

## SP-FE-LX



## Features

- Compliant with OC3/STM-1, IEEE 802.3ah, 100BASE-LX10
- Single 3.3 V Supply
- 10 dB Minimum Link Budget
- 15 km Minimum Reach
- 1310nm FP Laser
- Commercial Temperature Available (-Cxx)
- Industrial Temperature Available (-Txx)
- SFP MSA SFF-8074i Compliant
- Telcordia GR-468 Compliant
- Digital Diagnostic SFF-8472 Compliant
- Color coded bail latch tube: Grey
- RoHS-5/6 compliant product (lead exemption) (-xxA)
- RoHS-6/6 compliant product (lead free soldering) (-xxC)

## General operating

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	$V_{CC}$	3.135	3.3	3.465	V
Total Current	$I_{CC}$	-	-	300	mA
Power Supply Noise Rejection <sup>a</sup>	PSR	100	-	-	mV <sub>p-p</sub>
Operating Temperature (-Cxx)	$T_{op}$	-5	-	70	°C
Operating Temperature (-Txx)	$T_{op}$	-40	-	85	°C
Storage Temperature	$T_{st}$	-40	-	85	°C
Data Rate	DR	10	125	155	Mbps

a) 20 Hz to 155 MHz

## Transmitter Specifications

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power	$P_{OP}$	-15	-11	-8	dBm
Average Launch Power Of Off Tx	$P_{Off}$	-	-	-45	dBm
Extinction Ratio	ER	6.6	-	-	dB
Eye Mask	IEEE 802.3ah and SONET/SDH Compliant				
Optical Rise Time <sup>b</sup>	$t_r$	-	-	2	ns
Optical Fall Time <sup>b</sup>	$t_f$	-	-	2	ns
Mean Wavelength	$\lambda$	1260	1310	1360	nm
Spectral Width (RMS)	$\Delta\lambda$	-	-	7.7	nm
Optical Return Loss Tolerance	ORLT	-	-	12	dB

b) 20%-80% values

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## Transmitter Specifications (Electical)

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedence	$R_{in}$	80	100	120	$\Omega$
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

Parameter	Symbol	Min	Typical	Max	Unit
Receive Power Low <sup>c</sup>	$R_{sens,low}$	-	-34	-25	dBm
Receive Power High	$R_{sens,high}$	-8	-	-	dBm
Damage Threshold For Receiver	$P_{in,damage}$	0	-	-	dBm
Wavelength <sup>d</sup>	$\lambda$	1260	1310	1360	nm
Los Assert		-44	-	-	dBm
Los De-assert		-	-	-25	dBm
Los Hysteresis		0.5	-	-	dB

c) 27-1 PRBS, BER 10<sup>-12</sup>

d) Operational over 1200 to 1625 nm range

## Electrical Output

Parameter	Symbol	Min	Typical	Max	Unit
PECL Single Ended Data Output Swing	$V_{out,p-p}$	185	-	800	mV
Data Output Rise Time	$t_r$	-	-	2	ns
Data Output Fall Time	$t_f$	-	-	2	ns

## Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	$t_{on}$	-	-	25	ms
Tx Disable Assert Time	$t_{off}$	-	-	10	$\mu$ s
Time To Initialize, Including Reset Of Tx Fault	$t_{init}$	-	-	300	ms
Tx Fault Assert Time	$t_{fault}$	-	-	100	$\mu$ s
Tx Disable To Reset	$t_{reset}$	10	-	-	$\mu$ s
Los Assert Time	$t_{loss,on}$	-	-	300	$\mu$ s
Los De-assert Time	$t_{loss,off}$	-	-	100	$\mu$ s
Serial ID Clock Rate	$f_{serial\_clock}$	-	-	100	KHz
RX_LOS Voltage (High)		2	-	-	V
RX_LOS Voltage (Low)		-	-	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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Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Bit Value	Formula
Temperature (-CDx)	-5 to 70	±3	°C	Internal	1/256 C	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$
Temperature (-TDx)	-40 to 85	±3	°C	Internal	1/256 C	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$
Voltage	0 to Vcc	0.1	V	Internal	100µV	$V(\text{Volts}) = V_{ad}(16 \text{ bit unsigned integer}) * 0.1$
Bias Current	0 to 120	5	mA	External	-	$I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$
Tx Power	-15 to -8	±3	dBm	External	-	$Tx\_PWR(\mu W) = Tx\_PWR_{slope} * Tx\_PWR_{ad}(16 \text{ bit unsigned integer}) + Tx\_PWR_{offset}$
Rx Power	-25 to -8	±3	dBm	External	-	$Rx\_PWR(\mu W) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$

EEPROM Serial ID

Name of Field	Description 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 PN	Part number in ASCII, e.g. SP-FE-LX-CDA	40	53	S
		41	50	P
		42	46	F
		43	45	E
		44	4C	L
		45	58	X
		46	43	C
		47	44	D
48	41	A		

