

## 1.25Gbps SFP Optical Transceiver, 120km Reach

### Features

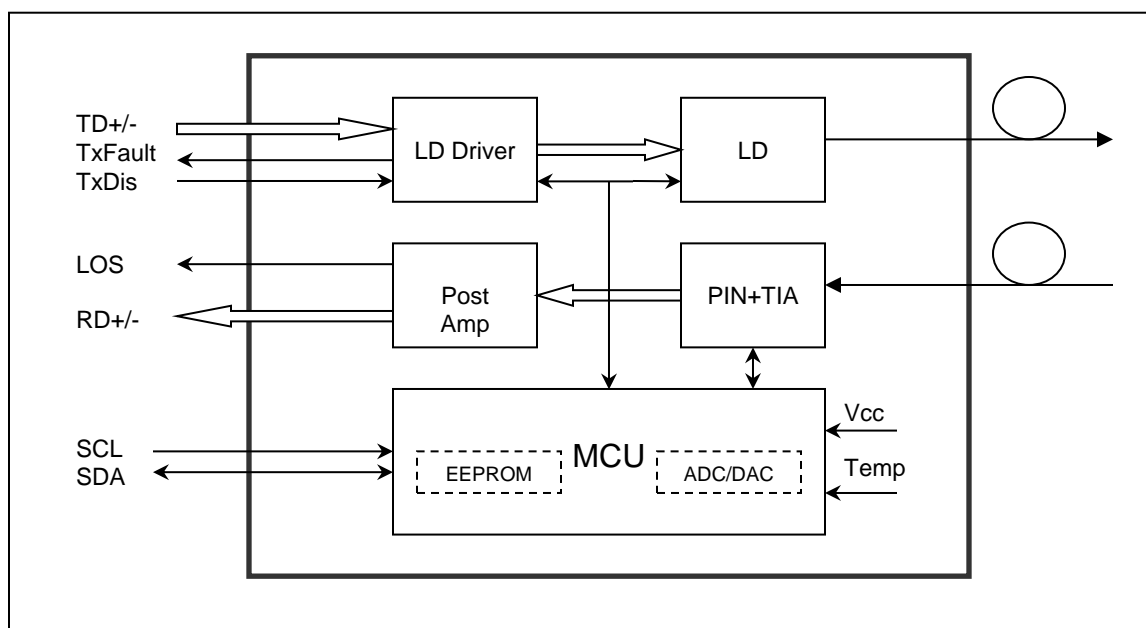
- ◆ Data-rate of 1.25Gbps operation
- ◆ 1550nm DFB laser and PIN photo detector for 120km transmission
- ◆ Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- ◆ Digital Diagnostic Monitoring:
- ◆ Compatible with SONET OC-24-LR-1
- ◆ Compatible with RoHS
- ◆ +3.3V single power supply
- ◆ Operating 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 system

## Module Block Diagram



## Absolute Maximum Ratings

**Table 1 - Absolute Maximum Ratings**

| Parameter           | Symbol | Min  | Max | Unit |
|---------------------|--------|------|-----|------|
| Supply Voltage      | Vcc    | -0.5 | 4.5 | V    |
| Storage Temperature | Ts     | -40  | +85 | °C   |
| Operating Humidity  | -      | 5    | 85  | %    |

## Recommended Operating Conditions

**Table 2 - Recommended Operating Conditions**

| Parameter                  | Symbol | Min  | Typical | Max  | Unit |
|----------------------------|--------|------|---------|------|------|
| Operating Case Temperature | Tc     | 0    |         | +70  | °C   |
|                            |        | -40  |         | +85  | °C   |
| Power Supply Voltage       | Vcc    | 3.13 | 3.3     | 3.47 | V    |
| Power Supply Current       | Icc    |      |         | 300  | mA   |
| Data Rate                  |        |      | 1.25    |      | Gbps |

