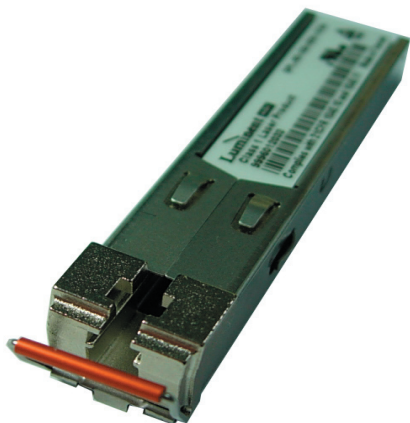


## SPL-54-MR-LR2



## Features

- Compliant with IEEE 802.3ah, 1000Base-BX10
- Compatible with OC-48/STM-16 Standards
- GR 253/ STM G.957 compliant
- Single 3.3V Supply
- Simplex LC Connector
- Digital Diagnostic SFF-8472 Compliant
- SFP MSA SFF-8074i compliant
- 26dB Minimum Power Budget
- 80km Minimum Reach
- Commercial temperature available (-Cxx)
- Industrial temperature available (-Txx)
- 1570nm DFB Laser
- Telcordia GR-468 Compliant
- Color code Bail Latch : Orange
- RoHS compliant (lead free soldered)

## 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 Noise Rejection		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 OC-48	DR	-	2488.32	-	Mbps
Data Rate FEC	DR	-	2700	-	Mbps
Data Rate Gigabit Ethernet	DR	-	1250	-	Mbps
Data Rate FC	DR	-	1062.5	-	Mbps
Data Rate 2xFC	DR	-	2125	-	Mbps

## Transmitter Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power	$P_{op}$	-2	+0.5	+3	dBm
Optical Crosstalk	XT	-	-	-45	dB
Average Launch Power (Tx:Off)	$P_{off}$	-	-	-45	dBm
Extinction Ratio	ER	8.2	-	-	dB
Eye Mask		SONET/SDH and IEEE 802.3ah Compliant			
Optical Rise Time (20% to 80% values)	$t_r$	-	-	160	ps
Optical Fall Time (20% to 80% values)	$t_f$	-	-	160	ps
Mean Wavelength	$\lambda$	1560	1570	1580	nm
Spectral Width (20dB)	$\Delta\lambda$	-	-	1	nm
Relative Intensity Noise	RIN	-	-	-120	dB/Hz
Transmitter Reflectance	-	-	-	-12	dB
Dispersion penalty (80km) <sup>a</sup>	dp	-	0.5	1	dB
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Reflectance Tolerance	rp	-24	-	-	dB

a) Measured at 2.7 Gb/s, BER of  $10^{-12}$ , PRBS of  $2^{23}-1$ , at eye center

## SPL-54-MR-LR2

## Transmitter Specifications (Electrical)

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedance	$R_{in}$	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 (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Receiver Power Low <sup>b</sup>	$R_{sens, low}$	-	-30	-28	dBm
Receiver Power High <sup>b</sup>	$R_{sens, high}$	-10	-	-	dBm
Damage Threshold for Receiver	$P_{in, damage}$	-	-	0	dBm
Wavelength	$\lambda$	1480	-	1500	nm
LOS Assert	-	-38	-	-	dBm
LOS De-assert	-	-	-	-28	dBm
LOS hysteresis	-	0.5	-	-	dB
Receiver Reflectance	-	-	-	-12	dB

b) Measured at  $10^{-10}$  BER, 2.7 Gb/s,  $2^{23}-1$  PRBS, and  $10^{-12}$  BER, 1250 Mb/s,  $2^7-1$  PRBS

## 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	$t_r$	-	-	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	$\mu$ 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	$t_{loss\_on}$	-	-	100	$\mu$ s
LOS De-assert time	$t_{loss\_off}$	-	-	100	$\mu$ s
Serial ID Clock Rate	$f_{serial\_clock}$	-	-	100	KHz
RX_LOS Voltage (high)	$Rx\_LOS_H$	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

SPL-54-MR-LR2

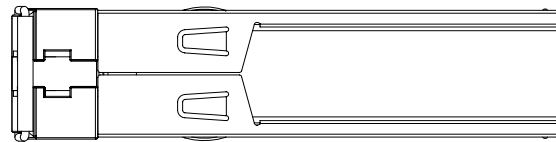
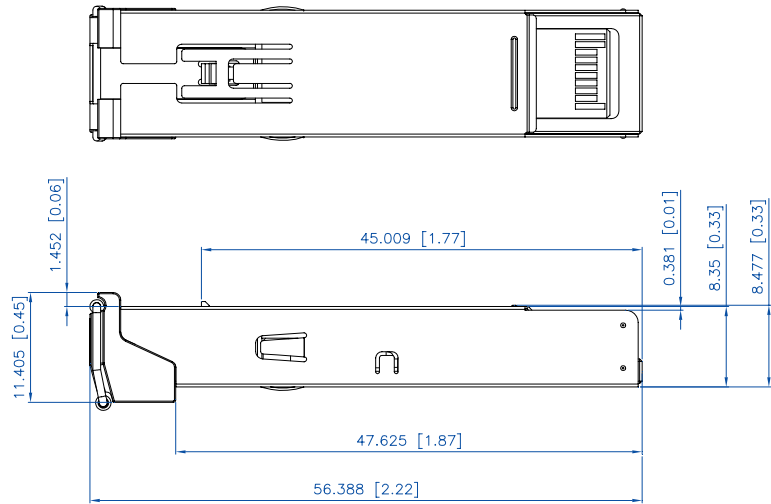
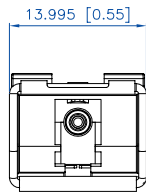
Diagnostics						
Parameter	Range	Accuracy	Unit	Calibration	Bit Value	Formula
Temperature (-Cxx)	-5 to 70	±3	°C	Internal	1/256 C	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$
Temperature (-Txx)	-40 to 85	±3	°C	Internal	1/256 C	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$
Voltage	0 to Vcc	.1	V	Internal	100µV	$V(\text{Volts}) = V_{ad}(16 \text{ bit unsigned integer}) * 0.1$
Bias Current	0 to 120	5	mA	External	0.002mA	$I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$
Tx Power	-2 to +3	±2dB	dBm	External	0.1µV	$Tx\_PWR(\mu W) = Tx\_PWR_{slope} * Tx\_PWR_{ad}(16 \text{ bit unsigned integer}) + Tx\_PWR_{offset}$
Rx Power	-28 to -10	±2dB	dBm	External	0.1µV	$Rx\_PWR(\mu W) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$

