SLC-25-8-1-X-R6 Optical Gigabit Ethernet / Fibre Channel Transceiver
850nm SFF – 2.125 / 1.25 / 1.0625 GBaud

FEATURES

- 2.125 Gbps Fibre Channel compliant
- 1.25 Gbps Gigabit Ethernet compliant
- 1.0625 Gbps Fibre Channel compliant
- Die Cast Metal Package
- TTL Signal Detect Output
- Transmitter Disable Input
- Low profile fits Mezzanine Card Applications
- 100Ωdifferential AC Coupled CML Level Outputs
- Single +3.3V Power Supply
- Wave Solderable / Aqueous Washable
- Class 1 Laser Safety Compliant
- RoHS compliant
- UL 1950 Approved

PRODUCT OVERVIEW

The SLC-25-8-1-X-R6 Small Form Factor (SFF) optical transceivers are high performance integrated duplex data links for bi-directional communication over multimode fiber. The SLC-25-8-1-X-R6 module is specifically designed to be used in multimode Gigabit Ethernet/Fibre Channel applications with data rate up to 2.125GBaud. The SLC-25-8-1-X-R6 transceivers are provided with the LC receptacle which is compatible with the industry standard LC connector. The Stratos Lightwave SFF transceivers measure 0.532 inches in width. These transceivers provide double port densities by fitting twice the number of transceivers into the same board space as a 1x9 transceiver.

This optoelectronic transceiver module is a class 1 laser product compliant with FDA Radiation Performance Standards, 21 CFR Subchapter J. This component is also class 1 laser compliant according to International Safety Standard IEC-825-1.

SHORT WAVELENGTH LASER

The use of short wavelength VCSELs (Vertical Cavity Surface Emitting Lasers) and high volume production processes has resulted in a low cost, high performance product available in various data transfer rates up to 2.125GBaud.

ORDERING INFORMATION

SLC – 25 – 8 – 1 – X - R6

GROUNDING CLIP
N = No Clip
E = Individual Clip (.6” center)
K = Extended Clip (.6” center)
G = Gang Clip (.55” center)

WAVELENGTH
1 = 850nm (Multimode)

PROTOCOL
8 = Gigabit Ethernet/Fibre Channel
2.125/1.25/1.0625 GBaud

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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTES
Storage Temperature	Tstg	-50	+100	°C	
Soldering Temperature			260	°C	10 seconds on leads only
Supply Voltage	$V_{CC}T$, $V_{CC}R$		6.0	V	VCC - ground
Data AC Voltage	Tx+, Tx-		2.6	Vpp	Differential
Data DC Voltage	Tx+, Tx-	-10	10.0	Vpk	V(Tx+ or Tx-) - ground

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Operating Case Temperature	Tc	-5		+80	°C	
Supply Voltage	Vcc	+3.0	+3.3	+3.6	VDC	
Baud Rate	BRate	1.0625		2.125	GBaud	1.6025/1.25/2.125 GBaud

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MODULE SPECIFICATIONS – ELECTRICAL

-5°C<Tc<+80°C;+3.0V<Vcc<+3.6V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Supply Current	Icc		150	200	mA	-5°C<Tc<+80°C;+3.0V<Vcc<+3.6V
TRANSMITTER						
CML/PECL Inputs (Differential)		400		2500	mVpp	AC coupled inputs
Input Impedance	Zin	85	100	115	ohms	
TX_DISABLE input Voltage - HIGH	V_{IH}	2.0		Vcc+0.3	V	
TX_DISABLE input Voltage - LOW	V_{IL}	0		0.8	V	
RECEIVER						
CML Outputs (Differential)		400	600	1000	mVpp	AC coupled outputs
Output Impedance (Differential)	Zin	90	100	110	ohms	
Total Contributed Jitter	TJ			75	ps	Measured with 2^7 –1 PRBS @ 2.125GBaud
				130	ps	Measured with 2^7 –1 PRBS @ 1.25/1.0625GBaud
TTL Signal Detect Output – LOW				0.8	V	I_{OL}= -1.6mA, 1 TTL unit load
TTL Signal Detect Output - HIGH		2.4	3		V	I_{OH}= 40µA, 1 TTL unit load

