

TRSL-9115G / TRSL-9115AG

3.3V / 1310 nm / 2.5 Gbps **RoHS Compliant** SFF LC SINGLE-MODE TRANSCEIVER

FEATURES

- | Duplex LC Single Mode Transceiver
- | SONET OC-48 IR-1 / SDH STM-16 (S-16.1) Compliant
- | Fiber Channel 2X/1X SM-LC-L FC-PI Compliant
- | IEEE 802.3z Gigabit Ethernet Compliant
- | Small Form Factor, RJ-45 size, 2X5 pin Package
- | 1310 nm DFB LD Transmitter
- | 13 dB Link Budget at Least
- | AC/AC Coupled Signal Input / Output
- | LVTTTL Transmitter Disable Input
- | LVTTTL Signal Detection Output
- | Single +3.3 V Power Supply
- | RoHS Compliant
- | 0 to 70°C Operating: TRSL-9115G
- | -20 to 85°C Operating: TRSL-9115AG
- | Wave Solderable and Aqueous Washable
- | Class 1 Laser International Safety Standard IEC-60825 Compliant

DESCRIPTION

The TRSL-9115G series single mode transceivers is small form factor, low power, high performance module for bi-directional serial optical data communications such as SONET OC-48 IR-1 / SDH STM-16 (S-16.1), gigabit Ethernet and 1X/2X Fiber channel. This module is designed for single mode fiber and operates at a nominal wavelength of 1310 nm. The transmitter section uses a multiple quantum well 1310 nm DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. A PECL logic interface simplifies interface to external circuitry.

LASER SAFETY

This single mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

APPLICATIONS

- | ATM Switches and Routers
- | SONET / SDH Switch Infrastructure
- | XDSL Applications
- | Metro Edge Switching

ORDER INFORMATION

| P/No. | Bit Rate (Mb/s) | SONET /SDH | Distance (km) | Wavelength (nm) | Package | Temp. (°C) | TX Power (dBm) | RX Sens. (dBm) | RoHS Compliant |
|--------------------|-----------------|-------------|---------------|-----------------|---------|------------------|----------------|----------------|----------------|
| TRSL-9115G | 2488 | IR-1/S-16.1 | 15 | 1310 DFB | 2X5 LC | 0 to 70 | 0 to -5 | -18 | Yes |
| TRSL-9115AG | 2488 | IR-1/S-16.1 | 15 | 1310 DFB | 2X5 LC | -20 to 85 | 0 to -5 | -18 | Yes |

| Absolute Maximum Ratings | | | | | |
|--------------------------|--------|----------|----------|-------|---------------------------|
| Parameter | Symbol | Min | Max | Units | Notes |
| Storage Temperature | Tstg | -40 | 85 | °C | |
| Operating Temperature | Topr | 0 -20 | 70 85 | °C | TRSL-9115G TRSL-9115AG |
| Soldering Temperature | --- | | 260 | °C | 10 seconds on leads only |
| Power Supply Voltage | Vcc | 0 | 4.5 | V | |
| Input Voltage | --- | GND | Vcc | V | |
| Output Current | Iout | 0 | 30 | mA | |

| Recommended Operating Conditions | | | | | |
|----------------------------------|--------|----------|------|----------|-------------------------------------|
| Parameter | Symbol | Min | Typ | Max | Units / Notes |
| Power Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V |
| Operating Temperature | Topr | 0 -20 | | 70 85 | °C / TRSL-9115G °C / TRSL-9115AG |
| Data Rate | | 622 | 2488 | 2700 | Mb/s |

| Transmitter Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V) | | | | | | |
|---|--|-----------------------|------|-----------------|---------|--------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Notes |
| Optical | | | | | | |
| Optical Transmit Power | Po | -5 | --- | 0 | dBm | 1 |
| Output Center Wavelength | λ | 1270 | 1310 | 1360 | nm | |
| Output Spectrum Width | $\Delta\lambda$ | --- | --- | 1 | nm | -20 dB Width |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Extinction Ratio | ER | 8.2 | --- | --- | dB | |
| Output Eye | Compliant with Bellcore GR-253-CORE and ITU recommendation G.957 | | | | | |
| Optical Rise Time | tr | | | 150 | ps | 20% to 80% Values |
| Optical Fall Time | tf | | | 150 | ps | 20% to 80% Values |
| Relative Intensity Noise | RIN | | | -120 | dB/Hz | |
| Electrical | | | | | | |
| Power Supply Current | Icc | | | 180 | mA | 2 |
| Data Input Current – Low | IL | -350 | | | μ A | |
| Data Input Current – High | I _{IH} | | | 350 | μ A | |
| Differential Input Voltage | V _{IH} - V _{IL} | 300 | | | mV | |
| Data Input Voltage – Low | V _{IL} - V _{CC} | -2.0 | | -1.58 | V | 3 |
| Data Input Voltage -- High | V _{IH} - V _{CC} | -1.1 | | -0.74 | V | 3 |
| Disable Input Voltage -- Low | V _{TDIS,L} | 0 | | 0.5 | V | TX Output Enabled |
| Disable Input Voltage -- High | V _{TDIS,H} | V _{CC} - 1.3 | | V _{CC} | V | TX Output Disabled |
| Shut Off Time for TxDis | t _{DIS} | | | 1 | ms | |

