

TRML-5101G / TRML-5101AG

(RoHS Compliant)

622 Mbps / 1310 nm 3.3V SFF LC MULTI-MODE TRANSCEIVER

FEATURES

- Duplex LC Multi- Mode Transceiver
- ATM Form 622.08Mb/s Physical Layer Compliant
- SONET OC-12 / SDH STM-4 Compliant
- Small Form Factor 2X5 pin Package
- 0 to 1000 m Transmission Distance
- LVPECL Signal Input / Output
- LVTTTL Transmitter Disable Input
- LVPECL Signal Detect Output
- Single +3.3 V Power Supply
- RoHS Compliant
- 0 to 70°C Operation: TRML-5101G
- -40 to 85°C Operation: TRML-5101AG
- Wave Solderable and Aqueous Washable
- Class 1 Laser International Safety Standard IEC-60825 Compliant

APPLICATIONS

- ATM 622 Mbps Links
- SONET/SDH Equipment Interconnect
- Fibre Channel Links

DESCRIPTION

The TRML-5101G series multi-mode transceivers are small form factor, low power, high performance module for bi-directional serial optical data communications such as SONET OC-12 / SDH STM-4 and Fiber Channel. This module is designed for multi-mode fiber and operates at a nominal wavelength of 1310 nm. The transmitter section uses a multiple quantum well 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 multi-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.

ORDER INFORMATION

| P/No. | Bit Rate (Mb/s) | SONET/SDH | Distance (m) | Wavelength (nm) | Package | Temp. (°C) | TX Power (dBm) | RX Sens. (dBm) | RoHS Compliant |
|-------------|-----------------|-----------|--------------|-----------------|---------|------------|----------------|----------------|----------------|
| TRML-5101G | 622 | | 0 to 1000 | 1310 | 2X5 LC | 0 to 70 | -12 to -19 | -26 | Yes |
| TRML-5101AG | 622 | | 0 to 1000 | 1310 | 2X5 LC | -40 to 85 | -12 to -19 | -26 | Yes |

Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Units | Notes |
|-----------------------|--------|----------|----------|-------|---------------------------|
| Storage Temperature | Tstg | -40 | 85 | °C | |
| Operating Temperature | Topr | 0 -40 | 70 85 | °C | TRML-5101G TRML-5101AG |
| 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 -40 | | 70 85 | °C / TRML-5101G °C / TRML-5101AG |
| Data Rate | | 100 | 622 | | 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 | -19 | --- | -12 | dBm | 1 |
| Output Center Wavelength | λ | 1260 | 1310 | 1360 | nm | |
| Output Spectrum Width | $\Delta\lambda$ | --- | --- | 10 | nm | RMS(σ) |
| Extinction Ratio | ER | 10 | --- | --- | dB | |
| Output Eye | Compliant with Bellcore GR-253-CORE and ITU recommendation G.957 | | | | | |
| Optical Rise Time | t_r | | | 1.2 | ns | 10% to 90% Values |
| Optical Fall Time | t_f | | | 1.2 | ns | 10% to 90% Values |
| Relative Intensity Noise | RIN | | | -116 | dB/Hz | |
| Total Jitter | TJ | | | 0.55 | ns | 2 |
| Electrical | | | | | | |
| Power Supply Current | Icc | | | 140 | mA | 3 |
| Data Input Current – Low | I _{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 | 4 |
| Data Input Voltage -- High | V _{IH} - V _{CC} | -1.1 | | -0.74 | V | 4 |
| Disable Input Voltage -- Low | V _{TDISL} | 0 | | 0.5 | V | TX Output Enabled |
| Disable Input Voltage -- High | V _{TDISH} | Vcc - 1.3 | | Vcc | V | TX Output Disabled |
| Shut Off Time for TxDis | t _{DIS} | | | 1 | Ms | |

- Notes: 1. Output power is power coupled into a 62.5/125 μ m MM fiber.
 2. Measured with a 2²³-1 PRBS with 72 ones and 72 zeros.
 3. Maximum current is specified at Vcc = Maximum @ maximum temperature
 4. 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 | --- | --- | --- | -26 | dBm | 1 |
| Maximum Input Power | P _{in} | -8 | | --- | dBm | |
| Signal Detect -- Asserted | P _a | --- | --- | -26 | dBm | Transition: low to high |
| Signal Detect -- Deasserted | P _d | -47 | --- | --- | 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 _{OL} | -2.0 | | -1.58 | V | |
| Signal Detect Output Voltage -- High | V _{OH} | -1.1 | | -0.74 | V | |

