# 155Mbps
# SC Optical Transceiver

REV. A/03/2003

## Features

- **Up to 155Mbps applications(ATM, SONET/OC-3, SDH/STM-1)**
- **Designed for short and long reach application**
- **InGaAsP MQW Fabry-Perot Laser**
- **High Sensitivity InGaAs PIN Photodiode**
- **Single +5V Power Supply (+3.3V option)**
- **PECL compatible data input & output logic levels**
- **Industry Standard 1x9 Foot-print with integral SC Duplex Connector (PCI Mezzanine Card compliant package)**
- **Fully Class 1 Laser Safety Compliance**

# 1310nm,1550nm Single Mode Fiber 1x9 SC Duplex Optical Transceiver

For ATM, SONET/OC-3, SDH/STM-1

The TRX03-SX5SC optical transceiver is high performance module for optical link over single mode optical fiber. It is designed to be used in 155Mbps ATM, SONET/OC-3, SDH/STM-1 applications and short/long reach links at a nominal wavelength of 1310nm, 1550nm windows MQW Fabry Perot(FP) Laser and PIN photodiode.

This module incorporates high performance, reliable optical devices and is proven circuit technology to give long life and consistent service and is provided high speed PECL differential interface for input and output.

This transceiver is recognized as a Mezzanine standard 1x9 package with SC Duplex fiber optic connector and this module is a class 1 laser product complying with FDA Radiation Performance Standards with IEC825-1.

## Absolute Maximum Ratings

Stress beyond those under "Absolute Ratings" may cause permanent damage to the module. These are stress ratings only and functional operation of the module at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied.
Exposure to absolute maximum conditions for extended periods may affect the Module reliability.

| Parameter | | Symbol | Min | Max | Units |
|---|---|---|---|---|---|
| Storage Temperature | | $T_{stg}$ | -40 | +85 | ℃ |
| Operating Temperature | | | 0 | +70 | ℃ |
| Lead Soldering Temperature | | | | 240 | ℃ |
| Lead Soldering Time | | | | 10 | s |
| Supply Voltage | +3.3V<br>+5.0V | $V_{CC}$ | 0<br>0 | +3.6<br>+5.5 | V |

# Specifications

## Operation Conditions

| Parameter | | Symbol | Min | Max | Units |
|---|---|---|---|---|---|
| Ambient Operating Temperature | | $T_{op}$ | 0 | +70 | ℃ |
| Operating Voltage | +3.3V<br>+5.0V | $V_{CC}$ | +3.13<br>+4.75 | +3.47<br>+5.25 | V |

## Electrical Characteristics

| Parameter | Symbol | Min | Typ | Max | |
|---|---|---|---|---|---|
| Supply Current [1] | $I_{CC}$ | | | 200 | mA |
| **Transmitter** | | | | | |
| Differential Input Data | $V_{IH-IL}$ | 300 | | | mV |
| Input Data-Low | $V_{IL}$ | $V_{CC}$-1.82 | | $V_{CC}$-1.62 | V |
| Input Data-High | $V_{IH}$ | $V_{CC}$-1.16 | | $V_{CC}$-0.89 | V |
| **Receiver** | | | | | |
| Output Data-Low [2] | $V_{OL}$ | $V_{CC}$-1.82 | | $V_{CC}$-1.62 | V |
| Output Data-High [2] | $V_{OH}$ | $V_{CC}$-1.16 | | $V_{CC}$-0.89 | V |
| Signal Detect Output-Low [2] | $V_{OL}$-$V_{CC}$ | $V_{CC}$-1.82 | | $V_{CC}$-1.62 | V |
| Signal Detect Output-High [2] | $V_{OH}$-$V_{CC}$ | $V_{CC}$-1.16 | | $V_{CC}$-0.89 | V |

Notes:
1. Input bias current and Output current are not included.
2. Compatible with LV PECL output