- Notes: 1. Output power is power coupled into a 9/125 μ m single mode fiber.
 2. Maximum current is specified at Vcc = Maximum @ maximum temperature.
 3. These inputs are compatible with 10K, 10KH and 100K ECL and PECL inputs.

| Receiver Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V) | | | | | | |
|--|-----------------------------------|------|-----|-------|-------|-------------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Notes |
| Optical | | | | | | |
| Sensitivity | --- | --- | --- | -18 | dBm | 1 |
| Maximum Input Power | Pin | 0 | | --- | dBm | |
| Signal Detect -- Asserted | Pa | --- | --- | -18 | dBm | Transition: low to high |
| Signal Detect -- Deasserted | Pd | -35 | --- | --- | dBm | Transition: high to low |
| Signal detect -- Hysteresis | | 1.0 | --- | | dB | |
| Wavelength of Operation | | 1100 | --- | 1600 | nm | |
| Electrical | | | | | | |
| Power Supply Current | Icc | | | 100 | mA | 2 |
| Data Output Voltage – Low | V _{OL} - V _{CC} | -2.0 | | -1.58 | V | 3 |
| Data Output Voltage – High | V _{OH} - V _{CC} | -1.1 | | -0.74 | V | 3 |
| Signal Detect Output Voltage -- Low | V _{SDL} | | | 0.8 | V | |
| Signal Detect Output Voltage -- High | V _{SDH} | 2.0 | | | V | |

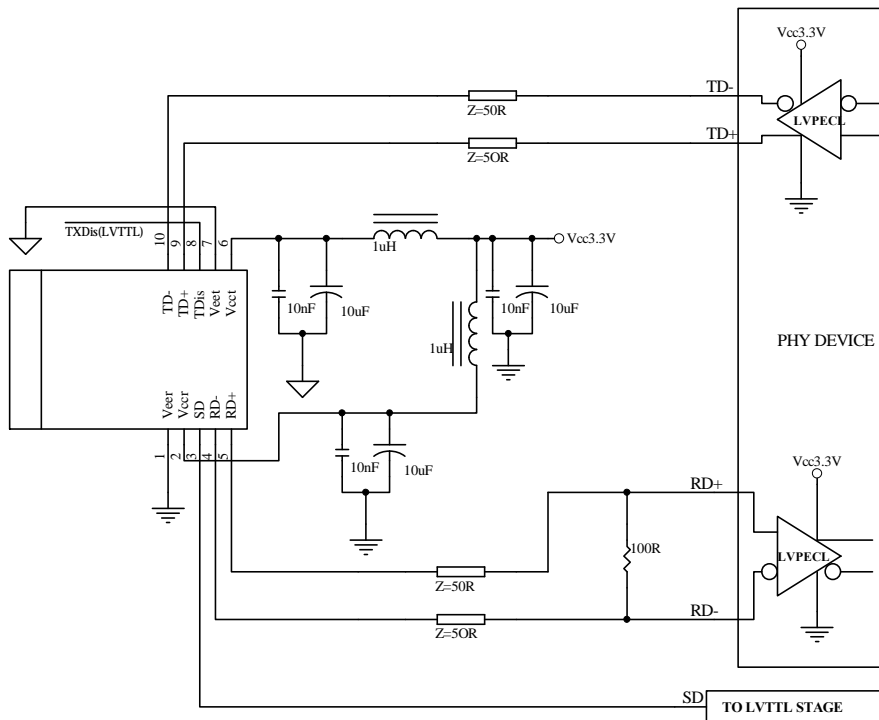
- Notes: 1. Minimum sensitivity and saturation levels at BER=1E-10 for a 2²³-1 PRBS.
 2. The current excludes the output load current.
 3. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