MODULE SPECIFICATIONS - OPTICAL

-5°C<Tc<+80°C;+3.0V<Vcc<+3.6V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
TRANSMISSION DISTANCE						
50µm Core Diameter MMF		300	500		m	BER<1.0E-12 @ 2.125Gbaud
		550	1000		m	BER<1.0E-12 @ 1.25/1.0625Gbaud
62.5µm Core Diameter MMF		200	300		m	BER<1.0E-12 @ 2.125Gbaud
		300	500		m	BER<1.0E-12 @ 1.25/1.0625Gbaud
TRANSMITTER						
Optical Center Wavelength	λ	830	850	860	nm	
Spectral Width	Δλ			0.85	nm	RMS
Optical Transmit Power	Popt	-9.5		-3	dBm	Average @ 850nm
Optical Modulation Amplitude	OMA	225			µW	pk-pk
Extinction Ratio	ER	9			dB	P1/P0
Relative Intensity Noise	RIN			-117	dB/Hz	Measured with –12dB optical return loss
Total Jitter	TJ			85	ps	Measured with 2^7 –1 PRBS @ 2.125Gbaud
				170	ps	Measured with 2^7 –1 PRBS @ 1.25/1.0625Gbaud
Output Rise/Fall Time	t_R, t_F			160	ps	20-80%; measured unfiltered @ 2.125Gbaud
				260	ps	20-80%; measured unfiltered @ 1.25/1.0625Gbaud
RECEIVER						
Optical Input Wavelength	λ	770		860	nm	
Optical Input Power	Pr	-17		0	dBm	BER<1.0E-12 @ 2.125/1.25/1.0625Gbaud
Optical Modulation Amplitude	OMA	31			µW	pk-pk @ 2.125/1.25/1.0625Gbaud
Optical Return Loss	ORL	12			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	

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TERMINATION CIRCUITS

Inputs to the SLC-25-8-1-X-R6 transmitter are AC coupled and internally terminated with 100ohm differential. These transceivers can operate with CML or PECL logic level. The input signal must have at least a 400 mV peak-to-peak (differential) signal swing. Output from the receiver section of the module is CML level AC coupled and is expected to drive into a 50 ohm load. Different termination strategies may be required depending on the particular Serializer/Deserializer chip set used.
The SLC-25 product family is designed with AC coupled data inputs and outputs to provide the following advantages:

- Close positioning of SERDES with respect to transceiver; 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 SERDES as close to the SLC-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 SLC-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 transmit and receive data line terminations and Figure 2 describes an alternative termination approach. Figure 3 illustrates a Thevenin equivalent 50 ohm termination circuit for the SERDES receiver input data lines, which require a +3.3 CML termination. Other equivalent circuits can be readily calculated for other bias voltages.

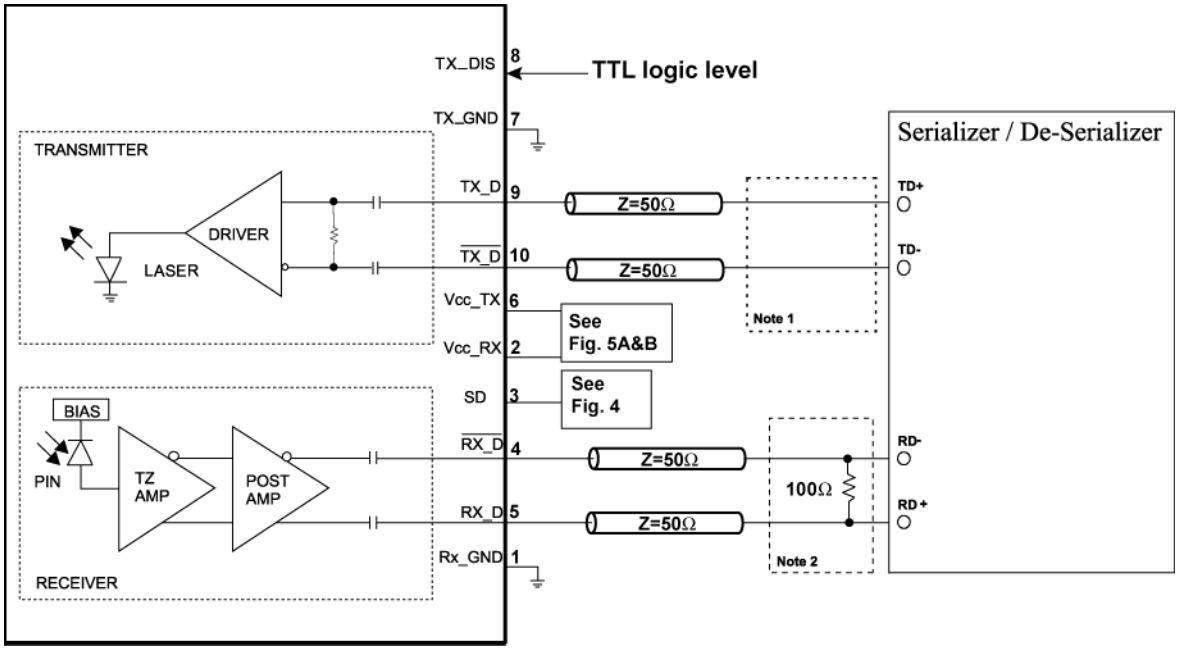

Figure 1. Recommended TRANSMIT and RECEIVE Data Terminations

Notes:

1. Consult the SERDES manufacturer's applications information for biasing required for Tx outputs. Some serializer outputs are internally biased and may not need external bias resistors.
2. Consult the SERDES manufacturer's data sheet and application data for appropriate receiver input biasing network.

