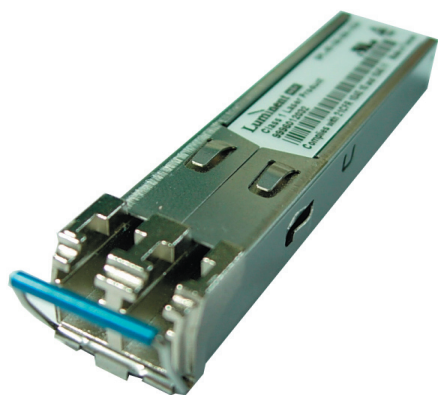


SP-TR-LX



Features

- Data Rate 1.062/1.25/2.125 Gb/s
- Single 3.3V Supply
- 10km Reach
- Fibre Channel 100-SM-LC-L Compliant
- Fibre Channel 200-SM-LC-L Compliant
- Gigabit Ethernet IEEE 802.3ah Compliant
- 11dB Typical Link Budget
- Commercial Temperature Available (-Cxx)
- Commercial and Industrial Temperature Available (-Txx)
- 1310nm FP Laser
- SFP MSA SFF-8074i Compliant
- Telcordia GR-468 Compliant
- Digital Diagnostic SFF-8472 Compliant
- Color Coded Bail Latch Tube: Blue
- RoHS-5/6 compliant (lead exemption)(-xxA)
- RoHS-6/6 compliant (lead free soldering)(-xxC)

General Operation

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Total Current	I_{CC}	-	-	300	mA
Power Supply Rejection ^a	PSR	100	-	-	mVp-p
Operating Temperature (-Cxx)	T_{opr}	-5	-	70	°C
Operating Temperature (-Txx)	T_{opr}	-40	-	85	°C
Storage Temperature	T_{stg}	-40	-	85	°C
Data Rate GbE	DR	-	1250	-	Mbps
Data Rate 1xFC	DR	-	1062.5	-	Mbps
Data Rate 2xFC	DR	-	2125	-	Mbps

a) 20Hz to 155MHz

Transmitter Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power	P_{op}	-9	-5	-3	dBm
Average Launch Power (Tx:Off)	P_{off}	-	-	-45	dBm
Optical Modulation Amplitude	OMA	0.213	-	-	mW
Extinction Ratio	ER	6	-	-	dB
Eye Mask		IEEE 802.3ah and FC-PI Rev 13 compliant			
Total Jitter	TJ	-	-	200	ps
Optical Rise Time, GbE, 1xFC ^b	t_r	-	-	260	ps
Optical Fall Time, GbE, 1xFC ^b	t_f	-	-	260	ps
Optical Rise Time, 2xFC ^b	t_r	-	-	160	ps
Optical Fall Time, 2xFC ^b	t_f	-	-	160	ps
Mean Wavelength ^c	λ	1265	1310	1365	nm
Spectral Width (RMS) ^c	$\Delta\lambda$	-	-	3.5	nm
Relative Intensity Noise	RIN	-	-	-120	dB/Hz

b) 20%-80% values

c) Wavelength and spectral limits complies with IEEE802.3ah and 1x/2x FC-PI Rev.13

SP-TR-LX

Transmitter Specifications (Electrical)

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedance	R_{in}	80	100	120	Ω
PECL Single Ended Data Input Swing	$V_{in, p-p}$	250	-	1200	mV
TxFault_Fault	V_{fault}	2	-	V_{cc}	V
TxFault_Normal	V_{normal}	V_{ee}	-	$V_{ee} + 0.5$	V
TxDisable_Disable	V_d	2	-	V_{cc}	V
TxDisable_Enable	V_{en}	V_{ee}	-	$V_{ee} + 0.8$	V

Receiver Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Receiver Power Low ^d	$R_{sens, low}$	-	-22	-20	dBm
Optical Modulation Amplitude (OMA), Min ^d	OMA	-	-	0.015	mW
Receiver Power High ^d	$R_{sens, high}$	-3	0	-	dBm
Damage Threshold for Receiver	$P_{in, damage}$	6	-	-	dBm
Wavelength ^e	λ	1265	-	1365	nm
Maximum Reflectance of Receiver	RX_r	-	-	-12	dB
LOS Assert	-	-38	-	-	dBm
LOS De-Assert	-	-	-	-20	dBm
LOS Hysteresis	-	0.5	-	-	dB

d) Measured at BER of 10^{-12} , PRBS of 2^7-1 , at eye center. 1.0625/1.25/2.125 Gbps

e) Operational over 1200-1625nm range

Receiver Specifications (Electrical)

