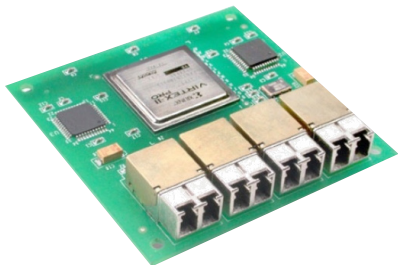


## LxF-LP11xx Series

Low Rider RJ Optical Transceiver

125 Mbps, 1310 nm LED Multimode



**Application Example:**

Low Rider transceivers with FPGA

The Low Rider RJ transceiver family offers pin-compatible versions to support an easy upgrade path for wavelength, data rate, link distance, or optical performance. Data rate options cover the range from 100 Mbps to 10 Gbps with choice of multimode or singlemode. The transceiver can be ordered with solder mounting posts or with screw posts. In both case the electrical I/O pins are the same: gull wing surface mount and footprint compatible within the entire family. The transceiver is offered with a flat shell, typically used when the device is mid-board mounted, or with an EMI clip that aids in case ground conduction when mounted through a front panel. The transceiver may be ordered with Parylene C conformal coating to provide superior long term reliability in presence of humidity.

Each transceiver in the family contains an optical transmit and receive function, converting to/from electrical differential signals. Each device contains a laser driver that is calibrated over temperature to provide excellent TX optical performance. The transmit optic may be LED, VCSEL, FP, or DFB technology, depending upon the device part number. The receive optical signal is gain controlled and conditioned to drive the receive differential signals.

Stratos (now Cinch) is the original designer of this form factor, now copied by other suppliers. We have a long history with over 20 years supplying this transceiver family into rugged industrial and defense applications. We offer not only the standard product options as shown in this datasheet, but often can modify certain specifications in order to support your particular requirement. Customization of TX power, extinction ratio, RX sensitivity, operational temperature extension, and fiber pigtail options are common types of modifications.

### Features & Benefits

- Miniature rugged optical transceiver
- 125 Mbps data rate
- 1310 nm multimode LED
- Link distance 2000 m
- Half the footprint of Small Form Factor (SFF) device
- Surface Mount I/O pins for high speed signal integrity
- Industrial Temp Range -40°C to +85°C
- Vibration tolerant design
- Duplex LC receptacle for optical cable
- 3.3 VDC power supply
- Pin compatible “Low Rider RJ Family” footprint

# LxF-LP11xx Series

Low Rider RJ Optical Transceiver

Stratos Optical Technologies

## General Specification

Parameter	Symbol	Min	Typical	Max	Unit
Storage Temperature	Ts	-55		+100	°C
Operating Temperature	Tc	-40		+85	°C
Supply Voltage	Vcc	3.135	3.3	3.465	V
Supply Current	Icc			300	mA
Lead Solder Temperature (hand solder) <sup>1</sup>				260	°C
Lead Solder Time <sup>1</sup>				10	s
TX Differential Input Voltage	V <sub>PP</sub>	0.4	1.25	2.0	V
RX Data Output Load	R <sub>L</sub>		50		Ohm

### Note:

<sup>1</sup> Recommend hand solder or hot bar soldering only. Convection or IR reflow oven profiles may damage internal solder joints and optical alignments. See Solder Application Note.

## 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

Application	Fiber Type	Distance
Fast Ethernet IEEE 802.3U	62.5/125, 500 MHz*km	2.0 km
FDDI PMD ISO / IEC 9314-3	50/125, 500 MHz*km	2.0 km



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# LxF-LP11xx Series

## Low Rider RJ Optical Transceiver

Stratos Optical Technologies

### LxF-LP11xx (125 Mbps, Fast Ethernet, 1310 nm multimode)

Transmitter Parameter	Symbol	Min	Typical	Max	Unit
Optical Output Power <sup>1</sup>	P <sub>O</sub>	-20.0		-14.0	dBm
Optical Center Wavelength	$\lambda_{OUT}$	1290	1310	1330	nm
Spectral Width, FWHM	$\Delta\lambda_{FWHM}$			175	nm
Extinction Ratio	ER	12			dB
Supply Current	I <sub>CC</sub>		120	160	mA
Output Optical Rise/Fall (20/80 %)	t <sub>R</sub>			3.0	ns

**Note:**

<sup>1</sup> Minimum TX Optical Power can be set at the factory for a higher minimum power, such as -17 dBm. Consult the factory.

