

SLC-25-C-X-XX Optical Infiniband -- +3.3V Small Form Factor (SFF) Transceiver at 2.5 GBaud



ORDERING INFORMATION

SLC - 25 - C - X - X X

ALIGNMENT/SIGNAL PIN LENGTH

Blank = .125"

D - .180"

GROUND CLIP

N - No Ground Clip

I - Individual Mount (.600 Center)

E - Extended Individual Mount(.600 Center)

G - Gang Mount (.550 Center)

WAVELENGTH

1 - 850 nm (multimode)

2 - 1300 nm (single mode)2km

2M - 1300nm (single mode)10km

2L - 1300nm (single mode) 20km

PROTOCOL

C - Infiniband, 2.5GBaud



Optoelectronic Products

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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

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		2.5		GBaud	±100ppm

Features

- 2.5 Gbps Infiniband Compliant
- Die Cast Metal Housing
- TTL Signal Detect Output and transmitter disable input
- 50Ω AC coupled CML level Outputs
- Low profile fits Mezzanine Card Applications
- Single +3.3V Power Supply
- Wave Solderable / Aqueous Washable
- Class 1 Laser Safety Compliant
- UL 1950 Approved

PRODUCT OVERVIEW

The SLC-25-C-X-XX Small Form Factor (SFF) optical transceivers are high performance integrated duplex data links for bi-directional communication over multimode or single mode optical fibre. The SLC-25-C module is specifically designed for high speed Infiniband data links at 2.5 GBaud. The SLC-25 transceivers are provided with the LC receptacle that 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 onto the same board as compared to a 1x9 transceiver. This saves on system costs and can reduce overall design time. The SLC-25-C-X-XX operates at +3.3V.

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 Laser) and high volume production processes has resulted in a low cost, high performance product available in various data transfer rates up to 2.5 GBaud.

LONG WAVELENGTH LASER

The SLC-25-C-2-XX is provided with single mode optics. The 1300 nm laser provides highly reliable single mode communications which meets or exceeds the Infiniband distance requirements.

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PERFORMANCE SPECIFICATIONS - ELECTRICAL

Ta = 25° C, Vcc = +3.3 V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Supply Current	Icc		140	150	mA	Ta = 25°C, Vcc = 3.3 V
	Icc			175	mA	0° C < Ta < 70°C, 3.0 V < Vcc < 3.6V
TRANSMITTER						
CML/PECL Inputs (Differential)		400		2500	mVpp	AC coupled inputs
Input Impedance (Differential)	Zin		100		ohms	Rin > 100 kohms @ DC
TX_DISABLE input voltage - High	VIH	2		Vcc+0.3	V	
TX_DISABLE input voltage - Low	UIL	0		0.8	V	
RECEIVER						
CML Outputs (Differential)		600	800	1200	mVpp	AC coupled outputs
Total Jitter ²	TJ			68	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 Laser Multimode

Ta = 25° C, Vcc = +3.3 V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
FIBER LENGTH						
50 µm Core Diameter MMF		250	500		m	BER < 1.0E-12 @ 2.5 GBaud
62.5 µm Core Diameter MMF		150 ¹	300		m	BER < 1.0E-12 @ 2.5 GBaud
TRANSMITTER						
Optical Center	λ	830	850	860	nm	
Optical Transmit Power	Popt	-10		-4	dBm	average @ 850 nm
Optical Modulation Amplitude	OMA	200			µW	pk-pk
Spectral Width	Δλ			0.85	nm	RMS
Relative Intensity Noise	RIN			-117	dB/Hz	
Total Jitter ²	TJ			85	psec	
Output Rise, Fall Time	t _R , t _F			150	psec	20 - 80% values, measured unfiltered
RECEIVER						
Optical Input	λ	770		860	nm	
Optical Input Power	Pr	-15		0	dBm	BER < 1.0E-12
Optical Modulation Amplitude	OMA	50			µW	pk-pk
Optical Return Loss	ORL	12			dB	
Signal Detect - Asserted	Pa			-15	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	

Note¹ - This is the link length for at least 95% of the installed fibre base.

