## Features

- Data-Rate of 1.25Gbps operation
- 850nm VCSEL laser and PIN photodetector
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitoring: Internal Calibration or External Calibration
- 550m transmission with 50/125μm MMF
- 300m transmission with 62.5/125μm MMF
- Single +3.3V power supply
- RoHS Compliant
- Operating case temperature:

  Class C : 0°C ~70°C

  Class I : -40°C ~85°C


## Applications

- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server Interface
- Other optical transmission systems

## Description

The SFP optical transceivers are high performance, cost effective modules supporting data-rate of 1.25Gbps and 550m transmission distance with MMF.

The transceiver consists of three sections: a VCSEL laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier ITIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472 for further information, please refer to SFP MSA.

## Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Units | Note |
|---|---|---|---|---|---|---|
| Storage Temperature | *Ts* | -40 | | 85 | °C | |
| Supply Voltage | *Vcc* | -0.5 | | 4.5 | V | |
| Operating Relative Humidity | | 5 | | 95 | % | |

## Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Units | Note |
|---|---|---|---|---|---|---|
| Power Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V | |
| Case Operating Temperature | *Top* | 0 | | 70 | °C | CMF |
| | | -40 | | 85 | °C | IMF |
| Power Supply Current | *Icc* | | | 300 | mA | |
| Data Rate | | | 1.25 | | Gbps | |

## Digital Diagnostic Functions

| Parameter | Symbol | Accuracy | Unit | Notes |
|---|---|---|---|---|
| Temperature Monitor Absolute Error | *DMI_Temp* | ± 3 | °C | Over operating Temp |
| Supply Voltage Monitor Absolute Error | *DMI_VCC* | ±0.1 | V | Full operating range |
| RX Power Monitor Absolute Error | *DMI_RX* | ± 3 dB | dB | 1 |
| Bias Current Monitor | *DMI_Ibias* | ± 10% | mA | |
| Laser Power Monitor Absolute Error | *DMI_TX* | ± 3 dB | dB | 1 |

**Notes:**

1. Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy.

## Optical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Units | Note |
|---|---|---|---|---|---|---|
| | | | ***Transmitter*** | | | |
| Optical Center Wavelength | $\lambda$ | 830 | 850 | 860 | nm | |
| Output Optical Power | $P_{TX}$ | -9.5 | | -3.5 | dBm | 1 |
| Extinction Ratio | *ER* | 9 | | | dB | |
| Spectral Width (RMS) | $\Delta\lambda$ | | | 0.85 | nm | |
| Optical Rise/Fall Time (20%-80%) | $t_r/t_f$ | | | 0.25 | Ns | |
| | | | ***Receiver*** | | | |
| Optical Center Wavelength | $\underline{\lambda}$ | 770 | | 860 | nm | |
| Receiver Overload | $P_{OL}$ | 0 | | | dBm | 2 |
| Receiver Sensitivity | $P_{SEN}$ | | | -18 | dBm | 2 |
| LOS Assert | *LOSA* | -35 | | | dBm | |
| LOS De-assert | *LOSD* | | | -18 | dBm | |
| LOS Hysteresis | *LOSH* | 1 | | 4 | dB | |

Note:

1. The optical power is launched into MMF
2. Measured with a PRBS$2^7$-1 test pattern @1250Mbps, BER$\leqq 1x10^{-12}$

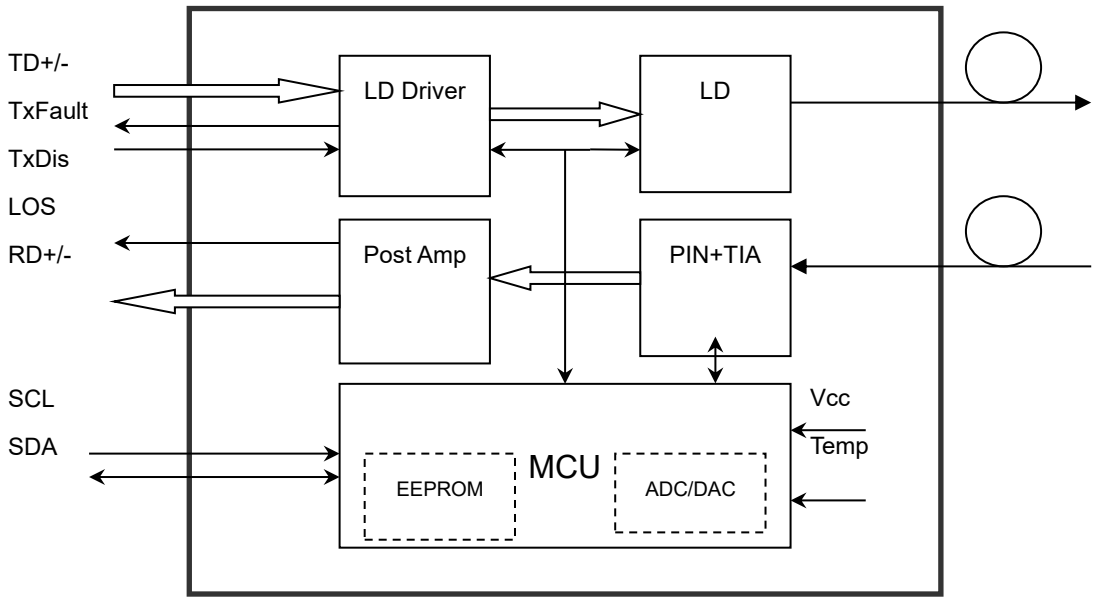
## Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Units | Note |
|---|---|---|---|---|---|---|
| | | | ***Transmitter*** | | | |
| Input Differential Impedance | *ZIN* | 90 | 100 | 110 | Ω | |
| Single Ended Data Input Swing | $V_{IN\_pp}$ | 400 | | 1800 | mV | 1 |
| Transmit Disable Voltage | $V_D$ | 2 | | Vcc | V | |
| Transmit Enable Voltage | $V_{EN}$ | 0 | | 0.8 | V | |
| | | | ***Receiver*** | | | |
| Data Output Swing Differential | $V_{OUT}$ | 400 | | 1800 | mV | 2 |
| Data Output Rise/Fall Time (20%~80%) | *tr/tf* | | | 300 | ps | |
| LOS | *High* | 2 | - | Vcc | V | |
| | *Low* | | | 0.8 | V | |

Note:

1. PECL input, internally AC-coupled and terminated.
2. Internally AC-coupled.

## Block Diagram of Transceiver



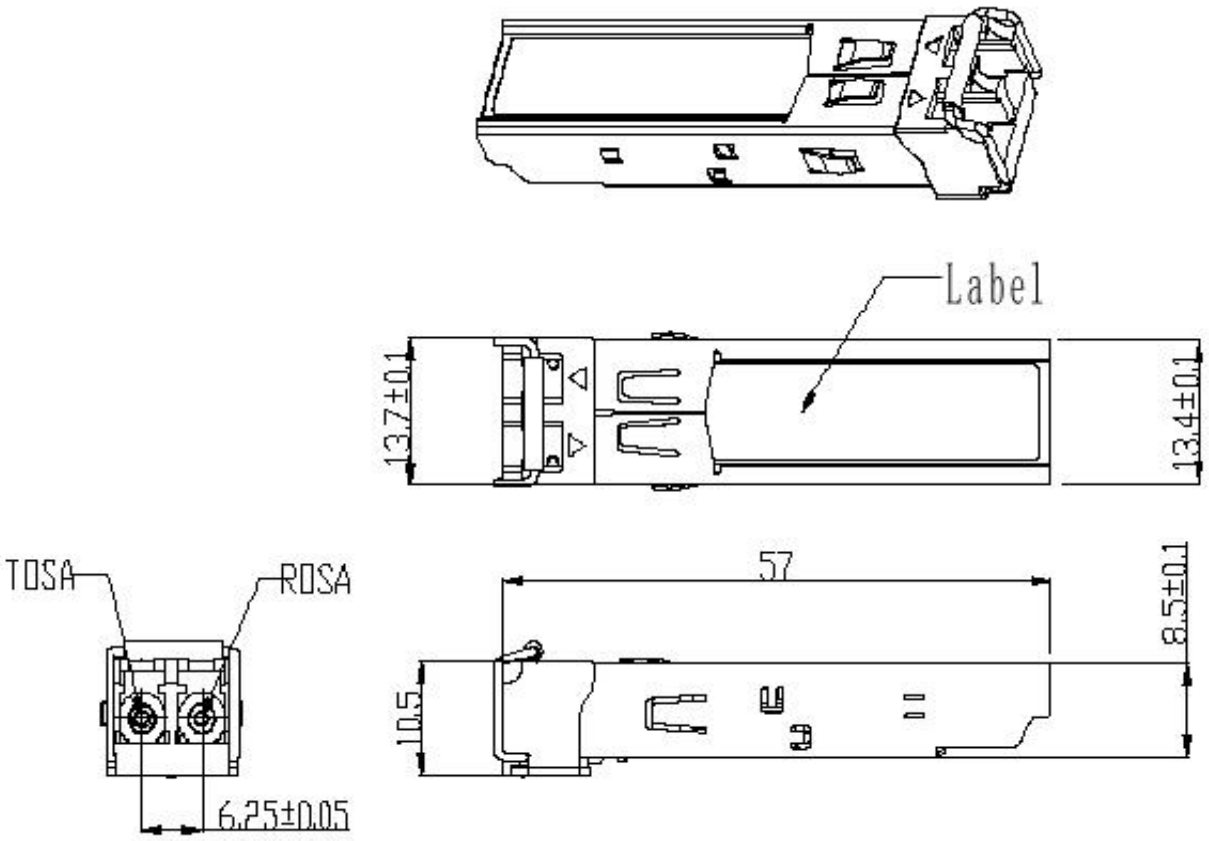
## Pin Assignment

| Pin | Symbol | Function/Description | Note |
|---|---|---|---|
| 1 | VEET | Transmitter ground (common with receiver ground) | 1 |
| 2 | TX_FAULT | Transmitter Fault. Not supported | |
| 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 isolated from chassis ground.
2. Disabled: TDIS>2V or open Enabled: TDIS<0.8V
3. Should be pulled up with 4.7k~10k ohm on host board to a voltage between 2V and 3.6V.
4. LOS is open collector output.

## Dimensions

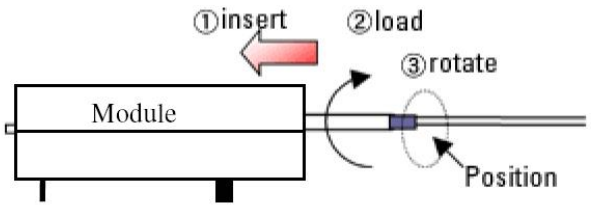


## Optical Receptacle Cleaning Recommendations :

All fiber stubs inside the receptacle portions were cleaned before shipment. In the event of contamination of the optical ports, the recommended cleaning process is the use of forced nitrogen. If contamination is thought to have remained, the optical ports can be cleaned using a NTT international Cletop® stick type and HFE7100 cleaning fluid. Before the mating of patch-cord, the fiber end should be cleaned up by using Cletop® cleaning cassette.

**Cleaning of patch-cord**


**Cleaning of fiber stub**




1. Insert
   Ensure that stick is held straight when inserting into sleeve.
2. Load
   Apply sufficient pressure (approx 600-700g) to ensure ferrule a little depressed in sleeve.
3. Rotate
   Rotate stick clockwise 4-5 times, while ensuring direct contact with ferrule end-face is maintained.

*Notice: Number of possible wipes: Maintenance (repair) ~1 use / piece Equipment construction: 4 uses / piece (max.)*

Note: The pictures were extracted from NTT-ME website. And the Cletop® is a trademark registered by NTT-ME

## Ordering Information

| Model Number | Part Number | Wavelength | Temperature |
|---|---|---|---|
| SFP-1.25G-SX-DM | OP6C-MX5-85-CMF | 850nm | 0°C ~70 °C |
| SFP-1.25G-SX-DM-I | OP6C-MX5-85-IMF | 850nm | -40 °C ~85 °C |

## Modification History

| Revision | Date | Description |
|---|---|---|
| A1 | Feb. 2013 | Initial Release |

**Note: All information contained in this document is subject to change without notice.**