Parameter	Symbol	Min	Typical	Max	Unit
PECL Single-Ended Data Output Swing	$V_{out, p-p}$	185	-	800	mV
Data Output Rise Time	t_r	-	-	260	ps
Data Output Fall Time	t_f	-	-	260	ps

Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_{on}	-	-	1	ms
Tx Disable Assert Time	t_{off}	-	-	10	μ s
Time to Initialize, Including Reset of Tx Fault	t_{init}	-	-	300	ms
Tx Fault Assert Time	t_{fault}	-	-	100	μ s
Tx Disable to Reset	t_{reset}	10	-	-	μ s
LOS Assert Time	t_{loss_on}	-	-	100	μ s
LOS De-assert Time	t_{loss_off}	-	-	100	μ s
Serial ID Clock Rate	f_{serial_clock}	-	-	100	KHz
RX_LOS Voltage (high)	RX_LOS_H	2	-	V_{cc}	V
RX_LOS Voltage (low)	RX_LOS_L	-	-	0.8	V
LOS Output Voltage-Fault	$V_{LOS\ fault}$	2	-	V_{cc}	V
LOS Output Voltage-Normal	$V_{LOS\ normal}$	V_{ee}	-	$V_{ee} + 0.5$	V
MOD_DEF (0:2)-High	V_h	2	-	V_{cc}	V
MOD_DEF (0:2)-Low	V_l	V_{ee}	-	$V_{ee} + 0.5$	V

SP-TR-LX

Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature (-CDx)	-5 to 70	±3	°C	Internal	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$
Temperature (-TDx)	-40 to 85	±3	°C	Internal	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$
Voltage	0 to Vcc	0.1	V	Internal	$V(\text{Volts}) = V_{ad}(16 \text{ bit unsigned integer}) * 0.1$
Bias Current	0 to 120	5	mA	External	$I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$
Tx Power	-9 to -3	±3dB	dBm	External	$Tx_PWR(\mu W) = Tx_PWR_{slope} * Tx_PWR_{ad}(16 \text{ bit unsigned integer}) + Tx_PWR_{offset}$
Rx Power	-20 to -3	±3dB	dBm	External	$Rx_PWR(\mu W) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$

EEPROM Serial ID

Name of Field	Discription of Field	Address	Hex	ASCII
Vendor Name	SFP Vendor name (ASCII)	20	4C	L
		21	55	U
		22	4D	M
		23	49	I
		24	4E	N
		25	45	E
		26	4E	N
		27	54	T
		28	4F	O
		29	49	I
		30	43	C
Vendor OUI	IEEE vendor OUI code for LuminentOIC Inc.	37	00	
		38	06	
		39	B5	
Vendor P/N	Part number in ASCII, e.g. SP-TR-LX-CDA	40	53	S
		41	50	P
		42	54	T
		43	52	R
		44	4C	L
		50	58	X
		51	43	C
		52	44	D
		53	41	A

