

TRML-8100WG / TRML-8100BWG

(RoHS Compliant)

3.3V / 850 nm / 4.25 Gbps **Digital Diagnostic** SFF LC MULTI-MODE TRANSCEIVER

FEATURES

- | Up to 4.25 Gb/s Bi-directional Data Link
- | Duplex LC Multi-Mode Transceiver
- | Compliant with Fibre Channel FC-PH-2 for 400-M5-SN-1 and 400-M6-SN-1
- | Compliant with IEEE 802.3z 1000BASE-SX
- | Link Distance at 4.25 Gbd
 - 150 m links with 50/125 μ m MMF Cables
 - 70 m links with 62.5/125 μ m MMF Cables
- | Link Distance at 2.125 Gbd
 - 300 m links with 50/125 μ m MMF Cables
 - 150 m links with 62.5/125 μ m MMF Cables
- | Link Distance at 1.063 Gbd
 - 500 m links with 50/125 μ m MMF Cables
 - 300 m links with 62.5/125 μ m MMF Cables
- | Small Form Factor, RJ-45 size, 2X5 pin Package
- | **SFF-8472 Digital Diagnostic Function**
- | 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 Operating: TRML-8100G
- | -10 to 85°C Operating: TRML-8100BG
- | Wave Solderable and Aqueous Washable
- | Class 1 Laser International Safety Standard IEC-60825 Compliant

DESCRIPTION

The TRML-8100WG series multi-mode transceivers is small form factor, low power, high performance module for bi-directional serial optical data communications such as Fibre Channel 4x/2x/1x and Gigabit Ethernet 1000BASE-SX. This 2×7 pin SFF transceiver comply with the 2×5 standard package defined by the SFF MSA with the exception of four extra pins for real-time digital diagnostics and transmitter fault indication. Digital diagnostic functions are available via the 2-wire serial interface defined in the SFF-8472 MSA. 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

- | Tri-Rate 4.25/2.125/1.063 Gb/s Fiber Channel
- | 1.25 Gb/s 1000BASE-SX Ethernet

ORDER INFORMATION

P/No.	Bit Rate (Gb/s)	FC	Distance (m)	Wavelength (nm)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
TRML-8100WG	4 / 2 / 1	400/200/100	150/300/500	850	2X7 LC with DMI	0 to 70	-2.5 to -9	-15/-17/-18	Yes
TRML-8100BWG	4 / 2 / 1	400/200/100	150/300/500	850	2X7 LC with DMI	-10 to 85	-2.5 to -9	-15/-17/-18	Yes

Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-40	85	°C	
Operating Temperature	Topr	0	70	°C	TRML-8100WG
		-10	85		TRML-8100BWG
Soldering Temperature	---		260	°C	10 seconds on leads only
Power Supply Voltage	Vcc	0	4.5	V	
Input Voltage	---	GND	Vcc	V	

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	V _{cc}	3.13	3.3	3.47	V
Operating Temperature	T _{opr}	0 -10		70 85	°C / TRML-8100WG °C / TRML-8100BWG
Data Rate		1062	4250		Mb/s
Power Supply Current	I _{cc}		180	240	mA

Transmitter Specifications (0°C < T _{opr} < 70°C, 3.13V < V _{cc} < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Optical Transmit Power	P _o	-9	---	-2.5	dBm	1
Output Center Wavelength	λ	840	850	860	nm	
Output Spectrum Width	Δλ	---	---	0.85	nm	RMS (σ)
Optical Modulation Amplitude@4.25Gb/s	OMA	247			μW	2
Optical Rise Time	t _r			90	ps	20% to 80%
Optical Fall Time	t _f			90	ps	20% to 80%
Relative Intensity Noise	RIN			-118	dB/Hz	
Electrical						
Data Input Current – Low	I _{IL}	-350			μA	
Data Input Current – High	I _{IH}			350	μA	
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 62.5/125 μm MM fiber.

2. An OMA of 196 μW is approximately equal to an average power of -9 dBm assuming an Extinction Ratio of 9 dB.

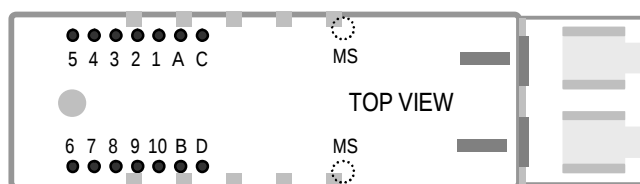
3. These inputs are compatible with 10K, 10KH and 100K ECL and PECL inputs.

