

## TRML-7100CG / TRML-7100ACG

### 3.3V / 850 nm / 1.25 Gbps **RoHS Compliant** SFF LC MULTI-MODE TRANSCEIVER

#### FEATURES

- | Duplex LC Multi-Mode Transceiver
- | Compliant with IEEE 802.3z 1000BASE-SX
- | Compliant with Fibre Channel FC-PH-2 for 100-M5-SN-1 and 100-M6-SN-1
- | 300 m links with 62.5/125 µm MMF Cables
- | 500 m links with 50/125 µm MMF Cables
- | Small Form Factor 2X5 pin Package
- | AC/AC Coupled Signal Input / Output
- | LVTTTL Transmitter Disable Input
- | LVTTTL Signal Detect Output
- | Single +3.3 V Power Supply
- | RoHS Compliant
- | 0 to 70°C Operation : TRML-7100CG
- | -20 to 85°C Operation : TRML-7100ACG
- | Wave Solderable and Aqueous Washable
- | Class 1 Laser International Safety Standard IEC-60825 Compliant

#### DESCRIPTION

The TRML-7100CG series multi-mode transceivers is small form factor, low power, high performance module for bi-directional serial optical data communications such as Gigabit Ethernet IEEE 802.3z 1000BASE-SX and Fiber Channel FC-PH-2. 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 850 nm VCSEL and is a class 1 laser compliant according to International Safety Standard IEC-60825. 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 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

- | SONET/SDH Equipment Interconnect
- | Gigabit Ethernet 1.25 Gb/s Links

#### ORDER INFORMATION

P/No.	Bit Rate (Gb/s)	1000 BASE	Distance (m)	Wavelength (nm)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
TRML-7100CG	1.25/1.063	SX	300/500*	850	2X5 LC	0 to 70	-4 to -9	-17	Yes
TRML-7100ACG	1.25/1.063	SX	300/500*	850	2X5 LC	-20 to 85	-4 to -9	-17	Yes

Note: 300 m links with 62.5/125 µm MMF Cables and 500 m links with 62.5/125 µm MMF Cables.

Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-40	85	°C	
Operating Temperature	Topr	0	70	°C	TRML-7100CG
		-20	85		TRML-7100ACG
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		70	°C / TRML-7100CG
		-20		85	°C / TRML-7100ACG
Data Rate		1000	1250		Mb/s
Power Supply Current	Icc		180	250	mA

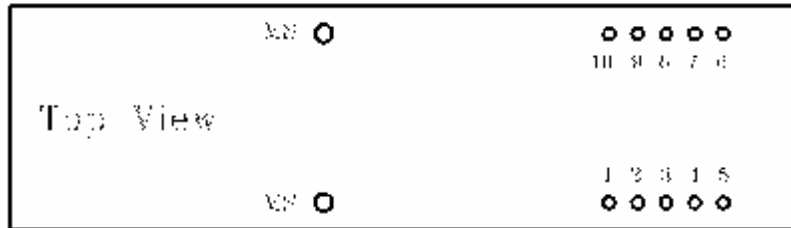
Transmitter Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
<b>Optical</b>						
Optical Transmit Power	P <sub>o</sub>	-9	---	-4	dBm	1
Output Center Wavelength	λ	830	850	860	nm	
Output Spectrum Width	Δλ	---	---	0.85	nm	RMS (σ)
Extinction Ratio	E <sub>R</sub>	9	---	---	dB	
Output Eye	Compliant with IEEE 802.3z					
Optical Rise Time	t <sub>r</sub>			0.26	ns	20% to 80% Values
Optical Fall Time	t <sub>f</sub>			0.26	ns	20% to 80% Values
Relative Intensity Noise	RIN			-116	dB/Hz	
Total Jitter	TJ			0.226	ns	2
<b>Electrical</b>						
Data Input Current – Low	I <sub>IL</sub>	-350			μA	
Data Input Current – High	I <sub>IH</sub>			350	μA	
Differential Input Voltage	V <sub>IH</sub> - V <sub>IL</sub>	300			mV	
Data Input Voltage – Low	V <sub>IL</sub> - V <sub>CC</sub>	-2.0		-1.58	V	3
Data Input Voltage -- High	V <sub>IH</sub> - V <sub>CC</sub>	-1.1		-0.74	V	3
Disable Input Voltage -- Low	V <sub>TDIS,L</sub>	0		0.8	V	TX Output Enabled
Disable Input Voltage -- High	V <sub>TDIS,H</sub>	V <sub>CC</sub> - 1.3		V <sub>CC</sub>	V	TX Output Disabled
Shut Off Time for TxDis	t <sub>DIS</sub>			1	ms	

