

1x/2x Fiber Channel Applications
3.3V, 850nm VCSEL, Multimode, Up to 500M

Key Features & Benefits

- Low Profile Design - 0.386 inches max. height
- Surface mount I/O pins for high speed signal integrity
- All metal body, solder or screw mount options
- Industrial Temp Range, Vibration tolerant design
- RX data squelch on Signal Detect deassert
- Individual (separate) +3.3 V power supply per port
- Industry standard duplex multimode LC receptacle
- Compliant with ANSI Fiber Channel FC-PI / PH2
- EN-60825 / IEC-825 / CDRH Class 1 Compliant
- Optional Parylene C Conformal Coating
- High Power options available
- Optional addition of fiber pigtail

Applications

The LxLx-ST11xx multimode optical fiber transceivers provide low profile, cost effective solutions for rate agile 1x/2x Fiber Channel multimode optical fiber data links with a duplex LC connector interface. These transceivers are fully compliant with the ANSI Fiber Channel standards but can be used for any other data communications purpose within their operating parameters.

Product Overview

The Emerson Network Power Connectivity Solutions LxLx-ST11xx fiber optic transceivers consist of transmitter and receiver functions combined in a Low Profile RJ Format module. The optical transmitter is a high output 850nm VCSEL. The transmitter input lines are driven with differential LVPECL signals applied to the Transmit (TX+ and TX-) pins. These signals are internally converted to a suitable modulation current by a CMOS integrated circuit. A Transmit Disable (TDIS) function is provided to enable control of the VCSEL optical output. The optical receivers consist of PIN and Preamplifier assemblies and CMOS limiting post-amplifier integrated circuits. Outputs from the receivers consist of differential CML data signals on the Receive (RX+ and RX-) pins and a single ended LVTTTL signal detect function on the Signal Detect (SD) pin. The RX data is squelched (JAM) upon Signal Detect deassert to prevent garbage data output when no optical signal is present. The High Power Low Profile optic transceiver family is based upon the Standard Power LxLx-ST11x product, with the addition of higher optical output power options.



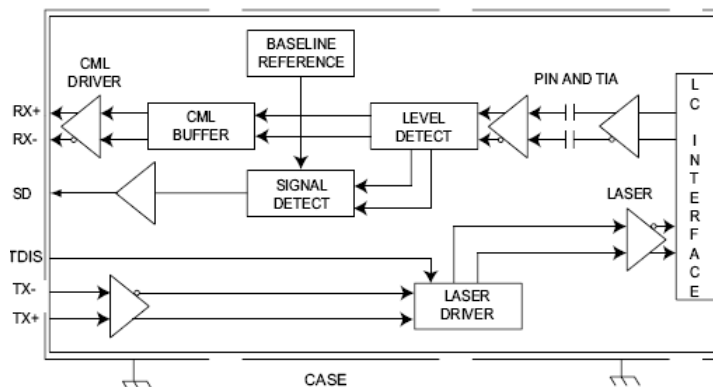
Ordering Information

Low Rider	L	X	L	X	-	ST11	X	X
Roughrider ¹	RR		L	X	-	ST11	X	X

Shell Options	Extended Margin Link	Temperature and coating	Mounting
N= No GND Tabs (Flat Shell)	BLANK= Standard Power	H= -40 to 85 C, No Coating	BLANK= Solder Posts (0.125 length)
T= GND Tabs	2= +2dB Margin	M= -40 to 85 C, Conformal Coating	B= Screw Posts (0.050 length)
	3= +3dB Margin		
	5= +5dB Margin		

1. Consult the Roughrider worksheet on pg. 13 for pigtail options.

Block Diagram



Absolute Maximum Ratings

Absolute maximum limits mean that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided each limiting parameter is in isolation and all other parameters have values within the performance specification. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time.

