

## TR4-M3-2D53K-W5

### Description

The TR4-M3 series is a 1x9 SC duplex 1.25Gbps transceiver. This is a low power, high performance module for optical data communications in Gigabit Ethernet and Fiber Channel.

This module is designed for multi-mode fiber and operates at a normal wavelength of 850nm.

The transmitter section uses a Vertical-cavity surface emitting laser (VCSEL) at 850 nm. This is class 1 laser compliant component, according to IEC-825, the International Safety Standard.

The receiver section uses an integrated GaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

A LVPECL logic interface simplifies interface to external circuitry. Operating temperature is from 0°C to 70°C.



### Applications

- Gigabit Ethernet
- SONET/SDH Equipment Interconnect
- Fiber Channel

### Features :

- Duplex SC Multi Mode Transceiver
- Industry Standard 1 x 9 Footprint
- Single +3.3 V Power Supply
- Complies with IEEE 802.3z Gigabit Ethernet
- LVPECL Differential Inputs and Outputs
- LVPECL Signal Detection Output
- DC Coupled Data Inputs and Outputs
- Distance : 50/125µm to 500m or 62.5/125µm to 220m

### Laser safety :

This multi mode transceiver is a Class 1 laser product. It complies with IEC 825 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.



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### Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Storage Temperature	$T_S$	-40	85	°C	
Supply Voltage	$V_{CC}$	---	6.0	V	
Soldering Temperature	$T_{SOLD}$	---	260	°C	10s on leads

### Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Ambient Operating Temperature	$T_{AMB}$	0	70	°C	
Supply Voltage	$V_{CC}$	3.15	3.45	V	
Supply Current	$I_{CC}$	---	260	mA	
Data Rate	---	---	1250	---	Mb/s

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### Ordering Information

T	R	4	-	M	3	-	2	D	5	3	K	-	W	5																																				
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\* Please contact us for the released types.



## TR4-M3-2D53K-W5

### Transmitter optical Specifications ( 0°C < Topr < 70°C, 3.15V < Vcc < 3.45V )

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Output Optical Power 50/125 $\mu$ m, NA=0.20 Fiber	Pout	-9.5	---	-4	dBm	1
Output Optical Power 62.5/125 $\mu$ m, NA=0.275 Fiber	Pout	-9	---	-4	dBm	1
Extinction Ratio	ER	9	---	---	dB	
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Output Eye	Compliant with IEEE 802.3z					
Center Wavelength	$\lambda_c$	830	850	860	nm	
Spectral Width(rms)	$\Delta\lambda$	---	---	0.85	nm	
Rise/Fall Time,20%~80%	$T_r, T_f$	---	---	260	ps	2
Relative Intensity Noise	RIN	---	---	-117	dB/Hz	
Coupled Power Ratio	CPR	9	---	---	dB	
Total jitter	TJ	---	---	227	ps	3
Deterministic Jitter	DJ	---	---	80	ps	
Random Jitter	$T_{RJ}$	---	---	147	ps	
<b>Electrical</b>						
Power Supply Current	Icc	---	---	160	mA	4
Data Input Voltage-Low	$V_{IL} - V_{cc}$	-2.0	---	-1.58	V	5
Data Input Voltage-High	$V_{IH} - V_{cc}$	-1.1	---	-0.74	V	

Notes:

1. Output power is coupled into a 50/125 or 62.5/125  $\mu$  m multi-mode fibers.
2. 20% to 80% Values. Maximum  $t_R, t_F$  times tested against eye mask.
3. Measured with a  $2^7 - 1$  PRBS with 72 ones and 72 zeros.
4. Maximum current is specified at  $V_{cc} = \text{Maximum @ maximum temperature}$ .
5. These inputs are compatible with 10K, 10KH and 100K LVECL and LVPECL inputs.



## TR4-M3-2D53K-W5

### Receiver optical Specifications ( 0°C < Topr < 70°C, 3.15 V < Vcc < 3.45V )

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Sensitivity	P <sub>in</sub>	---	-20	-17	dBm	1
Maximum Input Power	P <sub>in</sub>	-3	---	---	dBm	
Operating Center Wavelength	$\lambda_c$	770	---	860	nm	
Receiver Electrical 3dB Upper Cutoff Frequency	---	---	---	1500	MHz	
Signal Detect-Asserted	P <sub>A</sub>	---	---	-17	dBm	Average
Signal Detect-Deasserted	P <sub>D</sub>	-30	---	---	dBm	Average
Signal Detect-Hysteresis	P <sub>A</sub> -P <sub>D</sub>	1.5	---	---	dB	
Stressed Receiver Sensitivity	---	---	---	-13.5	dBm	50um MMF
	---	---	---	-12.5	dBm	62.5um MMF
<b>Electrical</b>						
Power Supply Current	I <sub>cc</sub>	---	---	130	mA	2
Data Output Voltage-Low	V <sub>OL</sub> - V <sub>cc</sub>	-2.0	---	-1.58	V	3
Data Output Voltage-High	V <sub>OH</sub> - V <sub>cc</sub>	-1.1	---	-0.74	V	
Signal Detect Voltage-Low	V <sub>OL</sub> - V <sub>cc</sub>	-2.0	-	-1.58	V	
Signal Detect Voltage-High	V <sub>OH</sub> - V <sub>cc</sub>	-1.1	-	-0.74	V	