Note² - Measured with 2⁷ - 1 Pseudorandom bit Sequence.

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SLC-25-C-2-XX PERFORMANCE SPECIFICATIONS - OPTICAL 1310nm Single Mode

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 @ 2.5 GBaud
TRANSMITTER						
Optical Center	λ	1270	1310	1355	nm	
Relative Intensity Noise	RIN			-120	dB/Hz	
RMS Spectral Width	$\Delta\lambda$			4	nm	RMS
Optical Transmit Power	Popt	-11		-3	dBm	average @ 1310 nm
Optical Modulation Amplitude	OMA	160			µW	pk-pk
Output Rise, Fall Time	t _R , t _F			150	ps	20 - 80% values, measured unfiltered
RECEIVER						
Optical Center	λ	1270	1310	1355	nm	
Optical Input Power	Pr	-17		-3	dBm	average power for BER < 1.0E-12
Optical Modulation Amplitude	OMA	31			µW	pk-pk
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	

SLC-25-C-2M-XX PERFORMANCE SPECIFICATIONS - OPTICAL 1310nm Single Mode

Ta=25°C, Vcc= +3.3V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
FIBER LENGTH						
9.0 µm Core Diameter SMF		10	20		km	BER < 1.0E-12 @ 2.5 GBaud
TRANSMITTER						
Optical Center	λ	1285	1310	1335	nm	
Relative Intensity Noise	RIN			-120	dB/Hz	
RMS Spectral Width	$\Delta\lambda$			3	nm	RMS
Optical Transmit Power	Popt	-10		-3	dBm	average @ 1310 nm
Optical Modulation Amplitude	OMA	186			µW	pk-pk
Output Rise, Fall Time	t _R , t _F			150	ps	20 - 80% values, measured unfiltered
RECEIVER						
Optical Center	λ	1270	1310	1355	nm	
Optical Input Power	Pr	-19		-3	dBm	average power for BER < 1.0E-12
Optical Modulation Amplitude	OMA	20			µW	pk-pk
Optical Return Loss	ORL	12			dB	
Signal Detect - Asserted	Pa			-19	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	

SLC-25-C-2M-XX PERFORMANCE SPECIFICATIONS - OPTICAL 1310nm Single Mode

Ta=25°C, Vcc= +3.3V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
FIBER LENGTH						
9.0 µm Core Diameter SMF		20	25		km	BER < 1.0E-12 @ 2.5 GBaud
TRANSMITTER						
Optical Center	λ	1300	1310	1320	nm	
Relative Intensity Noise	RIN			-120	dB/Hz	
RMS Spectral Width	$\Delta\lambda$			2	nm	RMS
Optical Transmit Power	Popt	-8.0		-3	dBm	average @ 1310 nm
Optical Modulation Amplitude	OMA	320			µW	pk-pk
Output Rise, Fall Time	t _R , t _F			150	ps	20 - 80% values, measured unfiltered
RECEIVER						
Optical Center	λ	1270	1310	1355	nm	
Optical Input Power	Pr	-21.5		-3	dBm	average power for BER < 1.0E-12
Optical Modulation Amplitude	OMA	11			µW	pk-pk
Optical Return Loss	ORL	12			dB	
Signal Detect - Asserted	Pa			-21.5	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 transmitter are AC coupled and internally terminated through 50 ohms to AC ground. These transceivers can operate with PECL or CML logic levels. 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 also AC coupled CML outputs and are 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 & 2 illustrates the recommended transmit and receive data line terminations for SERDES with CML and PECL Inputs/Outputs respectively.

