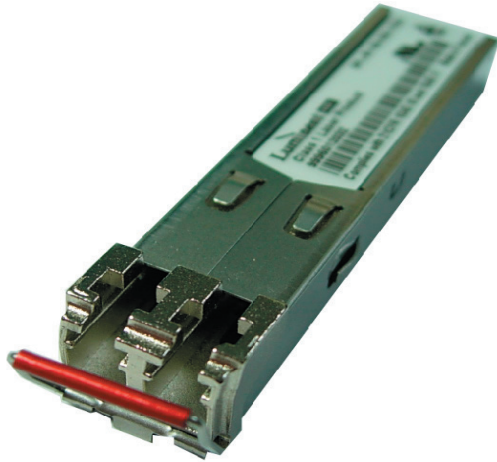


SP-48-LR1



Features

- Compliant with OC48/STM-16 Standards
- Single 3.3 V supply
- 40 km reach
- 25 dB min, 29.5 dB typical link budget
- Commercial Temperature Available (-CxA)
- Industrial Temperature Available (-TxA)
- Reduced Temperature Available (-RxA)
- 1310nm DFB Laser
- APD receiver
- SFP MSA SFF-8074i compliant
- GR 253/STM G.957 compliant
- Telcordia GR-468 compliant
- Digital Diagnostic SFF-8472 Rev. 9.3 compliant
- Color code Bail Latch : Red
- RoHS compliant

General Operating

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 Noise Rejection ^a	PSR	100	-	-	mVp-p
Operating Temperature(-CDA)	T_{op}	-5	-	70	°C
Operating Temperature(-RDA)	T_{op}	-20	-	85	°C
Operating Temperature(-TDA)	T_{op}	-40	-	85	°C
Storage Temperature	T_{stg}	-40	-	85	°C
Data Rate OC48/STM-16	DR	-	2488.32	-	Mbps

a) 20Hz to 155MHz

Transmitter Specifications, Optical

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power	P_{op}	-2	0.5	3	dBm
Average Launch Power of Off Tx	P_{off}	-	-	-30	dBm
Extinction Ratio	ER	8.2	-	-	dB
Eye Mask	SONET/SDH compliant				
Optical Jitter Generation	J_{gen}	-	-	0.007	UI
Optical Rise Time ^b	t_r	-	-	160	ps
Optical Fall Time ^b	t_f	-	-	160	ps
Mean Wavelength	λ	1280	1310	1335	nm
Spectral Width (20dB)	$\Delta\lambda$	-	-	1	nm
Dispersion Penalty (40Km) ^c	dp	-	-	1	dB
Relative Intensity Noise	RIN	-	-	-120	dB/Hz
Reflectance Tolerance ^d	rp	-24	-	-	dB

b) 20%-80% values

c) Measured at BER of $1e^{-10}$, PRBS of $2^{23}-1$, at eye center

d) 1dB degradation of receiver sensitivity

SP-48-LR1

Transmitter Specifications , Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedence	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 ^e	$R_{sens, low}$	-	-29	-27	dBm
Receiver Power High ^e	$R_{sens, high}$	-6	-	-	dBm
Damage Threshold for Receiver	$P_{in, damage}$	4	-	-	dBm
Wavelength ^f	λ	1280	1310	1335	nm
Maximum Reflectance of Receiver	RX_r	-	-	-27	dB
LOS Assert	-	-42	-	-	dBm
LOS De-assert	-	-	-	-27	dBm
LOS Hysteresis	-	0.5	-	-	dB

e) At 10⁻¹⁰ BER, PRBS 2²³-1

f) Operational over 1200-1625 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	-	-	175	ps
Data Output Fall Time	t_f	-	-	175	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
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-48-LR1

Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature (-CDA)	-5 to 70	±3	°C	External	$T_c(C) = T_{slope} * T_{ad}(16 \text{ bit signed twos complement value}) + T_{offset}$
Temperature (-RDA)	-20 to 85	±3	°C	External	$T_c(C) = T_{slope} * T_{ad}(16 \text{ bit signed twos complement value}) + T_{offset}$
Temperature (-TDA)	-40 to 85	±3	°C	External	$T_c(C) = T_{slope} * T_{ad}(16 \text{ bit signed twos complement value}) + T_{offset}$
Voltage	0 to Vcc	0.1	V	External	$V(\text{Volts}) = V_{slope} * V_{ad}(16 \text{ bit unsigned integer}) + V_{offset}$
Bias Current	0 to 120	5	mA	External	$I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$
Tx Power	-2 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	-31 to -6	±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	SFPVendor 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-48-LR1-CDA	40	53	S
		41	50	P
		42	34	4
		43	38	8
		44	4C	L
		45	52	R
		46	31	1
		47	43	C
		48	44	D
		49	41	A

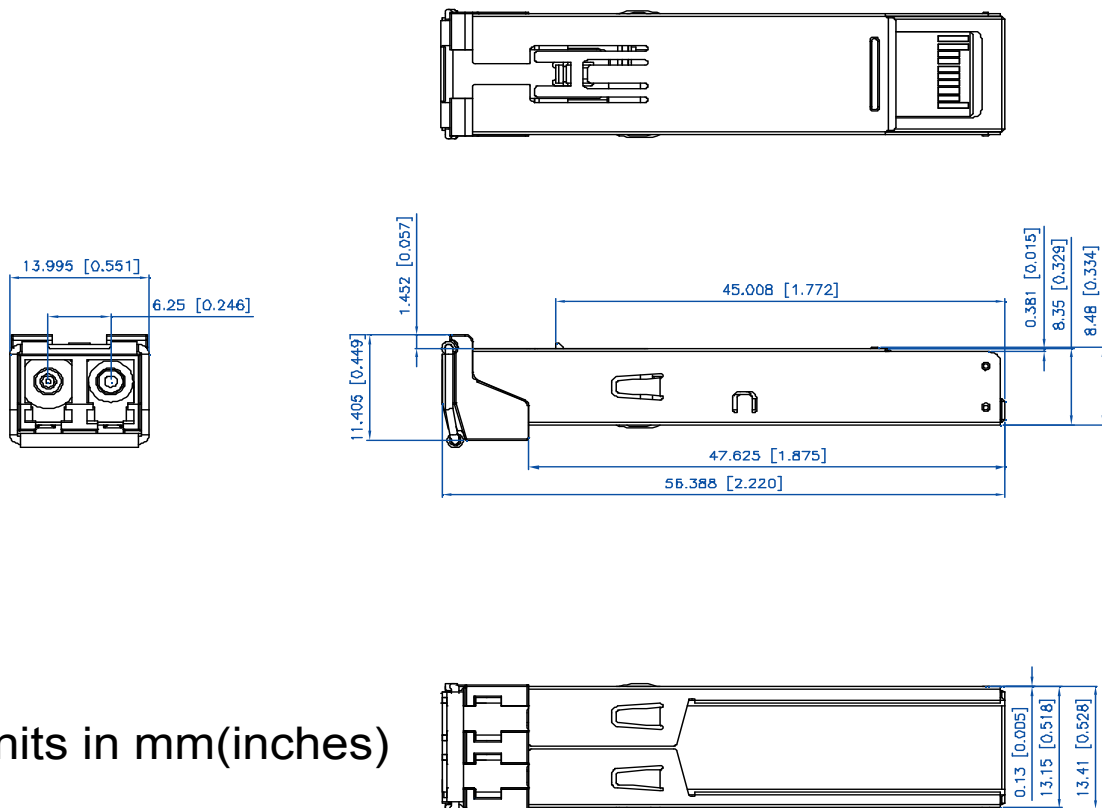
SP-48-LR1

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_DEF0	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-48-LR1