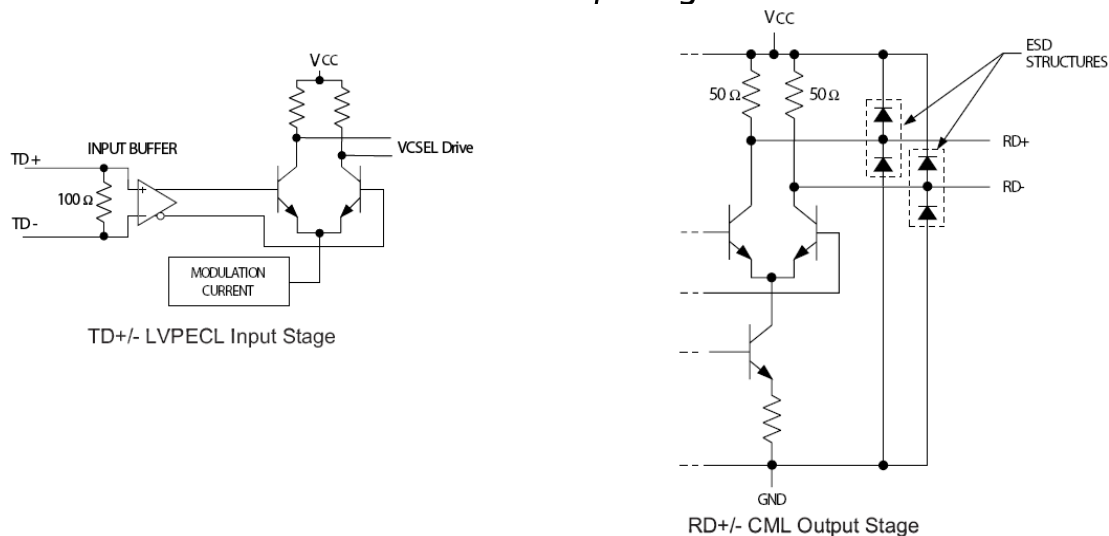
Parameter	Symbol	MIN	Typical	MAX	Unit
Storage Temperature	T_S	-55		+100	°C
Lead Soldering Temperature	T_{SOLD}			+260	°C
Lead Soldering Time ¹	t_{SOLD}			10	Seconds
Supply Voltage	V_{CC}	-0.5		+4.5	V
Data Input Voltage	V_I	-0.5		V_{CC}	V
Differential Input Voltage (p-p)	V_D			2.2	V
Output Current	I_O			50	mA

1. Recommended for hand solder or hot bar soldering only. Convection or IR reflow oven profiles may damage internal solder joints. Reference Low Rider Soldering Application Note.

Recommended Operating Conditions

Parameter	Symbol	MIN	Typical	MAX	Unit
Operating Temperature Limit	T_A	-40		+85	°C
Supply Voltage	V_{CC}	+3.135		+3.465	V
TX Common Mode Voltage	V_{CM}		2.0		V
TX Differential Input Voltage (p-p)	V_D	0.20		2.20	V
Transmit Disable Voltage	V_{TD}	2.0		V_{CC}	V
Transmit Enable Voltage	V_{TEN}	V_{EE}		0.8	V
RX Data Output Load	R_L		50		Ω

Detail of Data I/O Stages



Transmitters: VCCTX = 3.135V to 3.465V, T_A = Operating Temperature Range

Parameter	Symbol	MIN	Typical	MAX	Unit
Optical Output Power ^{1,2} LxL-ST11xx LxL2-ST11xx (+2dB Margin) LxL3-ST11xx (+3dB Margin) LxL5-ST11xx (+5dB Margin)	P _O	-10.0 -8.0 -7.0 -5.0		-1.5 -1.5 -1.5 -1.5	dBm
Optical Output Wavelength	λ _{OUT}	830	850	860	nm
Spectral Width	Δλ _{RMS}			0.85	nm
Extinction Ratio	ER		9		dB
Supply Current	I _{CC}		55	75	mA
Optical Rise/Fall Time (20% - %80) ^{1,2} 2.125 GigaBaud 1.0625 GigaBaud	t _{R,F}			0.15 0.30	nS nS
Relative Intensity Noise	RIN			-117	dB/Hz
Optical Modulation Amplitude (p-p) 2.125 GigaBaud 1.0625 GigaBaud	OMA	196 156			μW μW
Total Jitter ¹	T _j			85	ps