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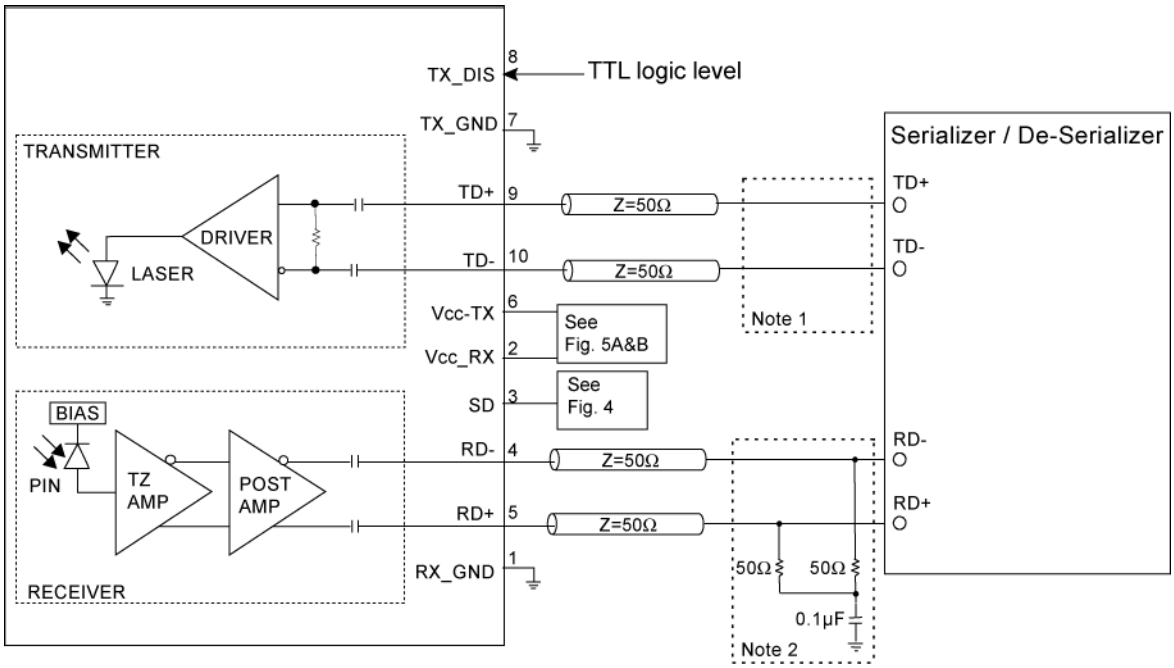