- Notes: 1. Output power is power coupled into a 62.5/125 μm MM fiber.  
 2. Measured with a 2<sup>7</sup>-1 PRBS.  
 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
<b>Optical</b>						
Sensitivity	---	---	---	-17	dBm	1
Maximum Input Power	P <sub>in</sub>	-3	0	---	dBm	
Signal Detect -- Asserted	P <sub>a</sub>	---	---	-17	dBm	Transition: low to high
Signal Detect -- Deasserted	P <sub>d</sub>	-31	---	---	dBm	Transition: high to low
Signal detect -- Hysteresis		1.0	---		dB	
Wavelength of Operation		1100	---	1600	nm	
<b>Electrical</b>						
Data Output Voltage – Low	V <sub>OL</sub> - V <sub>CC</sub>	-2.0		-1.58	V	2
Data Output Voltage – High	V <sub>OH</sub> - V <sub>CC</sub>	-1.1		-0.74	V	2
Signal Detect Output Voltage -- Low	V <sub>OL</sub>			0.5	V	
Signal Detect Output Voltage -- High	V <sub>OH</sub>	2.0			V	

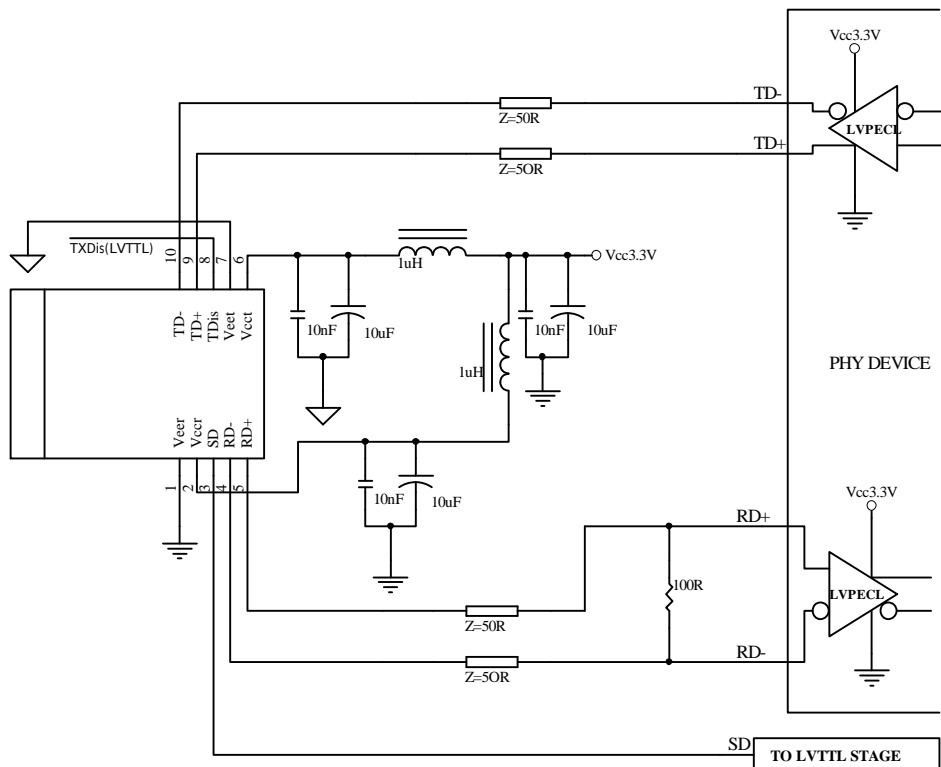
- Notes: 1. Minimum sensitivity and saturation levels at BER=1E-12 for a 2<sup>7</sup>-1 PRBS.  
 2. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