1. BER=10⁻¹² @ 2.125 GigaBaud, PRBS = 2⁷-1, NRZ, Compliant with FC-PI-2.

2. BER=10⁻¹² @ 1.0625 GigaBaud, PRBS = 2⁷-1, NRZ, Compliant with FC-PH.

Receivers: VCCR_X = 3.135V to 3.465V, T_A = Operating Temperature Range

Parameter	Symbol	MIN	Typical	MAX	Unit
Optical Sensitivity ¹	P _I				
2.125 GigaBaud ²		-15.0		0	dBm
1.0625 GigaBaud ³		-17.0		0	dBm
Optical Wavelength	λ _{IN}	830		860	nm
Optical Modulation Amplitude	OMA				
2.125 GigaBaud		49			μW
1.0625 GigaBaud		31			μW
Stressed Receiver Sensitivity (OMA)					
2.125 GigaBaud					μW
50/125 μm MMF		96			μW
62.5/125 μm MMF		109			μW
1.0625 GigaBaud					μW
50/125 μm MMF		55			μW
62.5/125 μm MMF		67			μW
Signal Detect Assert Time	t _{SDAS}		<10	100	μs
Signal Detect Deassert Time	t _{SDDA}		<10	350	μs
Signal Detect Deassert Level ⁴	SD _{OFF}	-31			dBm
Signal Detect Assert Level	SD _{ON}			-17	dBm
Signal Detect Hysteresis	HYS	1.5	2.25	3.5	dB
RX Data Output – Low	V _{OL} -V _{CC}	-1.810		-1.475	V
RX Data Output – High	V _{OH} -V _{CC}	-1.165		-0.880	V
Supply Current	I _{CC}		70	120	mA

1. Assuming an Extinction Ratio of 9 dB

2. BER=10⁻¹² @ 2.125 GigaBaud, PRBS = 2⁷-1, NRZ, Compliant with FC-PI-2.

3. BER=10⁻¹² @ 1.0625 GigaBaud, PRBS = 2⁷-1, NRZ, Compliant with FC-PH.

4. RX Data outputs are squelched when Signal Detect is deasserted to prevent garbage data output when no optical signal is present.

Conformal Coating Option

Parameter	Value
Specification	MIL-I-46058C, Type XY
Coating	Parylene type C
Deposition	Vacuum deposited
Film Thickness	1 MIL +/- 0.0002

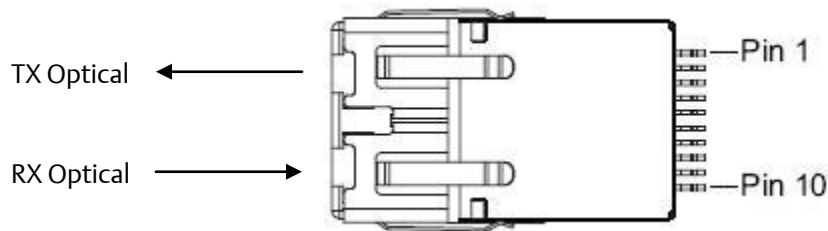
Link Distances

Fiber Specification	Application	Distance
62.5/125 (200MHz*Km)	2x Fiber Channel – ANSI X3.297 FC-PI	150M
	1x Fiber Channel – ANSI X3.297 FC-PH-2	300M
50/125 (500MHz*Km)	2x Fiber Channel – ANSI X3.297 FC-PI	300M
	1x Fiber Channel – ANSI X3.297 FC-PH-2	500M

Regulatory Compliance

Requirement	Feature	Condition	Notes
MIL-STD-883-3015.7	ESD	Class II	2200V
IEC-801-2	ESD	Human Body Model	25KV
IEC-801-3	EMI	Immunity	10V/M
FCC	EMI	Class B	>20dB
EN 55022 (CISPR 22A)	EMI	Class B	10V/M
IEC-825 Issue 1993-11	Eye Safety	Class 1	TUV Certificate Number on File
FDA CDRH 21-CFR 1040	Eye Safety	Class 1	CDRH Accession Number on File