## Optical and Electrical Characteristics

**Table 3 - Optical and Electrical Characteristics**

| Parameter                        |         | Symbol                         | Min  | Typical | Max             | Unit     | Notes |
|----------------------------------|---------|--------------------------------|------|---------|-----------------|----------|-------|
| Transmitter                      |         |                                |      |         |                 |          |       |
| Centre Wavelength                |         | $\lambda_c$                    | 1480 | 1550    | 1580            | nm       |       |
| Spectral Width (-20dB)           |         | $\Delta\lambda$                |      |         | 1               | nm       |       |
| Side Mode Suppression Ratio      |         | SMSR                           | 30   |         |                 | dB       |       |
| Average Output Power             |         | P <sub>out</sub>               | 0    |         | 5               | dBm      | 1     |
| Extinction Ratio                 |         | ER                             | 9    |         |                 | dB       |       |
| Optical Rise/Fall Time (20%~80%) |         | t <sub>r</sub> /t <sub>f</sub> |      |         | 0.26            | ns       |       |
| Data Input Swing Differential    |         | V <sub>IN</sub>                | 400  |         | 1800            | mV       | 2     |
| Input Differential Impedance     |         | Z <sub>IN</sub>                | 90   | 100     | 110             | $\Omega$ |       |
| TX Disable                       | Disable |                                | 2.0  |         | V <sub>cc</sub> | V        |       |
|                                  | Enable  |                                | 0    |         | 0.8             | V        |       |
| TX Fault                         | Fault   |                                | 2.0  |         | V <sub>cc</sub> | V        |       |
|                                  | Normal  |                                | 0    |         | 0.8             | V        |       |
| Receiver                         |         |                                |      |         |                 |          |       |
| Centre Wavelength                |         | $\lambda_c$                    | 1260 |         | 1580            | nm       |       |
| Receiver Sensitivity             |         |                                |      |         | -23             | dBm      | 3     |
| Receiver Overload                |         |                                | -3   |         |                 | dBm      | 3     |
| LOS De-Assert                    |         | LOS <sub>D</sub>               |      |         | -24             | dBm      |       |
| LOS Assert                       |         | LOS <sub>A</sub>               | -35  |         |                 | dBm      |       |
| LOS Hysteresis                   |         |                                | 1    |         | 4               | dB       |       |
| Data Output Swing Differential   |         | V <sub>out</sub>               | 370  |         | 1800            | mV       | 4     |
| LOS                              | High    |                                | 2.0  |         | V <sub>cc</sub> | V        |       |
|                                  | Low     |                                |      |         | 0.8             | V        |       |

**Notes:**

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2<sup>7</sup>-1 test pattern @1250Mbps, BER ≤1×10<sup>-12</sup>.
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 <sub>H</sub> | 2   |         | V <sub>cc</sub> | V    |
| MOD_DEF (0:2)-Low                               | V <sub>L</sub> |     |         | 0.8             | V    |

