

M2R-25-9-X-TL Multi-Protocol Video --- 1.5GBaud Optical Small Form Factor (SFF) Receivers -- 3.3V



Features

- 1.5 Gbps SMPTE-293 Performance
- TTL Signal Detect Output
- Low profile fits Mezzanine Card Applications
- 75Ω AC coupled LVPECL level Outputs
- Single +3.3V Power Supply
- Wave Solderable / Aqueous Washable
- Class 1 Laser Safety Compliant
- UL 1950 Approved

PRODUCT OVERVIEW

The M2R-25-9-X-TL Small Form Factor (SFF) optical receivers are high performance simplex data links for uni-directional communication over multimode or single mode optical fiber. The M2R-25-9 Receivers are designed to receive a wide range of data rates from 1Mbps to 1.5Gbps. These receivers are compatible with the following standards:

- SMPTE-292 (HDTV -- @ 1.5Gbps)
- SMPTE-259 (SDTV/ D1 -- @ 270Mbps)
- IEEE-1394B (Firewire --- @ 200Mbps to 1.6Gbps)
- MPEG2 (Compressed HDTV -- @ 5 to 10Mbps)
- SPDIF (Sony Phillip Digital Interconnect Format -- @ 2.8224Mbps)
- SDTI (Serial Data Transport Interface ---@ 270Mbps)

The M2T-25 receivers are provided with the LC receptacle which is compatible with the industry standard LC connector. The M2R-25-9-X-TL operates at +3.3V.

This dual optoelectronic receiver module is designed to operate with transmitters which are compliant with FDA Radiation Performance Standards, 21 CFR Subchapter J. and class 1 laser compliant according to International Safety Standard IEC-825-1.

SHORT WAVELENGTH RECEIVER

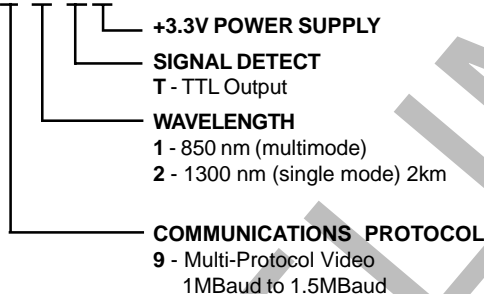
The use of short wavelength integrated PIN pre-amp subassemblies and high volume production processes has resulted in a low cost, high performance product available in various data transfer rates up to 1.5 GBaud.

LONG WAVELENGTH RECEIVER

The M2R-25-9-2-TL is provided with single mode optics. The 1300 nm PIN pre-amp subassemblies provides highly reliable single mode communications which meets or exceeds the SMPTE-292 distance requirements.

ORDERING INFORMATION

M2R- 25 - 9 - X - T L



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTES
Storage Temperature	Tstg	-40	85	°C	
Soldering Temperature			260	°C	10 seconds on leads only
Supply Voltage	Vcc		6.0	V	Vcc - ground
Data AC Voltage	Tx+, Tx-		2.6	Vpp	Differential
Data DC Voltage	Tx+, Tx-	-10	10	Vpk	V (Tx+ or Tx-) - ground

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RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Ambient Operating Temperature	Ta	0		70	°C	
Supply Voltage	Vcc	3.0	3.3	3.6	VDC	
Baud Rate	BRate		1.5		GBaud	

MODULE SPECIFICATIONS - ELECTRICAL

Ta = 25° C, Vcc = 3.3 V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Supply Current	icc		190	200	mA	Ta = 25°C, Vcc = 3.3 V
	icc			215	mA	0° C < Ta < 70°C, 3.3 V < Vcc < 3.6 V
RECEIVER						
ECL Output (Single Ended)		300	750	930	mVpp	AC coupled outputs
ECL Output (Differential)		600	1500	1860	mVpp	AC coupled outputs
Total Jitter ²	TJ			150	psec	
TTL Signal Detect Output - Low				0.5	V	IoL = -1.6 mA, 1 TTL Unit Load
TTL Signal Detect Output - High		2.4	3.0		V	IoH = 40µA, 1 TTL Unit Load