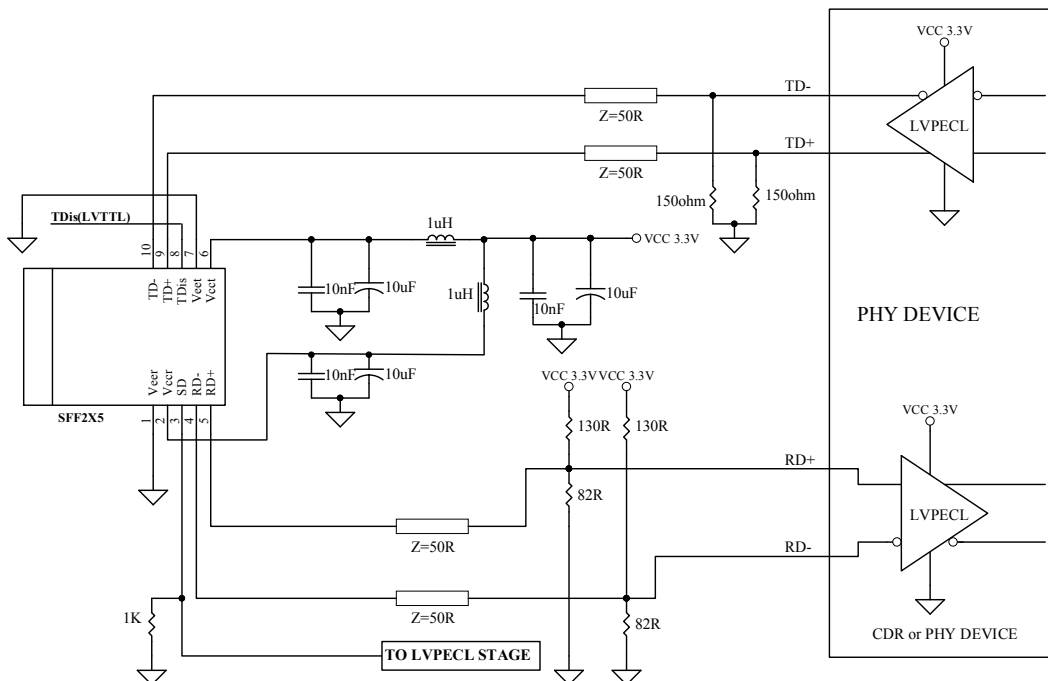
- Notes: 1. Minimum sensitivity and saturation levels at BER=1E-12 for a 2²³-1 PRBS with 72 ones and 72 zeros.
 2. The current excludes the output load current.
 3. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

CONNECTION DIAGRAM



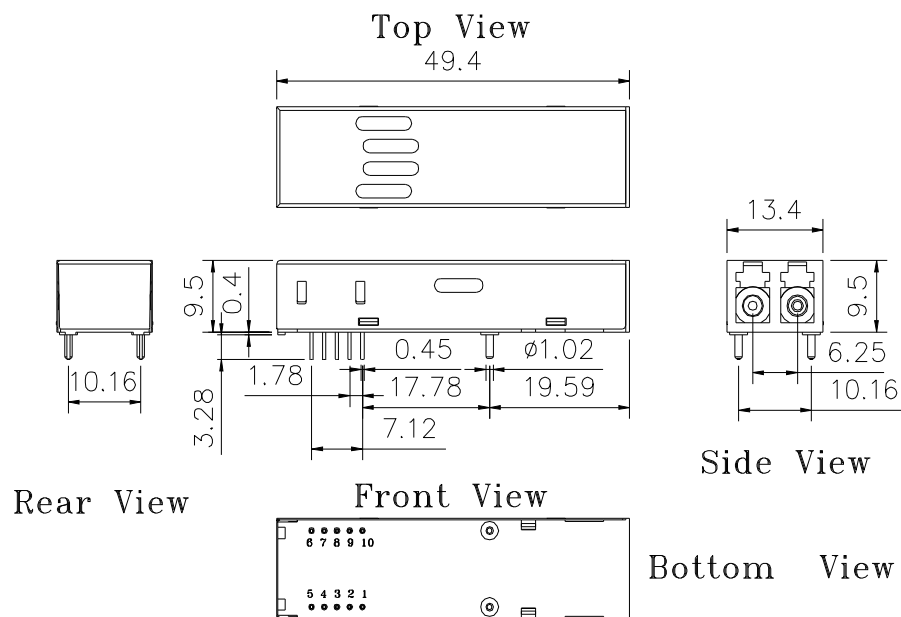
| PIN | Symbol | Notes |
|-----|-----------|---------------------------------------------------------------------------------------------------------------------------------|
| 1 | V_{EEr} | Directly connect this pin to the receiver ground plane |
| 2 | V_{CCr} | +3.3V dc power for the receiver section |
| 3 | SD | Active high on this indicates a received optical signal. |
| 4 | RD- | Receiver Data out Bar. See recommended circuit schematic |
| 5 | RD+ | Receiver Data out. See recommended circuit schematic |
| 6 | V_{CCt} | +3.3V dc power for the transmitter section |
| 7 | V_{EEt} | Directly connect this pin 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



PACKAGE DIAGRAM

Units in mm



TRML-5101G / TRML-5101AG

Note: Specifications subject to change without notice.

REVISION HISTORY

| Version | Subject | Release Date |
|---------|----------------------------------------------------|--------------|
| 2.0 | Initial datasheet | 2005/12/1 |
| 2.1 | Remove Note from the RECOMMENDED CIRCUIT SCHEMATIC | 2026/5/8 |
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