Receiver Parameter	Symbol	Min	Typical	Max	Unit
Optical Sensitivity <sup>1,2</sup>	P <sub>I</sub>	-32			dBm
Optical Saturation <sup>1</sup>	P <sub>S</sub>			-3.0	dBm
Optical Center Wavelength	$\lambda_{IN}$	1260		1380	nm
Supply Current	I <sub>CC</sub>		70	120	mA
Signal Detect Assert Time	t <sub>SDA</sub>	-	10	100	μs
Signal Detect De-Assert Time	t <sub>SDD</sub>	-	10	350	μs
Signal Detect Threshold <sup>3</sup>	Decreasing Light	LSDT	-45.0	-32.5	dBm
	Increasing Light	LSDI	-45.0	-32.0	dBm
RX Data Out - Low	V <sub>OL</sub> - V <sub>CC</sub>	-1.810		-1.475	V
RX Data Out - High	V <sub>OH</sub> - V <sub>CC</sub>	-1.165		-0.880	V

**Notes:**

<sup>1</sup> BER = 1E-12 @ 1.25 Gbps, PRBS7, NRZ and with TX signal ER greater than 8 dB

<sup>2</sup> Optical Sensitivity listed for TX FP source. If using an TX LED source, derate RX Sensitivity to -31.5 dBm.

<sup>3</sup> RX Data outputs are squelched when Signal Detect is de-asserted to prevent garbage output when no optical signal is present.



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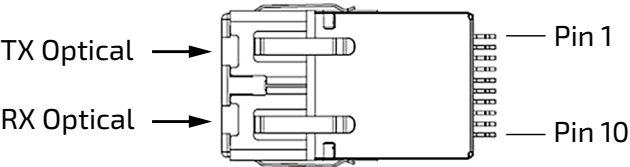
# LxF-LP11xx Series