PERFORMANCE SPECIFICATIONS - OPTICAL 850 nm Multimode Receiver

Ta = 25° C, Vcc = 3.3 V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
FIBER LENGTH						
50 µm Core Diameter MMF		550	750		m	BER < 1.0E-12 @ 1.5 GBaud
62.5 µm Core Diameter MMF		300 ¹	400		m	BER < 1.0E-12 @ 1.5 GBaud
RECEIVER						
Optical Input	λ	770		860	nm	
Optical Input Power	Pr	-17		0	dBm	BER < 1.0E-12
Optical Return Loss	ORL	12	30		dB	
Signal Detect - Asserted	Pa			-17	dBm	measured on transition - low to high
Signal Detect - Deasserted	Pd	-29			dBm	measured on transition - high to low
Signal Detect - Hysteresis	Pa - Pd		1.5	5.0	dB	

M2R-25-9-2-TL PERFORMANCE SPECIFICATIONS - OPTICAL

Ta=25°C, Vcc=3.3V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
FIBER LENGTH						
9.0 µm Core Diameter SMF		2	5		km	BER < 1.0E-12 @ 1.5 GBaud
RECEIVER						
Optical Input Power	Pr	-20		-7.5	dBm	average power for BER < 1.0E-12
Optical Center	λ	1270	1310	1355	nm	
Optical Return Loss	ORL	12	30		dB	
Signal Detect - Asserted	Pa			-20	dBm	measured on transition - low to high
Signal Detect - Deasserted	Pd	-29			dBm	measured on transition - high to low
Signal Detect - Hysteresis	Pa - Pd		1.5	5.0	dB	

Note: ¹This is the link length for at least 95% of the installed fiber base.

²Measured with a 2²³ -1 pseudorandom bit sequence

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TERMINATION CIRCUITS

The M2R-25 receivers can operate with PECL or ECL logic levels. Output from the receiver section of the module is AC coupled and is expected to drive into a 75 ohm load. Different termination strategies may be required depending on the particular Serializer/Deserializer chip set used.

The M2R-25 product family is designed with AC coupled data outputs to provide the following advantages:

- Close positioning of De-Serializer with respect to receiver; allows for shorter line lengths and at gigabit speeds reduces EMI.
- Minimum number of external components.
- Internal termination reduces the potential for unterminated stubs which would otherwise increase jitter and reduce transmission margin.

Subsequently, this affords the customer the ability to optimally locate the De-Serializer as close to the M2R-25 as possible and save valuable real estate on PCI cards and other small circuit assemblies. At gigabit rates this can provide a significant advantage resulting in better transmission performance and accordingly better signal integrity.

AC coupling allows the Stratos Lightwave M2R-25 to be applied across a wider range of applications without modification. This benefits users in terms of enhanced RF performance, reduced component count, tighter layout and fewer design problems.

Figure 1 illustrates the recommended receive data line terminations and Figure 2 describes an alternative termination approach. Figure 3 illustrates a Thevenin equivalent 75-ohm termination circuit for the De-serializer receiver input data lines, which require a +3.3V LVPECL termination. Other equivalent circuits can be readily calculated for other bias voltages.

