

Stratos

LxS-ST11xx Low Profile Optical Transceiver

Connectivity for
Business Critical Continuity™

2x/4x Fiber Channel (2.125G – 4.25Gbps), 3.3V,
850nm VCSEL, Multimode, Up to 300Meters

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-PH2
- EN-60825 / IEC-825 / CDRH Class 1 Compliant
- Optional Parylene C Conformal Coating
- Optional addition of fiber pigtail



Ordering Information

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

Shell Options

N= No GND Tabs (Flat Shell)
T= GND Tabs

Temperature and coating

H= -40 to 85 C, No Coating
M= -40 to 85 C, Conformal Coating

Mounting

BLANK= Solder Posts (0.125 length)
B= Screw Posts (0.050 length)

1. Consult the Roughrider worksheet on pg. 12 for pigtail options.

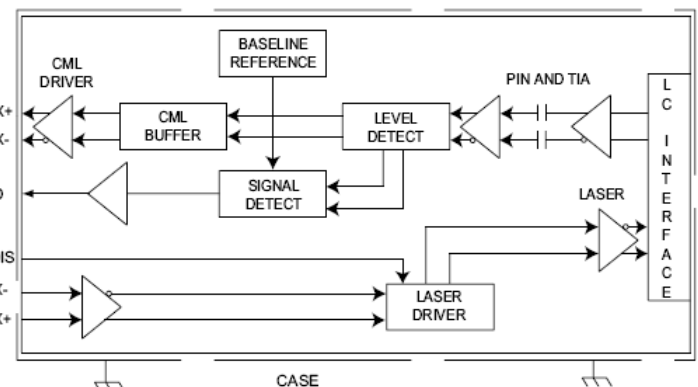
Applications

The LxS-ST11xx multimode optical fiber transceivers provide low profile, cost effective solutions for rate agile 2x/4x Fiber Channel multimode optical fiber data links, with a duplex LC connector interface. These transceivers are designed to work with 4x Fiber Channel (4.25G) applications but can be used for any other data communications purpose within their operating parameters.

Product Overview

The Emerson Network Power Connectivity Solutions LxS-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.

Block Diagram



日本エアーラフトサプライ株式会社

- 【本社】 東京都新宿区愛住町3-3
TEL: 03-5368-5200 FAX: 03-5368-5201
- 【名古屋支店】 愛知県名古屋市中区錦1-20-19 名神ビル
TEL: 052-220-5271 FAX: 052-220-5275
- 【大阪支店】 兵庫県尼崎市南塚口町2-12-18 塚口若松ビル
TEL: 06-6421-9801 FAX: 06-6421-9804
- 【URL】 <http://www.nasco.co.jp>

Stratos

LxS-ST11xx Low Profile Optical Transceiver

Connectivity for
Business-Critical Continuity™

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.