Low Profile Optical Transceiver
Top View Shown



Pin Functions

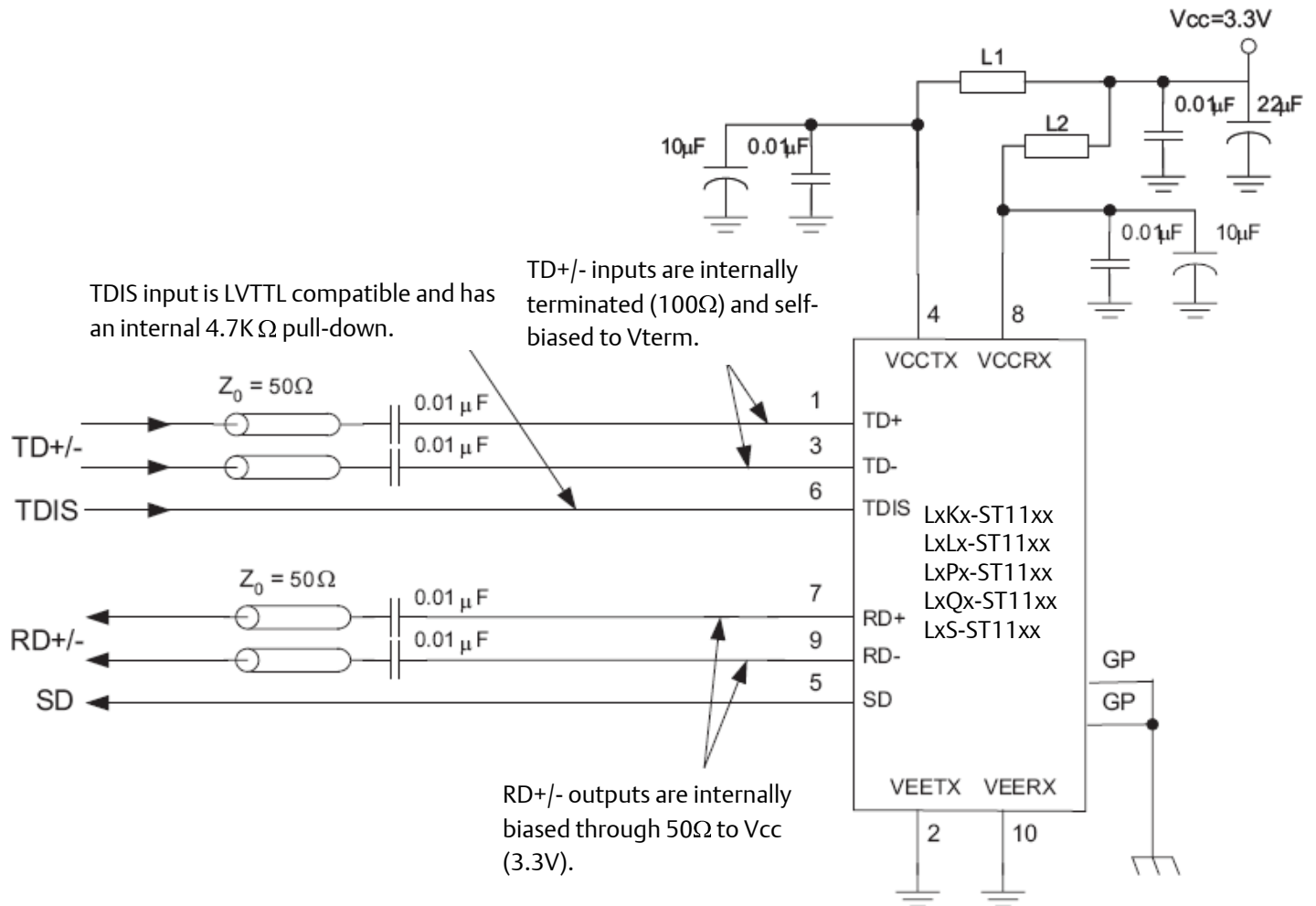
Pin Number	Symbol	Description	Logic Family
GP	GP	Grounding Posts Connect to chassis ground	N/A
1	TD+	Transmitter DATA In	LVPECL
2	VEETX	Transmitter Signal Ground	N/A
3	TD-	Transmitter DATA In	LVPECL
4	VCCTX	Transmitter Power Supply	N/A
5	SD	Signal Detect Output Satisfactory Optical Input: Logic "1" Output Fault Condition: Logic "0" Output	LVTTL
6	TDIS	Transmit Disable Input Logic 1 = Disable Optical Output Logic 0 = Enable Optical Output Internal 4.7K Ω pull-down (enable)	LVTTL
7	RD+	Receiver DATA Out	CML
8	VCCR _X	Receiver Power Supply	N/A
9	RD-	Receiver DATA Out	CML
10	VEER _X	Receiver Signal Ground	N/A

