

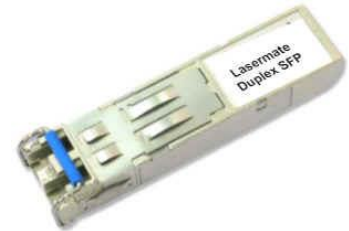


## 155Mbps 1550nm SMF 100km SFP Optical Transceiver with Duplex LC Connector

Model No. CS15D-03F-3L-Tx-LD

### FEATURES

- RoHS compliant
- Compliant with SONET/SDH application
- Compliant with Fast Ethernet standard
- Compliant with SFF8472 diagnostic monitoring interface
- Industry standard small form pluggable (SFP) package
- Hot pluggable
- Single power supply 3.3V
- Duplex LC connector
- TTL signal detect indicator
- Class 1 laser product compliant with EN 60825-1
- Input/Output: AC/AC



### 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     | -8 to +3  | ±3 dB    | dB   |             |
| RX Power     | -32 to -8 | ±3 dB    | dB   |             |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER           | SYMBOL          | MIN  | MAX             | UNIT |
|---------------------|-----------------|------|-----------------|------|
| Storage Temperature | T <sub>S</sub>  | -40  | 85              | °C   |
| Supply Voltage      | V <sub>CC</sub> | -0.5 | 4.0             | V    |
| Input Voltage       | V <sub>IN</sub> | -0.5 | V <sub>CC</sub> | V    |
| Output Current      | I <sub>o</sub>  | -    | 50              | mA   |
| Operating Current   | I <sub>OP</sub> | -    | 400             | mA   |

### RECOMMENDED OPERATING CONDITIONS

| PARAMETER                  | SYMBOL                            | MIN | MAX | UNIT | NOTES              |
|----------------------------|-----------------------------------|-----|-----|------|--------------------|
| Case Operating Temperature | T <sub>C</sub>                    | 0   | 70  | °C   | CS15D-03F-3L-TC-LD |
|                            |                                   | -40 | 85  |      | CS15D-03F-3L-TI-LD |
| Supply Voltage             | V <sub>CC</sub>                   | 3.1 | 3.5 | V    |                    |
| Supply Current             | I <sub>TX</sub> + I <sub>RX</sub> | -   | 300 | mA   |                    |

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## TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS ( $V_{CC} = 3.1V$ to $3.5V$ , $T_C = 0^\circ C$ to $70^\circ C$ , $-40^\circ C$ to $85^\circ C$ )

| PARAMETER                             | SYMBOL  | MIN  | TYP. | MAX  | UNIT | NOTES   |
|---------------------------------------|---|------|------|------|------|---------|
| Data Rate                             | B   | 50   | 155  | 200  | Mbps |         |
| Output Optical Power<br>9/125um fiber | $P_{out}$   | -5   | -    | 0    | dBm  | Average |
| Extinction Ratio                      | ER  | 10   | -    | -    | dB   |         |
| Center Wavelength                     | $\lambda_c$   | 1530 | 1550 | 1570 | nm   |         |
| Spectral Width (-20dB)                | $\Delta\lambda$   | -    | -    | 1    | nm   |         |
| Side Mode Suppression Ratio           | SMSR  | 30   | -    | -    | dB   |         |
| Rise/Fall Time (10~90%)               | $T_{r,f}$   | -    | 1    | 2    | ns   |         |
| Max. $P_{out}$ TX-DISABLE Asserted    | $P_{OFF}$   | -    | -    | -45  | dBm  |         |
| Output Eye                            | Compliant with Telcordia GR-253-CORE Issue 3 and ITU-T recommendation G-957 |      |      |      |      |         |
| Differential Input Voltage            | $V_{DIFF}$  | 0.4  | -    | 2.0  | V    |         |

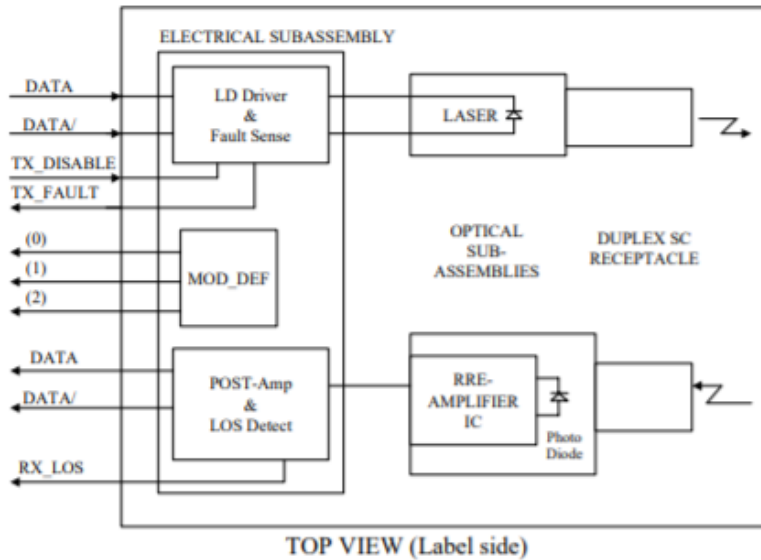
## RECEIVER ELECTRO-OPTICAL CHARACTERISTICS ( $V_{CC} = 3.1V$ to $3.5V$ , $T_C = 0^\circ C$ to $70^\circ C$ , $-40^\circ C$ to $85^\circ C$ )

| PARAMETER                                   | SYMBOL      | MIN  | TYP. | MAX      | UNIT | NOTES   |
|---|-------------|------|------|----------|------|---------|
| Data Rate                                   | B           | 50   | 155  | 200      | Mbps |         |
| Optical Input Power-Maximum                 | $P_{IN}$    | 0    | -    | -        | dBm  | Note 1  |
| Receiver Input Power-Minimum (Sensitivity)  | $P_{IN}$    | -    | -    | -35      | dBm  | Note 1  |
| Operating Center Wavelength                 | $\lambda_c$ | 1260 | -    | 1600     | nm   |         |
| Loss of Signal-Asserted                     | $P_A$       | -    | -    | -35      | dBm  | Average |
| Loss of Signal-Deasserted                   | $P_D$       | -45  | -    | -        | dBm  | Average |
| Loss of Signal-Hysteresis                   | $P_A - P_D$ | 1.0  | -    | -        | dB   |         |
| Data Output Rise, Fall time (10~90%)        | $T_{r,f}$   | -    | 1    | 2        | ns   |         |
| 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    |         |

