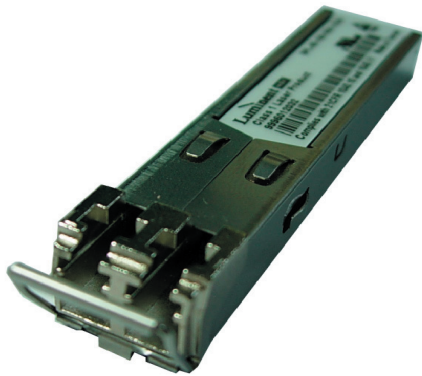


SPC-MR-LR-xx



Features

- Single 3.3 V supply
- 80 km reach
- 26dB minimum, 30.5 dB typical link budget
- Commercial temperature available
- Industrial temperature available
- CWDM wavelength, DFB laser
- APD Receiver
- SFP MSA SFF-8074i compliant
- GR 253/STM G.957 compliant
- Digital Diagnostic SFF-8472 compliant
- Telcordia GR-468 compliant
- RoHS compliant

General Operating

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Total Current, -40 to -5°C ^a	I_{CC}	-	-	500	mA
Total Current, -5 to 85°C	I_{CC}	-	-	300	mA
Total Current each supply pin	I_{CCR}, I_{CCT}	-	-	300	mA
Power Supply Noise Rejection ^b	PSR	100	-	-	mV _{p-p}
Operating Temperature (-CxA)	T_{op}	-5	-	70	°C
Operating Temperature (-TxA)	T_{op}	-40	-	85	°C
Storage Temperature	T_{st}	-40	-	85	°C
Data Rate	DR	100	-	2700	Mbps

(a) Denotes deviation from MSA

(b) 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}	-	-	-45	dBm
Extinction Ratio	ER	8.2	-	-	dB
Eye Mask	IEEE 802.3ah, SONET/SDH compliant				
Optical Jitter Generation	J_{gen}	-	-	0.007	UI
Optical Rise Time ^c	t_r	-	-	160	ps
Optical Fall Time ^c	t_f	-	-	160	ps
Mean Wavelength	λ	1xxx-6.5nm	1xxx	1xxx+6.5nm	nm
Spectral Width (20dB)	$\Delta\lambda$	-	-	1	nm
Dispersion Penalty (80 Km) ^d	dp	-	1	2	dB
Relative Intensity Noise	RIN	-	-	-120	dB/Hz
Reflection Tolerance ^e	rp	-24	-	-	dB

c) 20%-80% values

d) Measured at BER of $1e^{-12}$, PRBS of $2^{23}-1$, at eye center

e) 1 dB degradation of receiver sensitivity

SPC-MR-LR-xx

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

Parameter	Symbol	Min	Typical	Max	Unit
Receive Power Low ^f	$R_{sens,low}$	-	-30	-28	dBm
Receive Power High ^f	$R_{sens,high}$	-6	-	-	dBm
Damage Threshold For Receiver	$P_{in,damage}$	4	-	-	dBm
Wavelength	λ	1200	-	1625	nm
Maximum Reflectance Of Receiver	RX_r	-	-	-27	dB
LOS Assert		-42	-	-	dBm
LOS De-assert		-	-	-28	dBm
LOS Hysteresis		0.5	-	-	dB

^f 10^{-10} BER, PRBS 2²³-1 for SONET, 10^{-12} BER, PRBS 2⁷-1 for Gigabit Ethernet

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	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)		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

SPC-MR-LR-xx

 λ Wavelength Ordering

SPC-MR-LR-xxxDA

See table below for "XX" values

 λ_c Wavelength Guide

Code	λ_c	Unit	Code	λ_c	Unit	Code	λ_c	Unit
27	1271	nm	39	1391	nm	51	1511	nm
29	1291	nm	41	1411	nm	53	1531	nm
31	1311	nm	43	1431	nm	55	1551	nm
33	1331	nm	45	1451	nm	57	1571	nm
35	1351	nm	47	1471	nm	59	1591	nm
37	1371	nm	49	1491	nm	61	1611	nm

Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature (-CDA)	-5 to 70	± 3	$^{\circ}\text{C}$	External	$T_c(C) = T_{\text{slope}} * T_{\text{ad}}(16 \text{ bit signed twos complement value}) + T_{\text{offset}}$
Temperature (-TDA)	-40 to 85	± 3	$^{\circ}\text{C}$	External	$T_c(C) = T_{\text{slope}} * T_{\text{ad}}(16 \text{ bit signed twos complement value}) + T_{\text{offset}}$
Voltage	0 to V_{cc}	0.1	V	External	$V(\text{Volts}) = V_{\text{slope}} * V_{\text{ad}}(16 \text{ bit unsigned integer}) + V_{\text{offset}}$
Bias Current	0 to 120	5	mA	External	$I(\text{mA}) = I_{\text{slope}} * I_{\text{ad}}(16 \text{ bit unsigned integer}) + I_{\text{offset}}$
TX Power	-2 to 3	$\pm 3 \text{ dB}$	dBm	External	$TX_PWR(\mu W) = TX_PWR_{\text{slope}} * TX_PWR_{\text{ad}}(16 \text{ bit unsigned integer}) + TX_PWR_{\text{offset}}$
RX Power	-28 to -6	$\pm 3 \text{ dB}$	dBm	External	$RX_PWR(\mu W) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$

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

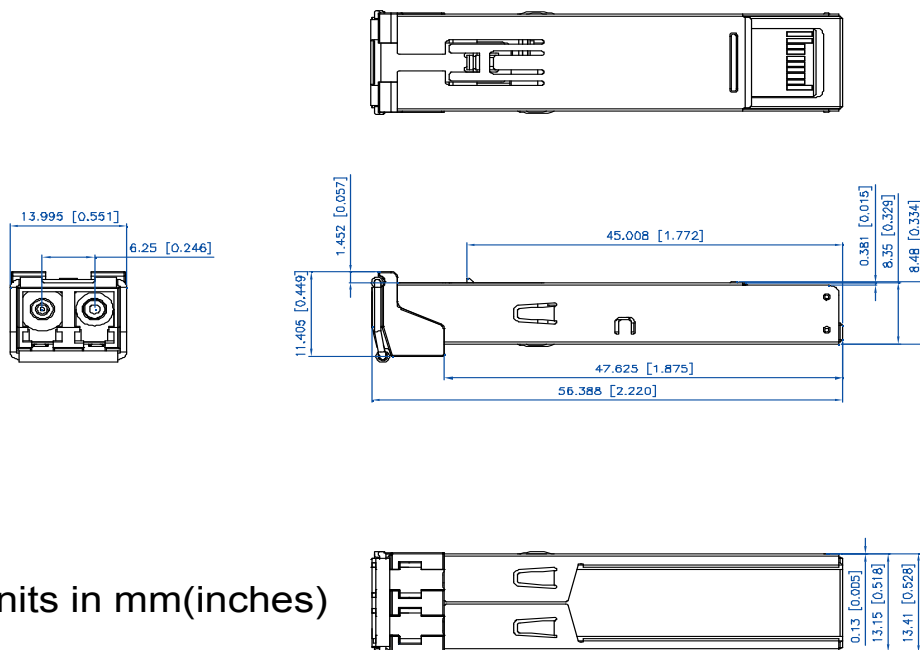
SPC-MR-LR-xx

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. SPC-MR-LR-xxxDA	40	53	S
		41	50	P
		42	43	C
		43	4D	M
		44	52	R
		45	4C	L
		46	52	R
		47	xx	x
		48	xx	x
		49	43 or 54	C or T
		50	44	D
		51	41	A