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Application Schematic



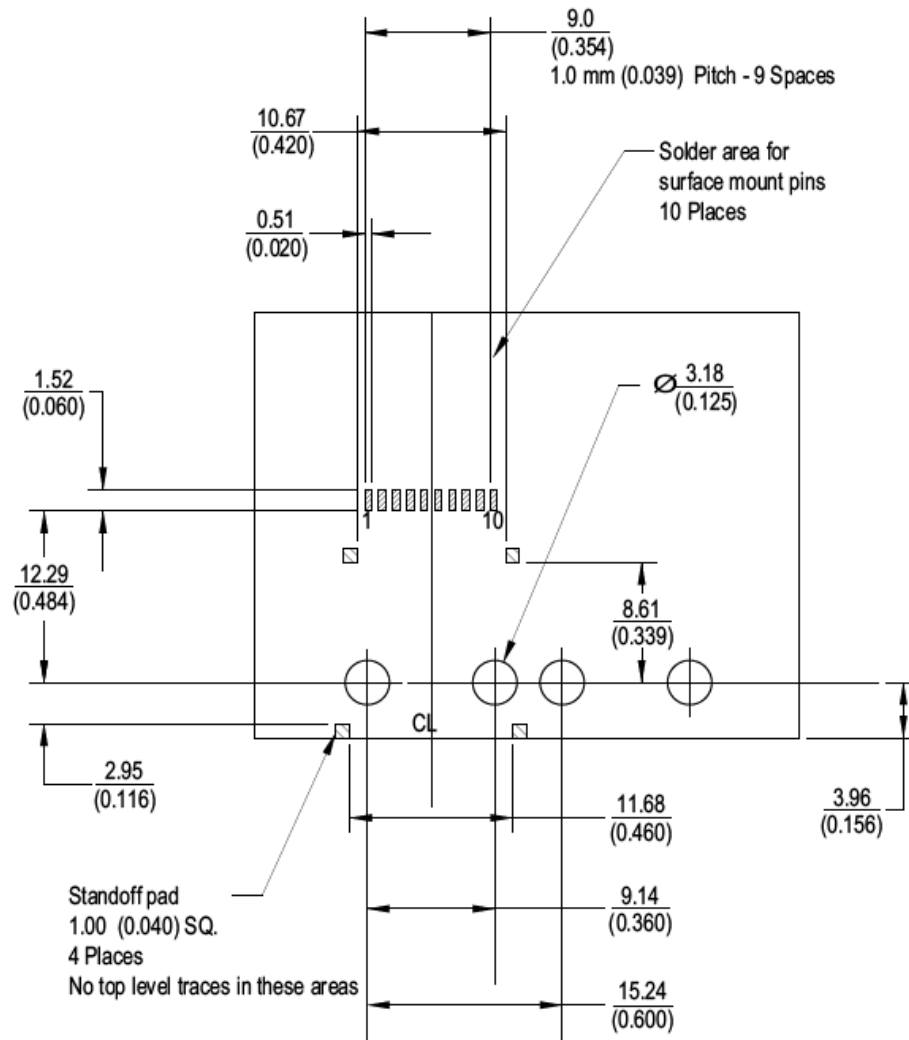
Notes:

- 1) L1 and L2 = MuRata BLM21A601S or equivalent (600Ω at 100MHz or better).
- 2) Route the differential pairs (TD +/- and RD +/-) together using 50Ω impedance matched traces.
- 3) Use separate power supply filtering for VCCTX and VCCR, as shown.
- 4) Use low ESR capacitors such as NPO or COG for AC Coupling of the TD+/- and RD+/- data signals.
- 5) Ground Posts (GP) are isolated from Signal Ground (Vee), and may be connected to Chassis Ground (as shown) or to Signal Ground if a Chassis Ground is not available.

Low Profile Optical Transceiver PCB Footprint

Dimensions are shown as:

mm
(inches)



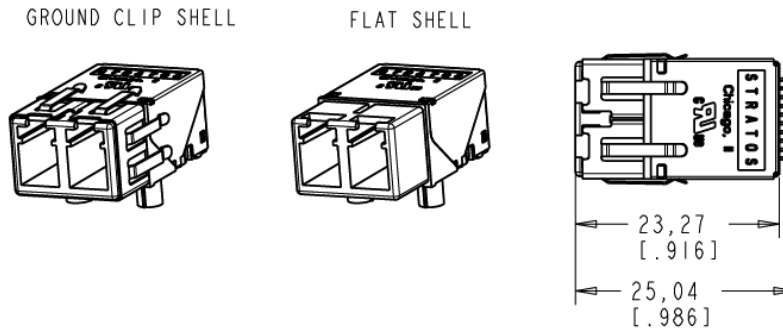
Top View Shown

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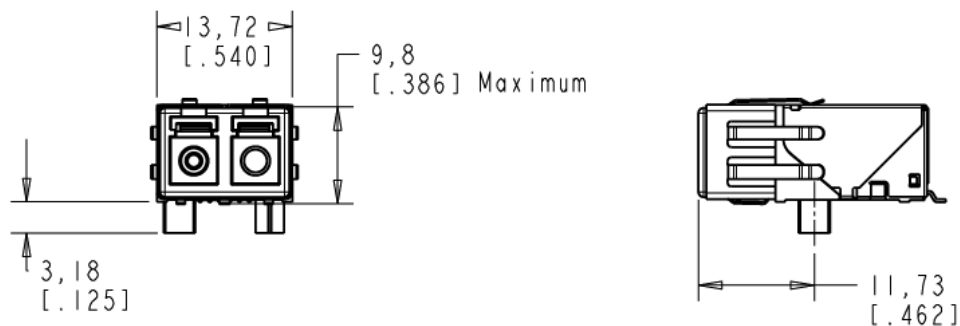
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Low Rider Mechanical Detail