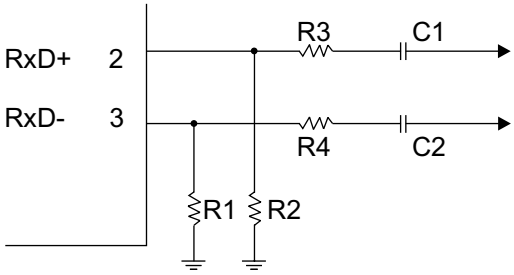
## Optical Characteristics

| Parameter | | Symbol | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| Optical Transmit Power [1] | Short Haul<br>Long Haul | $P_{opt}$ | -15<br>-5 | | -8<br>0 | dBm |
| Center Wavelength | | $\lambda_C$ | 1260<br>1500 | 1310<br>1550 | 1360<br>1600 | nm |
| Spectral Width (RMS) [2] | 1310nm<br>1550nm | $\Delta\lambda$ | | | 7.7<br>2.5 | nm |
| Extinction Ratio [3] | | $E_R$ | 9 | 10 | | dB |
| Data Rise/Fall Time [4] | | $t_R$, $t_F$ | | | 1600 | ps |
| **Receiver** | | | | | | |
| Optical Sensitivity [5] | | | | | -34 | dBm |
| Optical Overload | | | -8 | | | dBm |
| Operating Wavelength | | $\lambda_O$ | 1200 | | 1600 | nm |
| Signal Detect Alarm ON | | | -42 | | -34 | dBm |
| Signal Detect Hysteresis | | | 0.5 | 1.5 | 5.0 | dB |

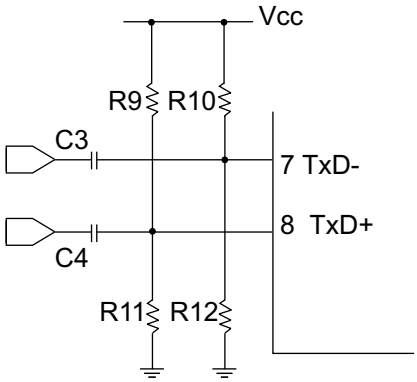
Notes:
Measured at the bit rate of 155.52Mbps, PRBS $2^{23}$-1, NRZ
1. Transmit Power is set to -10±1dBm @ SOL and room temperature
2. CW, $P_O$ = 5mW(1310nm), 3mW(1550nm) at TO CAN
3. Extinction Ratio is set to > 13dB @ SOL and room temperature
4. 20% to 80% values
5. Sensitivity is defined at a BER of $1x10^{-10}$, $2^{23}$-1 PRBS

## Recommendations

### Data Input/Output




Data Output




Data Input

Values
R1/R2 = 270ohm(5V)
= 150ohm(3.3V)
R3/R4 = Short(PECL Interface)
= 25ohm(CML Interface)
= 50ohm(LVDS Interface)

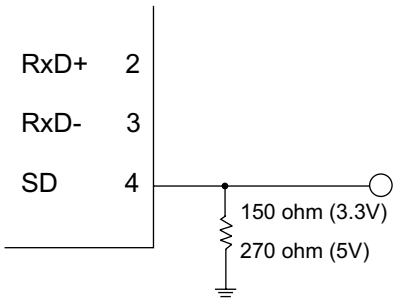
R9/R10= 82ohm(5V)
= 82ohm(3.3V)

R11/R12= 130ohm(5V)
=130ohm(3.3V)

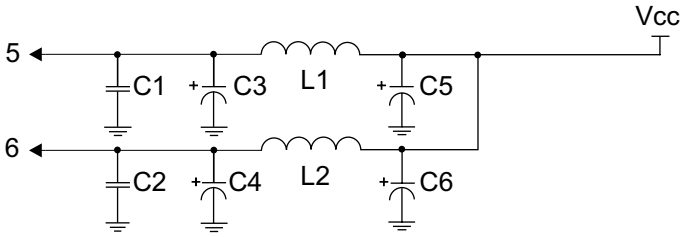
C3/C4= 100nF
C1/C2= 100nF

### Signal Detect

The PECL output option of the signal detect line may be terminated a 50ohm resistor to a Vcc-2 volt source or the Thevenin equivalent in order to generate the correct voltage outputs.