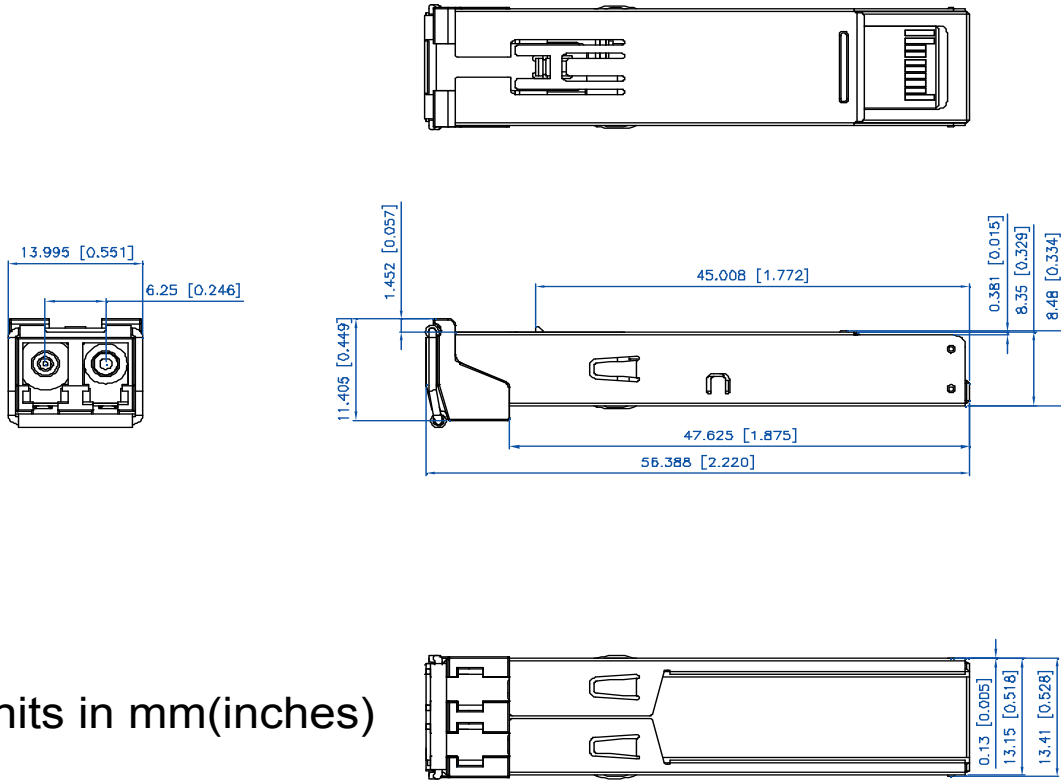
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## Pinout Definitions

Pin	Function	Notes
1	V <sub>ee</sub> 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_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	V <sub>ee</sub> R	RX Ground
10	V <sub>ee</sub> R	RX Ground
11	V <sub>ee</sub> R	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	V <sub>ee</sub> R	RX GND
15	V <sub>cc</sub> R	RX Power
16	V <sub>cc</sub> T	TX Power
17	V <sub>ee</sub> T	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	V <sub>ee</sub> T	TX GND