## Diagnostics

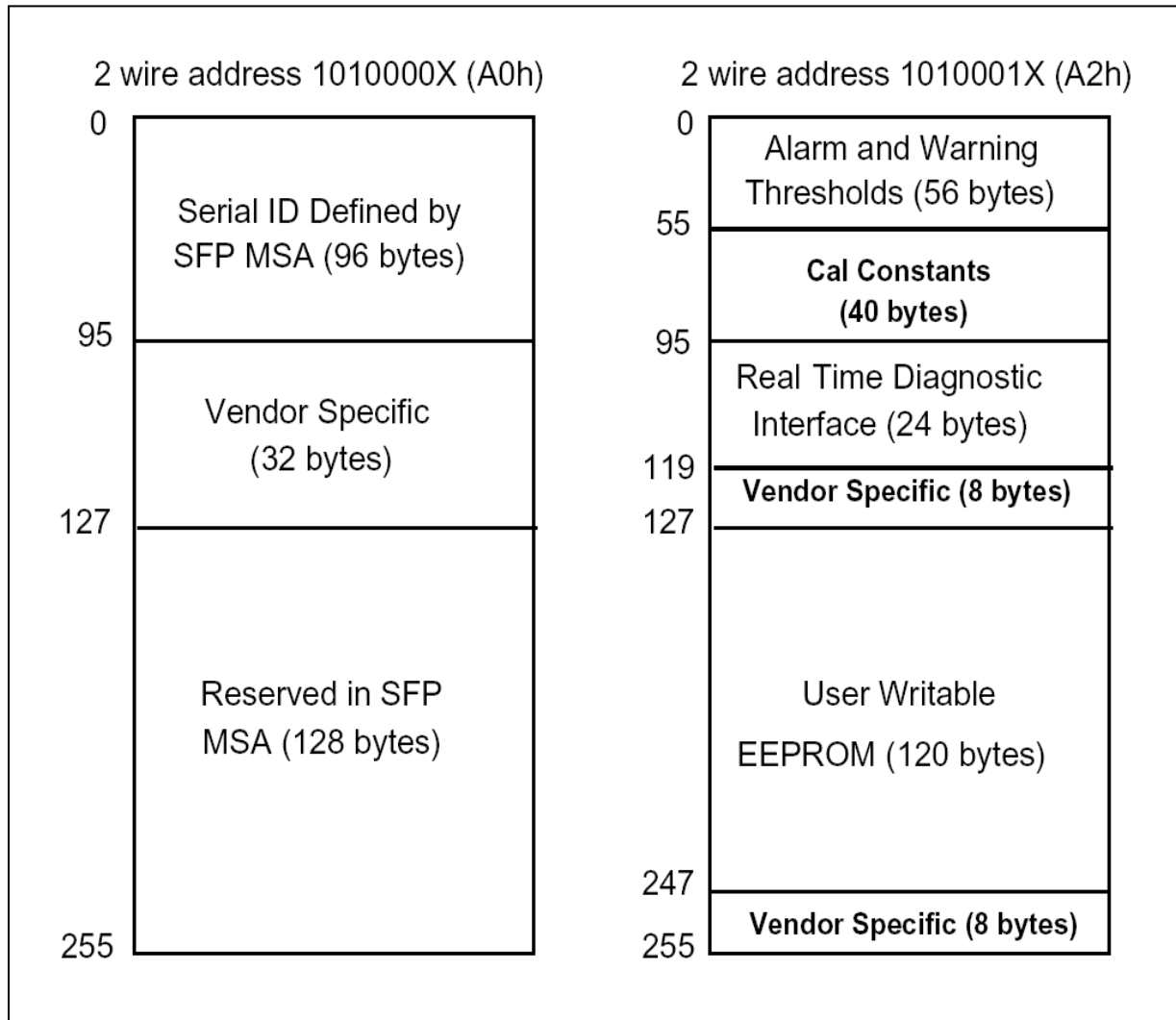
**Table 5 – Diagnostics Specification**

| Parameter    | Range      | Unit | Accuracy |
|--------------|------------|------|----------|
| Temperature  | 0 to +70   | °C   | ±3°C     |
|              | -40 to +85 |      |          |
| Voltage      | 3.0 to 3.6 | V    | ±3%      |
| Bias Current | 0 to 100   | mA   | ±10%     |
| TX Power     | 0 to +5    | dBm  | ±3dB     |
| RX Power     | -23 to -3  | dBm  | ±3dB     |