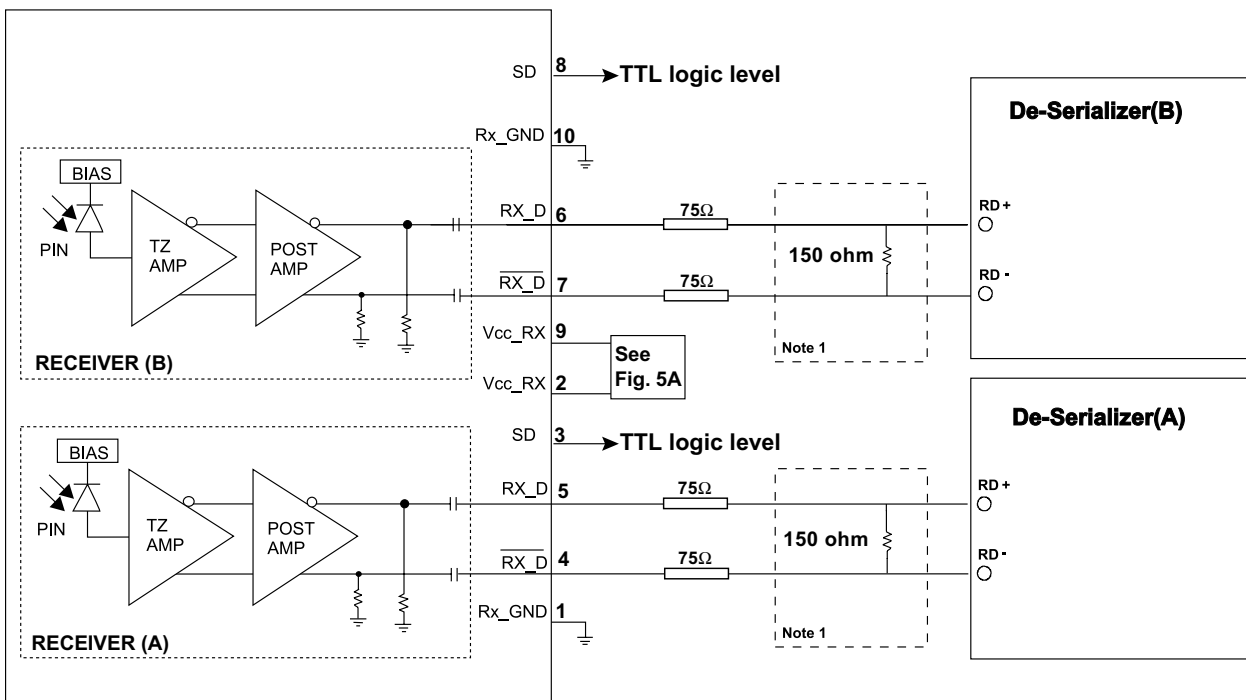


Figure 1. Recommended TRANSMIT and RECEIVE Data Terminations

Notes:

1. Consult SERDES manufacturer's data sheet and application data for appropriate receiver input biasing network.

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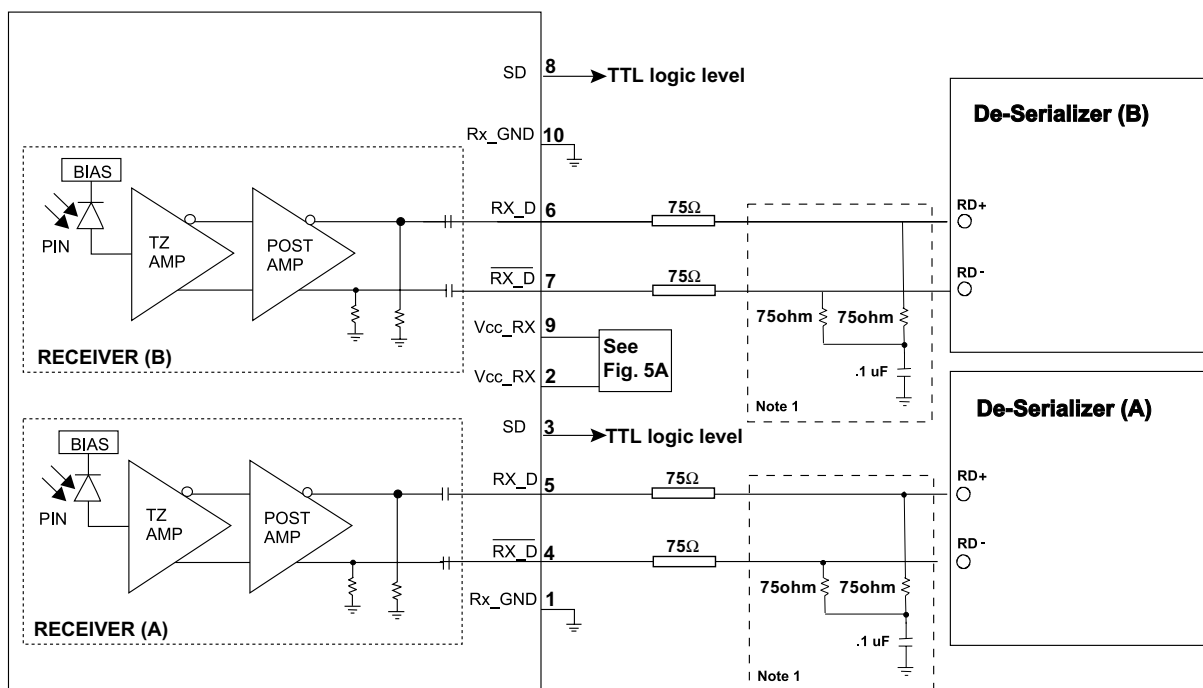


