  |                 | Ohm  |
| Data Input Swing Differential | V <sub>out</sub> | 370  |      | 2000            | mV   |
| Rx_LOS                        | Assert           | 2.0  |      | V <sub>cc</sub> | V    |
|                               | Deassert         | 0    |      | 0.8             | V    |

## 7. EEPROM INFORMATION (A0) :

| Addr  | Field Size (Bytes) | Name of Field   | HEX  | Description               |
|-------|--------------------|-----------------|--|---------------------------|
| 0     | 1                  | Identifier      | 03   | SFP                       |
| 1     | 1                  | Ext. Identifier | 04   | MOD4                      |
| 2     | 1                  | Connector       | 07   | LC                        |
| 3-10  | 8                  | Transceiver     | 00 00 00 02 12 00 0D 01                            | Transmitter Code          |
| 11    | 1                  | Encoding        | 01   | 8B10B                     |
| 12    | 1                  | BR, nominal     | 0D   | 1250M bps                 |
| 13    | 1                  | Reserved        | 00   |                           |
| 14    | 1                  | Length (9um)-km | 28   | 60km                      |
| 15    | 1                  | Length (9um)    | 64   |                           |
| 16    | 1                  | Length (50um)   | 00   |                           |
| 17    | 1                  | Length (62.5um) | 00   |                           |
| 18    | 1                  | Length (copper) | 00   |                           |
| 19    | 1                  | Reserved        | 00   |                           |
| 20-35 | 16                 | Vendor name     | 57 49 4E 54 4F 50 20 20<br>20 20 20 20 20 20 20 20 | CABLEXA                   |
| 36    | 1                  | Reserved        | 00   |                           |
| 37-39 | 3                  | Vendor OUI      | 00 00 00   |                           |
| 40-55 | 16                 | Vendor PN       | xx xx xx xx xx xx xx xx<br>xx xx xx xx xx xx xx xx | ASC II                    |
| 56-59 | 4                  | Vendor rev      | 31 2E 30 20  | V1.0                      |
| 60-61 | 2                  | Wavelength      | 05 1E/05 D2  | 1550nm/1490nm             |
| 62    | 1                  | Reserved        | 00   |                           |
| 63    | 1                  | CC BASE         | XX   | Check sum of byte 0~62    |
| 64-65 | 2                  | Options         | 00 1A  | LOS, TX_DISABLE, TX_FAULT |
| 66    | 1                  | BR, max         | 32   | 50%                       |
| 67    | 1                  | BR, min         | 32   | 50%                       |
| 68-83 | 16                 | Vendor SN       | 00 00 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 | Unspecified               |

|        |     |                  |             |                         |
|--------|-----|------------------|-------------|-------------------------|
| 84-91  | 8   | Vendor date code | XX XX XX 20 | Year, Month, Day        |
| 92-94  | 3   | Reserved         | 00          |                         |
| 95     | 1   | CC_EXT           | XX          | Check sum of byte 64~94 |
| 96-255 | 160 | Vendor specific  |             |                         |

## 8. Pin Description:

| Pins | Name        | Discription                  | NOTE |
|------|-------------|------------------------------|------|
| 1    | VeeT        | Transmitter Ground           |      |
| 2    | Tx Fault    | Transmitter Fault Indication | 1    |
| 3    | Tx Disable  | Transmitter Disable          | 2    |
| 4    | MOD DEF2    | Module Definition 2          | 3    |
| 5    | MOD DEF1    | Module Definition 1          | 3    |
| 6    | MOD DEF0    | Module Definition 0          | 3    |
| 7    | Rate Select | Not Connected                |      |
| 8    | LOS         | Loss of Signal               | 4    |
| 9    | VeeR        | Receiver Ground              |      |
| 10   | VeeR        | Receiver Ground              |      |
| 11   | VeeR        | Receiver Ground              |      |
| 12   | RD-         | Inv. Received Data Output    | 5    |
| 13   | RD+         | IReceived Data Output        | 5    |
| 14   | VeeR        | Receiver Ground              |      |
| 15   | VccR        | Receiver Power               |      |
| 16   | VccT        | Transmitter Power            |      |
| 17   | VeeT        | Transmitter Ground           |      |
| 18   | TD+         | Transmit Data Input          | 6    |
| 19   | TD-         | Inv. Transmit Data Input     | 6    |
| 20   | VeeT        | Transmitter Ground           |      |

