
TRM-7000-EMG / TRM-7000C-EMG / TRM-7000A-EMG / TRM-7000AC-EMG
5V / 850 nm / 1.25 Gbps **RoHS Compliant Optical Multi-Mode Transceiver**

FEATURES

- | Duplex SC Multi-Mode Transceiver
- | Compliant with IEEE-802.3z 1000BASE-SX
- | Industry Standard 1 x 9 Footprint
- | 850 nm VCSEL Transmission
- | 0 to 70°C Operating: TRM-7000-EMG
- | -20 to 85°C Operating: TRM-7000A-EMG
- | Single +5 V Power Supply
- | **RoHS Compliant**
- | 300 meter with 62.5/125 μm MMF
- | 500 meter with 50/125 μm MMF
- | LVPECL Signal Detect Output: TRM-7000-EMG
- | LVTTTL Signal Detect Output: TRM-7000C-EMG
- | Wave Solderable and Aqueous Washable
- | Class 1 Laser International Safety Standard IEC 60825-1 Compliant

DESCRIPTION

The TRM-7000-EMG series multi-mode transceivers is low power, high performance module for bi-directional serial optical data communications such Gigabit Ethernet and Fibre Channel. This module is designed for multi-mode fiber and operates at a nominal wavelength of 850 nm. The transmitter section uses a multiple quantum well VCSEL and is a class 1 laser compliant according to International Safety Standard IEC 60825-1. The receiver section uses an integrated GaAs 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 60825-1 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

- | Switch to Switch Interface
- | High Speed Interface for File Servers
- | High Performance Desktops

ORDER INFORMATION

| P/No. | Distance (m) | Wavelength (nm) | Voltage (V) | Package | Temp. (°C) | TX Power (dBm) | RX Sens. (dBm) | Signal Detect | RoHS Compliant |
|----------------|--------------|-----------------|-------------|---------|------------|----------------|----------------|---------------|----------------|
| TRM-7000-EMG | 300 / 500* | 850 | 3.3 | 1X9 SC | 0 to 70 | -4 to -9.5 | -18 | LVPECL | Y |
| TRM-7000C-EMG | 300 / 500* | 850 | 3.3 | 1X9 SC | 0 to 70 | -4 to -9.5 | -18 | LVTTTL | Y |
| TRM-7000A-EMG | 300 / 500* | 850 | 3.3 | 1X9 SC | -20 to 85 | -4 to -9.5 | -18 | LVPECL | Y |
| TRM-7000AC-EMG | 300 / 500* | 850 | 3.3 | 1X9 SC | -20 to 85 | -4 to -9.5 | -18 | LVTTTL | Y |

Note: Distance: 300 m for 62.5/125 μm MMF, 500 m for 50/125 μm MMF

| Absolute Maximum Ratings | | | | | |
|--------------------------|--------|----------|----------|-------|--------------------------|
| Parameter | Symbol | Min | Max | Units | Notes |
| Storage Temperature | Tstg | -40 | 85 | °C | |
| Operating Temperature | Topr | 0 -20 | 70 85 | °C | TRM-7000 TRM-7000A |
| Soldering Temperature | --- | | 260 | °C | 10 seconds on leads only |
| Power Supply Voltage | Vcc | -0.5 | 6 | V | |
| Input Voltage | --- | GND | Vcc | V | |
| Output Current | Iout | 0 | 30 | mA | |

| Recommended Operating Conditions | | | | | |
|----------------------------------|--------|----------|------|----------|---------------------------------|
| Parameter | Symbol | Min | Typ | Max | Units |
| Power Supply Voltage | Vcc | 4.75 | 5 | 5.25 | V |
| Operating Temperature | Topr | 0 -20 | | 70 85 | °C / TRM-7000 °C / TRM-7000A |
| Data Rate | | | 1250 | | Mb/s |