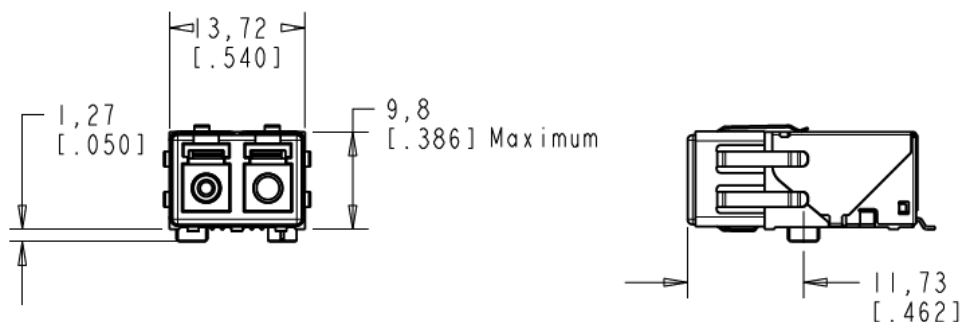


(Recommended panel cut-out for proper ground clip contact is 0.400 x 0.560 inches.)

Solder Post Version



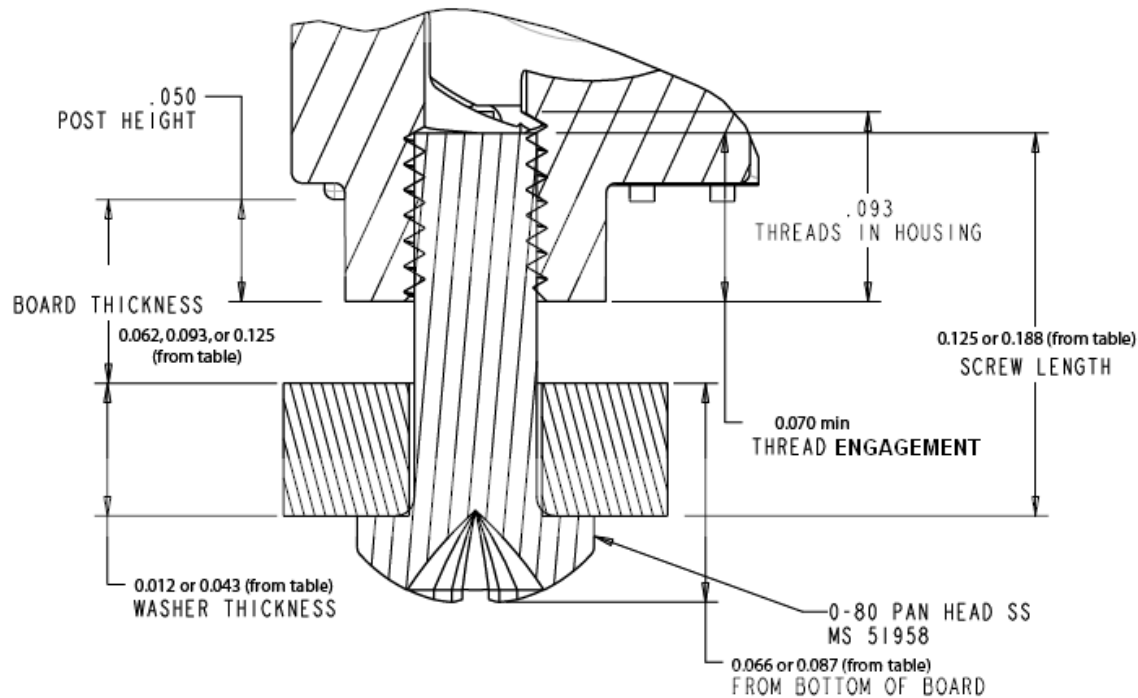
Screw Post Version



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PCB Nominal Thickness	Screw Length	Washer Thickness	Screw/Washer Height	Order Stratos Washer	Order Stratos Screw
0.062 inches +/- 0.005	0.125 inches	0.043 inches	0.087 inches	751-00002	618-00001
0.093 inches +/- 0.005	0.125 inches	0.012 inches	0.066 inches	751-00001	618-00001
0.125 inches +/- 0.005	0.188 inches	0.043 inches	0.087 inches	751-00002	618-00002

