

## SFP-MR-IR1



### Features

- Single 3.3V supply
- 15dB min, 19.5 typical link budget
- -5 to 70°C temperature range
- 1310nm DFB laser
- SFP MSA SFF-8074i compliant
- GR 253/STM G.957 compliant
- Digital Diagnostic SFF-8472 compliant
- Bellcore GR-468 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 <sup>a</sup>		100	-	-	mVp-p
Operating Temperature(case)	$T_{opr}$	-5	-	70	°C
Storage Temperature	$T_{stg}$	-40	-	85	°C
Data Rate	DR	100	-	2700	Mbps

a) 20Hz to 155MHz

### Transmitter Specifications, Optical

Parameter	Symbol	Min	Typical	Max	Unit
Optical power	$P_{op}$	-5	-2.5	0	dBm
Average Launch power of off Tx	$P_{off}$	-	-	-30	dBm
Extinction Ratio	ER	8.2	-	-	dB
Eye Mask		IEEE 802.3z, SONET/SDH compliant			
Optical Jitter generation	$J_{gen}$	-	-	0.002	UI
Optical Rise time <sup>b</sup>	$t_r$	-	-	160	ps
Optical Fall time <sup>b</sup>	$t_f$	-	-	160	ps
Mean Wavelength	$\lambda$	1260	-	1360	nm
Spectral width (20 dB)	$\Delta\lambda$	-	-	1	nm
Dispersion penalty(15Km) <sup>c</sup>	dp	-	0.5	1	dB
Relative Intensity Noise	RIN	-	-	-120	dB/Hz
Reflectance Tolerance	rp	-24	-	-	dB

b) 20%-80% values

c) Measured at BER of  $1e^{-12}$ , PRBS of 2<sup>23</sup>-1, at eye center

d) 1 dB degradation of receiver sensitivity

## SFP-MR-IR1

## Transmitter Specifications , Electrical

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, Optical

Parameter	Symbol	Min	Typical	Max	Unit
Receiver Power Lowe	$R_{sens,low}$	-20	-22	-	dBm
Receiver Power High	$R_{sens,high}$	-	-	0	dBm
Damage Threshold for Receiver	$P_{in, damage}$	-	-	5	dBm
Wavelength <sup>f</sup>	$\lambda$	1260	1310	1360	nm
Maximum Reflectance of Receiver	$RX_r$	-	-	-27	dB
LOS Assert	-	-30	-	-	dBm
LOS De-assert	-	-	-	-20	dBm
LOS hysteresis	-	1	-	-	dB

e) at  $10^{-10}$  BER, PRBS  $2^{23}-1$  for SONET,  $10^{-12}$  BER, PRBS  $2^7-1$  for Gigabit ethernet

f) Operational over 1200-1625 nm range

## Electrical Output

Parameter	Symbol	Min	Typical	Max	Unit
PECL Single ended data output swing	$V_{out,p-p}$	400	-	800	mV
Data output rise time	$t_r$	-	-	175	ps
Data output fall time	$t_f$	-	-	175	ps

## SFP-MR-IR1

## Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate time	t_on	-	-	1	ms
Tx Disable assert time	t_off	-	-	10	µs
Time to initialize, including reset of Tx fault	t_init	-	-	300	ms
Tx fault Assert time	t_fault	-	-	100	µs
Tx Disable to reset	t_reset	10	-	-	µs
LOS Assert time	t_loss_on	-	-	100	µs
LOS De-assert time	t_loss_off	-	-	100	µs
Serial ID Clock Rate	f_serial_clock	-	-	100	KHz
RX_LOS Voltage (high)	Rx_LOS <sub>H</sub>	2	-	-	V
RX_LOS Voltage (low)	RX_LOS <sub>L</sub>	-	-	0.8	V
LOS output voltage-Fault	V <sub>LOS</sub> fault	2	-	V <sub>cc</sub>	V
LOS output voltage-Normal	V <sub>LOS</sub> normal	V <sub>ee</sub>	-	V <sub>ee</sub> + 0.5	V
MOD_DEF (0:2)-High	V <sub>h</sub>	2	-	V <sub>cc</sub>	V
MOD_DEF (0:2)-Low	V <sub>l</sub>	V <sub>ee</sub>	-	V <sub>ee</sub> + 0.5	V

## Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Bit Value	Formula
Temperature	-5 to 70	±3	°C	Internal	1/256 C	T <sub>c</sub> (C) = T <sub>ad</sub> (16 bit signed twos complement)/256
Voltage	0 to V <sub>cc</sub>	0.1	V	Internal	100µV	V(Volts) = V <sub>ad</sub> (16 bit unsigned integer)*0.1
Bias Current	0 to 120	5	mA	External	-	I(mA) = I <sub>slope</sub> * I <sub>ad</sub> (16 bit unsigned integer)+I <sub>offset</sub>
Tx Power	0 to 0.5	±3dB	mW	External	-	T <sub>x_PWR</sub> (µW) = T <sub>x_PWRslope</sub> *T <sub>x_PWRad</sub> (16 bit unsigned integer)+T <sub>x_PWRoffset</sub>
Rx Power	-20 to 0dBm	±3dB	mW	External	-	R <sub>x_PWR</sub> (µW) = A0+A1*x+A2*x <sup>2</sup> +A3*x <sup>3</sup> +A4*x <sup>4</sup>

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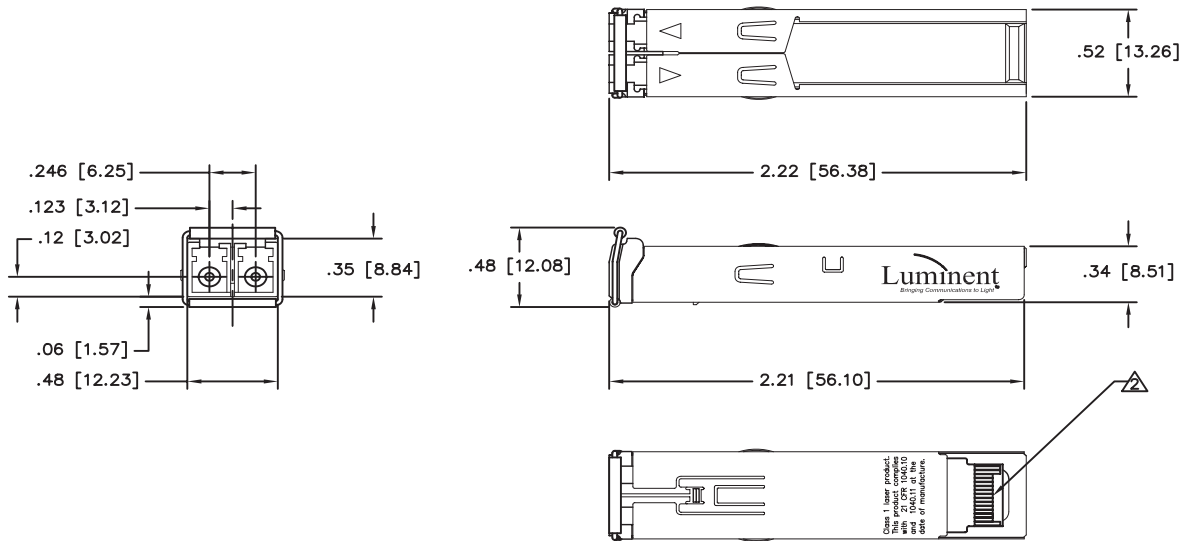
EEPROM Serial ID				
Name of Field	Discription of Field	Address	Hex	ASCII
Vendor Name	SFPVendor name (ASCII)	20	4C	L
		21	55	U
		22	4D	M
		23	49	I
		24	4E	N
		25	45	E
		26	4E	N
		27	54	T
Vendor OUI	IEEE vendor OUI code for LuminentOIC Inc.	37	00	
		38	06	
		39	B5	
Vendor PN	Part number in ASCII, e.g. SFP-MR-IR1	40	53	S
		41	46	F
		42	50	P
		43	4D	M
		44	52	R
		45	49	I
		46	52	R
		47	31	1