Figure 2. Alternative TRANSMIT and RECEIVE Data Terminations

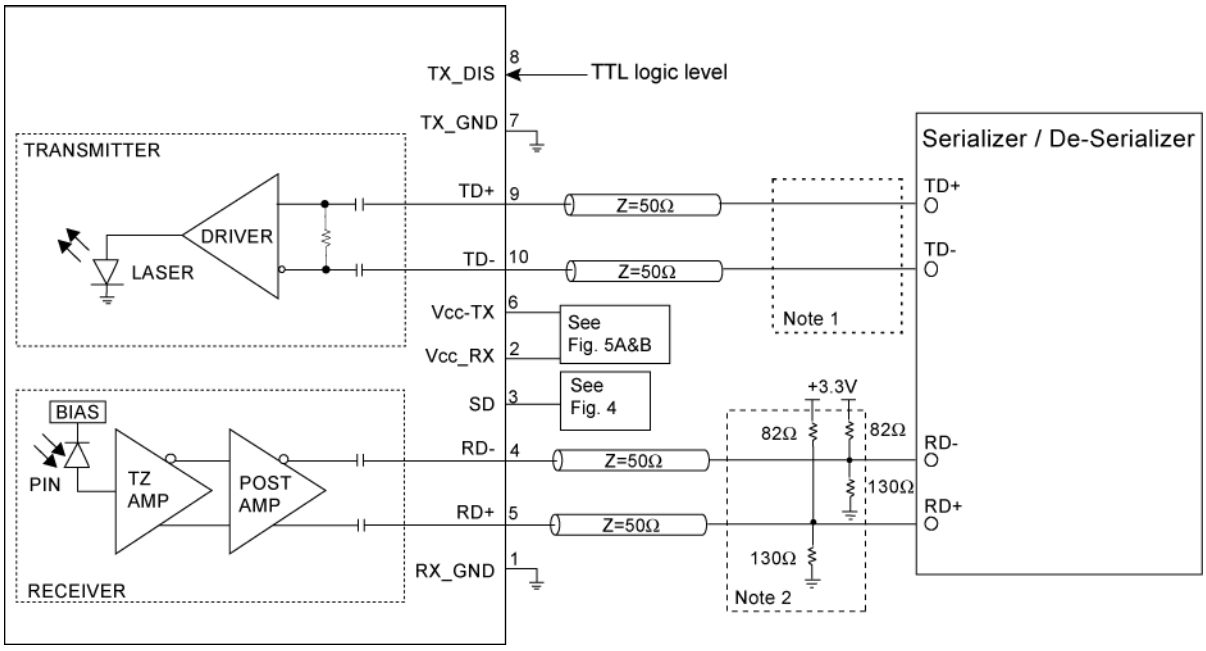

Figure 3. Thevenin Equivalent RECEIVE Data Terminations

Notes:
1. Consult the SERDES manufacturer's applications information for biasing required for Tx outputs. Some serializer outputs are internally biased and may not need external bias resistors.
2. Consult SERDES manufacturer's data sheet and application data for appropriate receiver input biasing network.

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SIGNAL DETECT

The SLC-25-8-1-X-R6 transceivers 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.

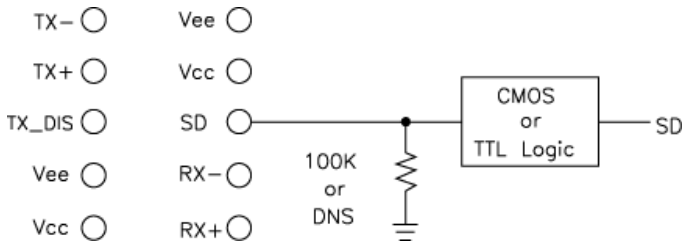
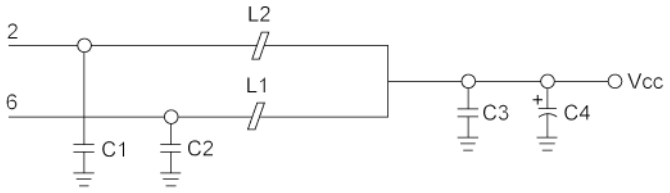


Figure 4. Signal Detect

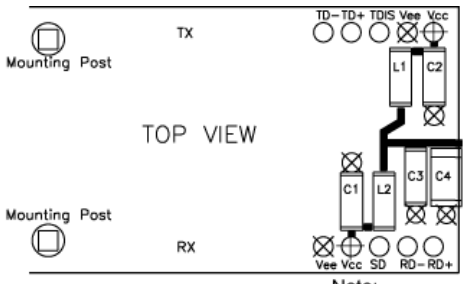
POWER COUPLING

A suggested layout for power and ground connections is given in figure 5B 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 220ohms at 100MHz. Bypass capacitors should be placed as close to the 10-pin connector as possible.



Values:
C1, C2 = 1000pF, COG
C3 = 0.1µF
C4 = 10µF, Tantilum
L1, L2 = Real Impedence of 220Ω @ 100MHz

Figure 5A. Suggested Power Coupling – Electrical Schematic



Values:
C1, C2 = 1000pF, COG
C3 = 0.1µF
C4 = 10µF, Tantilum
L1, L2 = Real Impedence of 220Ω @ 100MHz

Note:
(1) Components shown are placed on the bottom layer and are viewed through the board.

