



RoHS Compliant
TX-1310/RX-1550 nm Single-mode Bi-directional (26dB margin)
SFP SC Simplex Connector, with Diagnostic Monitoring
155 Mbps SONET OC-3/SDH STM-1/125 Mbps Fast
Ethernet/100Base-BX10-U/ITU-T G.985



Features

- Compliant with SONET/SDH standard
- Compliant with Fast Ethernet standard
- Industry standard small form pluggable (SFP) package
- Simplex SC connector
- Differential LVPECL inputs and outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1

Ordering Information

| PART NUMBER | TX/RX | TEMPERATURE | LD Type | Distance |
|------------------|-----------|----------------|---------|----------|
| LS38-A3L-TC-N-P3 | 1310/1550 | 0°C to 70 °C | 1310 FP | 40km |
| LS38-A3L-TI-N-P3 | 1310/1550 | -40°C to 85 °C | 1310 FP | 40km |

Diagnostics

| Parameter | Range | Accuracy | Unit | Calibration |
|--------------|-----------|----------|------|-------------|
| Temperature | -40 to 95 | ± 3 | °C | External |
| Voltage | 0 to VCC | ± 0.1 | V | |
| Bias Current | 0 to 120 | ± 5 | mA | |
| TX Power | -11 to +3 | ± 3 dB | dBm | |
| RX Power | -31 to -8 | ± 3 dB | dBm | |



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Absolute Maximum Ratings

| PARAMETER | SYMBOL | MIN | MAX | UNITS | NOTE |
|---------------------|----------|------|----------|-------|------|
| Storage Temperature | T_S | -40 | 85 | °C | |
| Supply Voltage | V_{CC} | -0.5 | 4.0 | V | |
| Input Voltage | V_{IN} | -0.5 | V_{CC} | V | |
| Output Current | I_o | --- | 50 | mA | |
| Operating Current | I_{OP} | --- | 400 | mA | |

Recommended Operating Conditions

| PARAMETER | SYMBOL | MIN | MAX | UNITS | NOTE |
|----------------------------|-------------------|-----|-----|-------|------|
| Case Operating Temperature | T_C | 0 | 70 | °C | |
| | | -40 | 85 | °C | |
| Supply Voltage | V_{CC} | 3.1 | 3.5 | V | |
| Supply Current | $I_{TX} + I_{RX}$ | --- | 300 | mA | |



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Transmitter Electro-optical Characteristics

$V_{CC} = 3.1 \text{ V to } 3.5 \text{ V}$, $T_C = 0^\circ \text{C to } 70^\circ \text{C}$ ($-40^\circ \text{C to } 85^\circ \text{C}$)

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNITS | NOTE |
|---|---|------|------|----------|---------------|---------|
| Output Optical Power 9/125 μm fiber | P_{out} | -8 | --- | 0 | dBm | Average |
| Extinction Ratio | ER | 9 | --- | --- | dB | |
| Center Wavelength | λ_C | 1261 | 1310 | 1360 | nm | |
| Spectral Width (RMS) | $\Delta\lambda$ | --- | --- | 3 | nm | |
| Rise/Fall Time (10–90%) | $T_{r,f}$ | --- | 1 | 2 | ns | |
| Output Eye | Compliant with Telcordia GR-253-CORE Issue 3 and ITU-T recommendation G-957 | | | | | |
| Max. P_{out} TX-DISABLE Asserted | P_{OFF} | --- | --- | -45 | dBm | |
| Differential Input Voltage | V_{DIFF} | 0.4 | --- | 2.0 | V | |
| Transmit Fault Output-Low | TX_FAULT_L | 0.0 | --- | 0.5 | V | |
| Transmit Fault Output-High | TX_FAULT_H | 2.4 | --- | V_{CC} | V | |
| Time to initialize, include reset of TX_FAULT | t_{init} | --- | --- | 300 | ms | |
| TX_FAULT from fault to assertion | t_{fault} | --- | --- | 100 | μs | |
| TX_DISABLE time to start reset | t_{reset} | 10 | --- | --- | μs | |



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Receiver Electro-optical Characteristics

