



1.25Gbps TX:1550nm/RX:1310nm SMF 10km BiDi SFP SC Optical Transceiver

CS5T3-24H-3S-Tx-C



DESCRIPTION

The CS5T3-24H-3S-Tx-C is a BiDi SFP optical transceiver module designed for bidirectional communication over a single strand of singlemode fiber (SMF). Operating at 1.25Gbps, it features a 1550nm transmitter (TX) and a 1310nm receiver (RX), enabling transmission distances of up to 10 kilometers. This transceiver is housed in a standard SFP form factor and equipped with a SC simplex connector, making it ideal for long-reach Gigabit Ethernet and other optical networking applications requiring high performance and space efficiency.

FEATURES

- Compliant with IEEE802.3z Gigabit Ethernet Standard
- Compliant with Fiber Channel 100-SM-LC-L standard
- Multi rate 125Mbps, 1.06Gbps and 1.25Gbps
- Industry standard small form pluggable (SFP) package
- Simplex SC connector
- Single power supply 3.3V
- Differential LVPECL inputs and outputs
- TTL signal detect indicator
- Hot pluggable
- Class 1 laser product compliant with EN 60825-1
- LD Type: 1550 DFB

APPLICATIONS

- Single-mode core fiber backbone links up to 10km
- 1000Base Bidi

PRODUCT OVERVIEW

| PART NUMBER | OPERATING TEMPERATURE |
|-------------------|-----------------------|
| CS5T3-24H-3S-TC-C | 0°C to 70°C |
| CS5T3-24H-3S-TI-C | -40°C to 85°C |

DIAGNOSTICS

| PARAMETER | RANGE | ACCURACY | UNIT | CALIBRATION |
|--------------|---------------|----------|------|-------------|
| Temperature | -20 to 95 | ±3 | °C | External |
| Voltage | 0 to V_{CC} | ±0.1 | V | |
| Bias Current | 0 to 120 | ±5 | mA | |
| TX Power | -12 to 0 | ±3 dB | dBm | |
| RX Power | -21 to -3 | ±3 dB | dBm | |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | MIN | MAX | UNIT | NOTES |
|---------------------|----------|------|----------|------|-------|
| 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 | UNIT | NOTES |
|----------------------------|-------------------|-----|-----|------|-------------------|
| Case Operating Temperature | T_C | 0 | 70 | °C | CS5T3-24H-3S-TC-C |
| | | -40 | 85 | | CS5T3-24H-3S-TI-C |
| Supply Voltage | V_{CC} | 3.1 | 3.5 | V | |
| Supply Current | $I_{TX} + I_{RX}$ | | 300 | mA | |

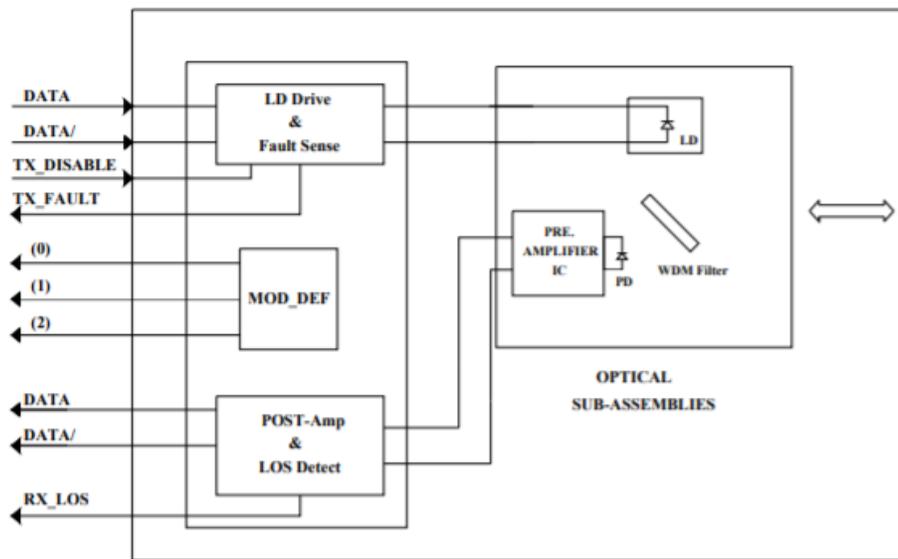
TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS ($V_{CC} = 3.1V$ to $3.5V$, $T_C = 0°C$ to $70°C$, $-40°C$ to $85°C$)

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNIT | NOTES |
|---|---------------------------|------|------|----------|-------|---------|
| Output Optical Power 9/125um fiber | P_{out} | -9 | - | -3 | dBm | Average |
| Extinction Ratio | ER | 9 | - | - | dB | |
| Center Wavelength | λ_c | 1530 | 1550 | 1570 | nm | |
| Spectral Width (-20dB) | $\Delta\lambda$ | - | - | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | - | - | dB | |
| Rise/Fall Time (20%~80%) | $T_{r,f}$ | - | - | 260 | ps | |
| Relative Intensity Noise | RIN | - | - | -120 | dB/Hz | |
| Total Jitter | TJ | - | - | 227 | ps | |
| Output Eye | Compliant with IEEE802.3z | | | | | |
| 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 | us | |
| TX_DISABLE time to start reset | t_{reset} | 10 | - | - | us | |

RECEIVER ELECTRO-OPTICAL CHARACTERISTICS (V_{CC} = 3.1V to 3.5V, T_c = 0°C to 70°C, -40°C to 85°C)