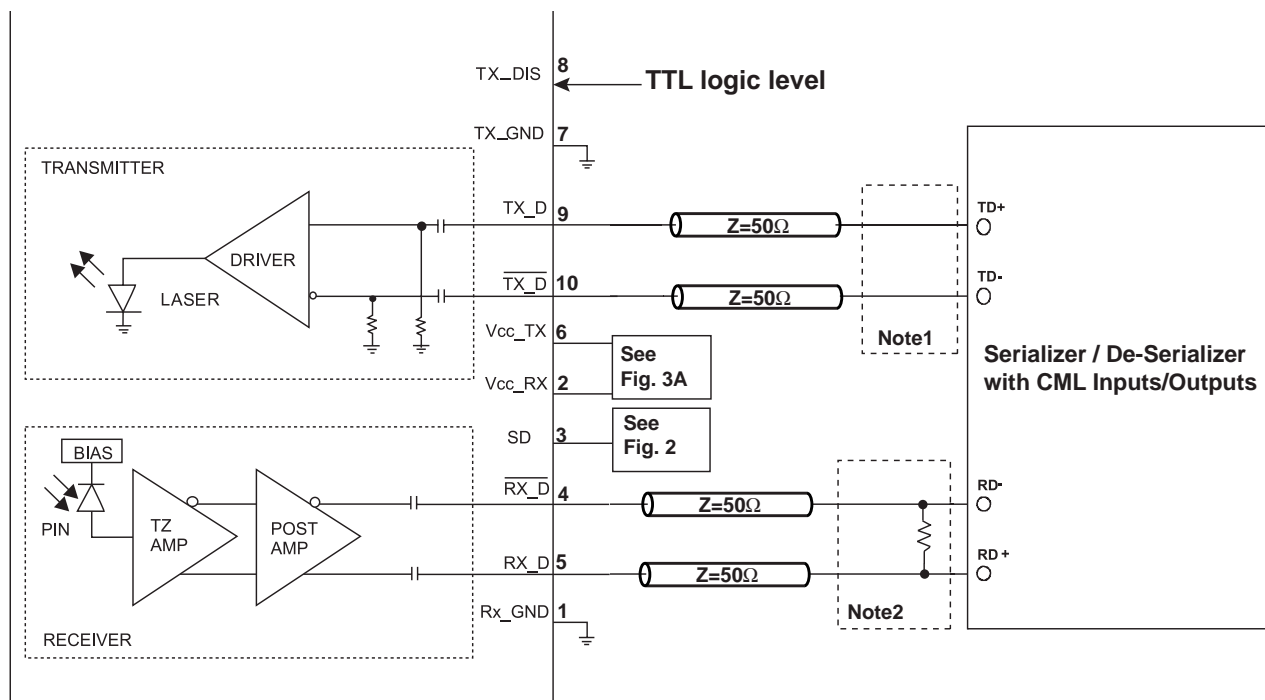


Figure 1. Recommended TRANSMIT and RECEIVE Data Terminations for SERDES with CML I/Os.

Note 1. Consult SERDES manufacturer's data sheet and application data for appropriate receiver input biasing network. Some deserializer inputs are internally terminated and may not need external termination resistors.

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SIGNAL DETECT

The SLC-25 transceivers are equipped with TTL signal detect outputs. The standard TTL output 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.

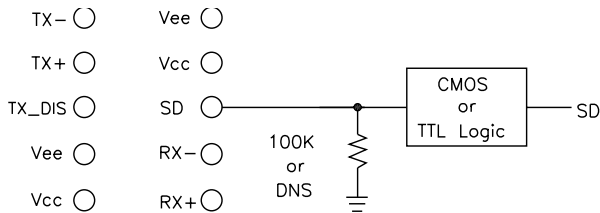
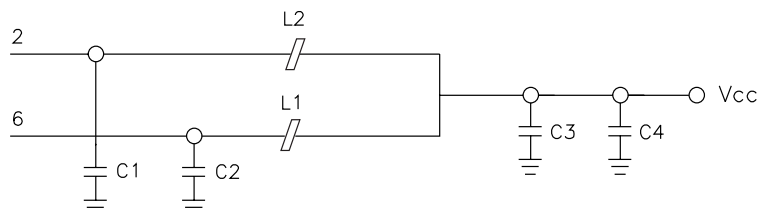


Figure 2. Signal Detect

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 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 3A. Suggested Power Coupling - Electrical Schematic