## Digital Diagnostic Memory Map

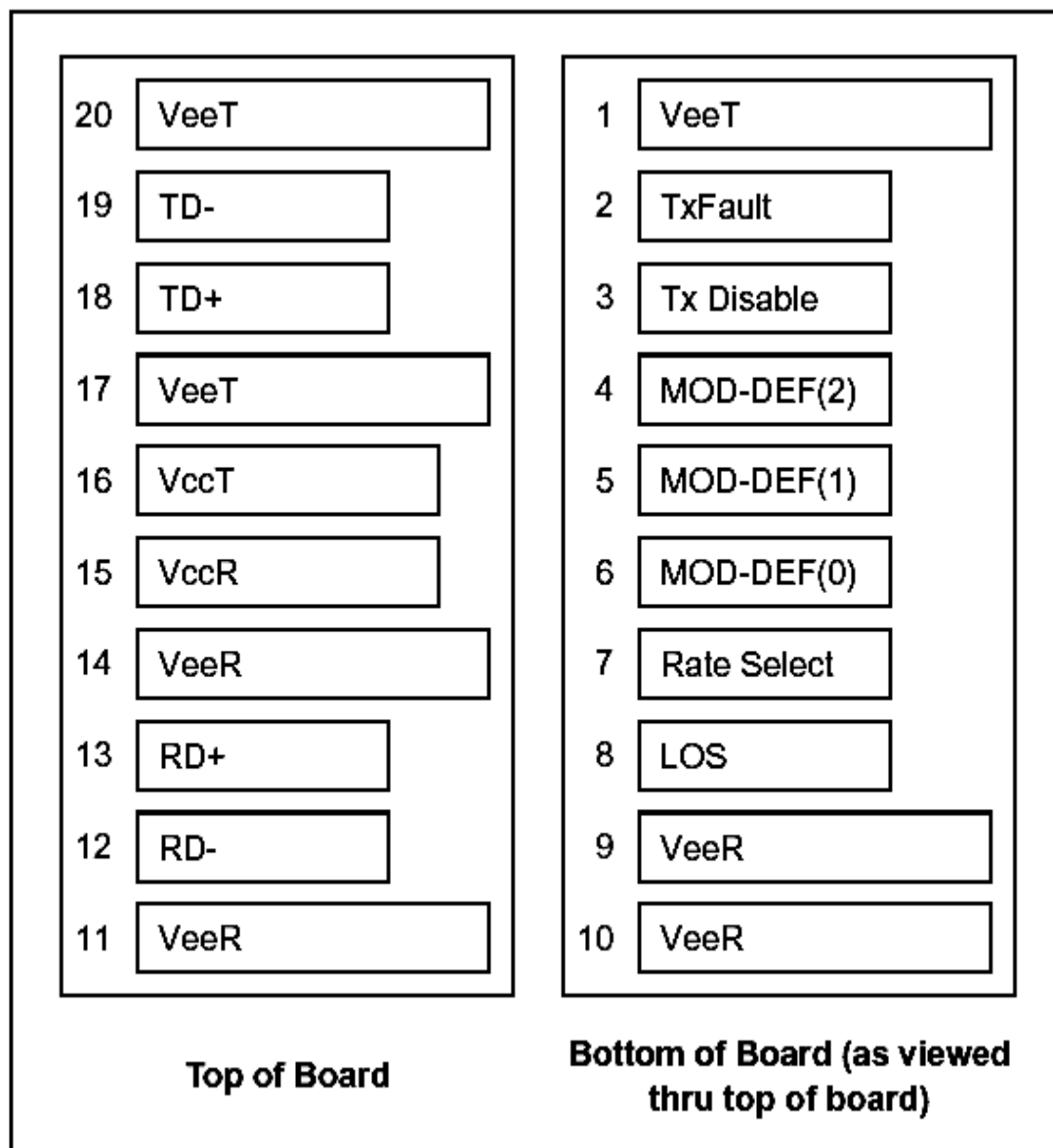
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

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 <sub>EET</sub> | 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 <sub>EER</sub> | Receiver ground              | 1         |        |
| 10  | V <sub>EER</sub> | Receiver ground              | 1         |        |
| 11  | V <sub>EER</sub> | Receiver ground              | 1         |        |
| 12  | RD-              | Inv. Received Data Out       | 3         | Note 5 |
| 13  | RD+              | Received Data Out            | 3         | Note 5 |
| 14  | V <sub>EER</sub> | Receiver ground              | 1         |        |
| 15  | V <sub>CCR</sub> | Receiver Power Supply        | 2         |        |
| 16  | V <sub>CCT</sub> | Transmitter Power Supply     | 2         |        |
| 17  | V <sub>EET</sub> | Transmitter Ground           | 1         |        |
| 18  | TD+              | Transmit Data In             | 3         | Note 6 |
| 19  | TD-              | Inv. Transmit Data In        | 3         | Note 6 |
| 20  | V <sub>EET</sub> | 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 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.
- 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 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
- LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+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  |
|--------------|--|
| SFPEZX-55-CC | 1550nm, 1.25Gbps, 120km, 0°C ~ +70°C, With Digital Diagnostic Monitoring   |
| SFPEZX-55-IC | 1550nm, 1.25Gbps, 120km, -40°C ~ +85°C, With Digital Diagnostic Monitoring |

### Cross-Platform/OEM Compatible:

| Part Number    | Product Description  |
|----------------|--|
| SFPEZX-55-CCxx | 1550nm, 1.25Gbps, 120km, 0°C ~ +70°C, With Digital Diagnostic Monitoring   |
| SFPEZX-55-ICxx | 1550nm, 1.25Gbps, 120km, -40°C ~ +85°C, With Digital Diagnostic Monitoring |

xx=TP, Cisco, Juniper & Ciena compatible

xx=AL, Alcatel compatible