Figure 2. Alternative TRANSMIT and RECEIVE Data Terminations

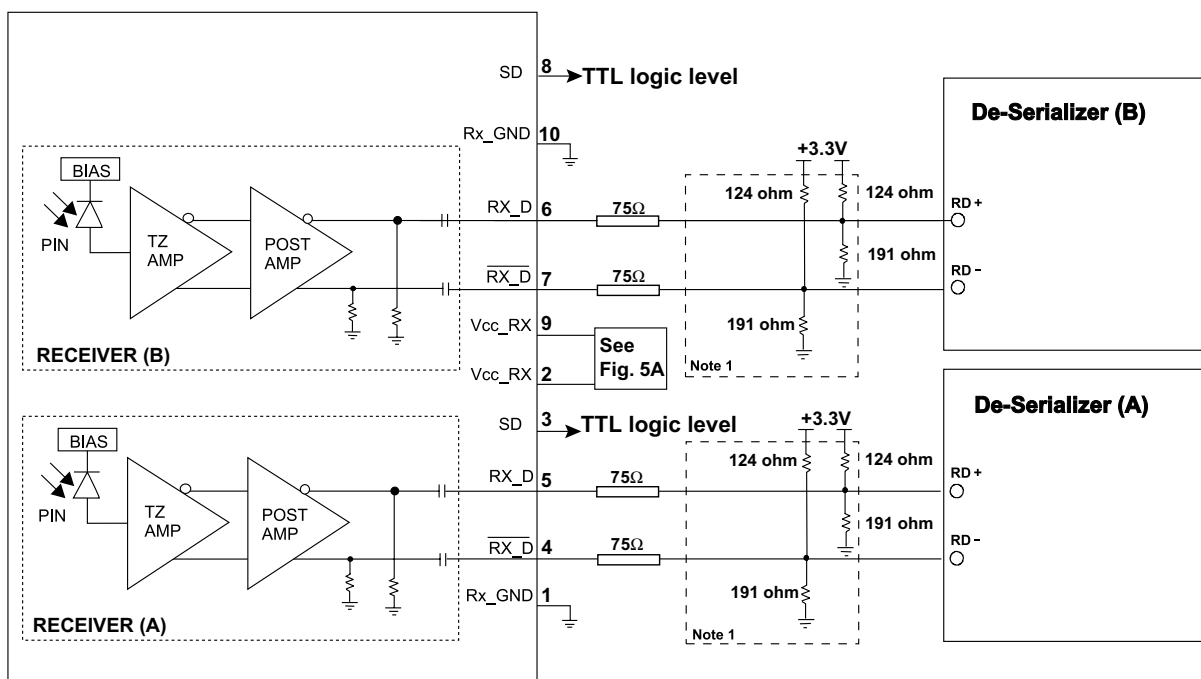


Figure 3. Thevenin Equivalent RECEIVE Data Terminations

Notes:

1. Consult SERDES manufacturer's data sheet and application data for appropriate receiver input biasing network.

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SIGNAL DETECT

The M2R-25 receivers are equipped with TTL signal detect outputs. The TTL option eliminates the need for a PECL to TTL level shifter in most applications. The SFF adhoc industry standard provides for a TTL level Signal Detect output.

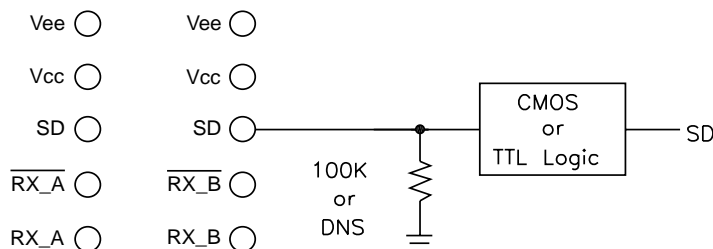
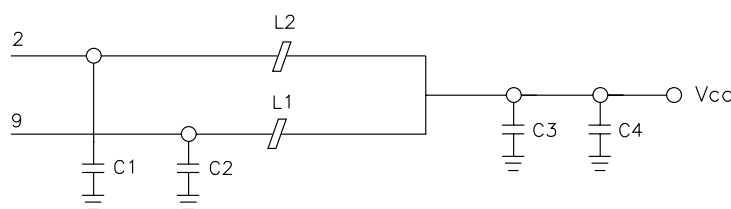


Figure 4. TTL Signal Detect

POWER COUPLING

A suggested layout for power and ground connections is given in figure 4B below. Connections are made via separate voltage and ground planes. The mounting posts are at case ground and should not be connected to circuit ground. The ferrite bead should provide a real impedance of 50 to 100 ohms at 100 to 1000 MHz. Bypass capacitors should be placed as close to the 10-pin connector as possible.



