

SP-MR-IR1



Features

- Single 3.3V supply
- 15 km reach
- 15dB min, 19.5 typical link budget
- Commercial and Reduced Industrial temperature available
- 1310nm DFB laser
- SFP MSA SFF-8074i compliant
- GR 253/STM G.957 compliant
- Digital Diagnostic SFF-8472 Rev.9.3 compliant
- Telcordia GR-468 compliant
- RoHS 5/6 compliant (Lead Exemption)

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	RSP	100	-	-	mVp-p
Operating Temperature(Cxx)	T_{op}	-5	-	70	°C
Operating Temperature(-Rxx)	T_{op}	-20	-	85	°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}	-	-	0.007	UI
Optical Rise time ^b	t_r	-	-	160	ps
Optical Fall time ^b	t_f	-	-	160	ps
Mean Wavelength	λ	1260	-	1360	nm
Spectral width (20 dB)	$\Delta\lambda$	-	-	1	nm
Dispersion penalty(15Km) ^c	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 $2^{23}-1$, at eye center

d) 1 dB degradation of receiver sensitivity

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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 Lowe	$R_{sens, low}$	-	-22	-20	dBm
Receiver Power High ^e	$R_{sens, high}$	0	-	-	dBm
Damage Threshold for Receiver	$P_{in, damage}$	5	-	-	dBm
Wavelength ^f	λ	1260	1310	1360	nm
Maximum Reflectance of Receiver	RX_r	-	-	-27	dB
LOS Assert	-	-30	-	-	dBm
LOS De-assert	-	-	-	-20	dBm
LOS hysteresis	-	0.5	-	-	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	$V_{out, p-p}$	185	-	800	mV
Data output rise time	t_r	-	-	175	ps
Data output fall time	t_f	-	-	175	ps

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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 _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

Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Bit Value	Formula
Temperature(-CDx)	-5 to 70	±3	°C	Internal	1/256 C	Tc(C) = Tad(16 bit signed twos complement)/256
Temperature(-RDx)	-20 to 85	±3	°C	Internal	1/256 C	Tc(C) = Tad(16 bit signed twos complement)/256
Voltage	0 to Vcc	0.1	V	Internal	100μV	V(Volts) = Vad(16 bit unsigned integer)*0.1
Bias Current	0 to 120	5	mA	External	-	I(mA) = Islope * lad(16 bit unsigned integer)+loffset
Tx Power	-5 to 0	±3dB	dBm	External	-	Tx_PWR(μW) = Tx_PWRslope*T _{x_PWR} ad(16 bit unsigned integer)+Tx_PWRoffset
Rx Power	-24 to 0	±3dB	dBm	External	-	Rx_PWR(μW) = A0+A1*x+A2*x^2+A3*x^3+A4*x^4

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EEPROM Serial ID

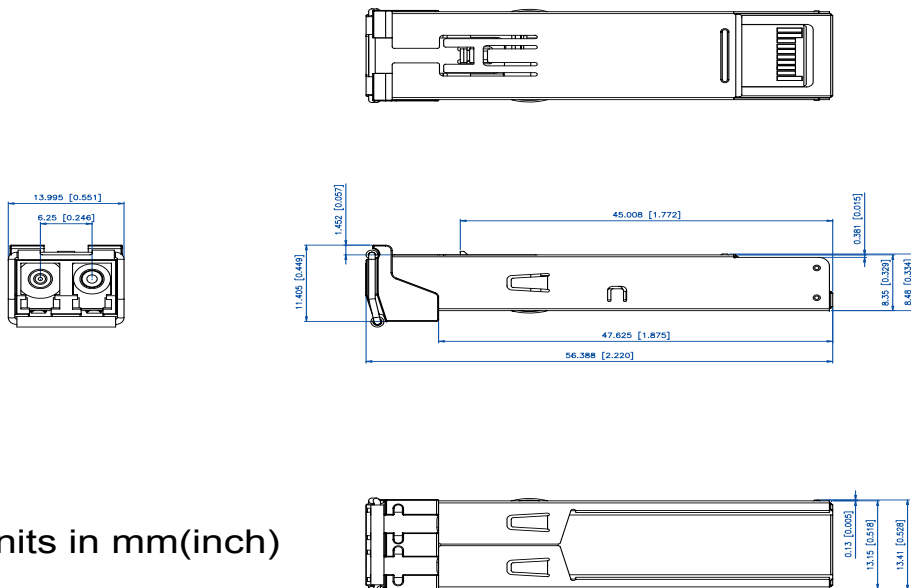
Name of Field	Discription of Field	Address	Hex	ASCII
Vendor Name	SFPVendor name (ASCII)	20	4C	L
		21	55	U
		22	4D	M
		23	49	I
		24	4E	N
		25	45	E
		26	4E	N
		27	54	T
		28	4F	O
		29	49	I
		30	43	C
Vendor OUI	IEEE vendor OUI code for LuminentOIC Inc.	37	00	
		38	06	
		39	B5	
Vendor PN	Part number in ASCII, e.g. SP-MR-IR1-CDA	40	53	S
		41	50	P
		42	4D	M
		43	52	R
		44	49	I
		45	52	R
		46	31	1
		47	43	C
		48	44	D
		49	41	A