Low Rider RJ Optical Transceiver

Stratos Optical Technologies

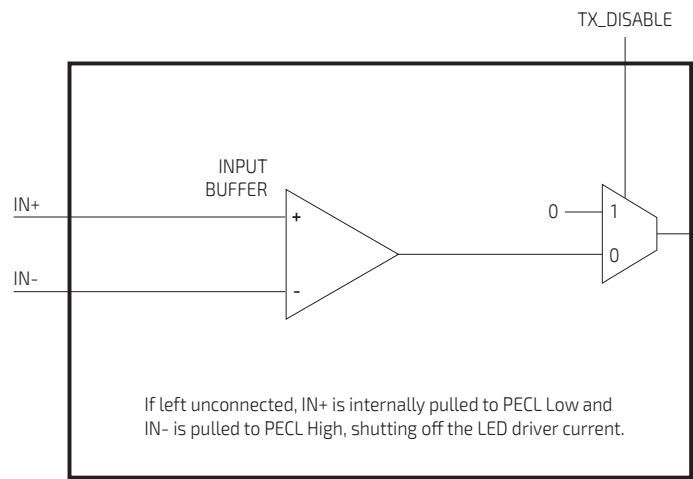
## Pin-Out Signal Definition

Top View

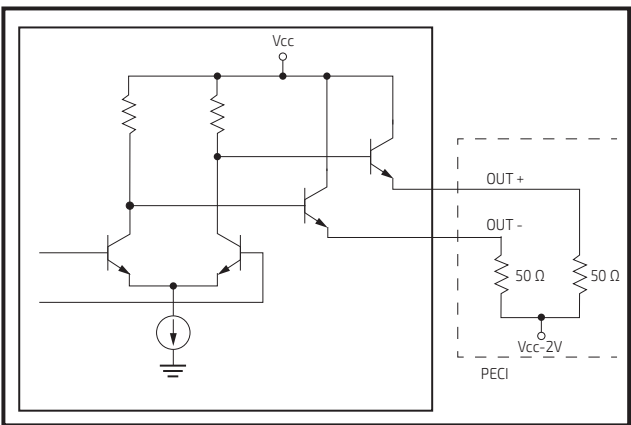


Pin	Symbol	Signal	Description
GP	GP	Chassis	Grounding Posts - Connect to chassis ground
1	TD+	LVPECL	Transmitter DATA IN +
2	VEETX	GND	Transmitter Signal Ground
3	TD-	LVPECL	Transmitter DATA IN -
4	VCCTX	+3.3 VDC	Transmitter Power Supply
5	SD	LVPECL	Signal Detect Output (1 = Detect, 0 = Loss)
6	NC	-	Not connected (This is TXDIS control on other Low Riders)
7	RD+	LVPECL	Receiver DATA OUT +
8	VCCRX	+3.3 VDC	Receiver Power Supply
9	RD-	LVPECL	Receiver DATA OUT -
10	VEERX	GND	Receiver Signal Ground

