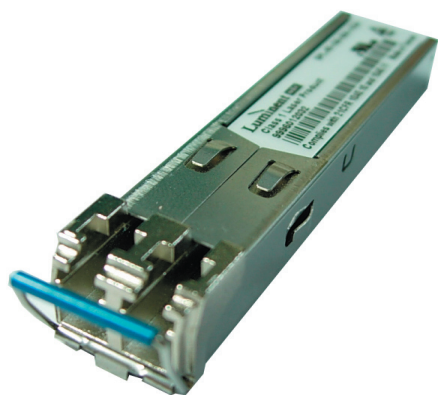


SP-TR-LX



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

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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

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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		

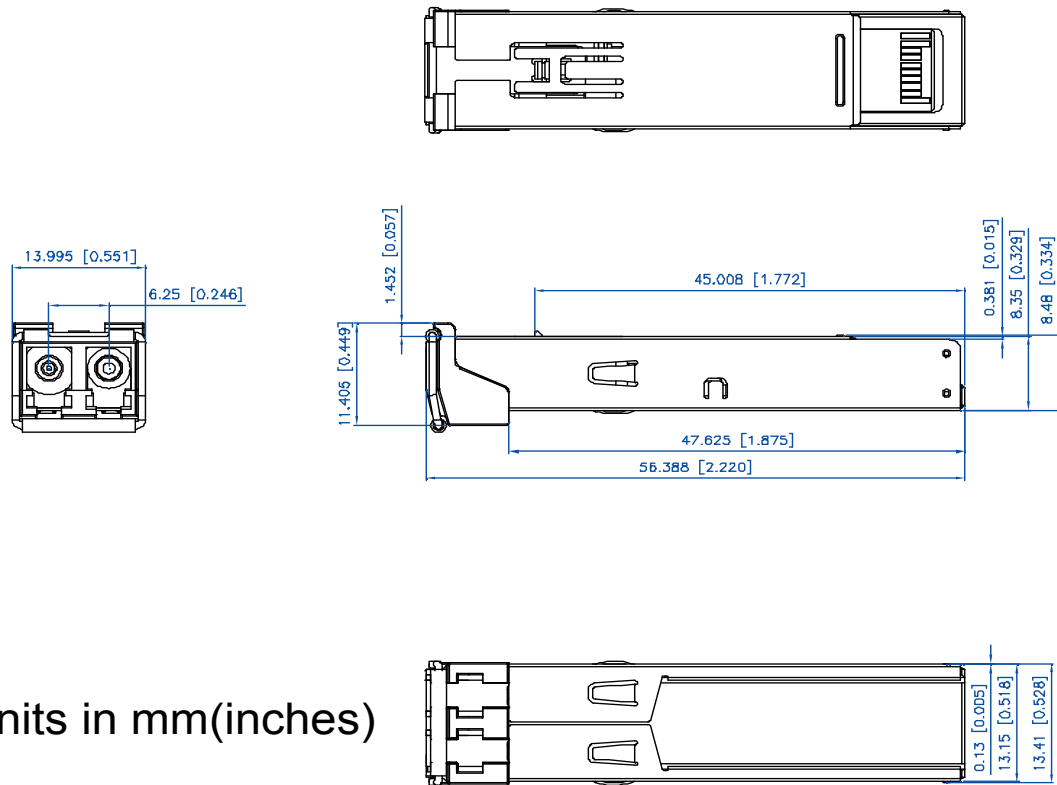
SP-TR-LX

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

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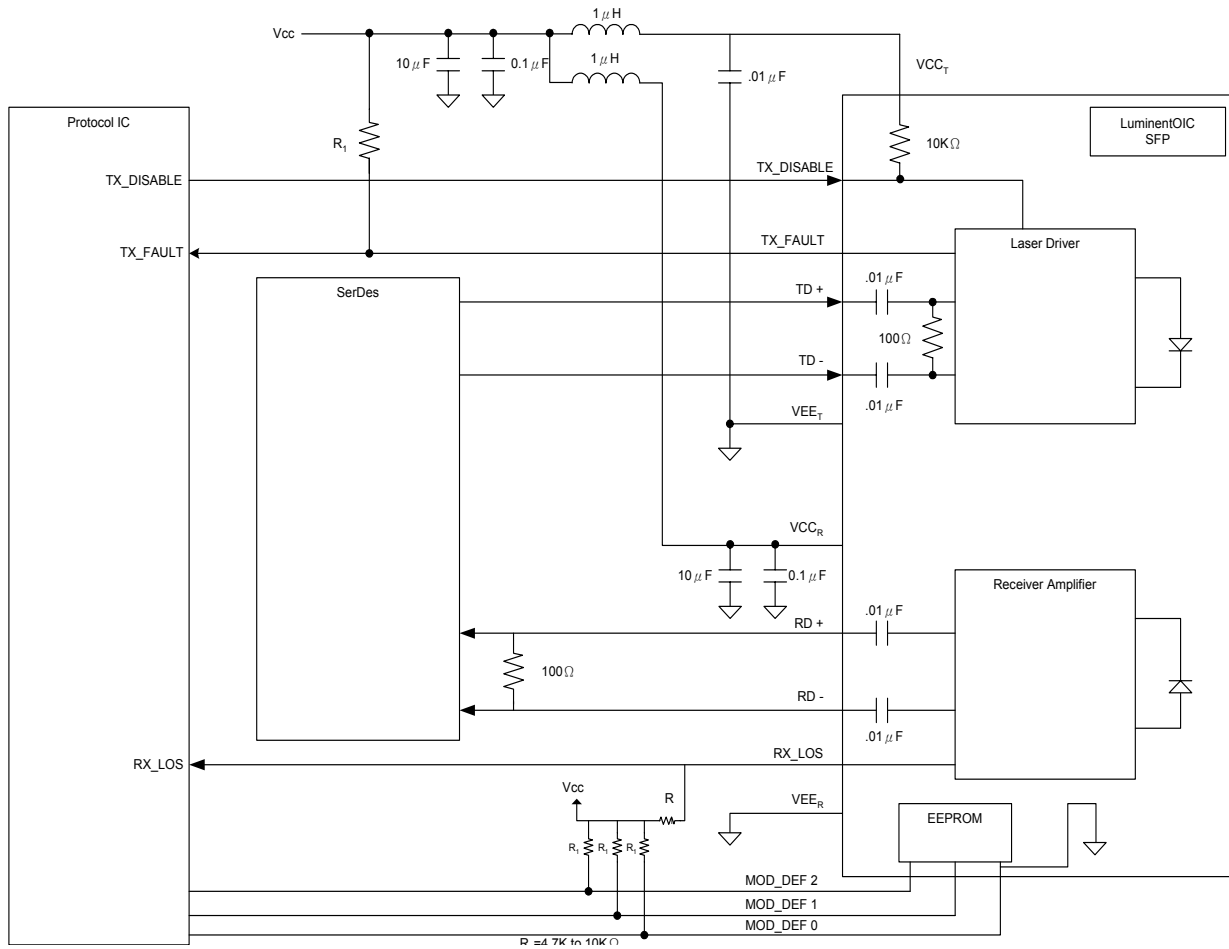
Outline Drawing



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:

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