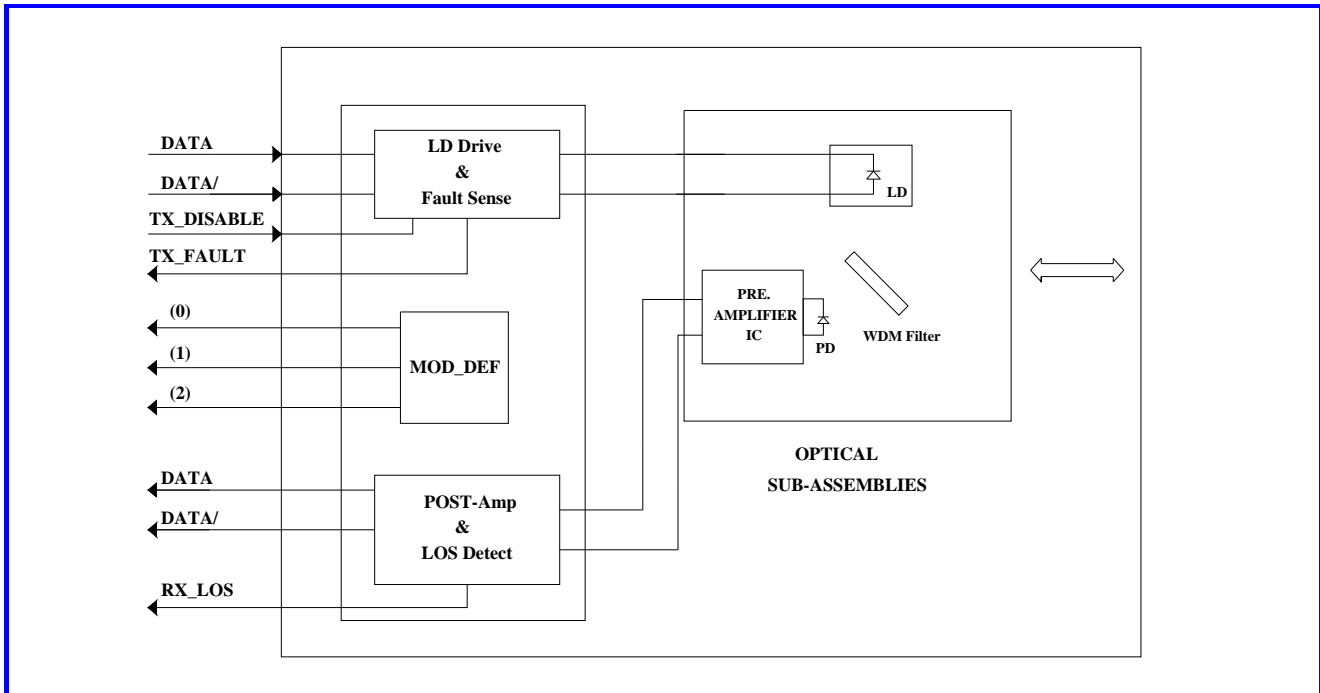
$V_{CC} = 3.1 \text{ V to } 3.5 \text{ V}, T_C = 0^\circ \text{C to } 70^\circ \text{C} (-40^\circ \text{C to } 85^\circ \text{C})$

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNITS | NOTE |
|---|-------------|------|------|----------|-------|---------------------------------|
| Optical Input Power-maximum | P_{IN} | 0 | --- | --- | dBm | $BER < 10^{-10}$ |
| RX Sensitivity @OC-3 | P_{IN} | --- | --- | -34 | dBm | PRBS23, $BER < 10^{-10}$ |
| RX Sensitivity @125Mbps | P_{IN} | --- | --- | -34 | dBm | PRBS7, $BER < 10^{-10}$ |
| Operating Center Wavelength | λ_C | 1480 | --- | 1600 | nm | |
| Optical Return Loss | ORL | 14 | --- | --- | dB | $\lambda=1480\sim1600\text{nm}$ |
| Optical isolation | ISO | --- | --- | -45 | dB | $\lambda=1260\sim1360\text{nm}$ |
| Loss of signal-Deasserted | P_A | --- | --- | -34 | dBm | |
| Loss of signal-Asserted | P_D | -45 | --- | --- | dBm | |
| Differential Output Voltage | V_{DIFF} | 0.5 | --- | 1.2 | V | |
| Receiver Loss of Signal Output Voltage-Low | RX_LOS_L | 0 | --- | 0.5 | V | |
| Receiver Loss of Signal Output Voltage-High | RX_LOS_H | 2.4 | --- | V_{CC} | V | |



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Block Diagram of Transceiver



Transmitter and Receiver Optical Sub-assembly Section

A 1310 nm InGaAsP laser and an InGaAs PIN photodiode integrate with an WDM filter to form a bi-directional single fiber optical subassembly (OSA). The laser of OSA is driven by a LD driver IC which converts differential input LVPECL logic signals into an analog laser driving current. And, The photodiode of OSA is connected to a circuit providing post-amplification quantization, and optical signal detection.

