

1.25Gbps SFP Optical Transceiver, 550m Reach

Features

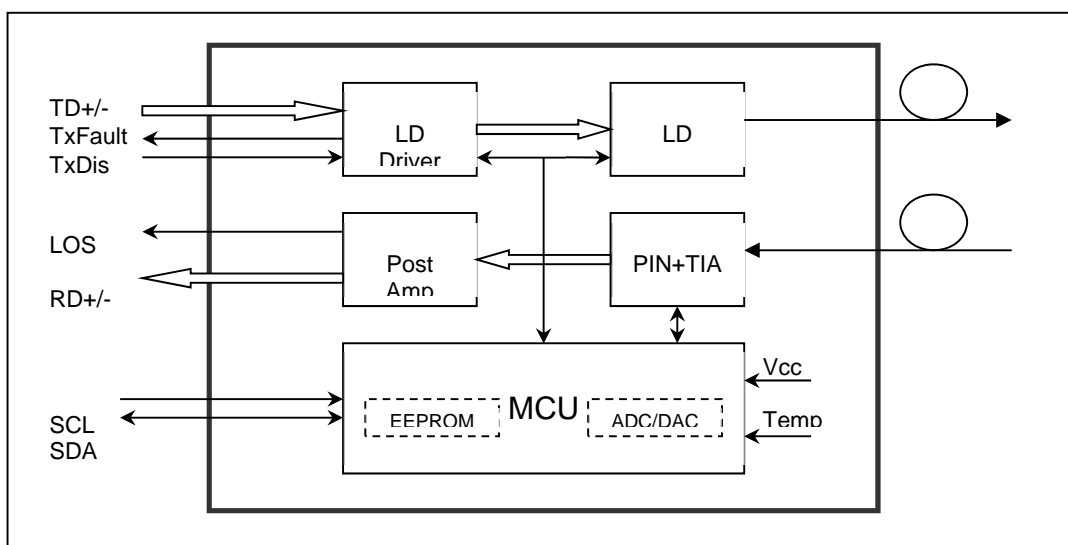
- ◆ Data-rate of 1.25Gbps operation
- ◆ 850nm VCSEL laser and PIN photodetector
- ◆ Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- ◆ Digital Diagnostic Monitoring:
 - ◆ 550m transmission with 50/125 μ m MMF
 - ◆ 300m transmission with 62.5/125 μ m MMF
- ◆ Compatible with RoHS
- ◆ +3.3V single power supply
- ◆ Operating case temperature:
 - Standard : 0 to +70°C
 - Industrial : -40 to +85°C



Applications

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

Module Block Diagram



Absolute Maximum Ratings

Table 1 - Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---------------------|-----------------|------|-----|------|
| Supply Voltage | V _{cc} | -0.5 | 4.5 | V |
| Storage Temperature | T _s | -40 | +85 | °C |
| Operating Humidity | - | 5 | 85 | % |

Recommended Operating Conditions

Table 2 - Recommended Operating Conditions

| Operating Case Temperature | Standard | T _c | 0 | | +70 | °C |
|----------------------------|------------|-----------------|------|------|------|------|
| | | | -20 | | +85 | |
| | industrial | | -40 | | +85 | °C |
| Power Supply Voltage | | V _{cc} | 3.13 | 3.3 | 3.47 | V |
| Power Supply Current | | I _{cc} | | | 300 | mA |
| Data Rate | | | | 1.25 | | Gbps |

Optical and Electrical Characteristics

VCSEL and PIN, 500m Reach

Table 3 - Optical and Electrical Characteristics

| Parameter | | Symbol | Min | Typical | Max | Unit | Notes |
|----------------------------------|---------|------------------|------|---------|-----------------|----------|-------|
| Transmitter | | | | | | | |
| Centre Wavelength | | λ_c | 830 | 850 | 860 | nm | |
| Spectral Width (RMS) | | $\Delta\lambda$ | | | 0.85 | nm | |
| Average Output Power | | P _{out} | -9.5 | | -3.5 | dBm | 1 |
| Extinction Ratio | | ER | 9 | | | dB | |
| Optical Rise/Fall Time (20%~80%) | | tr/ta | | | 0.26 | ns | |
| Data Input Swing Differential | | V _{IN} | 400 | | 1800 | mV | 2 |
| Input Differential Impedance | | Z _{IN} | 90 | 100 | 110 | Ω | |
| TX Disable | Disable | | 2.0 | | V _{cc} | V | |
| | Enable | | 0 | | 0.8 | V | |
| TX Fault | Fault | | 2.0 | | V _{cc} | V | |
| | Normal | | 0 | | 0.8 | V | |
| Receiver | | | | | | | |
| Centre Wavelength | | λ_c | 770 | | 860 | nm | |
| Receiver Sensitivity | | | | | -18 | dBm | 3 |
| Receiver Overload | | | 0 | | | dBm | 3 |
| LOS De-Assert | | LOS _D | | | -18 | dBm | |
| LOS Assert | | LOS _A | -35 | | | dBm | |
| LOS Hysteresis | | | 1 | | 4 | dB | |
| Data Output Swing Differential | | V _{out} | 400 | | 1800 | mV | 4 |
| LOS | High | | 2.0 | | V _{cc} | V | |
| | Low | | | | 0.8 | V | |