### TD +/- LVPECL Input Circuit



### RD +/- CML Output Circuit



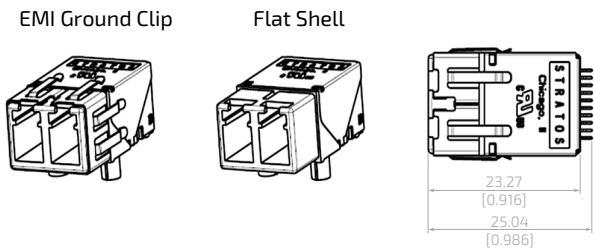
# LxF-LP11xx Series

Low Rider RJ Optical Transceiver

Stratos Optical Technologies

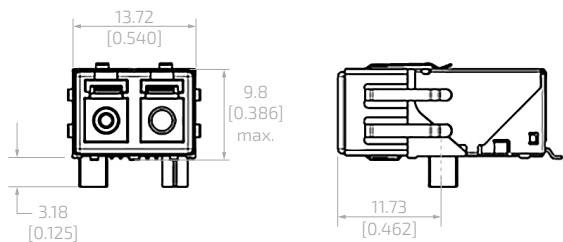
## Low Rider Mechanical Details

### EMI Clip Option

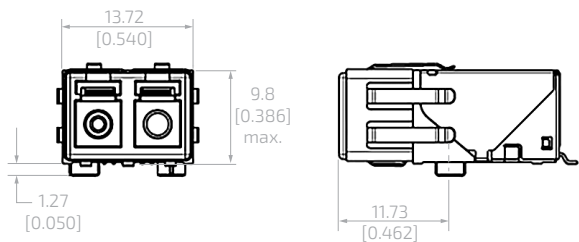


**Note:** Recommended panel cut-out for proper EMI ground clip contact is 0.400 x 0.560 inches.

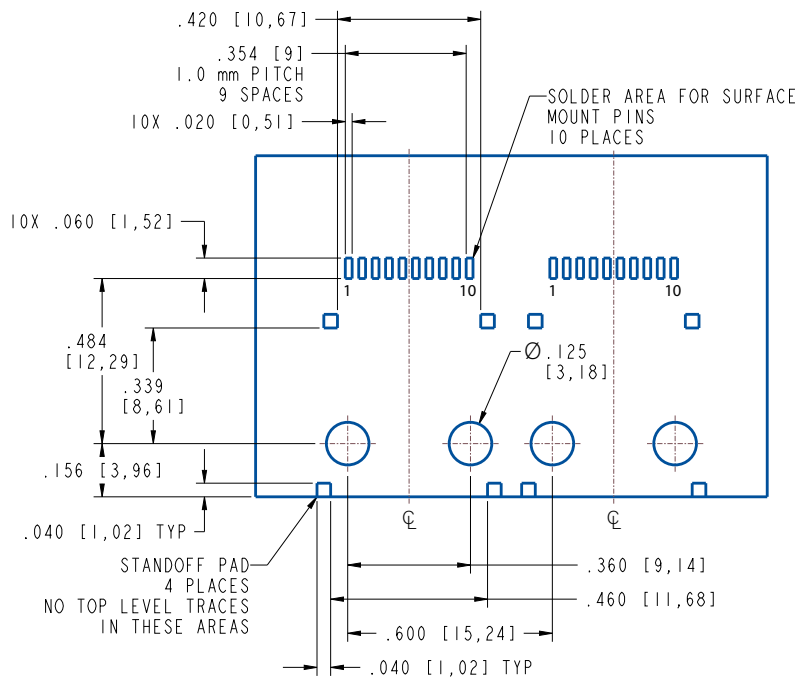
### Solder Post



### Screw Post



## Application Card Footprint Guide



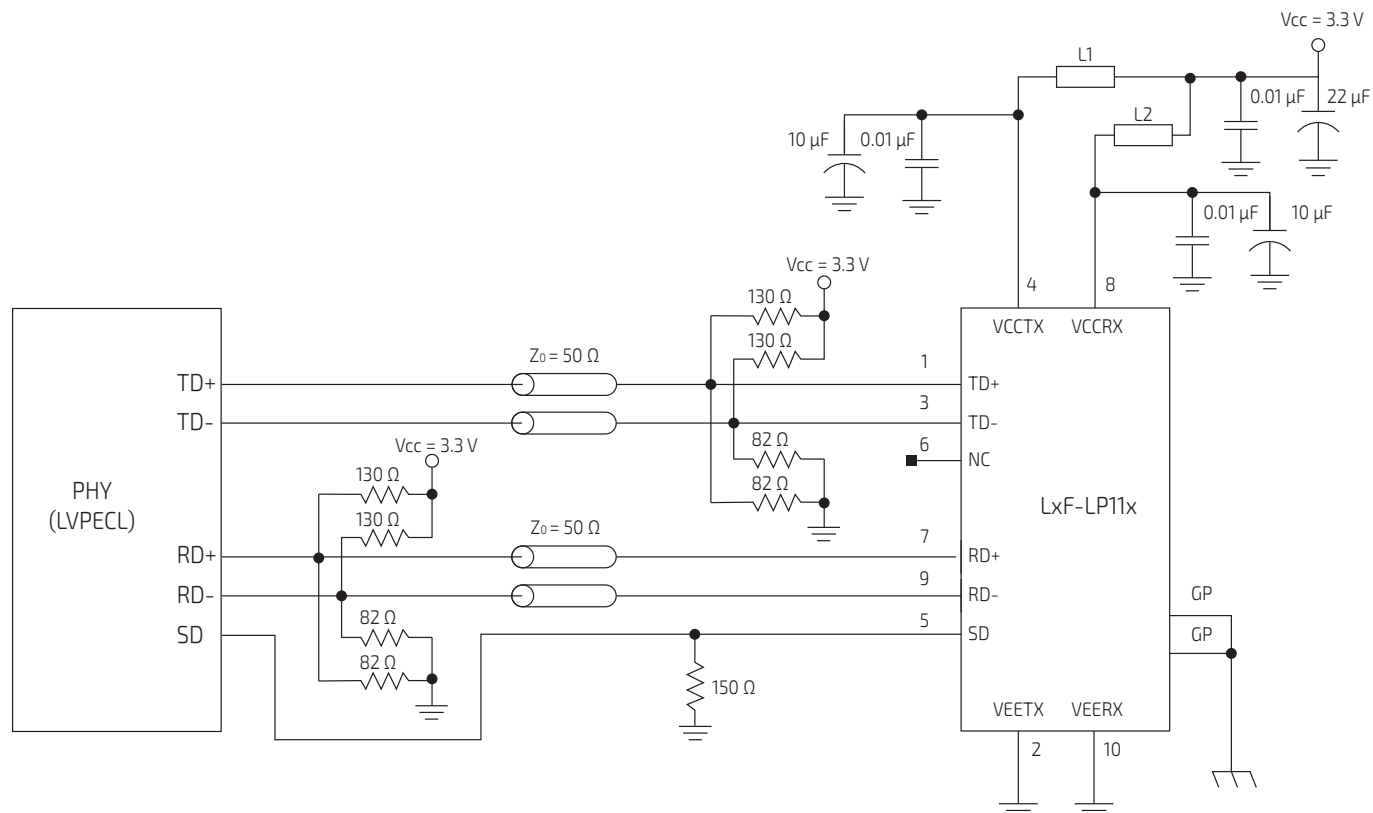
NOTES: 1. DIMENSIONS = INCHES [MM] 2. REF DRAWING 160-00003



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### Application Schematic

#### Parallel Termination (Thevenin Equivalent) for DC coupled LVPECL PHY Devices

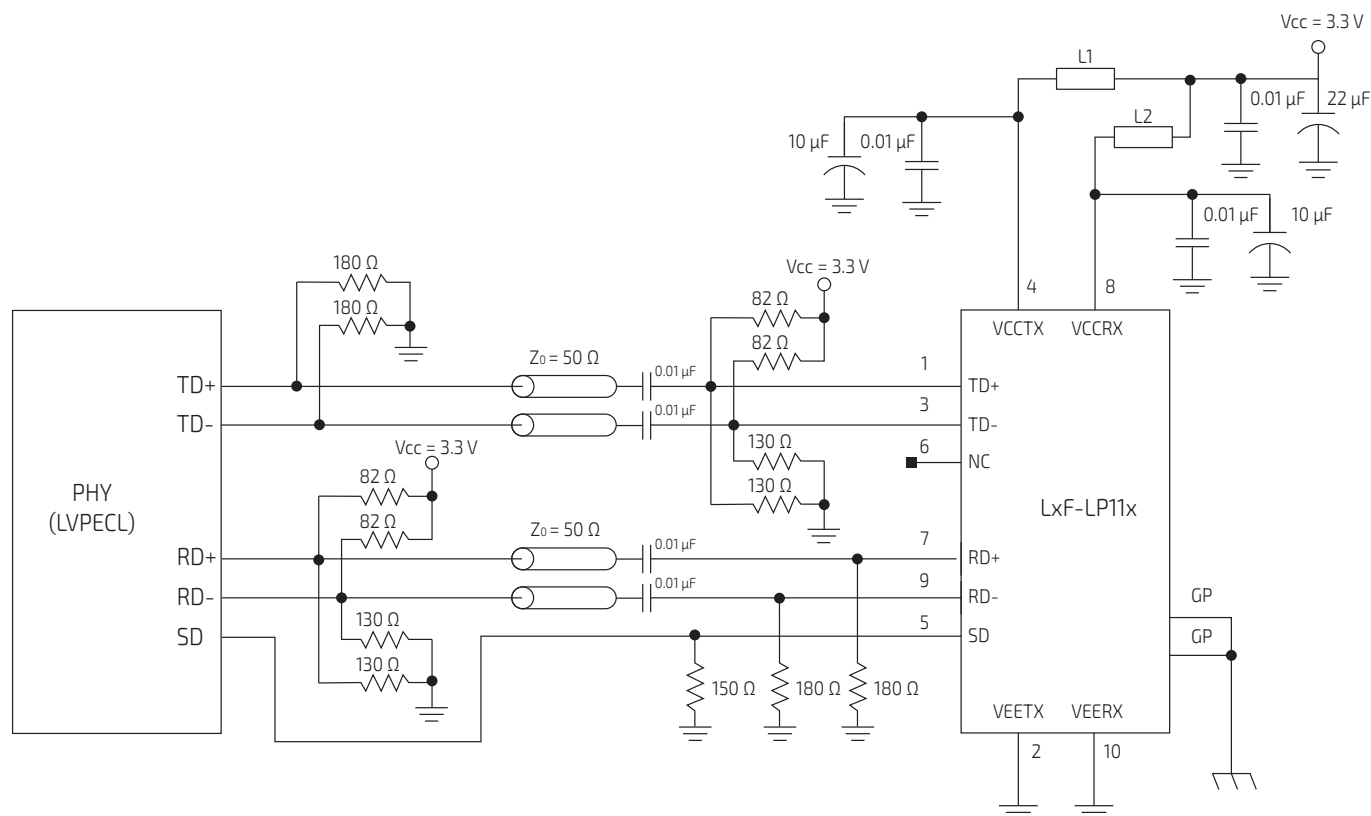


#### Notes:

1. L1 and L2 = MuRata BLM21A601S or equivalent (600 Ω at 100 MHz or better).
2. Place LVPECL termination resistors (130/82 Ω) as close as possible to termination points.
3. Route the differential pairs (TD+/- and RD +/-) together using 50 Ω impedance matched traces.
4. Other DC coupled LVPECL termination techniques are also valid.
5. Use separate power supply filtering for VCCTX and VCCRX, as shown.