TX_FAULT

When sensing an improper power level in the laser driver, the SFP set this signal high and turns off the Laser. TX_FAULT can be reset with the TX_DISABLE line. The signal is in TTL level.

TX_DISABLE

The TX_DISABLE signal is high (TTL logic "1") to turn off the laser output.

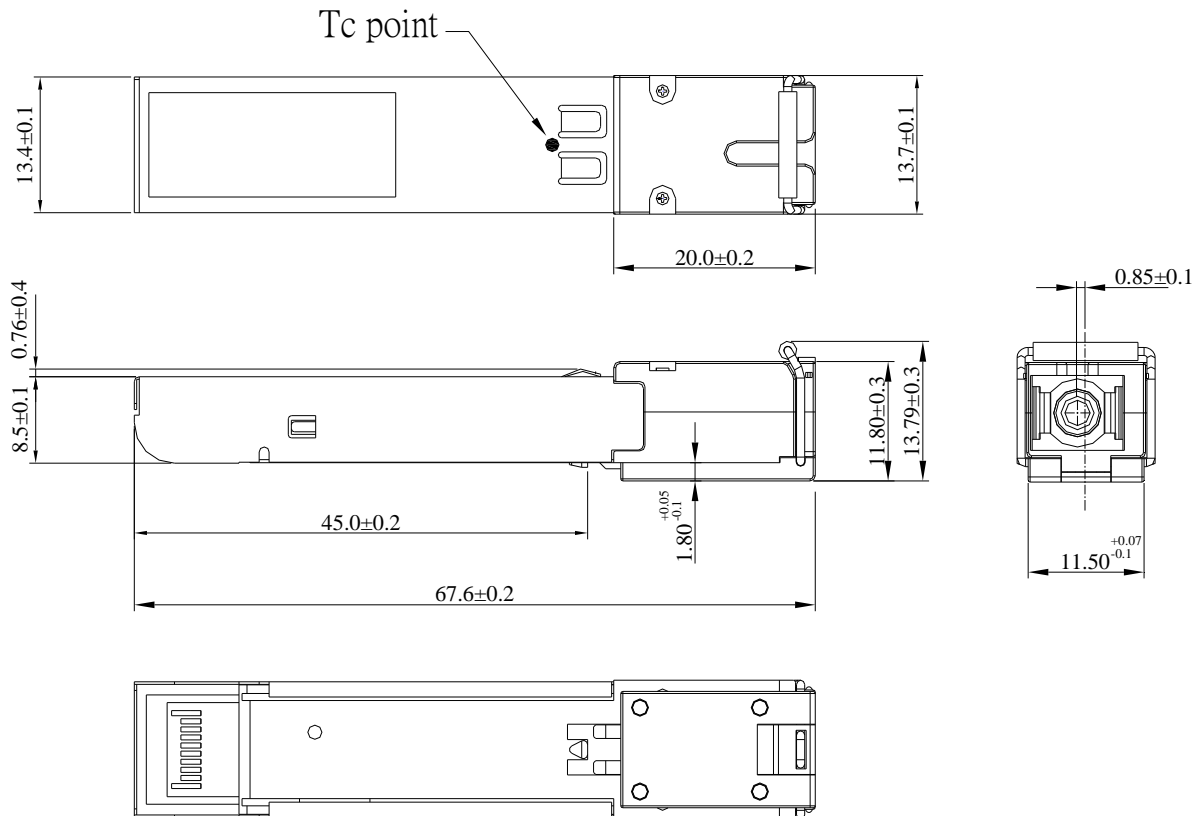
Receive Loss (RX_LOS)

The RX_LOS is high (logic "1") when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in TTL level.