Notes:

1. The optical power is launched into MMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2⁷-1 test pattern @1250Mbps, BER ≤1×10⁻¹².
4. Internally AC-coupled.

Timing and Electrical

Table 4 - Timing and Electrical

| Parameter | Symbol | Min | Typical | Max | Unit |
|---|---------------------------|-----|---------|-----------------|------|
| Tx Disable Negate Time | t _{on} | | | 1 | ms |
| Tx Disable Assert Time | t _{off} | | | 10 | µs |
| Time To Initialize, including Reset of Tx Fault | t _{init} | | | 300 | ms |
| Tx Fault Assert Time | t _{fault} | | | 100 | µs |
| Tx Disable To Reset | t _{reset} | 10 | | | µs |
| LOS Assert Time | t _{loss_on} | | | 100 | µs |
| LOS De-assert Time | t _{loss_off} | | | 100 | µs |
| Serial ID Clock Rate | f _{serial_clock} | | | 400 | KHz |
| MOD_DEF (0:2)-High | V _H | 2 | | V _{cc} | V |
| MOD_DEF (0:2)-Low | V _L | | | 0.8 | V |

Diagnostics

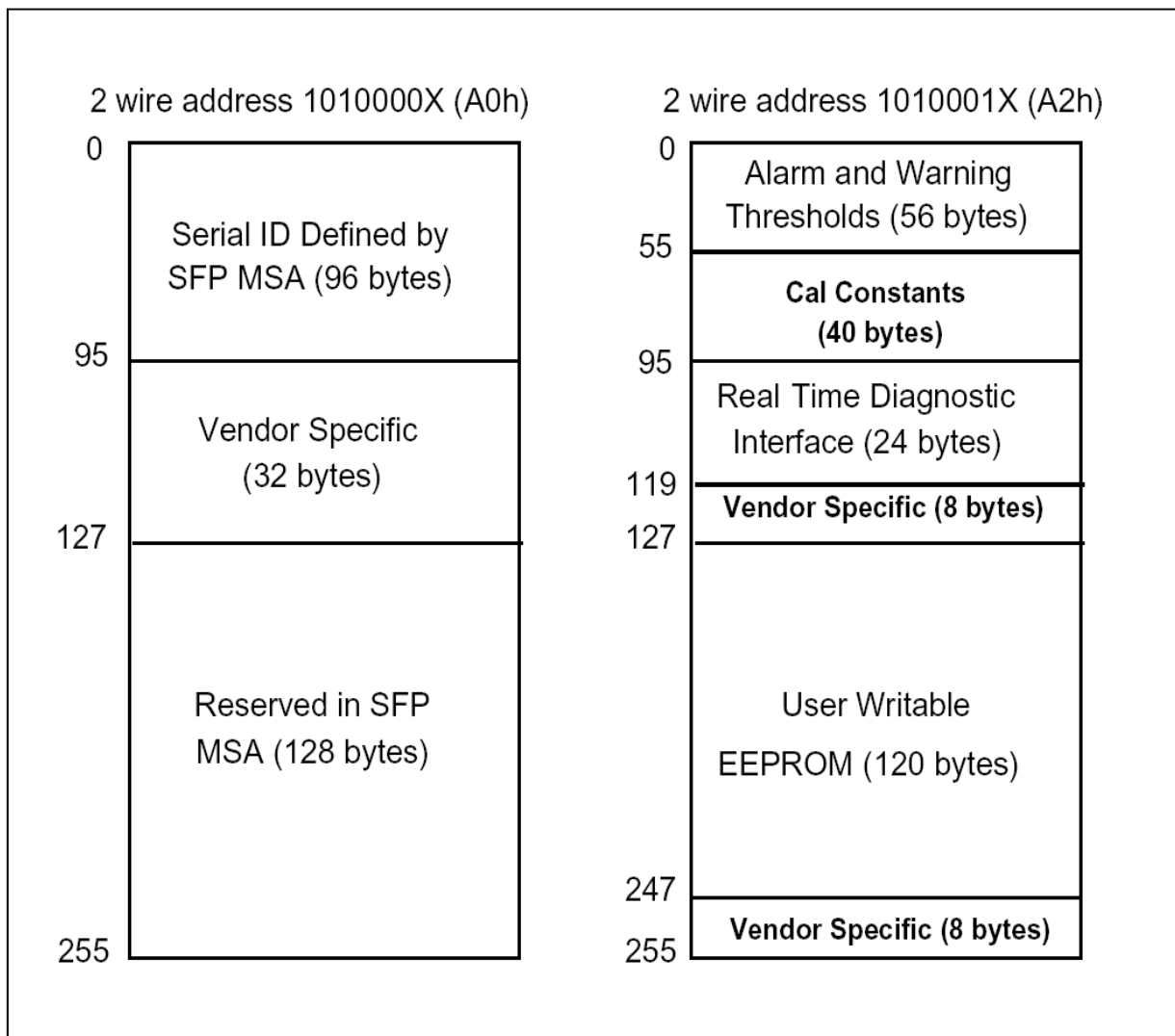
Table 5 – Diagnostics Specification

| Parameter | Range | Unit | Accuracy |
|--------------|--------------|------|----------|
| Temperature | 0 to +70 | °C | ±3°C |
| | -20 to +85 | | |
| Voltage | 3.0 to 3.6 | V | ±3% |
| Bias Current | 0 to 100 | mA | ±10% |
| TX Power | -9.5 to -3.5 | dBm | ±3dB |
| RX Power | -18 to -3 | dBm | ±3dB |

Digital Diagnostic Memory Map

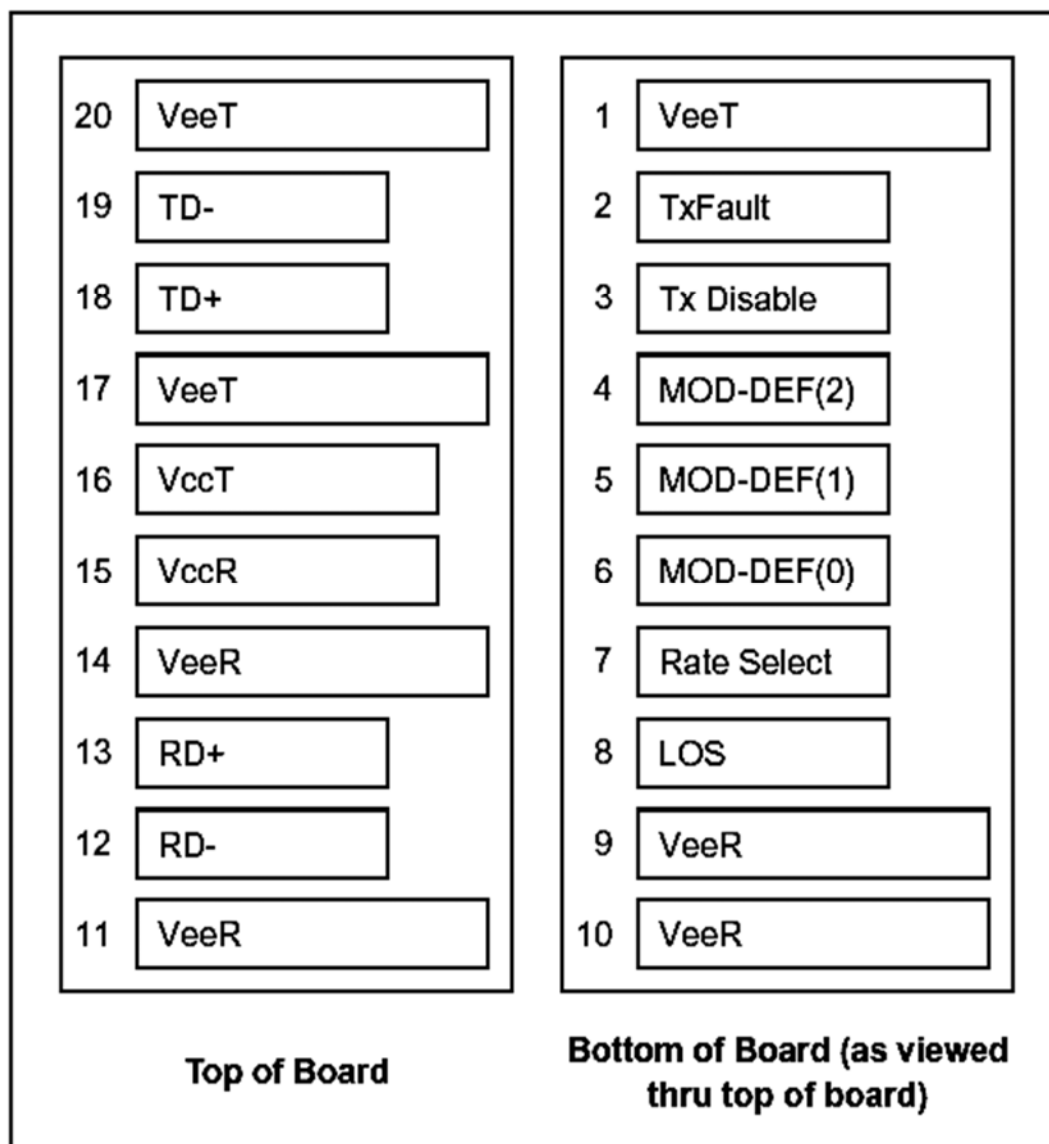
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The digital diagnostic memory map specific data field defines as following.