LEGEND:
Vcc Plane Connection
Circuit Ground Connection
Case Ground

Figure 5B. Suggested Power Coupling – Component Placement

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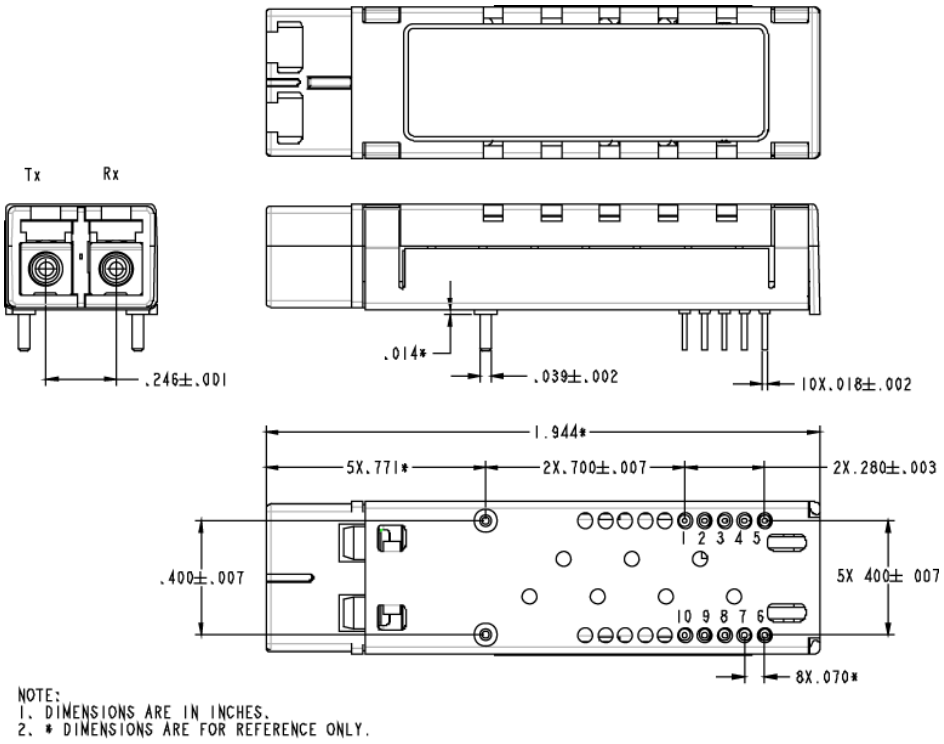
EMI and ESD CONSIDERATIONS

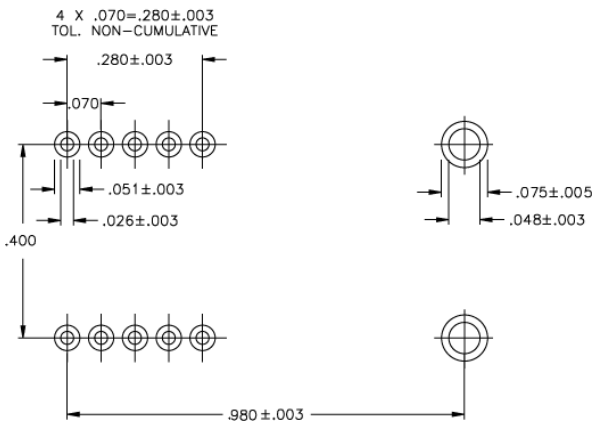
Stratos Lightwave optoelectronic transceivers offer a Die Cast Metal case and three types of chassis grounding clips (individual, extended individual, and gang mount). As shown in the drawing, these clips connect the module case to chassis ground when installed flush through the panel cutout. The grounding 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 in multimode transceiver. 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 PACKAGE DIMENSIONS (No Clip)