Notes:

- Customer may choose to any type 0-80 Stainless Steel (SS) screw configuration (pan head, flat head, hex head, etc) as long as the thread engagement is less than 0.93 inches max into the Low Rider housing.
- Customer can order 0-80 SS pan head screws and washers from Stratos for standard sized PCB thicknesses as identified in the table. The Stratos part number is identified for the screw/washer combination for each of three standard sized PCB thicknesses. Be sure to order 2 washers and 2 screws per Low Rider device.
- Torque screws to 7 to 9 in-oz for a clamping force of 36 to 47 lbs per screw. Do not exceed 16 in-oz torque per screw.

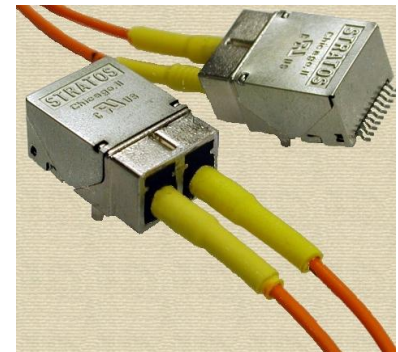
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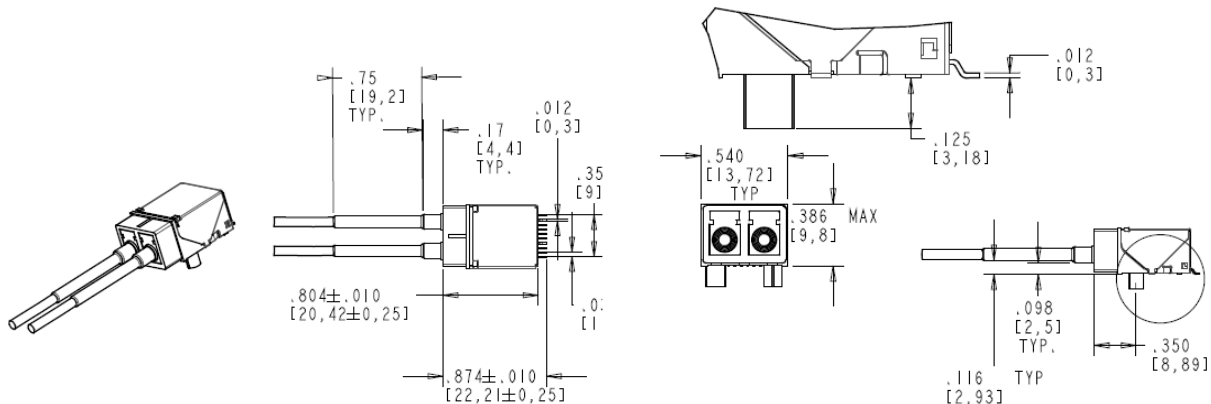
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Pigtail Options

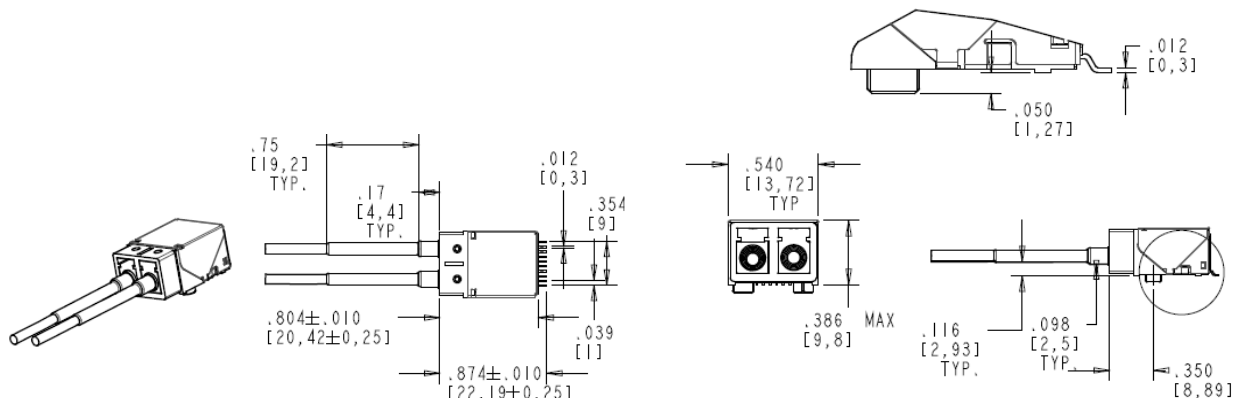
The Low Profile RJ optical transceiver can be ordered with permanently attached fiber pigtails. The fiber pigtails are customized to the customer's application and can vary in length from as short as 3 inches to as long as 50 inches, possibly longer dependent upon the application. The fiber pigtail optical connector may be selected from a wide variety of industry supported optical termini. Almost any combination is possible, as long as the termini components are available and supported by the OEM. Common termini components selected by customers include industry standard LC, SC, FC, ST, M29504, PHD, and others. Reference the Roughrider Worksheet portion of this datasheet as a guide to capture your custom requirements.



