

## SFP 155Mbps 1310nm 20Km

SLS-1531-20-X




### Overview

The SFP transceivers are high performance, cost effective modules supporting 155Mbps data-rate and 20km transmission.

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

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

### Features

- ◆ Up to 155Mbps data-rate
- ◆ 1310nm FP laser and PIN photo detector for 20km
- ◆ Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- ◆ Digital Diagnostic Monitoring:  
Internal Calibration or External Calibration
- ◆ Compatible with RoHS 
- ◆ +3.3V single power supply
- ◆ Operating case temperature:  
Standard: 0 to +70°C  
Industrial: -40 to +85°C

### Applications

- ◆ SDH STM-1, I-1
- ◆ Sonet OC-3,SR1
- ◆ Fast Ethernet
- ◆ Other Optical Links

### Ordering Information

| Part Number   | Product Description                              |
|---------------|--|
| SLS-1531-20   | SFP 155Mbps, 1310nm, 20km, 0°C ~ +70°C           |
| SLS-1531-20-D | SFP 155Mbps, 1310nm, 20km, 0°C ~ +70°C with DDMI |

## Datasheet

### 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

| Parameter                  | Symbol     | Min  | Typical | Max  | Unit |
|----------------------------|------------|------|---------|------|------|
| Operating Case Temperature | Standard   | Tc   | 0       | +70  | °C   |
|                            | Industrial | Tc   | -40     | +85  | °C   |
| Power Supply Voltage       | Vcc        | 3.13 | 3.3     | 3.47 | V    |
| Power Supply Current       | Icc        |      |         | 300  | mA   |
| Data Rate                  |            |      | 155     |      | Mbps |

### Optical and Electrical Characteristics

| Parameter                     | Symbol          | Min  | Typical | Max  | Unit     | Notes |
|-------------------------------|-----------------|------|---------|------|----------|-------|
| Transmitter                   |                 |      |         |      |          |       |
| Centre Wavelength             | $\lambda_c$     | 1260 | 1310    | 1360 | nm       |       |
| Spectral Width (RMS)          | $\sigma$        |      |         | 4    | nm       |       |
| Average Output Power          | Pout            | -14  |         | -8   | dBm      | 1     |
| Extinction Ratio              | ER              | 9    |         |      | dB       |       |
| Optical Rise/Fall Time        | $t_r/t_f$       |      |         | 1.3  | 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     | Vcc  | V        |       |
|                               | Enable          |      | 0       | 0.8  | V        |       |
| TX Fault                      | Fault           |      | 2.0     | Vcc  | V        |       |
|                               | Normal          |      | 0       | 0.8  | V        |       |
| Receiver                      |                 |      |         |      |          |       |
| Centre Wavelength             | $\lambda_c$     | 1260 |         | 1580 | nm       |       |

## Datasheet

|                                |                  |     |  |      |     |   |
|--------------------------------|------------------|-----|--|------|-----|---|
| Receiver Sensitivity           |                  |     |  | -32  | dBm | 3 |
| Receiver Overload              |                  | -3  |  |      | dBm | 3 |
| LOS De-Assert                  | LOS <sub>D</sub> |     |  | -34  | dBm |   |
| LOS Assert                     | LOS <sub>A</sub> | -45 |  |      | dBm |   |
| LOS Hysteresis                 |                  | 1   |  | 4    | dB  |   |
| Data Output Swing Differential | Vout             | 370 |  | 1800 | mV  | 4 |
| LOS                            | High             | 2.0 |  | Vcc  | 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>23</sup>-1 test pattern @155Mbps, BER ≤1×10<sup>-10</sup>
4. Internally AC-coupled.