SUGGESTED PCB LAND PATTERN



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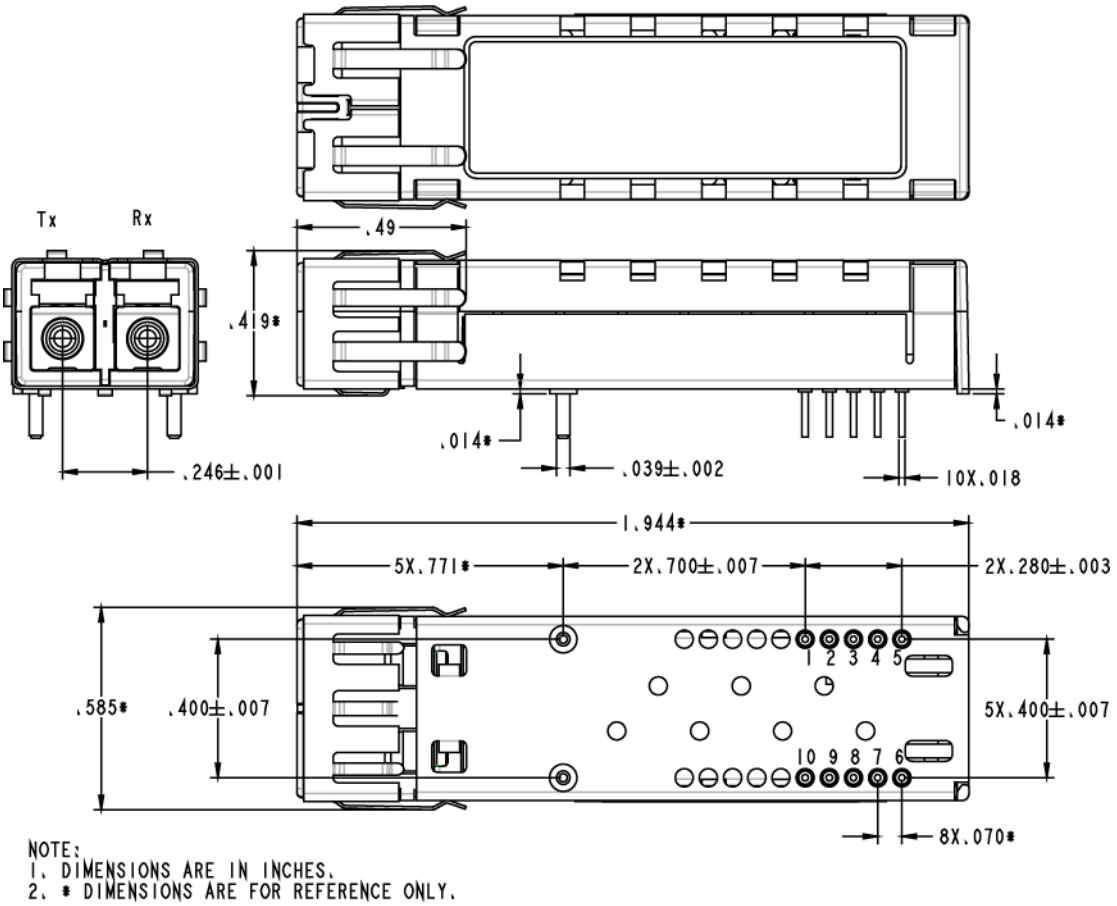
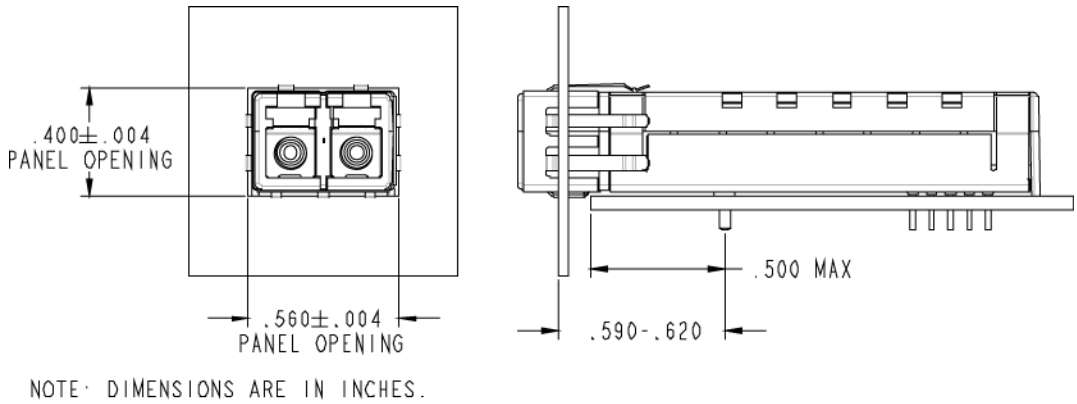
MECHANICAL PACKAGE DEFINITIONS (“E” Clip)



PANEL CUTOUT DIMENSIONS (“E” Clip)