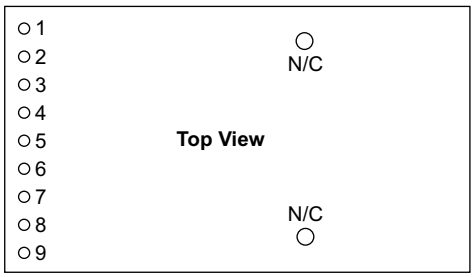



### Power Coupling




Values
C1/C2= 100nF Ceramic
C3/C4/C5/C6= 10uF Tantal
L1/L2=3.3uH Coil or Ferrite Inductor

## Pin Assignment




| Pin. | Symbol | Descriptions |
|---|---|---|
| Pin 1 | Rx_GND | Receiver Ground |
| Pin 2 | RxD+ | Receiver Data Out |
| Pin 3 | RxD- | Receiver Data Out Bar |
| Pin 4 | SD | Receiver signal detect output |
| Pin 5 | Rx_Vcc | +5V Supply for the Receiver section(+3.3V option) |
| Pin 6 | Tx_Vcc | +5V Supply for the Transmitter section(+3.3V option) |
| Pin 7 | TxD- | Transmitter Data In Bar |
| Pin 8 | TxD+ | Transmitter Data In |
| Pin 9 | Tx_GND | Transmitter Ground |

## Regulatory Compliance

| Feature | Test Method | performance |
|---|---|---|
| Laser Eye Safety | 21 CFR(J) 1040.10 and 1040.11 | CDRH Compliant and Class 1 Laser Safety product |
| Electromagnetic Interference | FCC part 15 Class A, C63.4: 2001 | Compliant with Standard |
| | EN55022: 1998 Class A,<br>EN610000-6-1: 2001,<br>EN610000-6-3: 2001 | |

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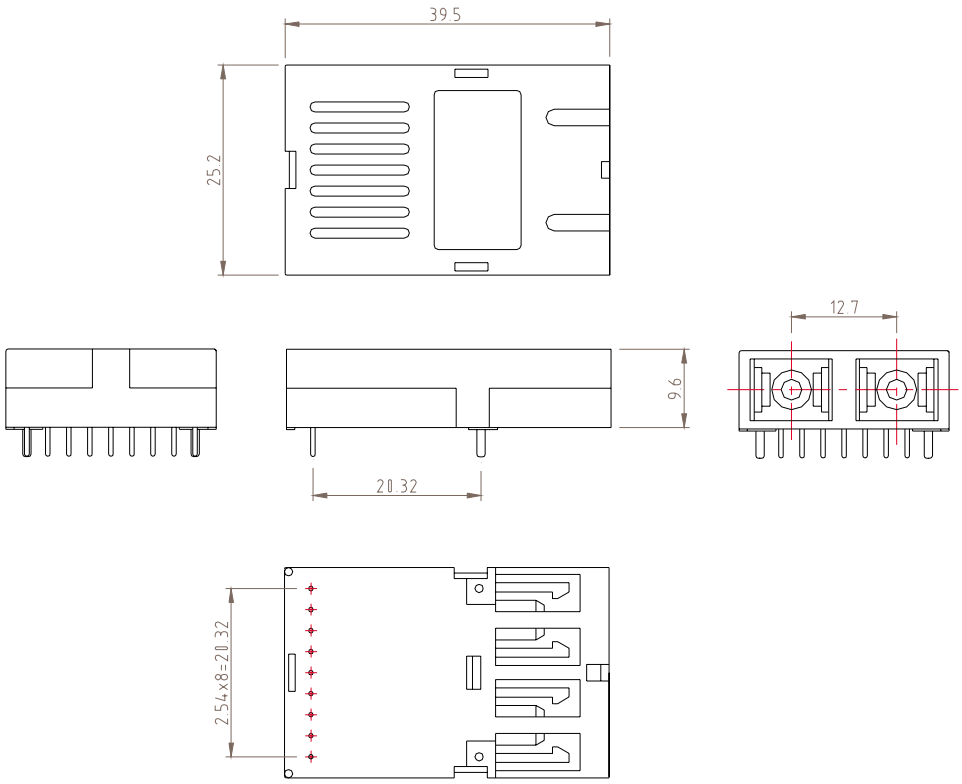
## Dimensions

Dimensions are in millimeters .

* Mezzanine standard




## Ordering Information

**T R X 0 3 - S X 5 S C**

| | |
|---|---|
| **Application** | 03: 155Mbps(OC-3, STM-1) |
| **Source** | S: 1310nm Short Haul SM 20Km<br>L: 1310nm Long Haul SM 40Km<br>T: 1550nm Short Haul SM 20Km |
| **Blank** | X |
| **Power Supply** | 3: +3.3V<br>5: +5.0V |
| **Connector Type** | SC: SC Connector |



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