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNIT | NOTES |
|---|---------------------|------|------|-----------------|------|------------------------------|
| Optical Input Power-Maximum | P _{IN} | -3 | - | - | dBm | BER<10 ⁻¹² |
| RX Sensitivity @GbE | P _{IN} | - | - | -21 | dBm | PRBS7, BER<10 ⁻¹² |
| RX Sensitivity @1x FC | P _{IN} | - | - | -21 | dBm | PRBS7, BER<10 ⁻¹² |
| RX Sensitivity @125Mbps | P _{IN} | - | - | -21 | dBm | PRBS7, BER<10 ⁻¹⁰ |
| Operating Center Wavelength | λ _c | 1260 | - | 1360 | nm | |
| Optical Return Loss | ORL | 14 | - | - | dB | λ=1260~1360nm |
| Optical Isolation | ISO | - | - | -45 | dB | λ=1480~1600nm |
| Signal Detect-Asserted | P _A | - | - | -21 | dBm | |
| Signal Detect-Deasserted | P _D | -35 | - | - | dBm | |
| Differential Output Voltage | V _{DIFF} | 0.5 | - | 1.2 | V | |
| Data Output Rise, Fall Time (20%~80%) | T _{r,f} | - | - | 0.35 | ns | |
| 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 | |

BLOCK DIAGRAM OF TRANSCEIVER



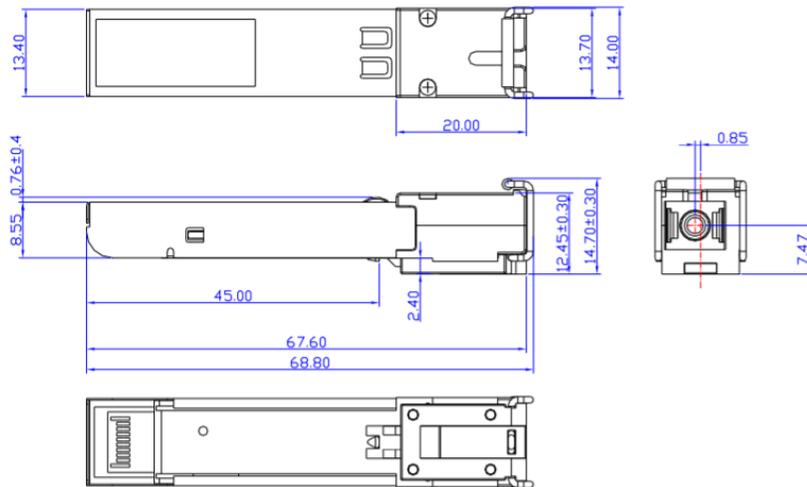
Transmitter and Receiver Optical Sub-Assembly Section - A 1550 nm InGaAsP laser and an InGaAs PIN photodiode integrate with an WDM filter to form a bi-directional single fiber optical subassembly (OSA). The laser of OSA is driven by a LD driver IC which converts differential input LVPECL logic signals into an analog laser driving current. 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.

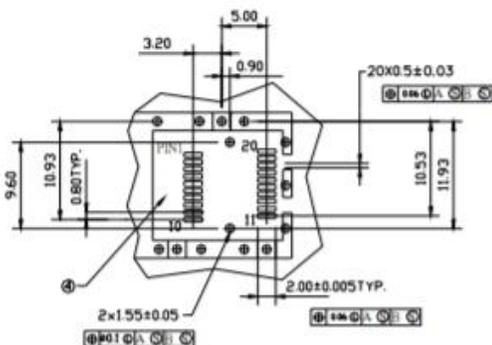
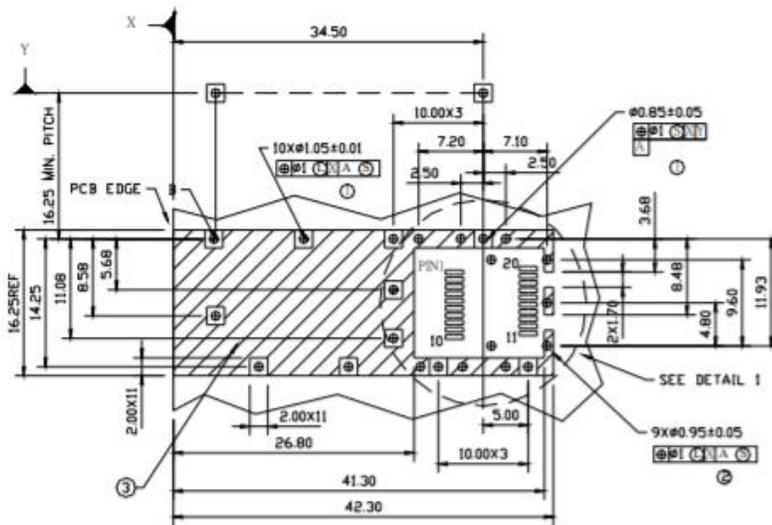
DIMENSIONS



DIMENSIONS ARE IN MILLIMETERS

ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED

SFP HOST BOARD MECHANICAL LAYOUT

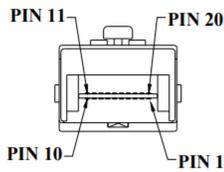


DETAIL I

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

PIN ASSIGNMENT

| 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 PECL, ac coupled |
| 19 | $TX-$ | Transmit Data Bar, Differential PECL, ac coupled |
| 20 | T_{GND} | Transmitter Ground |

EYE SAFETY MARK

The single-mode 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.

ADDITIONAL NOTES

- Avoid eye or skin exposure to laser radiations.
- The device is sensitive to electro-static discharge (ESD). The device should be handled with ESD proof tools. To assemble the device on PCB, proper grounding is required to prevent ESD.
- Specifications are subject to change without notice.



www.lasermate.com

Lasermate Group, Inc.

19608 Camino De Rosa

Walnut, CA 91789 USA

Tel: (909)718-0999

Fax: (909)718-0998

sales@lasermate.com

www.lasermate.com