Notes:

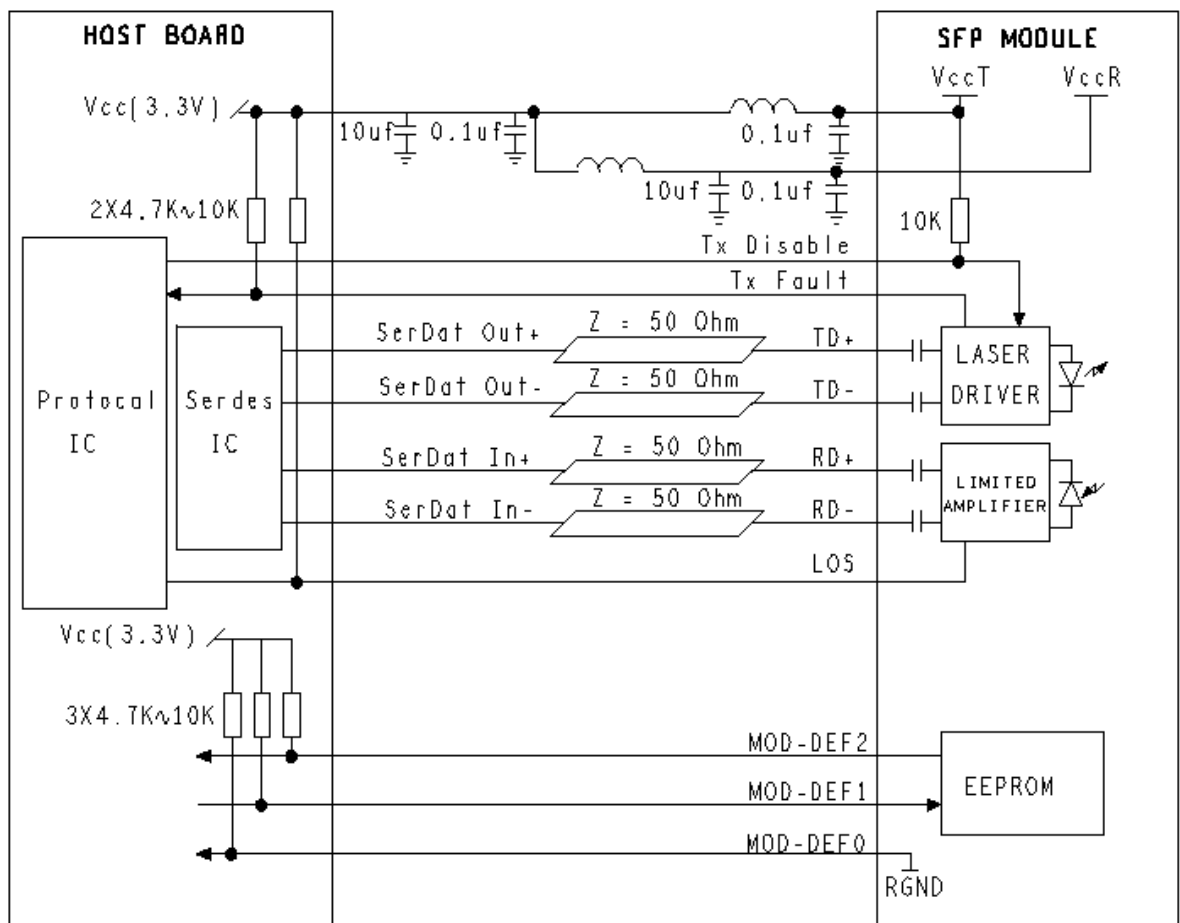
1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2. TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:  
Low (0~0.8V): Transmitter on  
(>0.8V, <2.0V): Undefined