Roughrider Mechanical Detail (Solder Post Version)



Roughrider Mechanical Detail (Screw Post Version)



All dimensions are +/- .005 unless otherwise noted. All dimensions are inch/mm.

Part Number Summary and Options

	Low Rider Part Number	Roughrider Part Number ¹	Flat Shell	Clip Shell	Conf Coat	Solder Posts	Screw Posts
Standard Power	LNL-ST11H	RRL-ST11H-Sxxx	X			X	
	LNL-ST11M	RRL-ST11M-Sxxx	X		X	X	
	LNL-ST11HB	RRL-ST11HB-Sxxx	X				X
	LNL-ST11MB	RRL-ST11MB-Sxxx	X		X		X
	LTL-ST11H			X		X	
	LTL-ST11M			X	X	X	
	LTL-ST11HB			X			X
	LTL-ST11MB			X	X		X
(+2dB Margin)	LNL2-ST11H	RRL2-ST11H-Sxxx	X			X	
	LNL2-ST11M	RRL2-ST11M-Sxxx	X		X	X	
	LNL2-ST11HB	RRL2-ST11HB-Sxxx	X				X
	LNL2-ST11MB	RRL2-ST11MB-Sxxx	X		X		X
	LTL2-ST11H			X		X	
	LTL2-ST11M			X	X	X	
	LTL2-ST11HB			X			X
	LTL2-ST11MB			X	X		X
(+3dB Margin)	LNL3-ST11H	RRL3-ST11H-Sxxx	X			X	
	LNL3-ST11M	RRL3-ST11M-Sxxx	X		X	X	
	LNL3-ST11HB	RRL3-ST11HB-Sxxx	X				X
	LNL3-ST11MB	RRL3-ST11MB-Sxxx	X		X		X
	LTL3-ST11H			X		X	
	LTL3-ST11M			X	X	X	
	LTL3-ST11HB			X			X
	LTL3-ST11MB			X	X		X
(+5dB Margin)	LNL5-ST11H	RRL5-ST11H-Sxxx	X			X	
	LNL5-ST11M	RRL5-ST11M-Sxxx	X		X	X	
	LNL5-ST11HB	RRL5-ST11HB-Sxxx	X				X
	LNL5-ST11MB	RRL5-ST11MB-Sxxx	X		X		X
	LTL5-ST11H			X		X	
	LTL5-ST11M			X	X	X	
	LTL5-ST11HB			X			X
	LTL5-ST11MB			X	X		X

1. For Roughrider options, consult the factory to determine your custom part number (-Sxxx suffix) dependent upon fiber type, termination type, and other Roughrider worksheet options.

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Emerson Connectivity Solutions – Stratos Products Roughrider Worksheet

(Please use this worksheet to specify your order for Roughrider parts)

Customer, Program:

Low Rider or MIL SFF Part
Number: (if known)

Data Rate:

Wavelength:

☐ 850

☐ 1310

Mode:

☐ Singlemode

☐ Multimode

Conformal Coat:

☐ Yes

☐ No

Post:

☐ Screw Post

☐ Solder Post

Fiber Type:

☐ 62.5/125 μ m Multimode: OCC A01-020V-WST/900-MIL

☐ 50/125 μ m Multimode: OCC A01-020C-AST/900-MIL

☐ 9/125 μ m Singlemode: OCC A01-020G-SLS/900-HS

☐ Other: _____

RX Termini:

TX Termini:

RX Pigtail Length: (+/- 0.5 inches is default)

TX Pigtail Length: (+/- 0.5 inches is default)

Special Notes: (Boot color, heatshrink, labels,
special testing, shipping, etc.)

Part Number:

(Assigned by Emerson Connectivity Solutions)

Assigned By:

(Emerson)

Date:

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