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

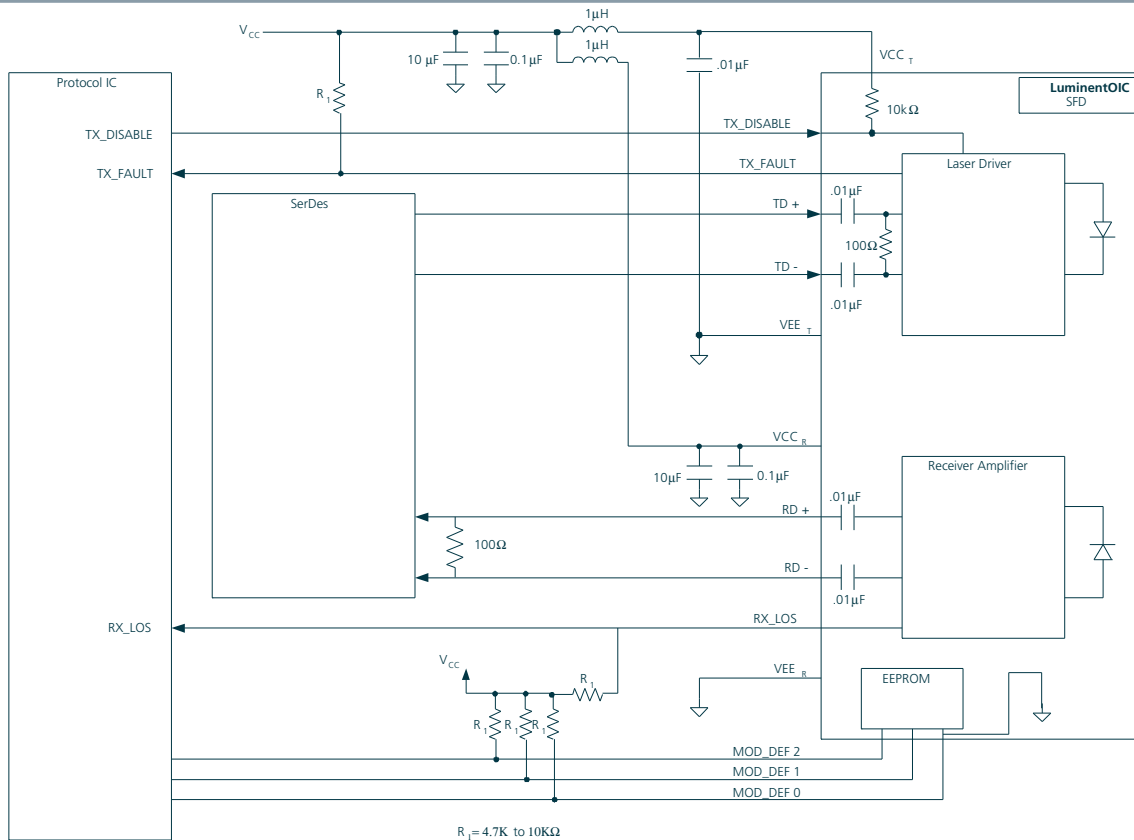
## SFP-MR-IR1

Units in inches [mm]

### Outline Drawing



### Suggested Transceiver Interface



SFP-MR-IR1

Ordering Information

Available Options:

- SFP-MR-IR1
- SFP-MR-IR1-D1

Part numbering Definition:

SFP-MR-IR1 - Latch type - Digital Diagnostics - Customer Specific

- Blank=Bail  
A= I-Latch
- Blank=No Diagnostic  
D1= External Calibration  
D2= Internal Calibration
- 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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