Receiver Specifications (0°C < T _{opr} < 70°C, 3.13V < V _{cc} < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Sensitivity @4.25Gb/s	Sens			-15 40	dBm μW	4
Sensitivity @2.125Gb/s	Sens			-17	dBm	4
Sensitivity @1.063Gb/s	Sens			-18	dBm	4
Maximum Input Power	P _{in}	0		---	dBm	
Signal Detect -- Asserted	P _a	---	---	-18	dBm	Transition: low to high
Signal Detect -- Deasserted	P _d	-31	---	---	dBm	Transition: high to low
Signal detect -- Hysteresis		1.0	---		dB	
Wavelength of Operation		1100	---	1600	nm	
Electrical						
Data Output Voltage – Low	V _{OL} - V _{CC}	-2.0		-1.58	V	5
Data Output Voltage – High	V _{OH} - V _{CC}	-1.1		-0.74	V	5
Signal Detect Output Voltage -- Low	V _{OL}			0.5	V	
Signal Detect Output Voltage -- High	V _{OH}	2.0			V	

Notes: 4. Minimum sensitivity and saturation levels at BER=1E-12 for a 2⁷-1 PRBS.

5. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

CONNECTION DIAGRAM



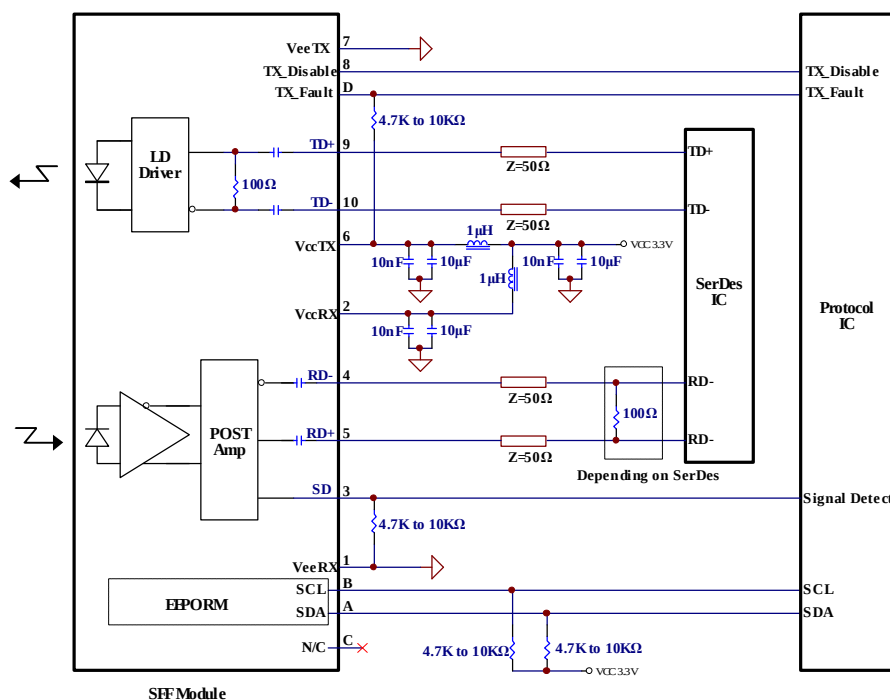
PIN	Signal Name	Description	PIN	Signal Name	Description
C	N/C	Not Connected	D	TX_Fault	Transmitter Fault Indication
A	SDA	Data line of two wire serial interface	B	SCL	Clock line of two wire serial interface
1	VeeRx	Rreceiver ground	10	TD-	Transmitter Data In Bar
2	VccRx	Receiver Power – 3.3V±5%	9	TD+	Transmitter Data In
3	SD	Signal Detect Output	8	TX_Disable	Logic low to enable TXoutput
4	RD-	Receiver Data Out Bar	7	VeeTx	Transmitter ground
5	RD+	Receiver Data Out	6	VccTx	Transmitter Power – 3.3V±5%
MS	MS	Mounting Studs. Connect to Chassis Ground			

Module Definition

Module Definition	MOD-DEF2 PIN A	MOD-DEF1 PIN B	MOD-DEF0	Interpretation by Host
4	SDA	SCL		Serial module definition protocol

