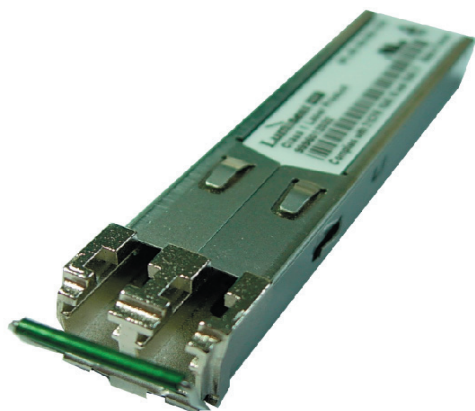


## SP-4F-01-xDA



## Features

- Single 3.3 V supply
- 10 km reach
- Supports 1.06/2.125/4.25Gb/s Fibre Channel Operation
- Gigabit Ethernet compatible
- Industrial Temperature Available (-TDA)
- Commercial Temperature Available (-CDA)
- 1310nm DFB Laser
- SFP MSA SFF-8074i 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	$I_{cc}$	-	-	300	mA
Power Supply Noise Rejection <sup>a</sup>	PSR	100	-	-	mV <sub>p-p</sub>
Operating Temperature (-CDA)	$T_{op}$	-5	-	70	°C
Operating Temperature (-TDA)	$T_{op}$	-40	-	85	°C
Storage Temperature	$T_{st}$	-40	-	85	°C
Data Rate FC-400 Fibre Channel	DR	-	4250	-	Mbps

a) 20Hz to 155MHz

## Transmitter Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power	$P_{op}$	-8.4	-	-1	dBm
Average Launch Power Of Off Tx	$P_{off}$	-	-	-45	dBm
Eye Mask		-	-	-	Fibre Channel <sup>b</sup> Compliant
Optical Rise Time <sup>c</sup>	$t_r$	-	-	130	ps
Optical Fall Time <sup>c</sup>	$t_f$	-	-	130	ps
Mean Wavelength	$\lambda$	1260	1310	1360	nm
Spectral Width (20dB)	$\Delta\lambda_{20}$	-	-	1	nm
Dispersion Penalty (10 Km) <sup>d</sup>	dp	-	0.5	1	dB
Relative Intensity Noise	RIN	-	-	-120	dB/Hz
Reflection Tolerance <sup>e</sup>	rp	-24	-	-	dB

b) FC400 compliant

c) 20%-80% values

d) Measured at BER of 1E-12, PRBS of 2<sup>7</sup>-1, at eye center

e) 1 dB degradation of receiver sensitivity

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## Transmitter Specifications (Electical)

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

Parameter	Symbol	Min	Typical	Max	Unit
Receive Power Low <sup>f</sup>	$R_{sens,low}$	-	-20	-18	dBm
Receive Power High <sup>f</sup>	$R_{sens,high}$	0	-	-	dBm
Damage Threshold For Receiver	$P_{in,damage}$	4	-	-	dBm
Wavelength	$\lambda$	1200	-	1625	nm
Maximum Reflectance Of Receiver	$RX_r$	-	-	-27	dB
LOS Assert		-28	-	-	dBm
LOS De-assert		-	-	-18	dBm
LOS Hysteresis		0.5	-	-	dB

f) at 4.25Gb/s, 1E-12 BER, PRBS 2<sup>7</sup>-1

## 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	$\mu$ 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	$f_{serial\_clock}$	2	-	100	kHz
RX_LOS Voltage (High)		2	-	$V_{cc}$	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

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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(-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 $V_{cc}$	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	-8.4 to -1	±3 dB	dBm	External	$TX\_PWR(\mu W) = TX\_PWR_{slope} * TX\_PWR_{ad}(16 \text{ bit unsigned integer}) + TX\_PWR_{offset}$
RX Power	-18 to 0	±3 dB	dBm	External	$RX\_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$