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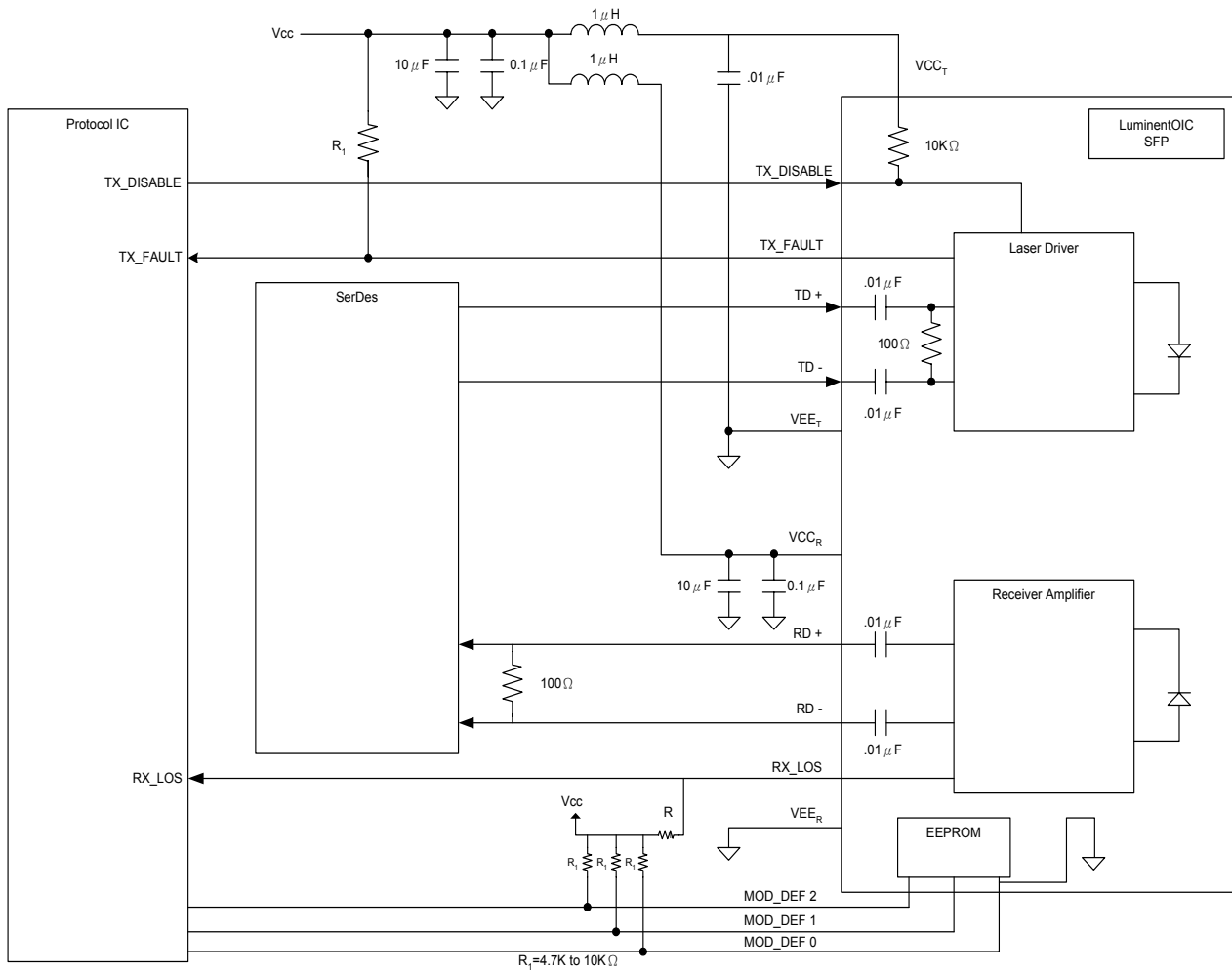
Outline drawing



Units in mm(inches)

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Suggested Transceiver Interface



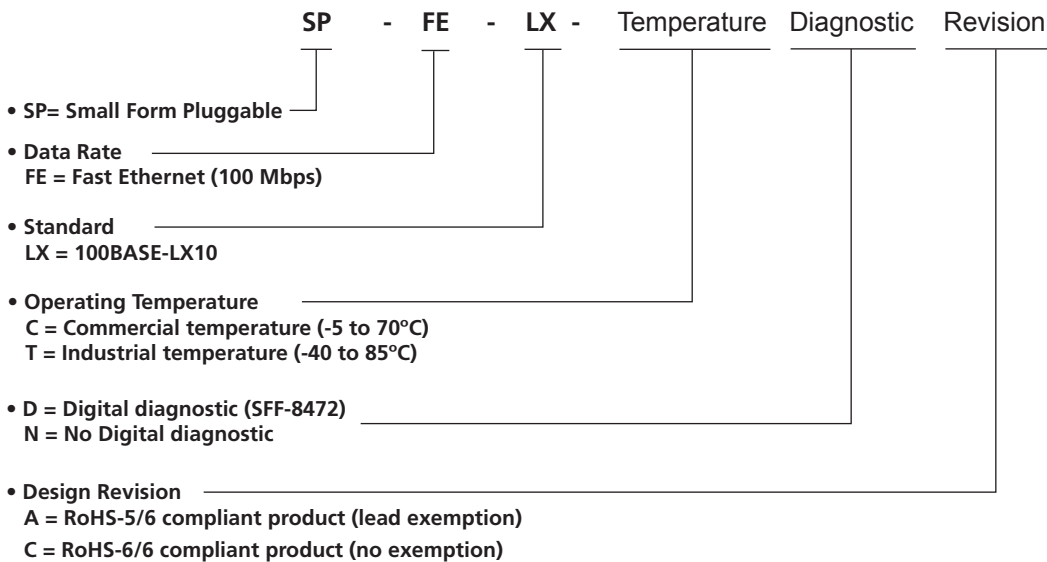
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Ordering Information

Available Options:

- SP-FE-LX-CDA    SP-FE-LX-CDC
- SP-FE-LX-CNA    SP-FE-LX-CNC
- SP-FE-LX-TDA    SP-FE-LX-TDC
- SP-FE-LX-TNA    SP-FE-LX-TNC

Part numbering Definition:



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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