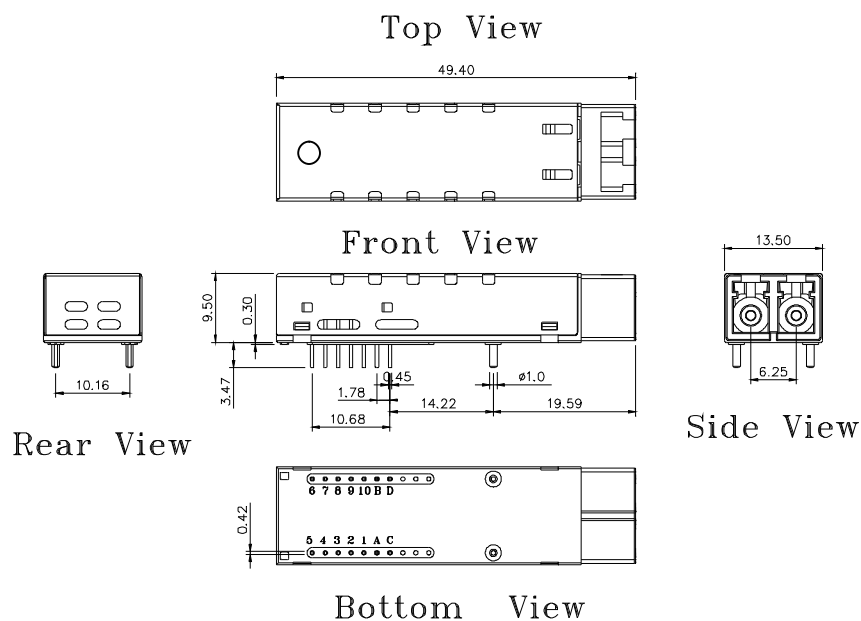
Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, MOD-DEF(1:2) appear as no connector (NC) and MOD-DEF(0) is TTL LOW. When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E²PROM protocol of the ATMEL AT24C01A/02/04 family of components.

Recommended Circuit Schematic



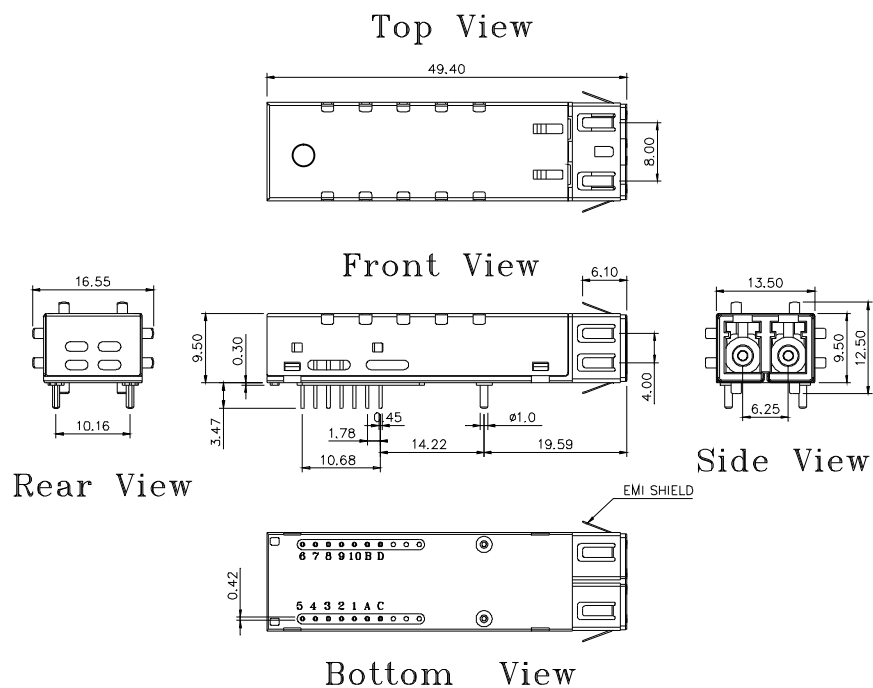
PACKAGE DIAGRAM (Units in mm)

A) Standard Case



TRML-8100WG / TRML-8100BWG

B) Extended Case



TRML-8100WEG / TRML-8100BWEG

Note: Specifications subject to change without notice.