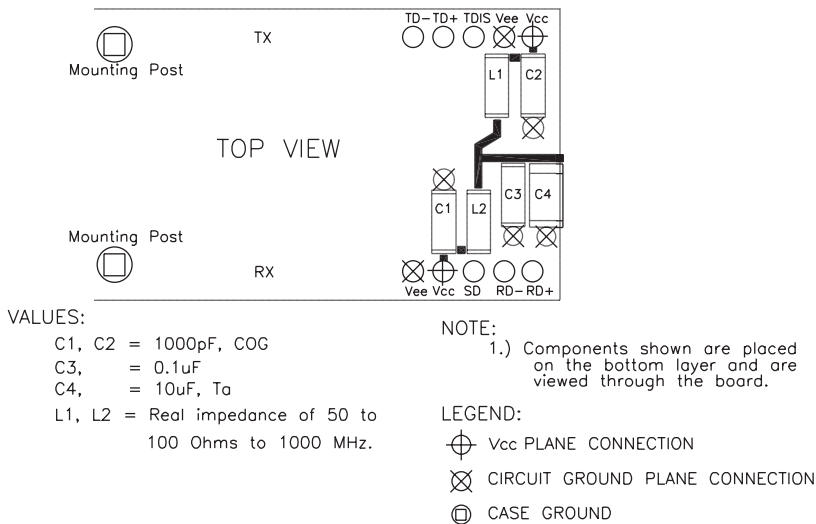


Figure 3B. Suggested Power Coupling - Component Placement

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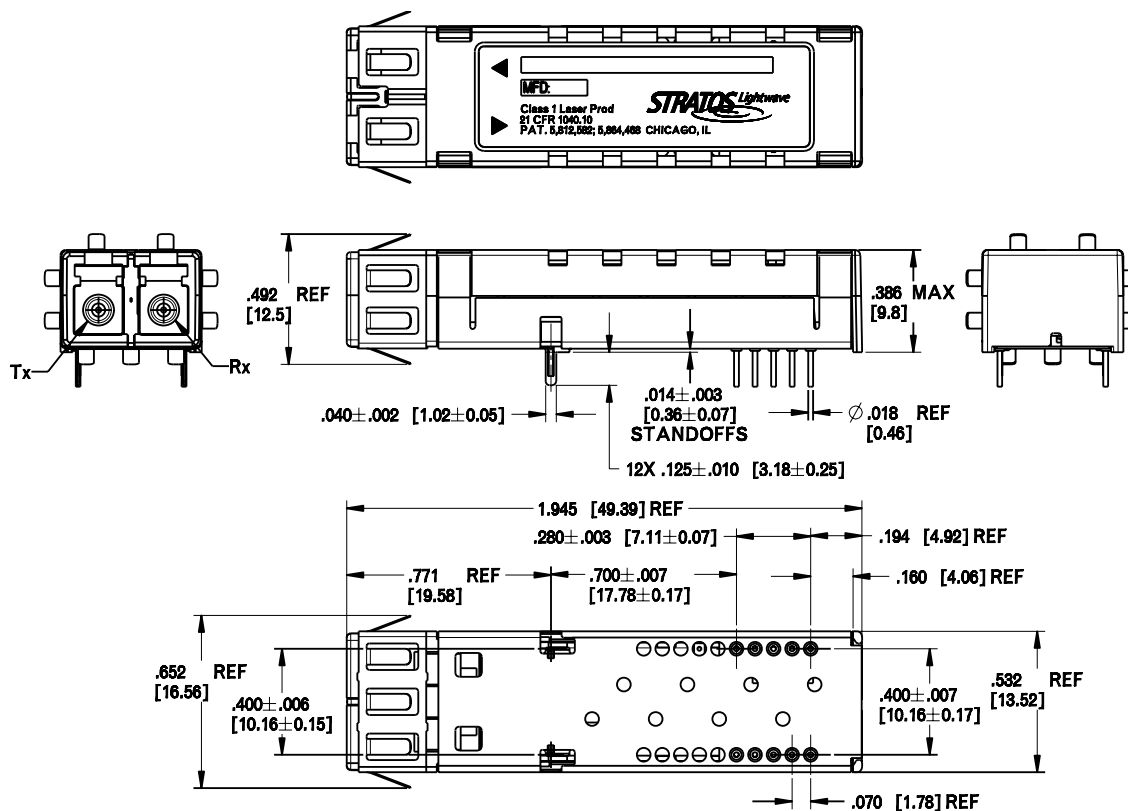


EMI and ESD CONSIDERATIONS

Stratos Lightwave optoelectronic transceivers offer a Die Cast Metal case and three types of chassis grounding clips (Individual, extended Individual & Gang Mount). As shown in the drawing, grounding 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.