**Note 1:** The input data is at 155.52 Mbps,  $2^{23}-1$  PRBS data pattern. The receiver is guaranteed to provide output data with Bit Error Rate (BER) better than or equal to  $1 \times 10^{-10}$ .



**BLOCK DIAGRAM OF TRANSCEIVER**



TOP VIEW (Label side)

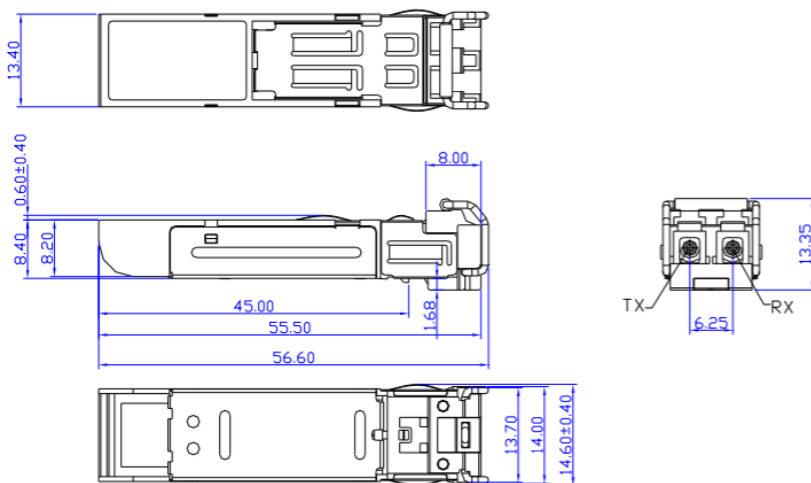
**Transmitter Section** - The transmitter section consists of a 1550 nm InGaAsP laser in an eye safe optical subassembly (OSA) which mates to the fiber cable. The laser OSA is driven by a LD driver IC which converts differential input LVPECL logic signals into an analog laser driving current.

**TX\_DISABLE** - The TX\_DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on when TX\_DISABLE is low (TTL logic "0").

**Receiver Section** - The receiver utilizes an InGaAs PIN photodiode mounted together with a trans-impedance preamplifier IC in an OSA. This OSA is connected to a circuit providing post-amplification quantization, and optical signal detection.

**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.

**DIMENSIONS**



**DIMENSIONS ARE IN MILLIMETERS**

**ALL DIMENSIONS ARE ± 0.2mm UNLESS OTHERWISE SPECIFIED**

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## PIN ASSIGNMENT



| PIN | SIGNAL NAME      | DESCRIPTION                                       | PIN | SIGNAL NAME      | DESCRIPTION                                      |
|-----|------------------|---|-----|------------------|--|
| 1   | T <sub>GND</sub> | Transmit Ground                                   | 11  | R <sub>GND</sub> | Receiver Ground                                  |
| 2   | TX_FAULT         | Transmit Fault                                    | 12  | RX-              | Receive Data Bar, Differential PECL, ac coupled  |
| 3   | TX_DISABLE       | Transmit Disable                                  | 13  | RX+              | Receive Data, Differential PECL, ac coupled      |
| 4   | MOD_DEF (2)      | SDA Serial Data Signal                            | 14  | R <sub>GND</sub> | Receiver Ground                                  |
| 5   | MOD_DEF (1)      | SCL Serial Clock Signal                           | 15  | V <sub>CCR</sub> | Receiver Power Supply                            |
| 6   | MOD_DEF (0)      | TTL Low   | 16  | V <sub>CCT</sub> | Transmitter Power Supply                         |
| 7   | RATE_SELECT      | Open Circuit                                      | 17  | T <sub>GND</sub> | Transmitter Ground                               |
| 8   | RX_LOS           | Receiver Loss of Signal, TTL High, open collector | 18  | TX+              | Transmit Data, Differential PECL, ac coupled     |
| 9   | R <sub>GND</sub> | Receiver Ground                                   | 19  | TX-              | Transmit Data Bar, Differential PECL, ac coupled |
| 10  | R <sub>GND</sub> | Receiver Ground                                   | 20  | T <sub>GND</sub> | Transmitter Ground                               |

## EYE SAFETY MARK

The transceiver is a class 1 laser product. It complies with EN 60825-1 and FDA 21 CFR 1040.10 and 1040.11. In order to meet laser safety requirements, the transceiver shall be operated within the Absolute Maximum Ratings.

## Required Mark

**Class 1 Laser Product  
Complies with  
21 CFR 1040.10 and 1040.11**

**[Caution]** All adjustments have been done at the factory before the shipment of the devices. No maintenance and user serviceable part is required. Tampering with and modifying the performance of the device will result in voided product warranty.

## ORDERING INFORMATION

| PART NUMBER        | OPERATING TEMPERATURE |
|--------------------|-----------------------|
| CS15D-03F-3L-TC-LD | 0°C to 70°C           |
| CS15D-03F-3L-TI-LD | -40°C to 85°C         |

**Note:** The specifications subject to change without notice.

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