## Timing and Electrical

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

### Timing and Electrical

## Datasheet

### Pin Definitions

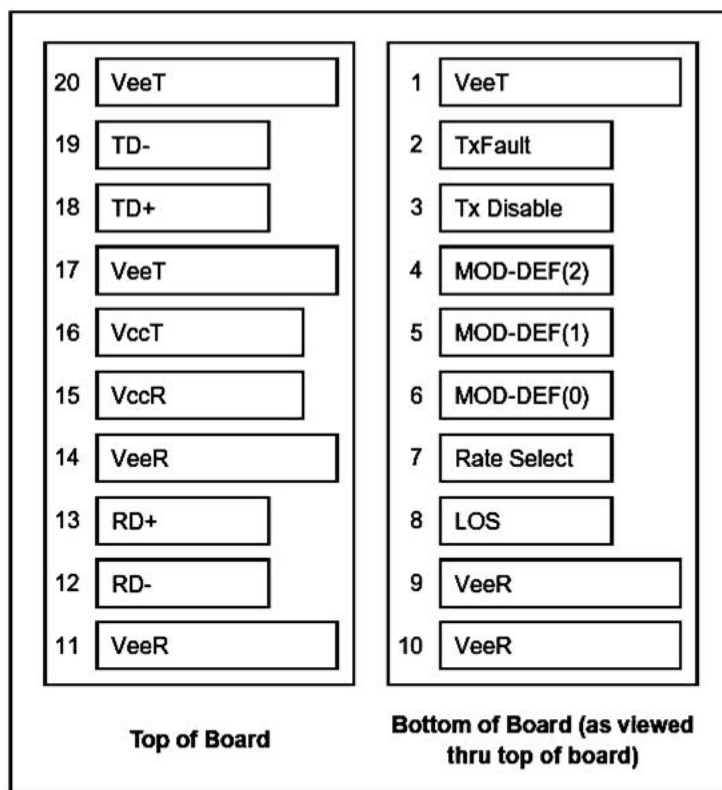


Figure 1: Pin Definitions

### 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         |        |

## Datasheet

|    |                  |                          |   |        |
|----|------------------|--------------------------|---|--------|
| 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.

- 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 V<sub>cc</sub>+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 to 0.8V) : Transmitter on  
(>0.8V, < 2.0V) : Undefined  
High (2.0 to 3.465V) : Transmitter Disabled  
Open : Transmitter Disabled
- 3) 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<sub>ccT</sub> or V<sub>ccR</sub>.  
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~10kΩ resistor. Pull up voltage between 2.0V and V<sub>cc</sub>+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.
- 5) 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.
- 6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

## Recommended Interface Circuit

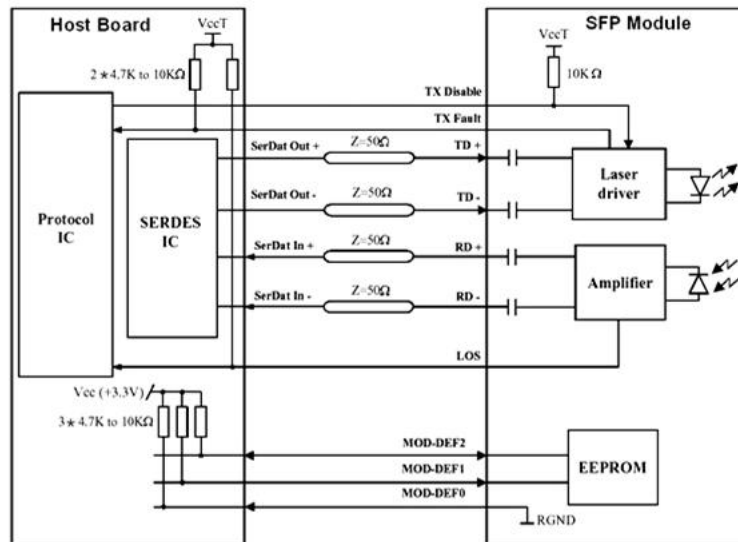


Figure 2: Recommended Interface Circuit

## Datasheet

### Mechanical Dimensions

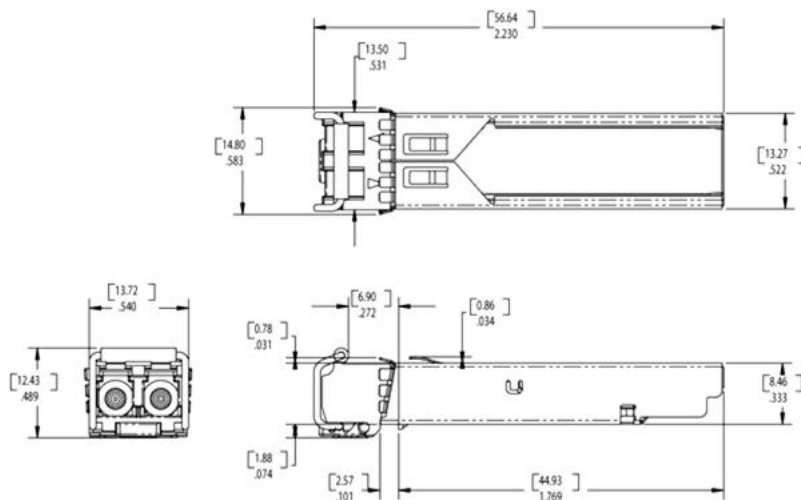


Figure 3: Mechanical Dimensions

### References

1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.
2. Telcordia GR-253-CORE and ITU-T G.957 Specifications.

#### Shenzhen Sourcelight Technology Co., Ltd

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