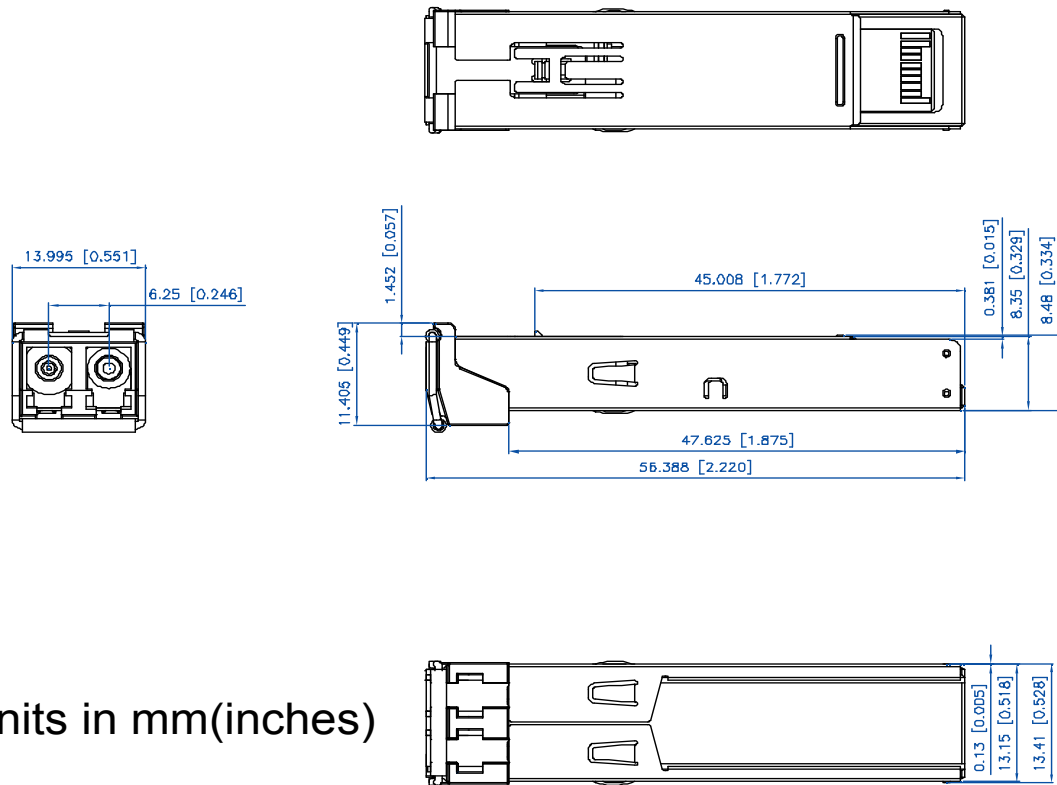
SP-TR-LX

Pinout Definitions

Pin	Function	Notes
1	V _{ee} T	TX GND
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEFO	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	V _{ee} R	RX Ground
10	V _{ee} R	RX Ground
11	V _{ee} R	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	V _{ee} R	RX GND
15	V _{CC} R	RX Power
16	V _{CC} T	TX Power
17	V _{ee} T	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	V _{ee} T	TX GND