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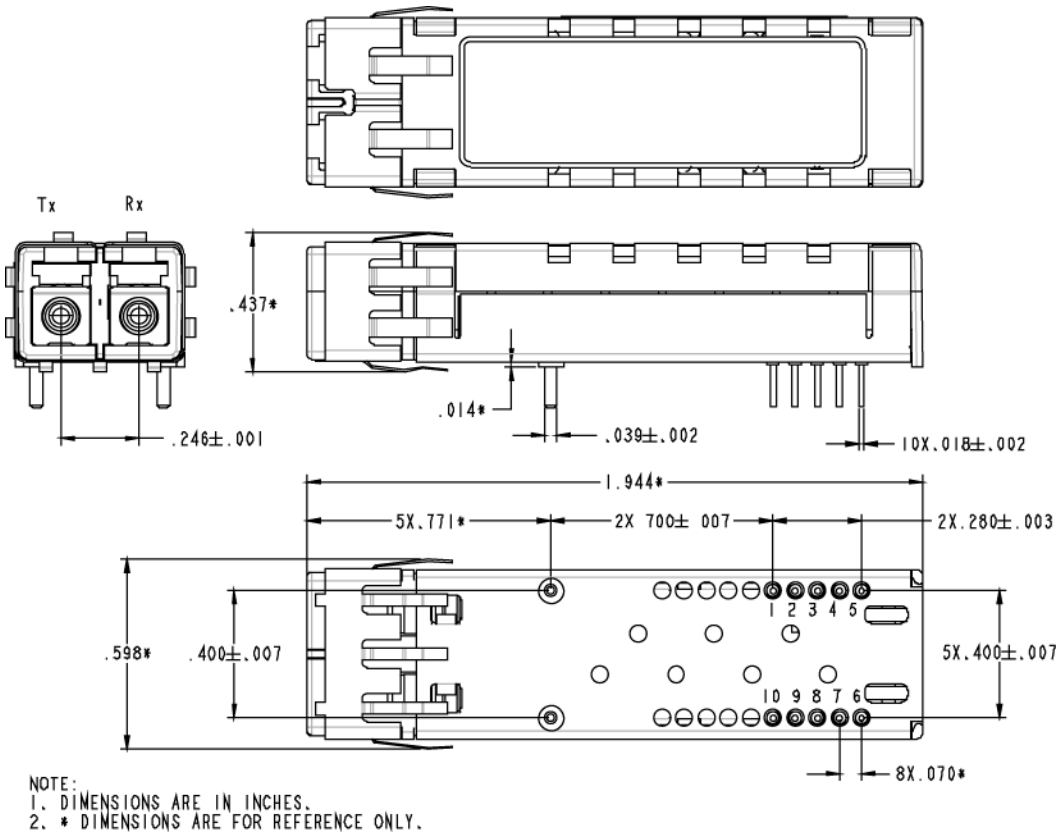
MECHANICAL PACKAGE DIMENSIONS (“K” Clip)



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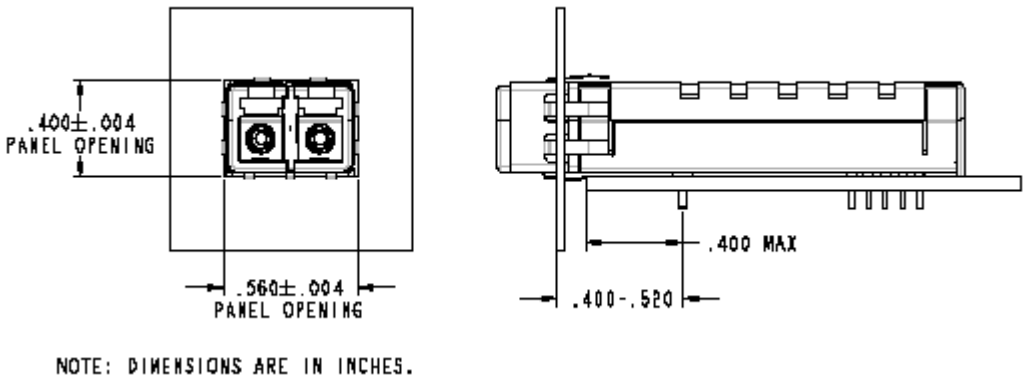