CONNECTION DIAGRAM



| PIN | Symbol | Notes |
|-----|------------|---|
| 1 | V_{EE}^r | Directly connect this pin to the receiver ground plane |
| 2 | V_{CC}^r | +3.3V dc power for the receiver section |
| 3 | SD | Active high on this indicates a received optical signal. |
| 4 | RD- | Receiver Dataout Bar. See recommended circuit schematic |
| 5 | RD+ | Receiver Dataout. See recommended circuit schematic |
| 6 | V_{CC}^t | +3.3V dc power for the transmitter section |
| 7 | V_{EE}^t | Directly connect this plan to the transmitter ground plane |
| 8 | TDis | Transmitter Disable. Connect this pin to +3.3V TTL logic "1" to disable module To enable module connect to TTL logic low "0" |
| 9 | TD+ | Transmitter Data In. See recommended circuit schematic |
| 10 | TD- | Transmitter Data In Bar. See recommended circuit schematic |
| MS | MS | Mounting Studs. Connect to Chassis Ground |

RECOMMENDED CIRCUIT SCHEMATIC

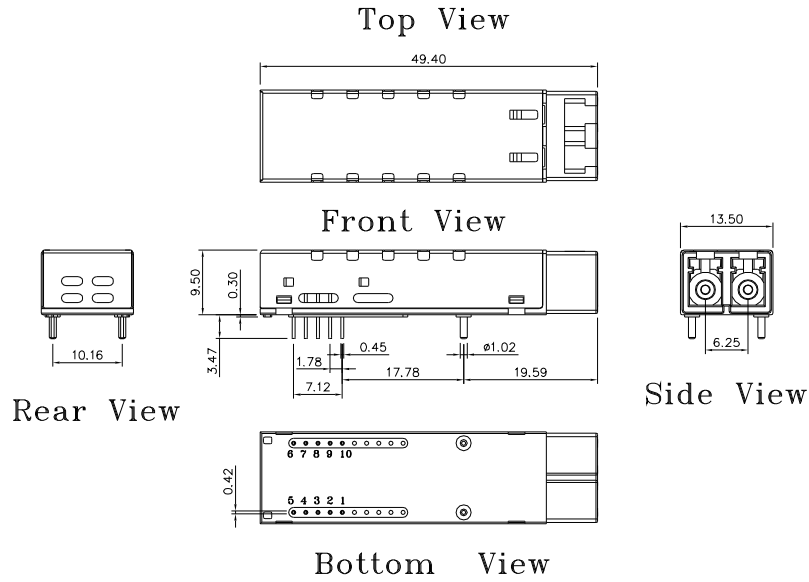


- Note: 1. TX input is terminated inside the module.
 2. Veer and Veet are not internally connected to each other.
 3. 50 Ω line pattern and component placements on TD+/TD- and RD+/RD- lines shall be symmetrical for better impedance matching.

PACKAGE DIAGRAM

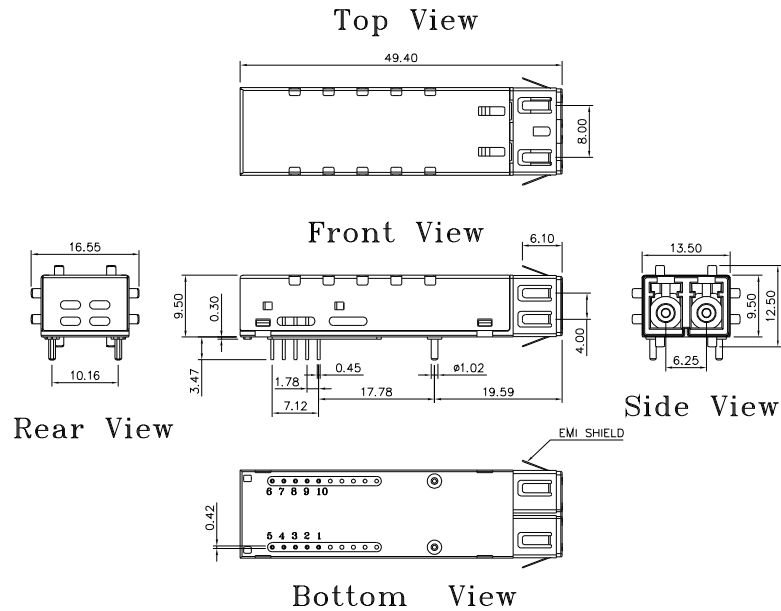
Units in mm

1) Standard Case



TRSL-9115G / TRSL-9115AG

2) Extended Case



TRSL-9115EG / TRSL-9115AEG

Note: Specifications subject to change without notice.