SP-TR-LX

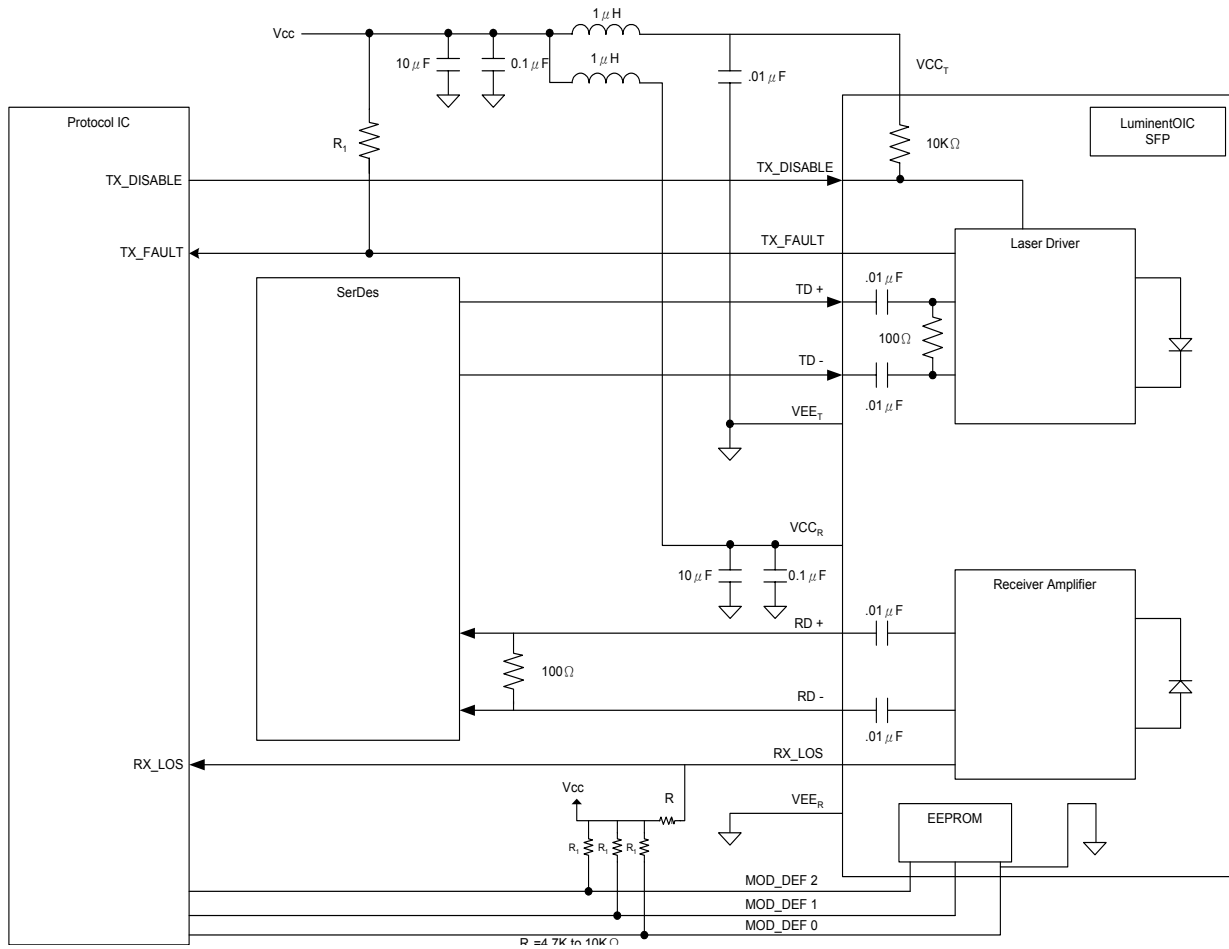
Outline Drawing



Units in mm(inches)

SP-TR-LX

Suggested Transceiver interface



SP-TR-LX

Ordering Information

Available Options:

- | | |
|--------------|--------------|
| SP-TR-LX-CNA | SP-TR-LX-CNC |
| SP-TR-LX-TNA | SP-TR-LX-TNC |
| SP-TR-LX-CDA | SP-TR-LX-CDC |
| SP-TR-LX-TDA | SP-TR-LX-TDC |

Part numbering Definition:

SP - TR - LX - Temperature Diagnostic Revision - Customer Specific

- SP = Small Form Pluggable
 - TR = Tri-rate
 - LX = 10km reach
 - Operating Temperature
 - C = Commercial temperature (-5 to 70°C)
 - T = Industrial temperature (-40 to 85°C)
 - D = Digital Diagnostic (SFF-8472)
 - N = No Digital Diagnostic
 - Design Revision
 - A = RoHS-5/6 compliant (lead exemption)
 - C = RoHS-6/6 compliant (lead free soldering)
 - Blank = Standard Procedure
- Labelling, Serial number, or Shipping Instructions, etc.

Warnings:

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

Legal Notes:

IMPORTANT NOTICE!

All information contained in this document is subject to change without notice, at LuminentOIC's sole and absolute discretion. LuminentOIC warrants performance of its products to current specifications only in accordance with the company's standard one-year warranty; however, specifications designated as "preliminary" are given to describe components only, and LuminentOIC expressly disclaims any and all warranties for said products, including express, implied, and statutory warranties, warranties of merchantability, fitness for a particular purpose, and non-infringement of proprietary rights. Please refer to the company's Terms and Conditions of Sale for further warranty information.

LuminentOIC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents, services, or intellectual property described herein. No license, either express or implied, is granted under any patent right, copyright, or intellectual property right, and LuminentOIC makes no representations or warranties that the product(s) described herein are free from patent, copyright, or intellectual property rights. Products described in this document are NOT intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. LuminentOIC customers using or selling products for use in such applications do so at their own risk and agree to fully defend and indemnify LuminentOIC for any damages resulting from such use or sale.

THE INFORMATION CONTAINED IN THIS DOCUMENT IS PROVIDED ON AN "AS IS" BASIS. Customer agrees that LuminentOIC is not liable for any actual, consequential, exemplary, or other damages arising directly or indirectly from any use of the information contained in this document. Customer must contact LuminentOIC to obtain the latest version of this publication to verify, before placing any order, that the information contained herein is current.

© LuminentOIC, Inc. 2003
All rights reserved