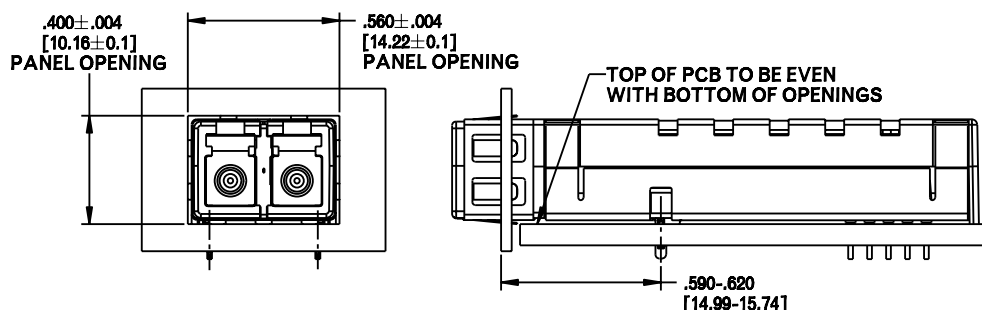
Plastic optical subassemblies are used to further reduce the possibility of radiated emissions in multimode transceiver. By providing a non-metal receptacle for the optical cable ferrule, the gigabit speed RF electrical signal is isolated from the connector area thus preventing radiated energy leakage from these surfaces to the outside of the panel.

MECHANICAL DIMENSIONS – (INDIVIDUAL MOUNT)



NOTE: DIMENSIONS IN IN[mm].

PANEL CUTOUT DIMENSIONS – (INDIVIDUAL MOUNT)