| Transmitter Specifications (0°C < Topr < 70°C, 4.75V < Vcc < 5.25V) | | | | | | |
|---|-----------------------------------|------|-----|-------|-------|-------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Notes |
| Optical | | | | | | |
| Optical Transmit Power 62.5/125 μm, NA=0.275 Fiber | Po | -9.5 | --- | -4 | dBm | |
| Optical Transmit Power 50/125 μm, NA=0.20 Fiber | Po | -9.5 | --- | -4 | dBm | |
| Output Center Wavelength | λ | 830 | 850 | 860 | nm | |
| Output Spectrum Width | Δλ | --- | --- | 0.85 | nm | RMS (σ) |
| Extinction Ratio | ER | 9 | --- | --- | dB | |
| Output Eye | Compliant with IEEE 802.3z | | | | | |
| Optical Rise Time | tr | | | 0.26 | ns | 20% to 80% Values |
| Optical Fall Time | tf | | | 0.26 | ns | 20% to 80% Values |
| Relative Intensity Noise | RIN | | | -117 | dB/Hz | |
| Total Jitter | TJ | | | 227 | ps | |
| Coupled Power Ratio | CPR | 9 | | | dB | |
| Electrical | | | | | | |
| Power Supply Current | Icc | | | 120 | mA | 1 |
| Data Input Current – Low | IIL | -350 | | | μA | |
| Data Input Current – High | IIH | | | 350 | μA | |
| Differential Input Voltage | V _{IH} - V _{IL} | 300 | | | mV | |
| Data Input Voltage – Low | V _{IL} - V _{CC} | -2.0 | | -1.58 | V | 2 |
| Data Input Voltage -- High | V _{IH} - V _{CC} | -1.1 | | -0.74 | V | 2 |

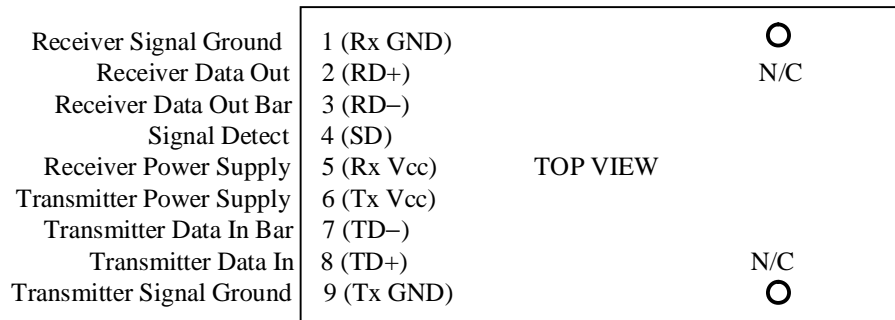
1. Maximum current is specified at Vcc = Maximum @ maximum temperature.
2. These inputs are compatible with 10K, 10KH and 100K ECL and LVPECL inputs.

Receiver Specifications (0°C < Topr < 70°C, 4.75 V < Vcc < 5.25V)

| 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 | -30 | --- | --- | dBm | Transition: high to low |
| Signal Detect -- Hysteresis | | | 3 | | dB | |
| Wavelength of Operation | | 770 | --- | 860 | 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} - V _{CC} | -2.0 | | -1.58 | V | TRM-7000 |
| Signal Detect Output Voltage -- High | V _{OH} - V _{CC} | -1.1 | | -0.74 | V | |
| Signal Detect Output Voltage -- Low | V _{SDL} | | | 0.5 | V | TRM-7000C |
| Signal Detect Output Voltage -- High | V _{SDH} | 2.0 | | | V | |