Pin Definitions

Pin Diagram



Pin Descriptions

| Pin | Signal Name | Description | Plug Seq. | Notes |
|-----|------------------|------------------------------|-----------|--------|
| 1 | V _{EET} | Transmitter Ground | 1 | |
| 2 | TX FAULT | Transmitter Fault Indication | 3 | Note 1 |
| 3 | TX DISABLE | Transmitter Disable | 3 | Note 2 |
| 4 | MOD_DEF(2) | SDA Serial Data Signal | 3 | Note 3 |
| 5 | MOD_DEF(1) | SCL Serial Clock Signal | 3 | Note 3 |
| 6 | MOD_DEF(0) | TTL Low | 3 | Note 3 |
| 7 | Rate Select | Not Connected | 3 | |
| 8 | LOS | Loss of Signal | 3 | Note 4 |
| 9 | V _{EER} | Receiver ground | 1 | |
| 10 | V _{EER} | Receiver ground | 1 | |
| 11 | V _{EER} | Receiver ground | 1 | |
| 12 | RD- | Inv. Received Data Out | 3 | Note 5 |
| 13 | RD+ | Received Data Out | 3 | Note 5 |
| 14 | V _{EER} | Receiver ground | 1 | |
| 15 | V _{CCR} | Receiver Power Supply | 2 | |
| 16 | V _{CCT} | Transmitter Power Supply | 2 | |
| 17 | V _{EET} | Transmitter Ground | 1 | |
| 18 | TD+ | Transmit Data In | 3 | Note 6 |
| 19 | TD- | Inv. Transmit Data In | 3 | Note 6 |
| 20 | V _{EET} | Transmitter Ground | 1 | |

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- 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 V_{CC}+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.
- 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 to 0.8V): Transmitter on
 (>0.8V, < 2.0V): Undefined
 High (2.0 to 3.465V): Transmitter Disabled
 Open: Transmitter Disabled
- Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be V_{CC}T or V_{CC}R.
 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
- LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and V_{CC}+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
- RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.



Ordering information

MSA Standard:

| Part Number | Product Description |
|--------------|--|
| SFP-SX-85-CC | 850nm, 1.25Gbps, 550m, 0°C ~ +70°C, With Digital Diagnostic Monitoring |
| SFP-SX-85-IC | 850nm, 1.25Gbps, 550m, -40°C ~ +85°C, With Digital Diagnostic Monitoring |

Cross-Platform/OEM Compatible:

| Part Number | Product Description |
|----------------|--|
| SFP-SX-85-CCxx | 850nm, 1.25Gbps, 550m, 0°C ~ +70°C, With Digital Diagnostic Monitoring |
| SFP-SX-85-ICxx | 850nm, 1.25Gbps, 550m, -40°C ~ +85°C, With Digital Diagnostic Monitoring |

xx=TP, Cisco, Juniper & Ciena compatible

xx=AL, Alcatel compatible