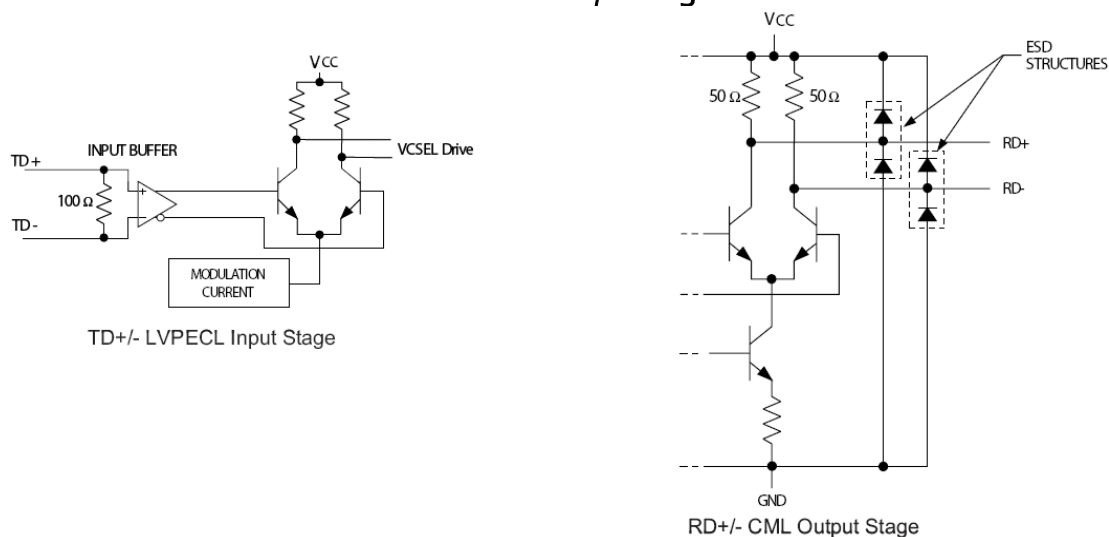
Parameter	Symbol	MIN	Typical	MAX	Unit
Storage Temperature	T_s	-55		+100	°C
Lead Soldering Temperature	T_{SOLD}			+260	°C
Lead Soldering Time ¹	t_{SOLD}			10	Seconds
Supply Voltage	V_{CC}	-0.5		+4.5	V
Data Input Voltage	V_I	-0.5		V_{CC}	V
Differential Input Voltage (p-p)	V_D			2.2	V
Output Current	I_O			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_{FE}		0.8	V
RX Data Output Load	R_L		50		Ω

Detail of Data I/O Stages



Stratos

LxS-ST11xx Low Profile Optical Transceiver

Connectivity for
Business-Critical Continuity™

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

Parameter	Symbol	MIN	Typical	MAX	Unit
Optical Output Power ¹	P _O	-9.0	-6	-4	dBm
Optical Output Wavelength	λ _{OUT}	830	850	860	nm
Spectral Width	Δλ _{RMS}			0.85	nm
Extinction Ratio	ER		7		dB
Supply Current	I _{CC}		55	75	mA
Optical Rise/Fall Time (20% - 80%) ¹	t _{R,F}			0.16	nS
Relative Intensity Noise	RIN			-118	dB/Hz
Optical Modulation Amplitude (p-p) 4.25 GigaBaud 2.125 GigaBaud	OMA	247 196			μW μW
Total Jitter ¹	Tj			85	ps

1. BER=10⁻¹² @ 4.25Gbps, PRBS 2⁷-1, NRZ, Compliant with FC-PI-2

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

Parameter	Symbol	MIN	Typical	MAX	Unit
Optical Sensitivity ¹ 4.125 GigaBaud ² 2.0625 GigaBaud	P _I	-15.0 -17.0		0 0	dBm dBm
Optical Wavelength	λ _{IN}	830		860	nm
Optical Modulation Amplitude 4.25 GigaBaud 2.125 GigaBaud	OMA	61 49			μW μW
Stressed Receiver Sensitivity (OMA) 4.25 GigaBaud 50/125 μm MMF 62.5/125 μm MMF 2.125 GigaBaud 50/125 μm MMF 62.5/125 μm MMF		138 148 96 109			μW μW μW 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	100	mA

1. Assuming an Extinction Ratio of 7 dB

2. BER=10⁻¹² @ 4.25 GigaBaud, PRBS = 2⁷-1, NRZ, Compliant with FC-PH-2.

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

Stratos

LxS-ST11xx Low Profile Optical Transceiver

Connectivity for
Business-Critical Continuity™

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)	4x Fiber Channel – ANSI X3.297 FC-PI	70M
	2x Fiber Channel – ANSI X3.297 FC-PI	150M
50/125 (500MHz*Km)	4x Fiber Channel – ANSI X3.297 FC-PI	150M
	2x Fiber Channel – ANSI X3.297 FC-PI	300M