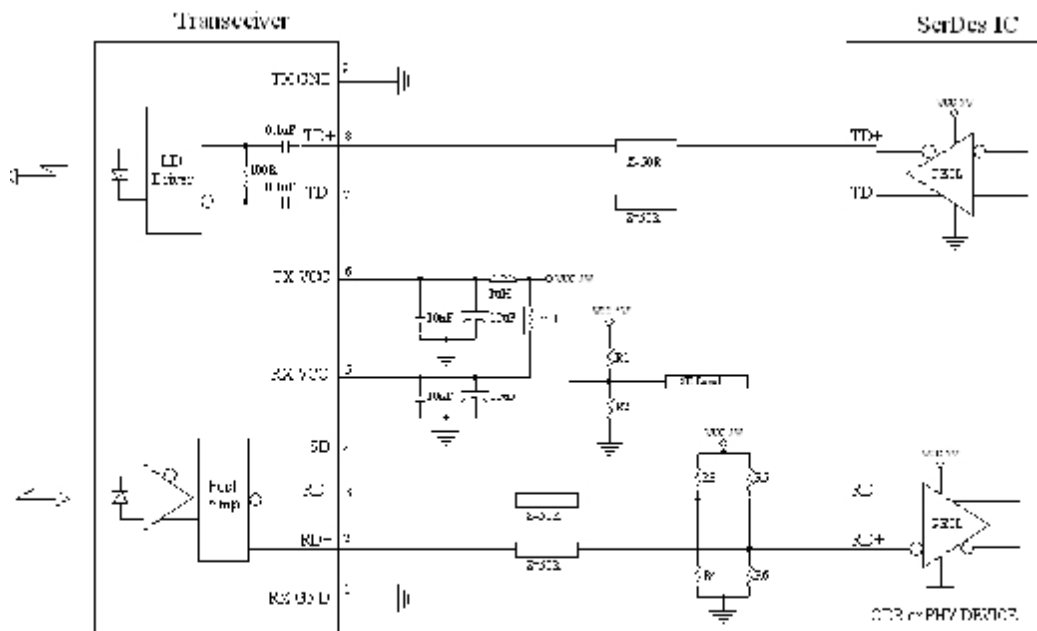
1. Minimum sensitivity and saturation levels at BER=1E-12 for a 2⁷-1 PRBS at ER= 9 dB. For example, an OMA of 22 μW is approximately equal to an average power of -18.4 dBm, average with an Extinction ratio of 9 dB.
2. The current excludes the output load current.
3. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

CONNECTION DIAGRAM



| PIN | Symbol | Notes |
|-----|--------|--|
| 1 | Rx GND | Directly connect this pin to the receiver ground plane |
| 2 | RD+ | See recommended circuit schematic |
| 3 | RD- | See recommended circuit schematic |
| 4 | SD | Active high on this indicates a received optical signal |
| 5 | Rx Vcc | +5V dc power for the receiver section |
| 6 | Tx Vcc | +5V dc power for the transmitter section |
| 7 | TD- | See recommended circuit schematic |
| 8 | TD+ | See recommended circuit schematic |
| 9 | Tx GND | Directly connect this plan to the transmitter ground plane |

RECOMMENDED CIRCUIT SCHEMATIC

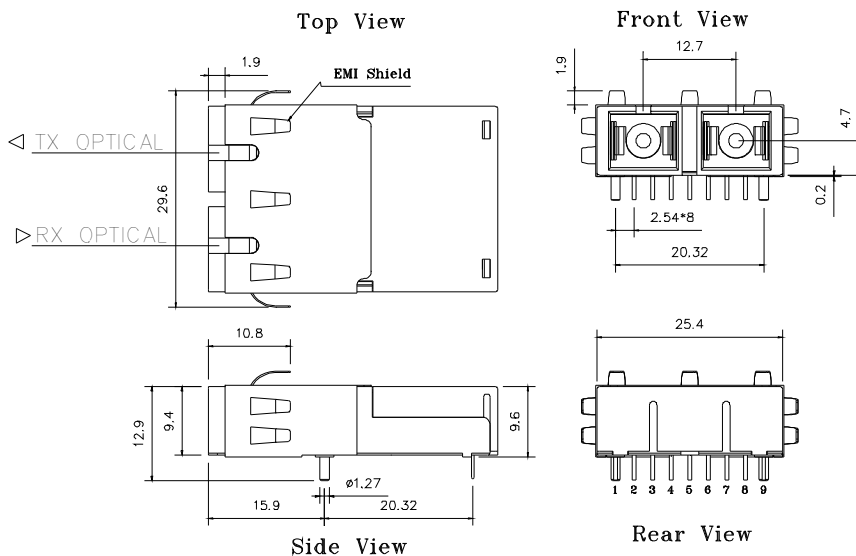


For TTL SD Level R1=R2=N.C., R3=R4=82R, R5=R6=130R
For PECL SD Level R1 R3 R5 82R, R2 R4 R6 130R

The split-load terminations for ECL signals need to be located at the input of devices receiving those ECL signals. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc and Tx Vcc. A GND plane under the module is required for good EMI and sensitivity performance.

PACKAGE DIAGRAM

Units in mm



TRM-7000-EMG / TRM-7000C-EMG / TRM-7000A-EMG / TRM-7000AC-EMG

Note: Specifications subject to change without notice.