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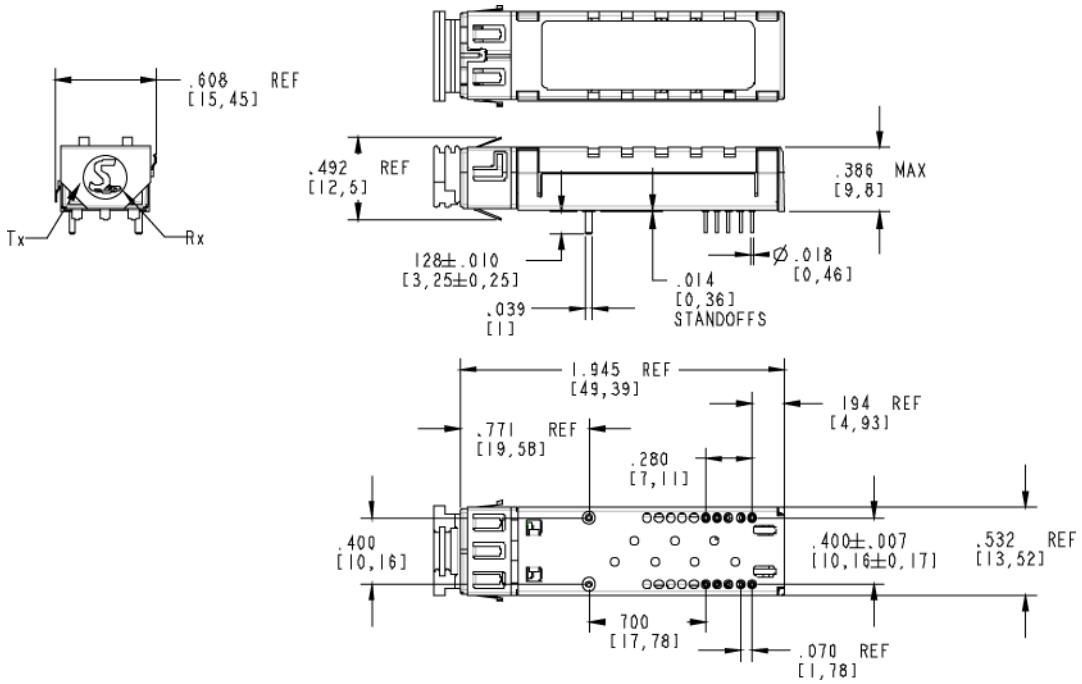
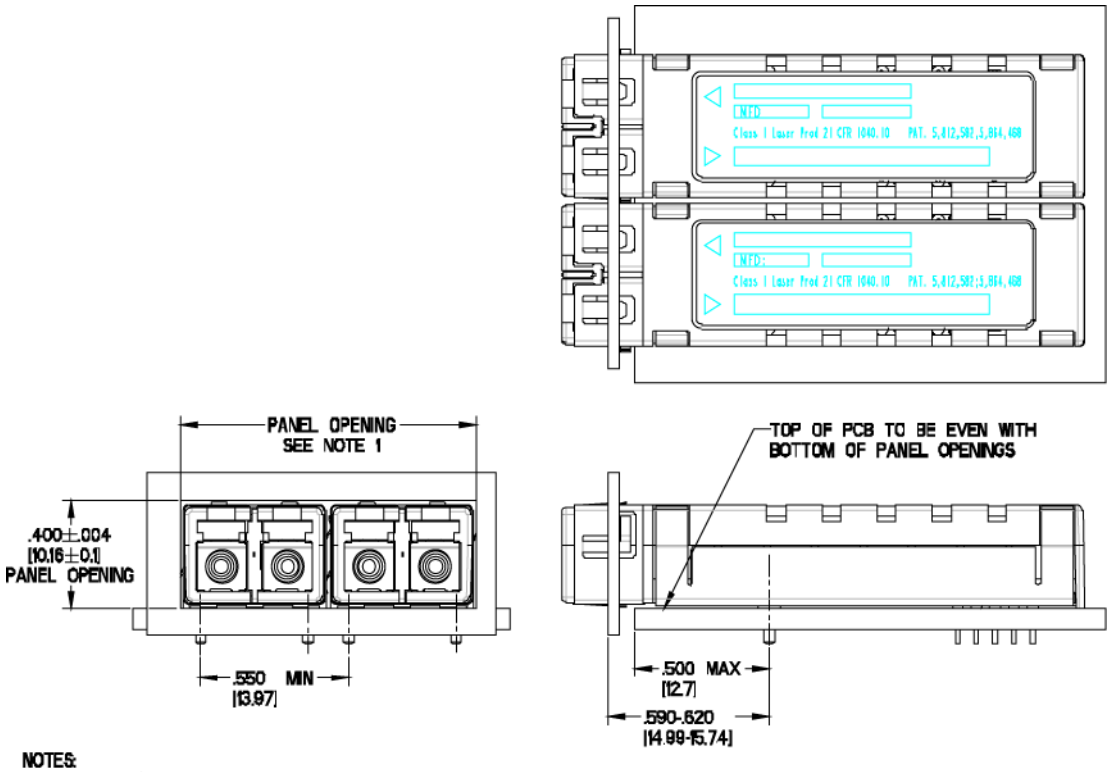
MECHANICAL PACKAGE DIMENSIONS (“G” Clip)



PANEL CUTOUT DIMENSIONS (“G” Clip)



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PHYSICAL DESCRIPTION

This SLC-25-8-1-X-R6 features a compact design with a standard LC duplex connector for fiber optic connections. The 10-pin connection (70 mil spacing) provides the electrical connection for all operation. With a height of 9.8 mm the SLC-25 fits mezzanine card applications. 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
PIN 2	Vcc_RX	+3.3 volt supply for the Receiver Section
PIN 3	SD	Receiver Signal Detect TTL output. Active high on this line indicates a received optical signal.
PIN 4	RD-	Receiver Data Inverted Differential Output
PIN 5	RD+	Receiver Data Non-Inverted Differential Output
PIN 6	Vcc_TX	+3.3 volt supply for the Transmitter Section
PIN 7	TX_GND	Ground
PIN 8	TX_DIS	Transmitter Disable
PIN 9	TD+	Transmitter Data Non-Inverted Differential Input
PIN 10	TD-	Transmitter Data Non-Inverted Differential Input
Attaching Posts		The attaching posts are at case potential and maybe connected to chassis ground. They should not be connected to circuit ground.

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