6. 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.

### Parallel Termination (Thevenin Equivalent) for AC coupled LVPECL PHY Devices

Similar to DC coupled, except for addition of emitter follower pull-down resistors (180  $\Omega$ ), different  $V_t$  operating point (2.0 V vs 1.1 V), and addition of series RF capacitors.



#### Notes:

1. L1 and L2 = MuRata BLM21A601S or equivalent (600  $\Omega$  at 100 MHz or better).
2. Place LVPECL termination resistors (130/82  $\Omega$ ) as close as possible to termination points. Place LVPECL emitter follower pull-down (180  $\Omega$ ) as close as possible to source points.
3. Route the differential pairs (TD+/- and RD+/-) together using 50  $\Omega$  impedance matched traces.
4. Other AC coupled LVPECL termination techniques are also valid.
5. Use separate power supply filtering for VCCTX and VCCR, as shown.
6. 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.
7. Use low ESR capacitors, such as NPO or COG, for AC coupling of TD+/- and RD+/- signals.

# LxF-LP11xx Series

## Low Rider RJ Optical Transceiver

Stratos Optical Technologies

### RoHS Compliance

The standard Low Rider transceiver products are offered with high reliability internal circuits that use 63/37 tin-lead solder. The product may also be ordered with internal circuits that use SAC305 lead-free alloy, compliant to ROHS R6 requirements.