Regulatory Compliance

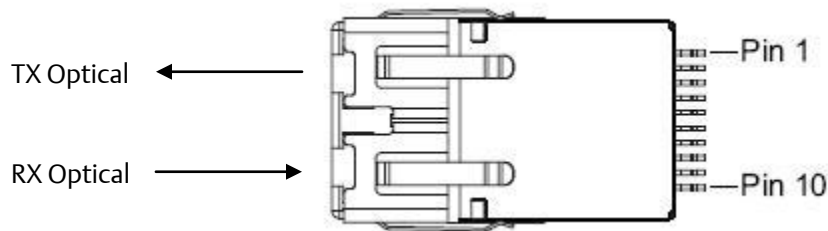
Requirement	Feature	Condition	Notes
MIL-STD-883-3015.7	ESD	Class II	2200V
IEC-801-2	ESD	Human Body Model	25KV
IEC-801-3	EMI	Immunity	10V/M
FCC	EMI	Class B	>20dB
EN 55022 (CISPR 22A)	EMI	Class B	10V/M
IEC-825 Issue 1993-11	Eye Safety	Class 1	TUV Certificate Number on File
FDA CDRH 21-CFR 1040	Eye Safety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

Stratos

LxS-ST11xx Low Profile Optical Transceiver

Connectivity for
Business-Critical Continuity™

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

Connectivity for
Business-Critical Continuity™

The schematic diagram illustrates the L64790 receiver IC and its external components. The IC is a 10-pin device with the following connections:

- Pin 1 (TD+):** Connected to the positive input of the TD+/- differential pair.
- Pin 3 (TD-):** Connected to the negative input of the TD+/- differential pair.
- Pin 6 (TDIS):** Connected to the TDIS input.
- Pin 7 (RD+):** Connected to the positive output of the RD+/- differential pair.
- Pin 9 (RD-):** Connected to the negative output of the RD+/- differential pair.
- Pin 5 (SD):** Connected to the SD output.
- Pin 2 (VEETX):** Connected to ground.
- Pin 10 (VEERX):** Connected to ground.

Power Supply and Decoupling:

- VCC=3.3V:** The supply voltage for the IC.
- L1:** A series inductor connected to the VCC pin.
- L2:** A series inductor connected to the VCC pin.
- 0.01 μ F:** Two decoupling capacitors connected to the VCC pin.
- 22 μ F:** A large electrolytic capacitor connected to the VCC pin.
- 10 μ F:** A decoupling capacitor connected to the VCC pin.

Input and Output Impedances:

- TD+/-:** The inputs are terminated with $Z_0 = 50 \Omega$ and have an internal 4.7K Ω pull-down.
- RD+/-:** The outputs are biased through 50Ω to VCC (3.3V).

IC Pinout and Labels:

- VCCTX:** Pin 1
- VCCRX:** Pin 3
- TD+:** Pin 1
- TD-:** Pin 3
- TDIS:** Pin 6
- RD+:** Pin 7
- RD-:** Pin 9
- SD:** Pin 5
- VEETX:** Pin 2
- VEERX:** Pin 10

IC Model:

- LxKx-ST11xx
- LxLx-ST11xx
- LxPx-ST11xx
- LxQx-ST11xx
- LxS-ST11xx

GP: Ground Plane

dr-lxsst11xx
May 21, 2010

mm
(inches)