## 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

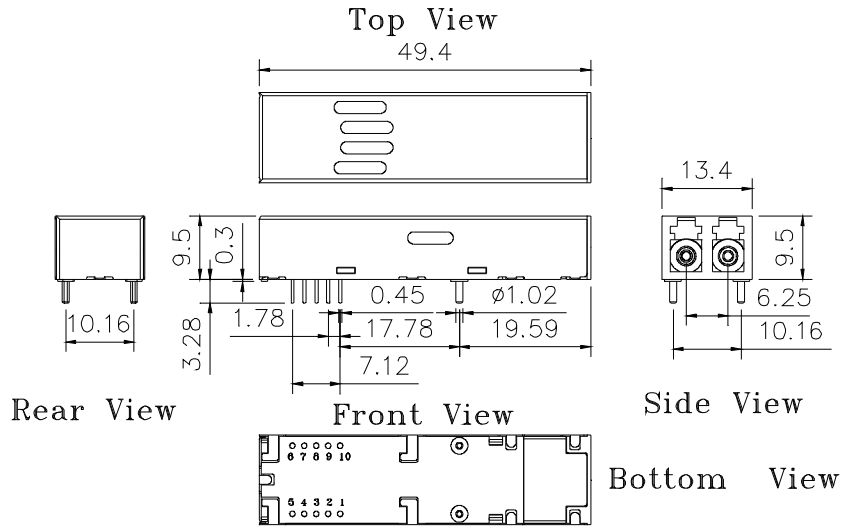


- Note: 1. No SD pull-down resistor required for TRML-7100CG (LVTTTL SD Output)  
 2. Veeer and Veeet are not internally connected to each other.  
 3. 50  $\Omega$  line pattern and component placements on TD+/TD- and RD+/RD- lines shall be symmetrical for better impedance matching.

PACKAGE DIAGRAM

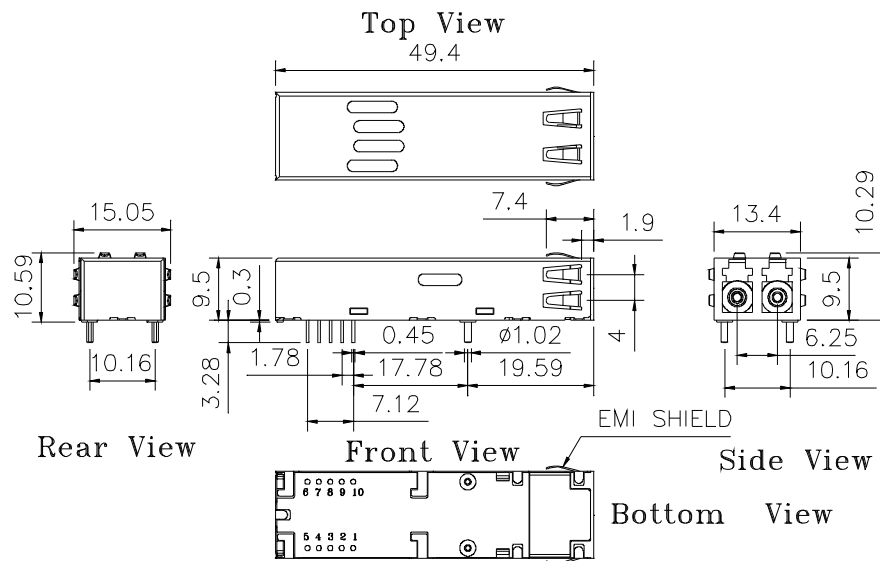
Units in mm

1) Standard Case



TRML-7100CG / TRML-7100ACG

2) Extended Case



TRML-7100CEG / TRML-7100ACEG

**Note:** Specifications subject to change without notice.