#### Part Numbers with internal circuits that contain 63/37 tin-lead solder

Parameter	Flat Shell	EMI Clip	Conf. Coat	Solder Post	Screw Post
LNF-LP11H	X			X	
LNF-LP11M	X		X	X	
LNF-LP11HB	X				X
LNF-LP11MB	X		X		X
LTF-LP11H		X		X	
LTF-LP11M		X	X	X	
LTF-LP11HB		X			X
LTF-LP11MB		X	X		X

#### Part Numbers with internal circuits that contain SAC305 lead-free alloy solder (RoHS compliant)

Parameter	Flat Shell	EMI Clip	Conf. Coat	Solder Post	Screw Post
LNF-LP11H-R6	X			X	
LNF-LP11M-R6	X		X	X	
LNF-LP11HB-R6	X				X
LNF-LP11MB-R6	X		X		X
LTF-LP11H-R6		X		X	
LTF-LP11M-R6		X	X	X	
LTF-LP11HB-R6		X			X
LTF-LP11MB-R6		X	X		X

# LxF-LP11xx Series

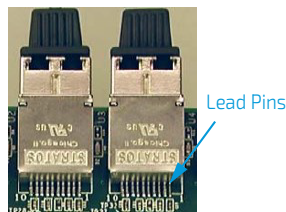
Low Rider RJ Optical Transceiver

# Stratos Optical Technologies

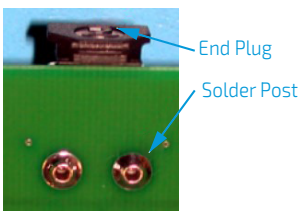
## Solder Post Application Note

Each transceiver is shipped with a plastic molded boot or end plug. The end plug should remain in place during installation, soldering, and cleaning to protect the optical lenses from contamination. The end plug is designed and tested to maintain seal under IPC standard water wash processes and will withstand heated and/or ultrasonic solvent cleaning processes for up to 2 minutes before elasticity is compromised.