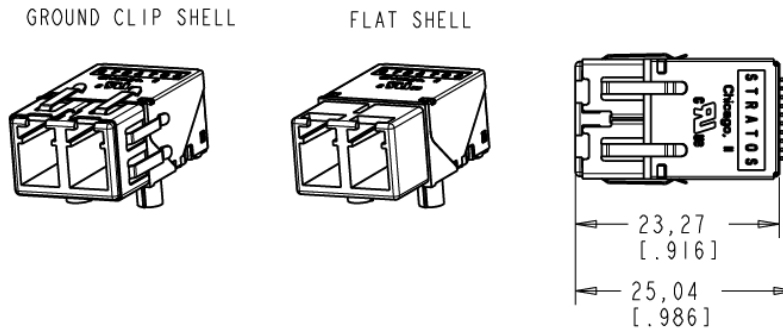


Stratos

LxS-ST11xx Low Profile Optical Transceiver

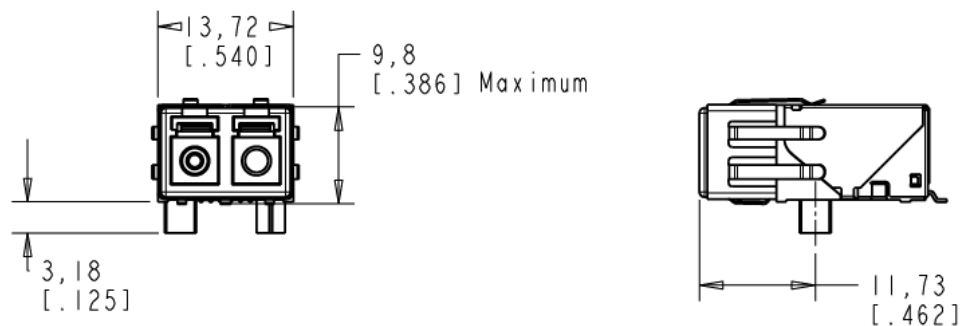
Connectivity for
Business-Critical Continuity™

Low Rider Mechanical Detail

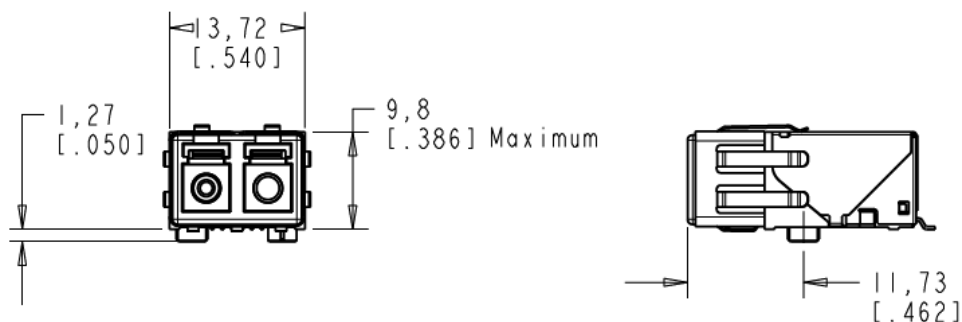


(Recommended panel cut-out for proper ground clip contact is 0.400 x 0.560 inches.)