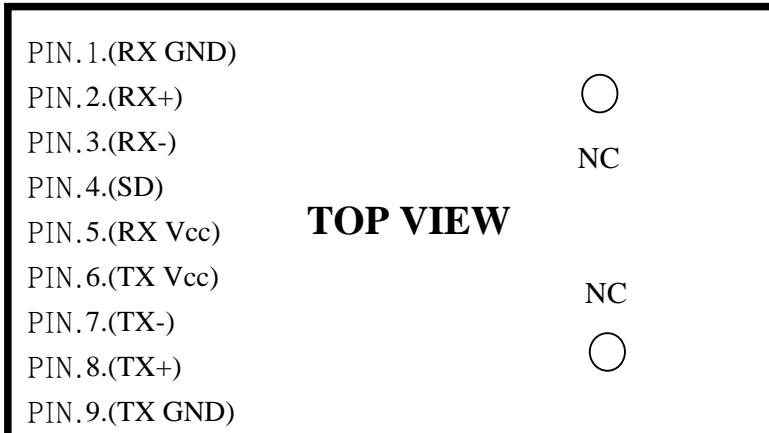
Notes:

1. Minimum sensitivity and saturation levels at BER=1E-12 for a 2<sup>7</sup>-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 LVECL and LVPECL outputs.

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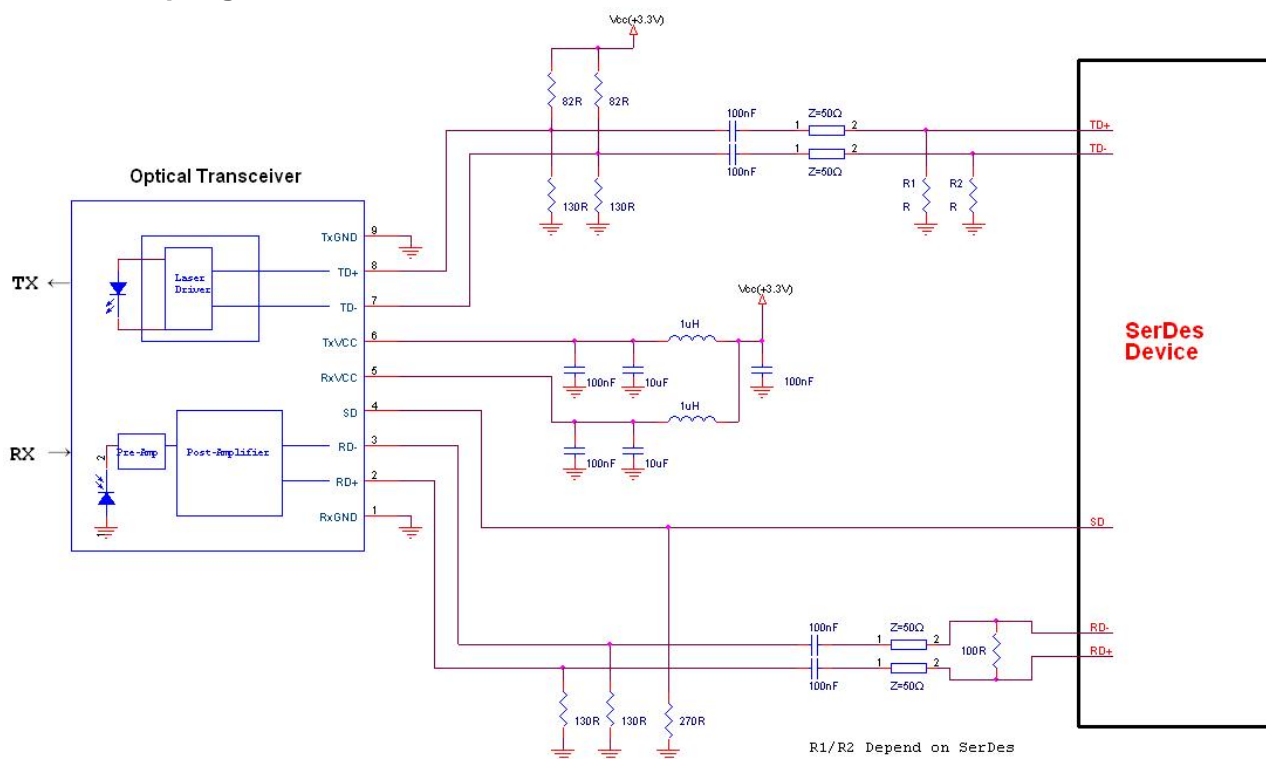
### Connection Diagram

- Receiver Signal Ground
- Receiver Data Out
- Receiver Data Out Bar
- Signal Detect
- Receiver Power Supply
- Transmitter Power Supply
- Transmitter Data In Bar
- Transmitter Data In
- Transmitter Signal Ground



### Recommended Application Circuit

#### DC/DC Coupling



## TR4-M3-2D53K-W5

### Dimensions in mm