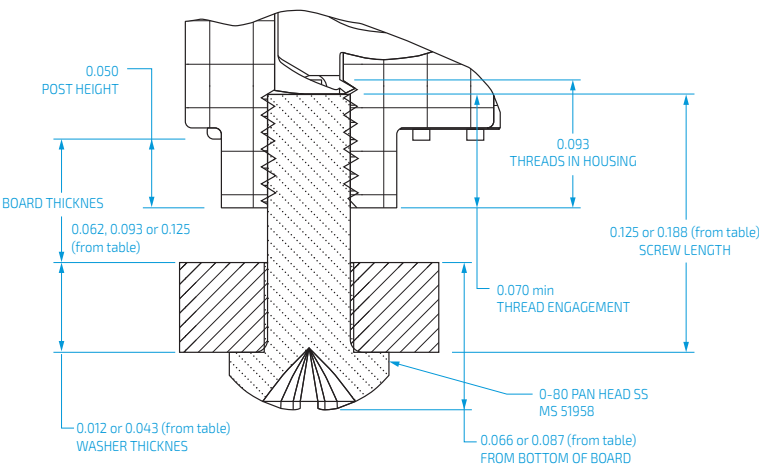
### Electrical Lead Pins Solder Profile 260°C / 10 s (Hand Solder)



### Solder Post Mount Solder Profile 450°C/ 10 s (Hand Solder)



## Screw Post Application Note



## Torque

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.

PCB Nominal Thickness	Screw Length	Washer Thickness	Screw/Washer Height	Cinch PN Washer	Cinch PN Screw
0.062 in ± 0.005	0.125 in	0.043 in	0.087 in	751-00002	618-00001
0.093 in ± 0.005	0.125 in	0.012 in	0.066 in	751-00001	618-00001
0.125 in ± 0.005	0.188 in	0.043 in	0.087 in	751-00002	618-00002

- Notes:**
- Customer may choose 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 0.093 inches max into the transceiver housing.
  - Customer can order 0-80 SS pan head screws and washers from table above, sorted by standard PCB thickness. Order two each washers and screws for each optical transceiver.



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# LxF-LP11xx Series

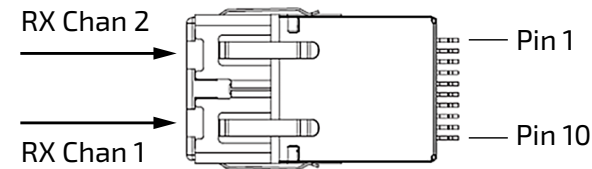
Low Rider RJ Optical Transceiver

Stratos Optical Technologies

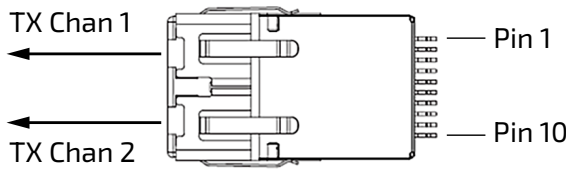
## Dual Port Configurations

Low Rider RJ transceivers can be ordered with two TX channels or two RX channels, instead of a single port TX and RX combination. Consult the factory.

### Dual RX Option



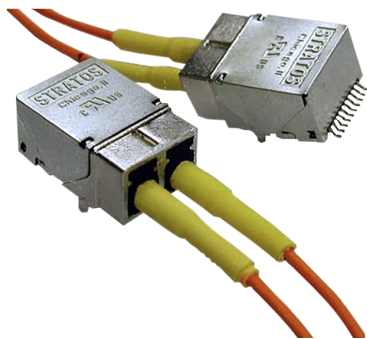
### Dual TX Option



## Fiber Pigtail Option

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, 29504, PHD, and others. Consult the factory.



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# LxF-LP11xx Series

Low Rider RJ Optical Transceiver

Stratos Optical Technologies

## Low Rider Family Part Numbering, Footprint Compatible

Pick a base part number from Table A or Table B, then complete the PN by selecting the EMI clip, coating and mounting option.