VALUES:

- C1, C2 = 1000pF, COG
- C3, = 0.1uF
- C4, = 10uF, Ta
- L1, L2 = Real impedance of 50 to 100 Ohms to 1000 MHz.

Figure 5A. Suggested Power Coupling - Electrical Schematic

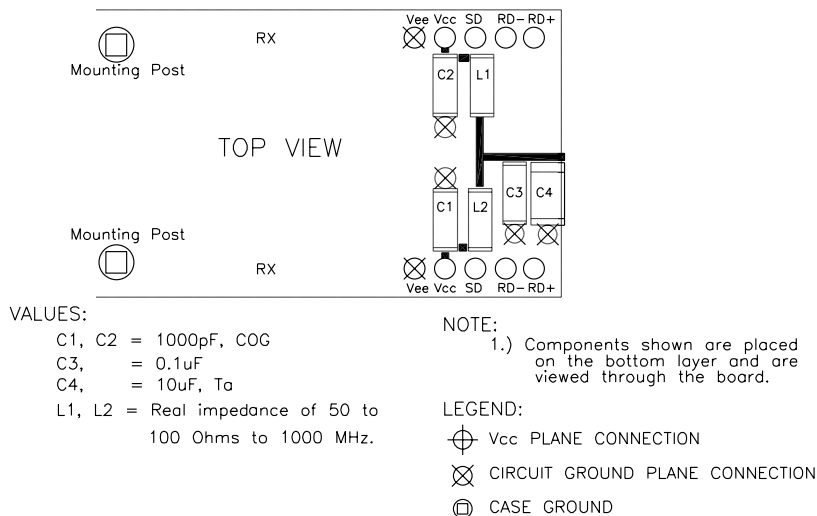


Figure 5B. Suggested Power Coupling - Component Placement

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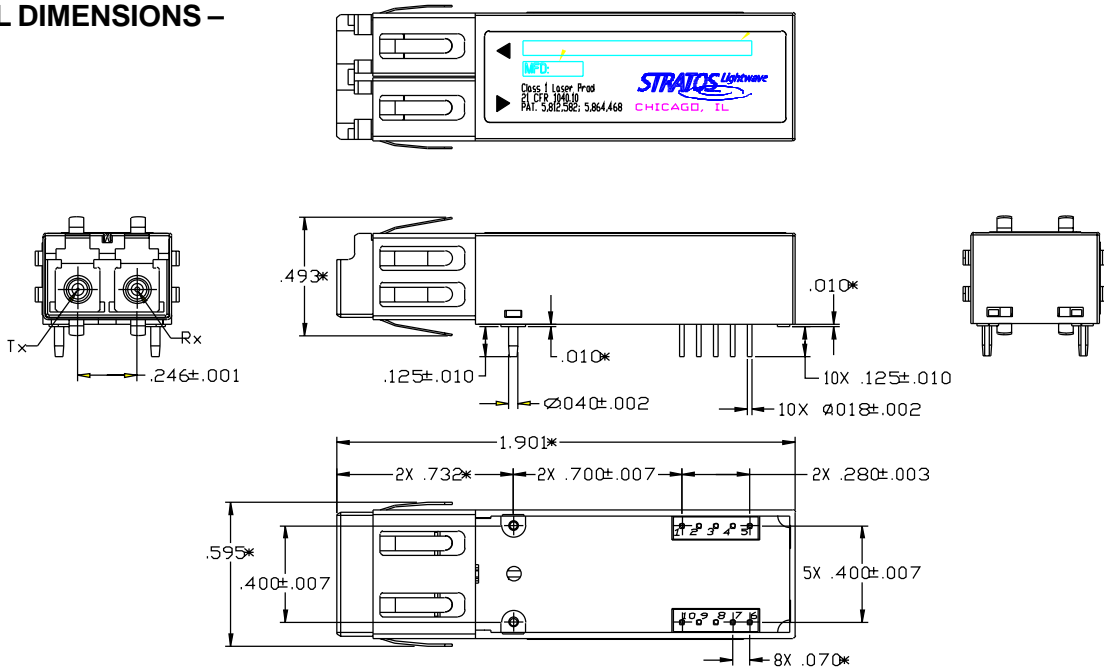