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. SPL-54-MR-LR2-CDA	40	53	S
		41	50	P
		42	4C	L
		43	35	5
		44	34	4
		45	4D	M
		46	52	R
		47	4C	L
		48	52	R
		49	32	2
		50	43	C
		51	44	D
52	41	A		

## Pinout Definitions

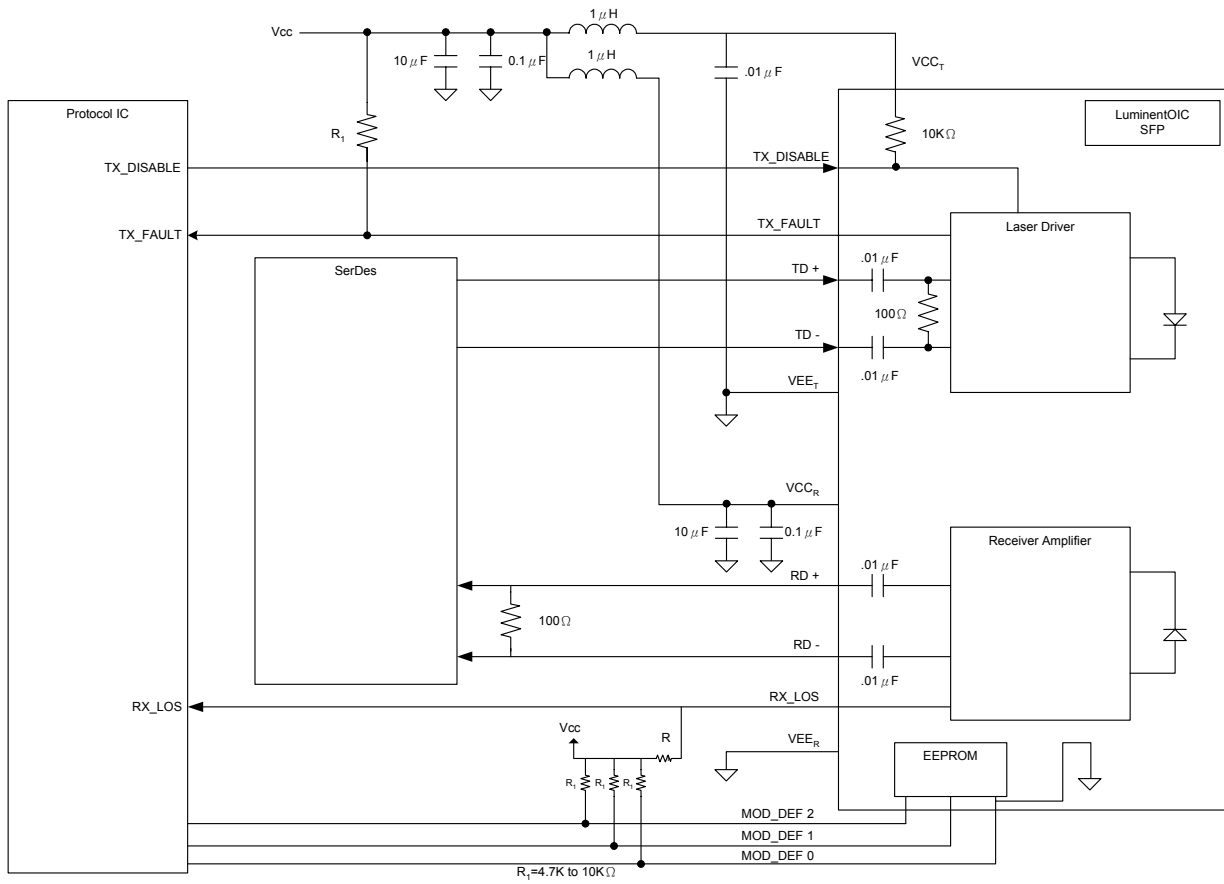
Pin	Function	Notes
1	V <sub>ee</sub> T	TX GND
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	V <sub>ee</sub> R	RX Ground
10	V <sub>ee</sub> R	RX Ground
11	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

Mechanicals



**Units in mm (inches)**

### Suggested Transceiver Interface



Ordering Information

**Available Options:**  
 SPL-54-MR-LR2-CDA  
 SPL-54-MR-LR2-CNA  
 SPL-54-MR-LR2-TDA  
 SPL-54-MR-LR2-TNA

Part numbering Definition:

SPL - 54 - MR - LR2 - Temperature Diagnostic Revision

- SPL = LC connector
- 54 = Tx 1570nm/Rx 1490nm
- MR = Multi Rate
- LR2 = Reach 80 km
- Operating Temperature
  - C = Commercial temperature (-5 to 70°C)
  - T = Industrial temperature (-40 to 85°C)
- D = Digital Diagnostic (SFF-8472)
  - N = No Diagnostic
- Design Revision
  - A = RoHS compliant (lead free soldered)

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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