Table A — Multimode Base Part Selection Guide

Part Number <sup>1,2</sup>	Rate	Typical App	Wavelength	Min TX	Min RX	Distance <sup>3</sup>
LxF-LP11xx	125 Mbps	Fast Ethernet	1310 nm	-20 dBm	-32 dBm	2000 m
LxK-ST11xx	1.25 Gbps	Gigabit Ethernet	850 nm	-9.5 dBm	-21 dBm	850 m
LxL-LT1Axx	2.125 Gbps	Fiber Channel	1310 nm	-9.5 dBm	-20 dBm	500 m
LxL-ST11xx	2.125 Gbps	Fiber Channel	850 nm	-10 dBm	-15 dBm	500 m
LxP-ST11xx	2.5 Gbps	Infiniband	850 nm	-10 dBm	-15 dBm	400 m
LxS-ST11xx	4.25 Gbps	4x Fiber Channel	850 nm	-4 dBm	-11 dBm	350 m
Lx10G-ST11xx	10.3 Gbps	10G Ethernet	850 nm	-4 dBm	-11 dBm	300 m

Table B — Singlemode Base Part Selection Guide

Part Number <sup>1,2</sup>	Rate	Typical App	Wavelength	Min TX	Min RX	Distance <sup>3</sup>
LxK-LT12xx	1.25 Gbps	Gigabit Ethernet	1310 nm	-9.5 dBm	-20 dBm	10 km
LxL-LT12xx	2.125 Gbps	Fiber Channel	1310 nm	-9.5 dBm	-20 dBm	10 km
LxP-LT12xx	2.5 Gbps	Infiniband	1310 nm	-10 dBm	-18 dBm	10 km
Lx10G-LT12xx	10.3 Gbps	10G Ethernet	1310 nm	-10 dBm	-14 dBm	10 km

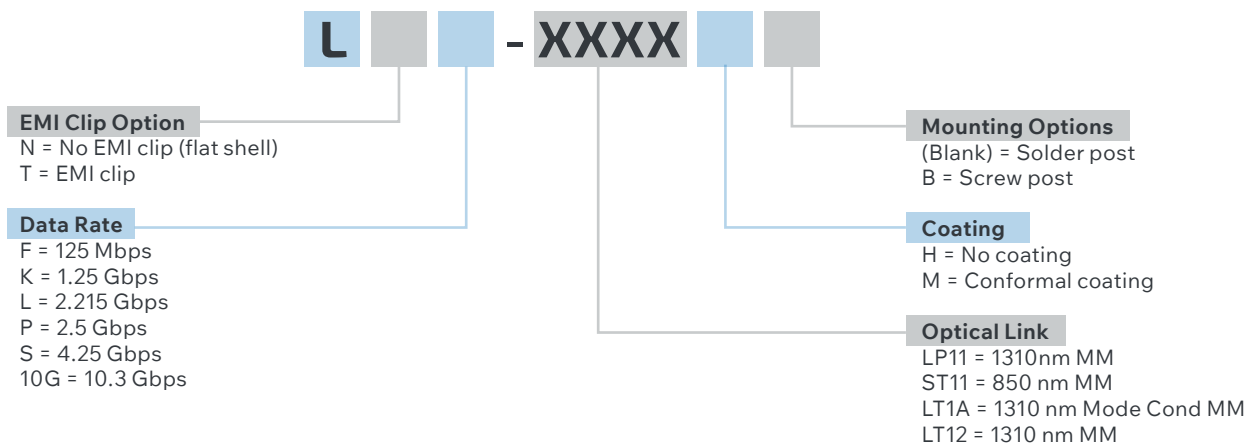
### Notes:

<sup>1</sup> The Part number is completed by using the Configuration Options Guide.

<sup>2</sup> All Low Rider transceivers are form/fit and pin compatible for easy upgrade/downgrade path

<sup>3</sup> Link distance is a typical value when using standard fiber types with nominal connector losses

## Configuration Options Guide



**Note:** Pick a base part number from Table A or Table B, then complete the PN by selecting the EMI clip, coating and mounting option.



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