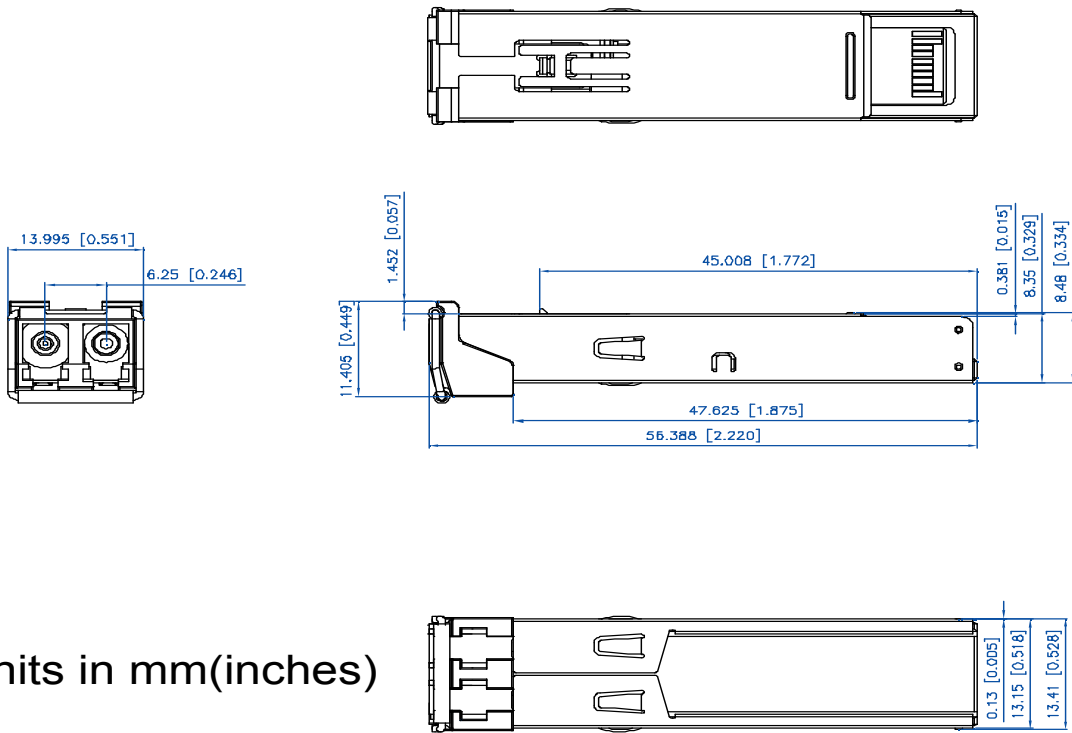
EEPROM Serial ID				
Name of Field	Description of Field	Address	Hex	ASCII
Vendor Name	SFP Vendor Name(ASCII)	20	4C	L
		21	55	U
		22	4D	M
		23	49	I
		24	4E	N
		25	45	E
		26	4E	N
		27	54	T
		28	4F	O
		29	49	I
30	43	C		
Vendor OUI	IEEE Vendor OUI Code For LuminentOIC Inc.	37	00	
		38	06	
		39	B5	
Vendor PN	Part Number in ASCII, e.g. SP4F01xDA	40	53	S
		41	50	P
		42	34	4
		43	46	F
		44	30	0
		45	31	1
		46	xx	x
		47	44	D
48	41	A		

## SP-4F-01-xDA

Pin	Function	Notes
1	V <sub>eeT</sub>	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>eeR</sub>	RX Ground
10	V <sub>eeR</sub>	RX Ground
11	V <sub>eeR</sub>	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	V <sub>eeR</sub>	RX GND
15	V <sub>ccR</sub>	RX Power
16	V <sub>ccT</sub>	TX Power
17	V <sub>eeT</sub>	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	V <sub>eeT</sub>	TX GND