SPC-MR-LR-xx

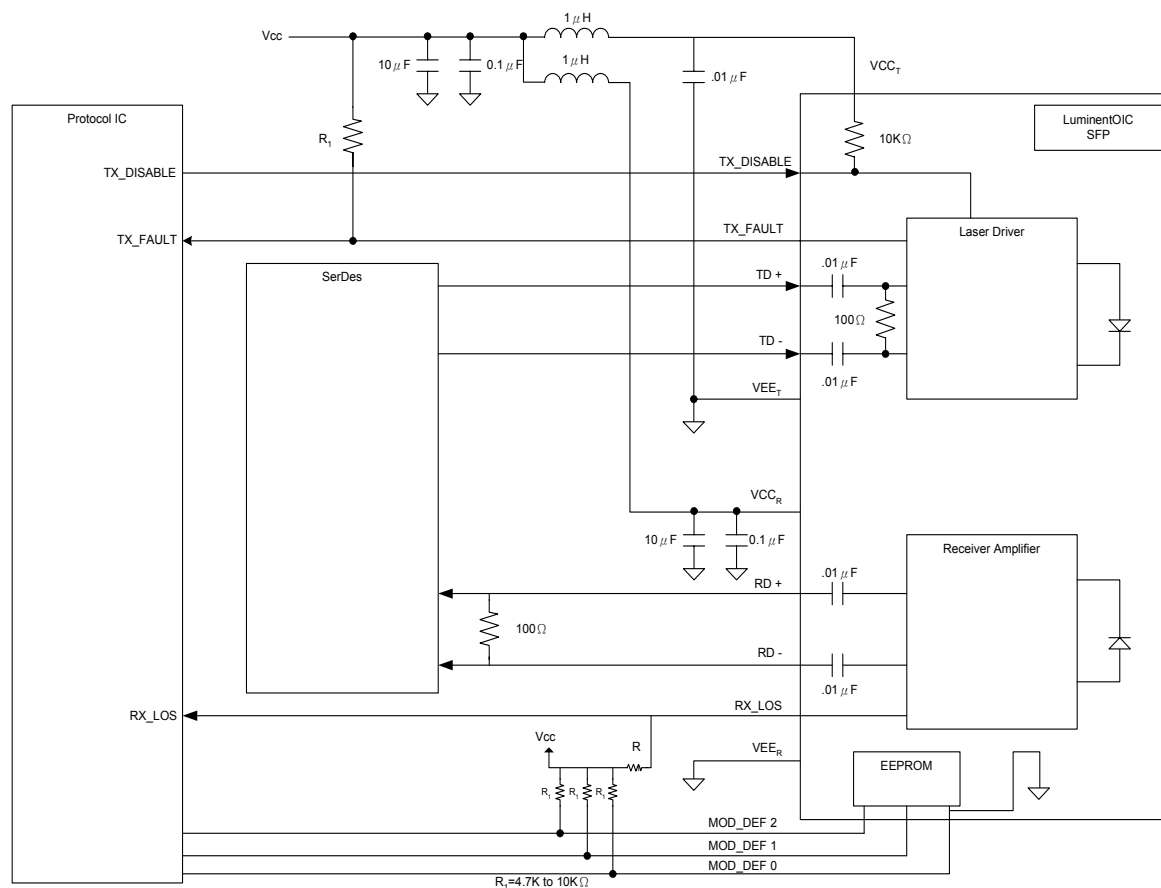
Outline Drawing



Units in mm(inches)

SPC-MR-LR-xx

Suggested Transceiver Interface



SPC-MR-LR-xx

Ordering Information

Available Options:

SPC-MR-LR-xxCDA SPC-MR-LR-xxTDA
SPC-MR-LR-xxCNA SPC-MR-LR-xxTNA

Part numbering Definition:

	SPC - MR - LR - xx	Temperature	Diagnostic	Revision
• SPC = Small Form Pluggable CWDM				
MR = Multi Rate				
LR = Long Reach 80 km				
• xx = CWDM Wavelength				
• Operating Temperature				
C = Commercial temperature (-5 to 70°C)				
T = Industrial temperature (-40 to 85°C)				
• D = Digital Diagnostic (SFF-8472)				
N = No Digital 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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