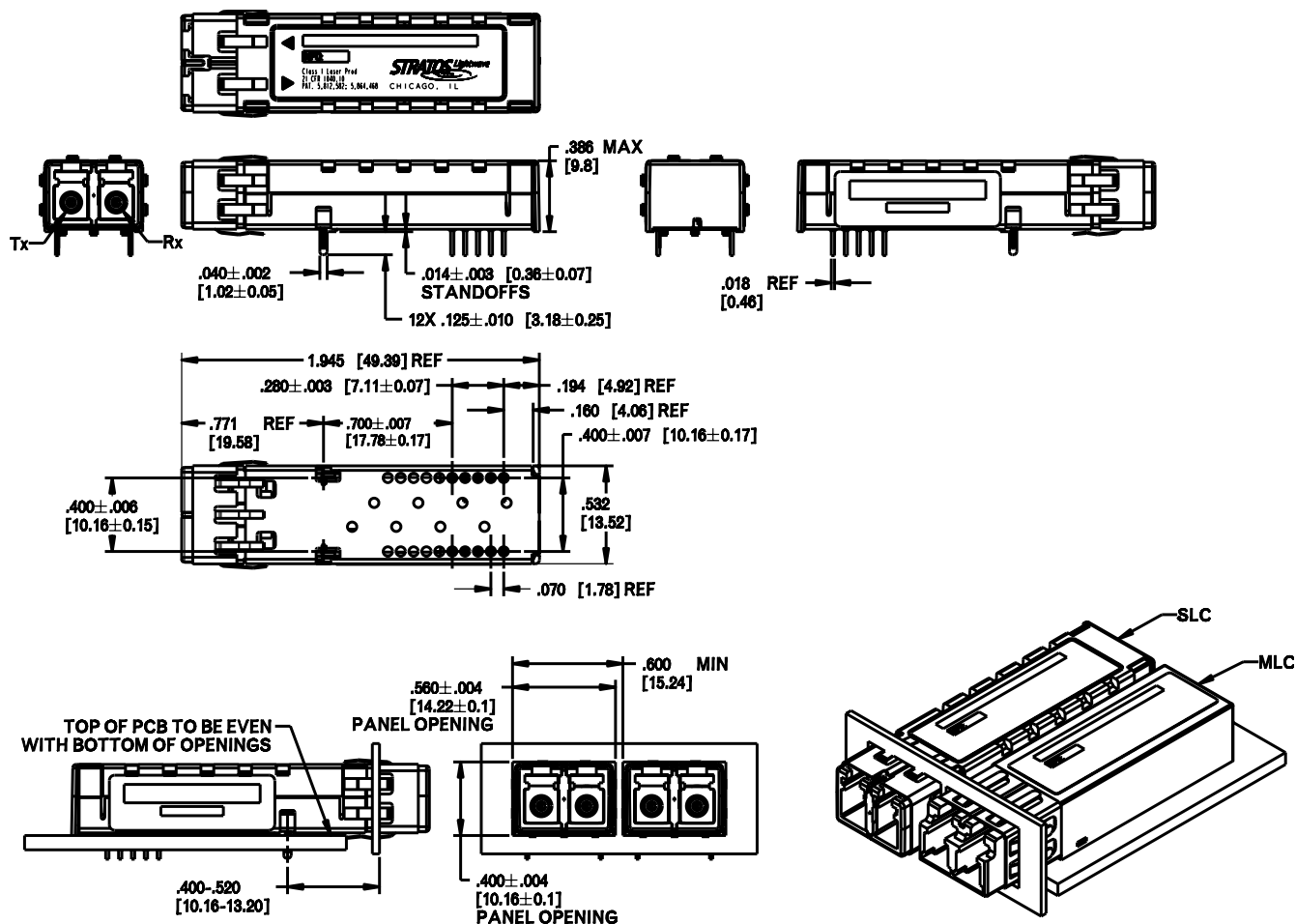
NOTE: SPACING BETWEEN MODULES .600 MIN.

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MECHANICAL DIMENSIONS – (EXTENDED INDIVIDUAL MOUNT)

The Extended Individual mount allows the SLC-25 (Die cast metal) transceiver to be inserted in footprint designed for MLC-25 (metalized plastic) transceiver.