High (2.0~3.3V): Transmitter Disabled

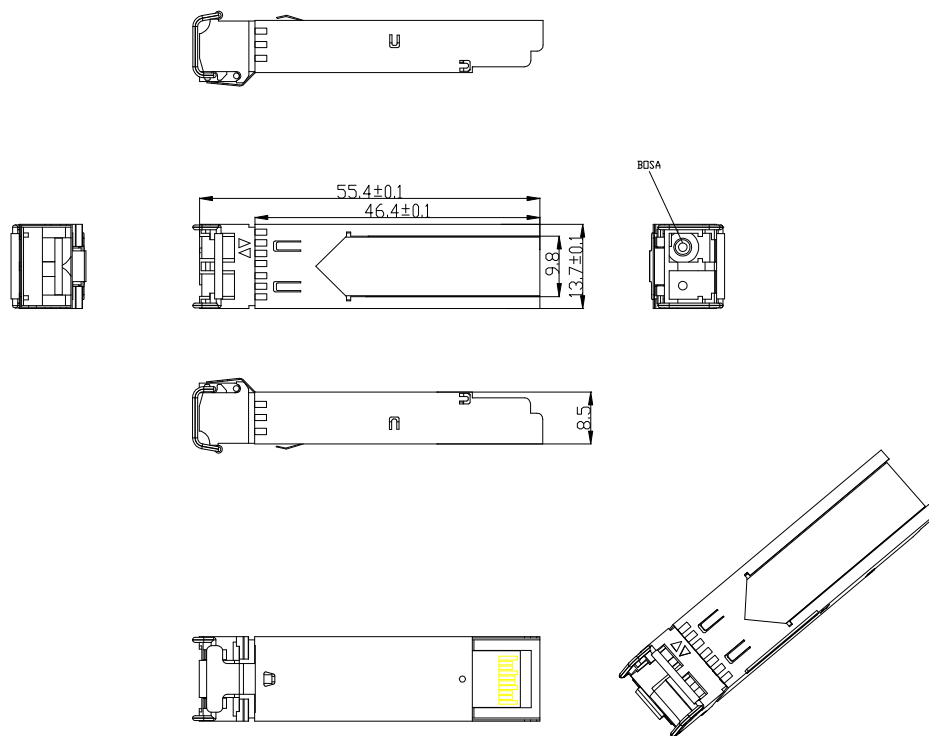
Open: Transmitter Disabled

3. MOD-DEF 0,1,2 are the module definition pins. They should be pulled up with a 4.7k~10k $\Omega$  resistor on the host board. The pull-up voltage shall be VccT or VccR.  
MOD-DEF 0 is grounded by the module to indicate that the module is present  
MOD-DEF 1 is the clock line of two wire serial interface for serial ID  
MOD-DEF 2 is the data line of two wire serial interface for serial ID
4. LOS is an open collector output, which should be pulled up with a 4.7k~10k $\Omega$  resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates loss of signal. In the low state, the output will be pulled to less than 0.8V.
5. These are the differential receiver output. They are internally AC-coupled 100 $\Omega$  differential lines which should be terminated with 100 $\Omega$  (differential) at the user SERDES.
6. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 $\Omega$  differential termination inside the module.

## 9. Recommended Application Circuit:



## 10. Outline drawing (mm):



## 11. Ordering information :

|                  |                  |        |
|------------------|------------------|--------|
| SFP-GE-3155-60KM | TX-1490, RX-1550 | 0~70°C |
| SFP-GE-5531-60KM | TX-1550, RX-1490 | 0~70°C |