EMI and ESD CONSIDERATIONS

Stratos Lightwave optoelectronic dual receivers offer a metalized plastic case and a special chassis grounding clip. As shown in the drawing, this clip connects the module case to chassis ground when installed flush through the panel cutout. The grounding clip in this way brushes the edge of the cutout in order to make a proper contact. The use of a grounding clip also provides increased electrostatic protection and helps reduce radiated emissions from the module or the host circuit board through the chassis faceplate. The attaching posts are at case potential and may be connected to chassis ground. They should not be connected to circuit ground.

Plastic optical subassemblies are used to further reduce the possibility of radiated emissions by eliminating the metal from the receiver diode housings which extends into the connector space. By providing a non-metal receptacle for the optical cable ferrule, the gigabit speed RF electrical signal is isolated from the connector area thus preventing radiated energy leakage from these surfaces to the outside of the panel.

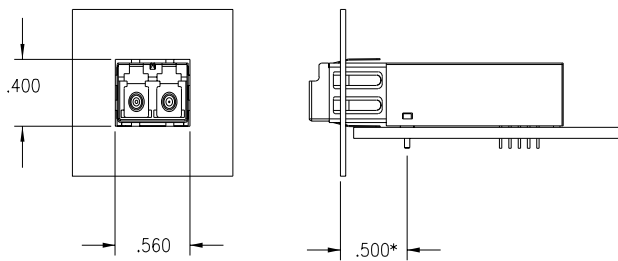
MECHANICAL DIMENSIONS –



NOTES:

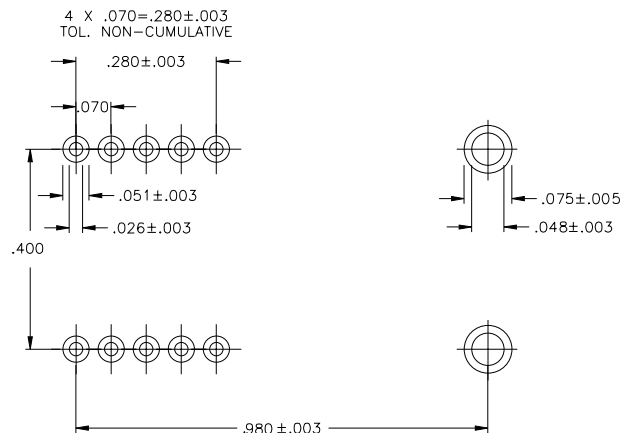
1. * DIMENSIONS ARE FOR REFERENCE.

PANEL CUTOUT DIMENSIONS



*DIMENSION REFERRED TO OUTSIDE WALL

SUGGESTED PCB LAND PATTERN



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PHYSICAL DESCRIPTION

The M2R-25 features a compact design with a standard LC duplex connector for fiber optic connections. The 10-pin connector (70 mil spacing) provides the electrical connection for all operation. With a height of 9.8 mm the M2R-25 fits mezzanine card applications. An epoxy encapsulation provides excellent protection from environmental hazards and assists in heat dissipation for all components. Two wave-solderable posts are provided for attaching the package to the circuit board without the need for multiple attachment operations.

ELECTRICAL INTERFACE, PIN DESCRIPTIONS

PIN 1	RX_GND	Ground (A)
PIN 2	Vcc_RX	+3.3 volt supply for the Receiver Section (A)
PIN 3	SD_A	Receiver Signal Detect TTL output. Active high on this line indicates a received optical signal. (A)
PIN 4	RX_D_A	Receiver Data Inverted Differential Output (A)
PIN 5	RX_D_A	Receiver Data Non-Inverted Differential Output (A)
PIN 6	RX_D_B	Receiver Data Non-Inverted Differential Output (B)
PIN 7	RX_D_B	Receiver Data Inverted Differential Output (B)
PIN 8	SD_B	Receiver Signal Detect TTL output. Active high on this line indicates a received optical signal. (B)
PIN 9	Vcc_RX	+3.3 volt supply for the Receiver Section (B)
PIN 10	RX_GND	Ground (B)
Attaching Posts		The attaching posts are at case potential and may be connected to chassis ground. They should not be connected to circuit ground.



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