Pinout Definitions

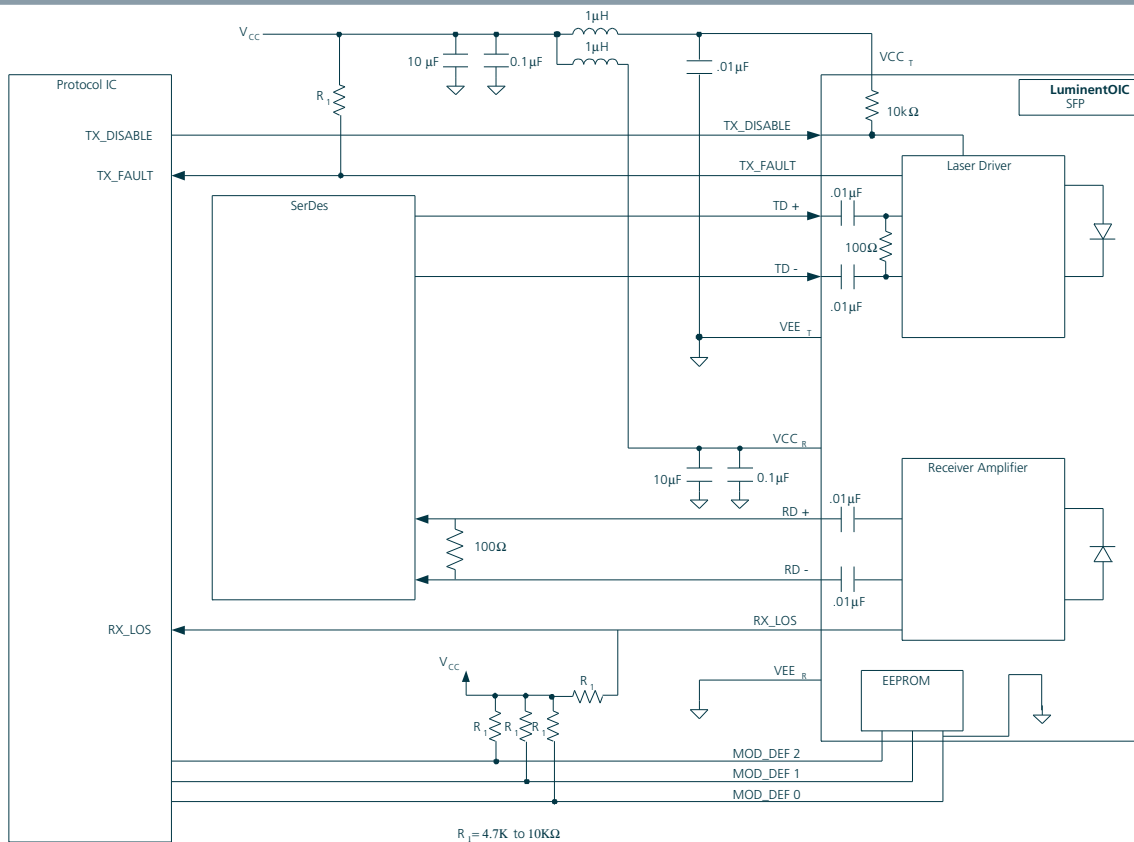
Pin	Function	Notes
1	V _{ee} T	TX GND
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	V _{ee} R	RX Ground
10	V _{ee} R	RX Ground
11	V _{ee} R	RX Ground
12	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

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Outline Drawing



Suggested Transceiver Interface



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Ordering Information

Available Options:

SP-MR-IR1-CDA
SP-MR-IR1-CNA
SP-MR-IR1-RDA
SP-MR-IR1-RNA

Part numbering Definition:

SP - MR - IR1 - Temperature Diagnostic Revision

- SP = Small Form Pluggable
- MR = Multi Rate
- IR1 = Intermediate reach 15km
- Operating Temperature
 - C = Commercial (-5 to 70)
 - R = Reduced industrial (-20 to 85)
- D = Digital Diagnostic
- N = No Digital Diagnostic
- Design Revision

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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