Solder Post Version



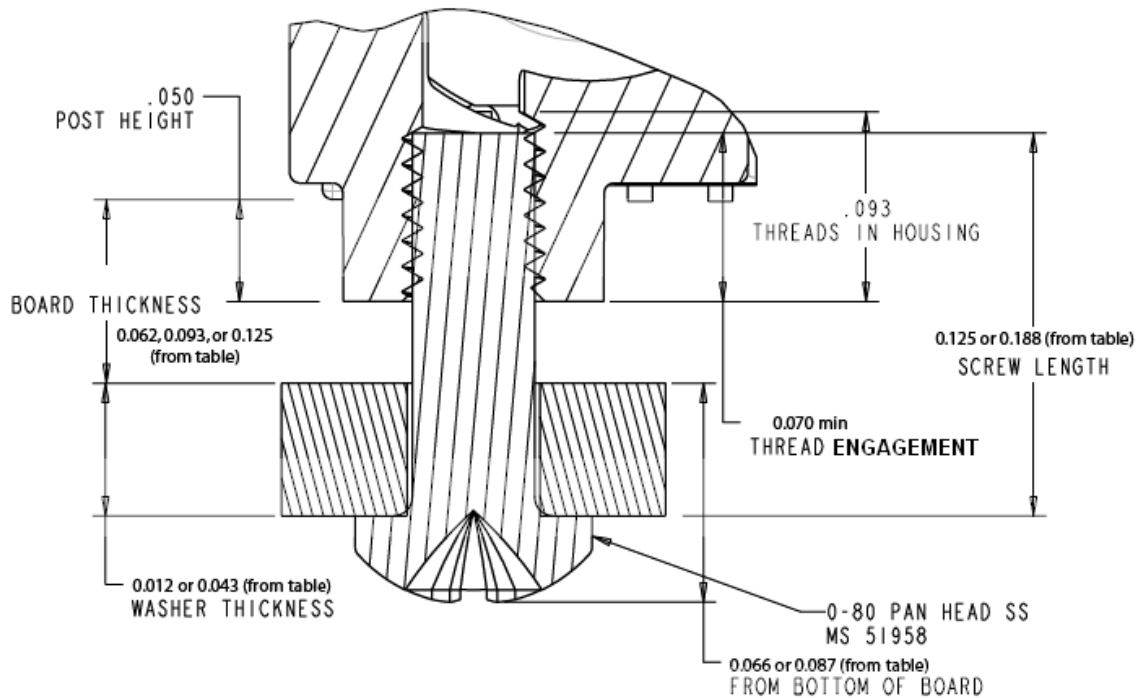
Screw Post Version



Stratos

LxS-ST11xx Low Profile Optical Transceiver

Connectivity for
Business-Critical Continuity™



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.

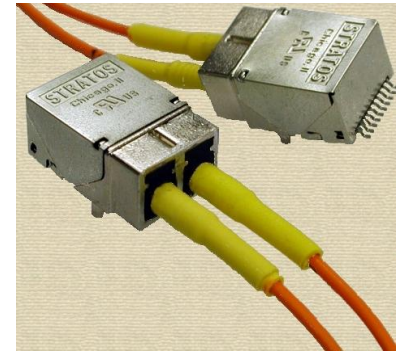
Stratos

LxS-ST11xx Low Profile Optical Transceiver

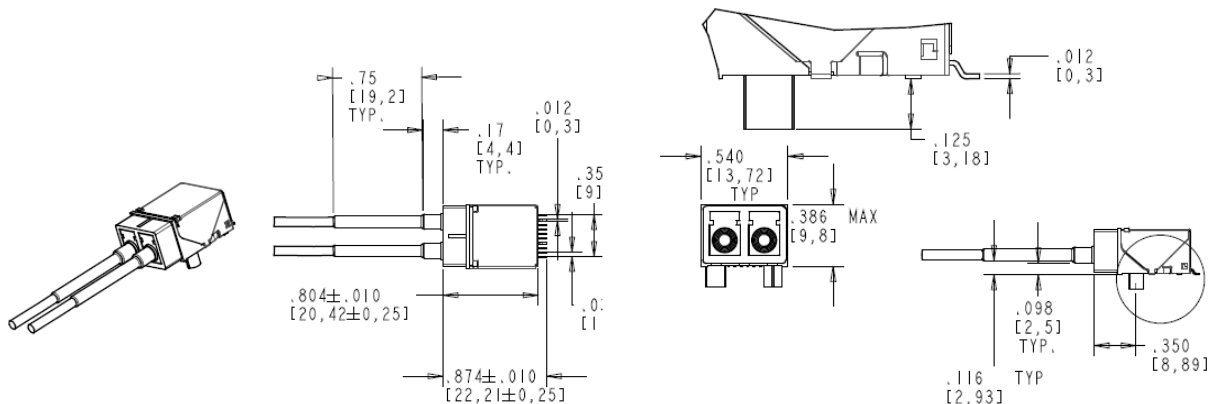
Connectivity for
Business-Critical Continuity™