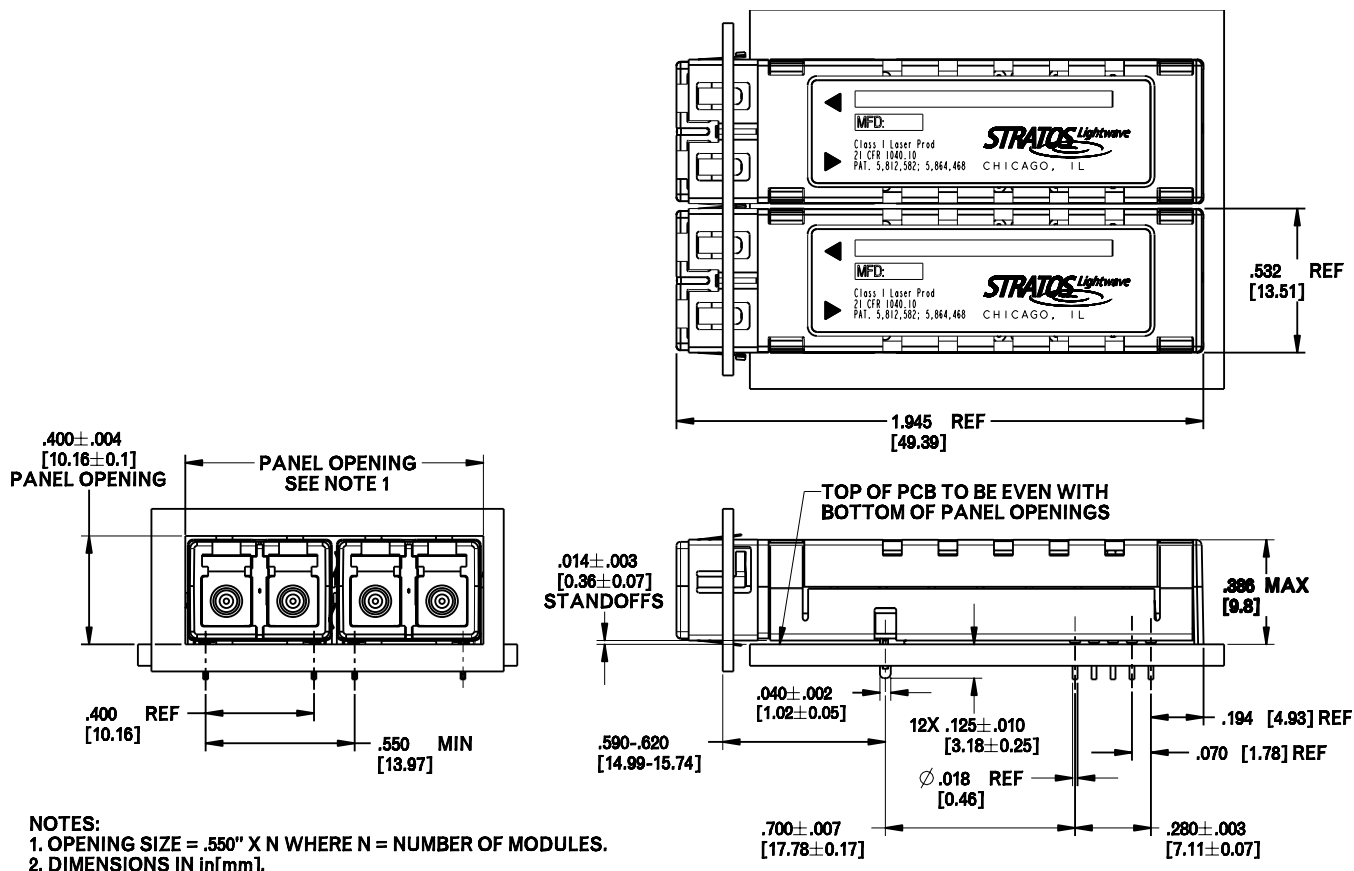


NOTE: DIMENSIONS IN in[mm].

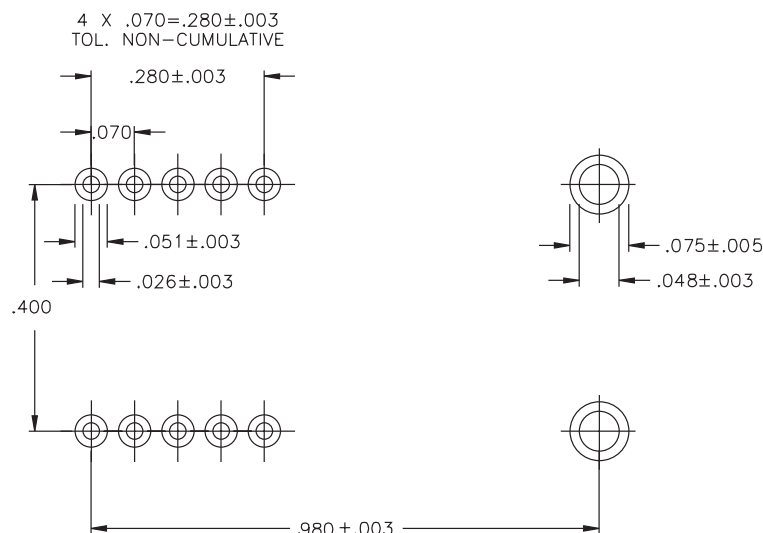
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MECHANICAL DIMENSIONS – (GANG MOUNT)



SUGGESTED PCB LAND PATTERN



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PHYSICAL DESCRIPTION

The SLC-25 features a compact design with a standard LC duplex connector for fibre optic connections. The 10-pin connector (70 mil spacing) provides the electrical connection for all operation. With a height of 9.8 mm the SLC-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
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 Inverted Differential Input
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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