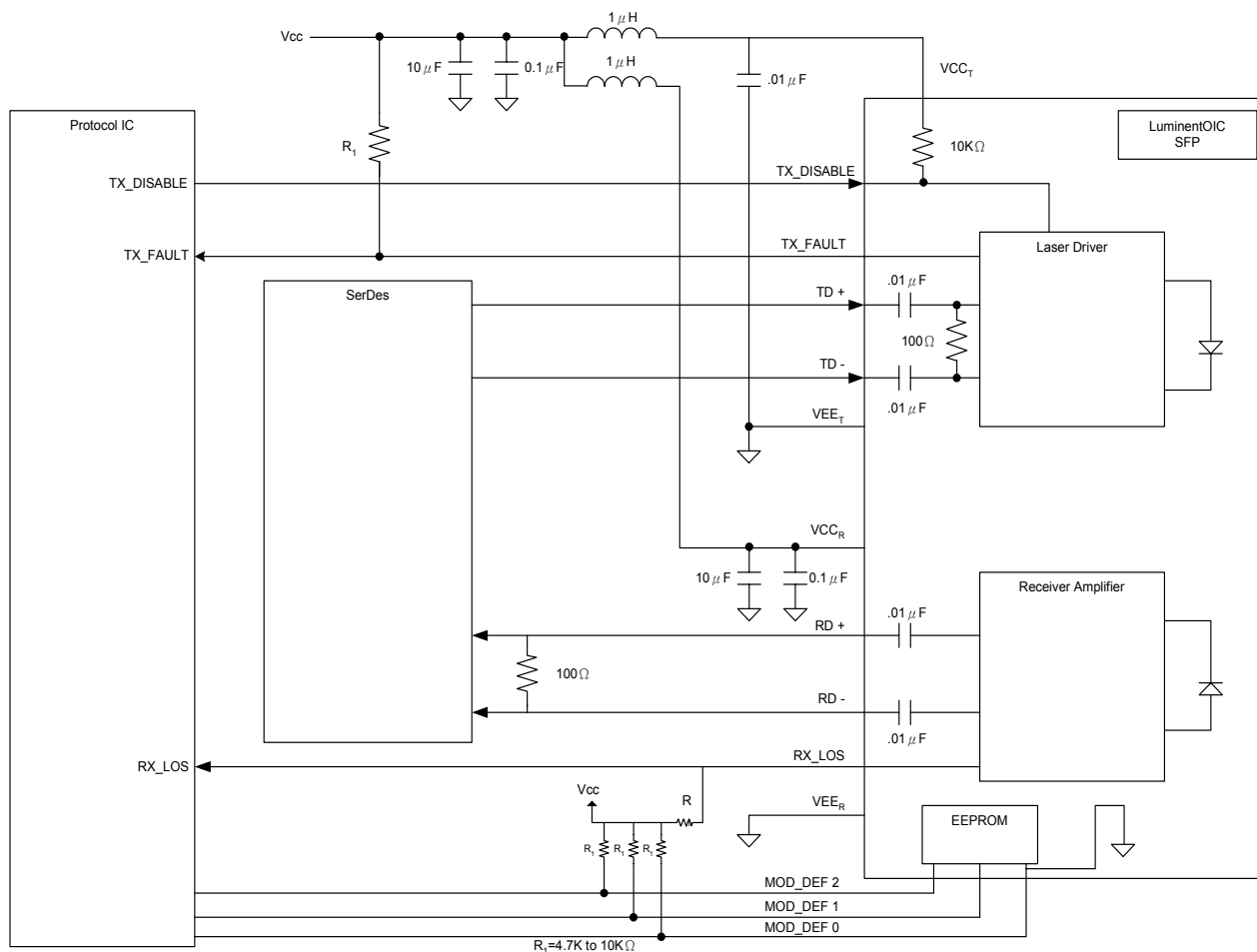
Outline Drawing



Units in mm(inches)

SP-48-LR1

Suggested Transceiver Interface



SP-48-LR1

Ordering Information

Available Options:

SP-48-LR1-CDA	SP-48-LR1-CNA
SP-48-LR1-TDA	SP-48-LR1-TNA
SP-48-LR1-RDA	SP-48-LR1-RNA

Part Numbering Definition:

SP - 03 - LR1 - Temperature Diagnostic Revision

- SP = Small Form Pluggable
- 48 = OC48
- LR1 = Long Reach 40 km
- Operating Temperature
 - C = Commercial temperature (-5 to 70°C)
 - T = Industrial temperature (-40 to 85°C)
 - R = Reduced Industrial (-20 to 85°C)
- Diagnostic
 - D = Digital Diagnostic (SFF-8472)
 - N = No Diagnostic
- Design Revision
 - A = RoHS compliant

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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