Pigtail Options

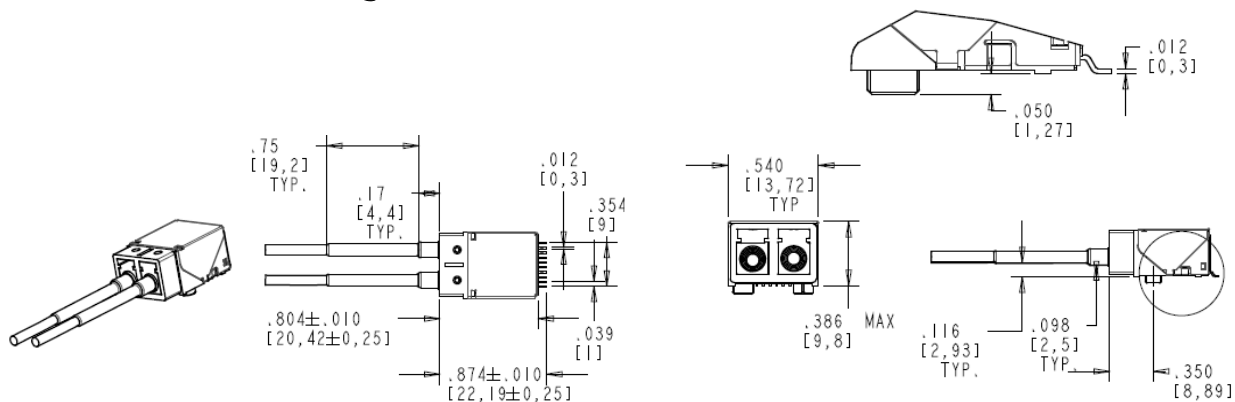
The Low Profile RJ optical transceiver can be ordered with permanently attached fiber pigtails. The fiber pigtails are customized to the customer's application and can vary in length from as short as 3 inches to as long as 50 inches, possibly longer dependent upon the application. The fiber pigtail optical 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.

Stratos

LxS-ST11xx Low Profile Optical Transceiver

Connectivity for
Business-Critical Continuity™

Part Number Summary and Options

Low Rider Part Number	Roughrider Part Number ¹	Flat Shell	Clip Shell	Conf Coat	Solder Posts	Screw Posts
LNS-ST11H	RRS-ST11H-Sxxx	X			X	
LNS-ST11M	RRS-ST11M-Sxxx	X		X	X	
LNS-ST11HB	RRS-ST11HB-Sxxx	X				X
LNS-ST11MB	RRS-ST11MB-Sxxx	X		X		X
LTS-ST11H			X		X	
LTS-ST11M			X	X	X	
LTS-ST11HB			X			X
LTS-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. Worksheet located in product detail sheet.

Stratos

LxS-ST11xx Low Profile Optical Transceiver

Connectivity for
Business-Critical Continuity™

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 AE001CWST5KM or equivalent

☐ 50/125 μ m Multimode: OCC AE001CAST5KM or equivalent

☐ 9/125 μ m Singlemode: OCC AE001CSLS5KM or equivalent

☐ Other: _____

RX Termini:

TX Termini:

RX Pigtail Length: (+/- 0.5 inches is default)
(Not including transceiver body, to tip of termini)

TX Pigtail Length: (+/- 0.5 inches is default)
(Not including transceiver body, to tip of termini)

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

Part Number:

(Assigned by Emerson Connectivity Solutions)

Assigned By:

(Emerson)

Date:

--	--	--

IMPORTANT NOTICE

Stratos International, Inc. reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice. Stratos International, Inc. recommends that its customers obtain the latest version of the publications to verify, before placing orders, that the information being relied on is current. Stratos International, Inc. warrants performance of its optical link products to current specifications in accordance with the Stratos International, Inc. standard warranty. Testing and other quality control techniques are utilized to the extent that Stratos International, Inc. has determined it to be necessary to support this warranty. Specific testing of all parameters of each optical link product is not necessarily performed on all optical link products. Stratos International, Inc. products are not designed for use in life support appliances, devices, or systems where malfunction of a Stratos International, Inc. product can reasonably be expected to result in a personal injury. Stratos International, Inc. customers using or selling optical link products for use in such applications do so at their own risk and agree to fully indemnify Stratos International, Inc. for any damages resulting from such improper use or sale. Stratos International, Inc. assumes no liability for Stratos International, Inc. applications assistance, customer product design, software performance, or infringement of patents or services described here in. Nor does Stratos International, Inc. warrant or represent that a license, either expressed or implied is granted under any patent right, copyright, or intellectual property right, and makes no representations or warranties that these products are free from patent, copyright, or intellectual property rights. Applications that are described herein for any of the optical link products are for illustrative purposes only. Stratos International, Inc. makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.