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Dimensions



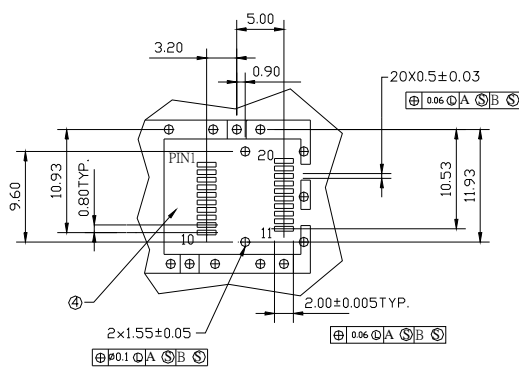
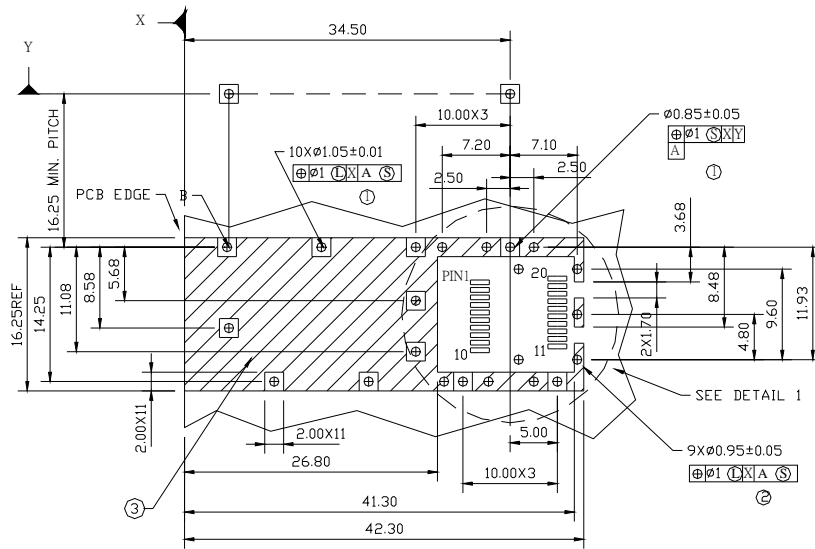
DIMENSIONS ARE IN MILLIMETERS

ALL DIMENSIONS ARE ± 0.2 mm UNLESS OTHERWISE SPECIFIED



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SFP host board mechanical layout



DETAIL 1

LEGEND

1. PADS AND VIAS ARE CHASSIS GROUND
2. THROUGH HOLES, PLATING OPTIONAL
3. HATCHED AREA DENOTES COMPONENT AND TRACE KEEPOUT (EXCEPT CHASSIS GROUND)
4. AREA DENOTES COMPONENT KEEPOUT (TRACES ALLOWED)

DIMENSIONS ARE IN MILLIMETERS

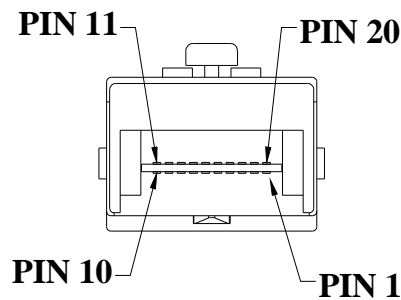
Unit: mm



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Pin Assignment

Pin-Out



| Pin | Signal Name | Description |
|-----|----------------|---|
| 1 | T_{GND} | Transmit Ground |
| 2 | TX_FAULT | Transmit Fault |
| 3 | $TX_DISABLE$ | Transmit Disable |
| 4 | $MOD_DEF (2)$ | SDA Serial Data Signal |
| 5 | $MOD_DEF (1)$ | SCL Serial Clock Signal |
| 6 | $MOD_DEF (0)$ | TTL Low |
| 7 | $RATE_SELECT$ | Open Circuit |
| 8 | RX_LOS | Receiver Loss of Signal, TTL High, open collector |
| 9 | R_{GND} | Receiver Ground |
| 10 | R_{GND} | Receiver Ground |
| 11 | R_{GND} | Receiver Ground |
| 12 | $RX-$ | Receive Data Bar, Differential PECL, ac coupled |
| 13 | $RX+$ | Receive Data, Differential PECL, ac coupled |
| 14 | R_{GND} | Receiver Ground |
| 15 | V_{CCR} | Receiver Power Supply |
| 16 | V_{CCT} | Transmitter Power Supply |
| 17 | T_{GND} | Transmitter Ground |
| 18 | $TX+$ | Transmit Data, Differential PCEL, ac coupled |
| 19 | $TX-$ | Transmit Data Bar, Differential PCEL, ac coupled |
| 20 | T_{GND} | Transmitter Ground |

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