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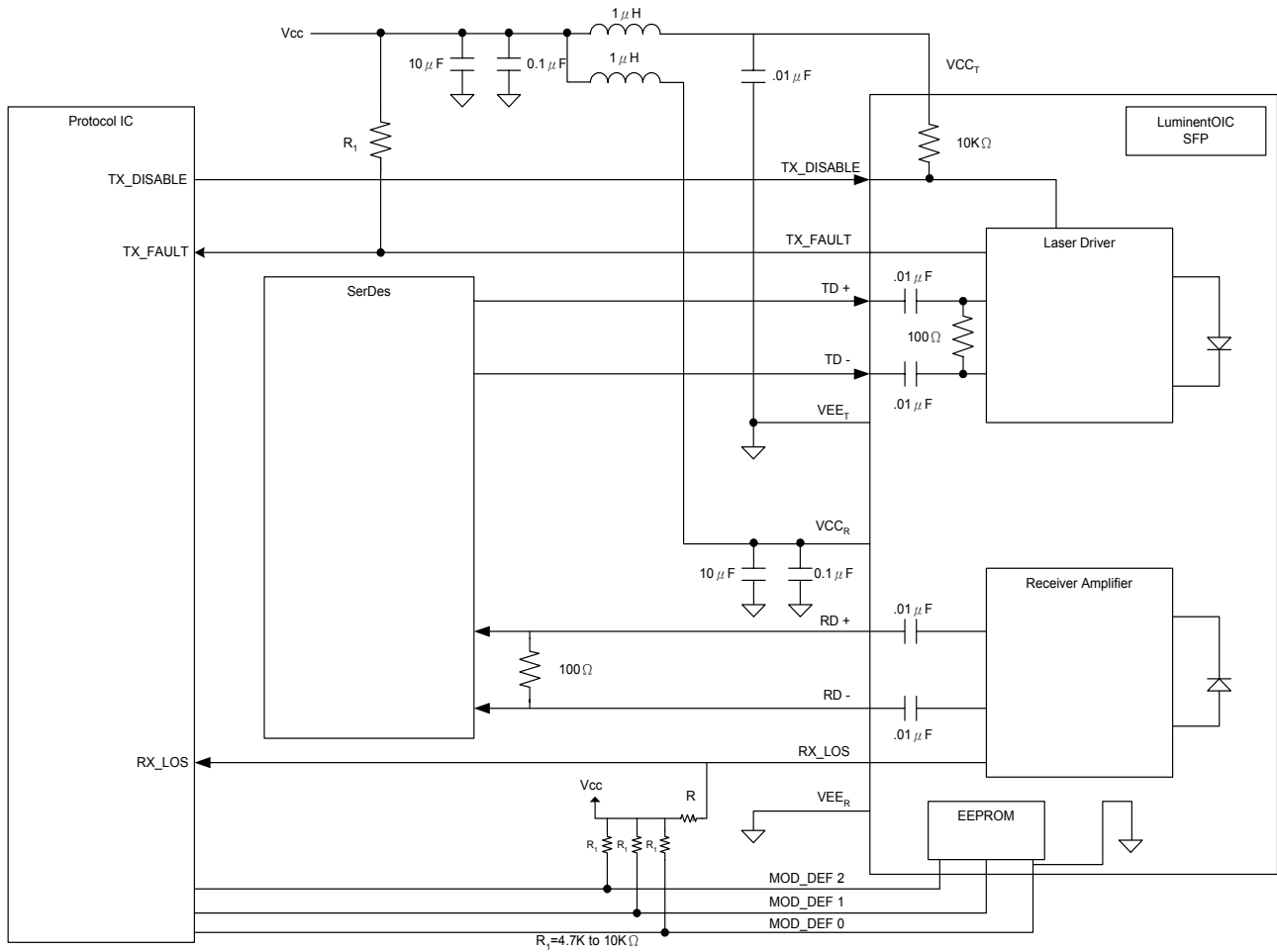
Outline Drawing



Units in mm(inches)

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Suggested Transceiver Interface



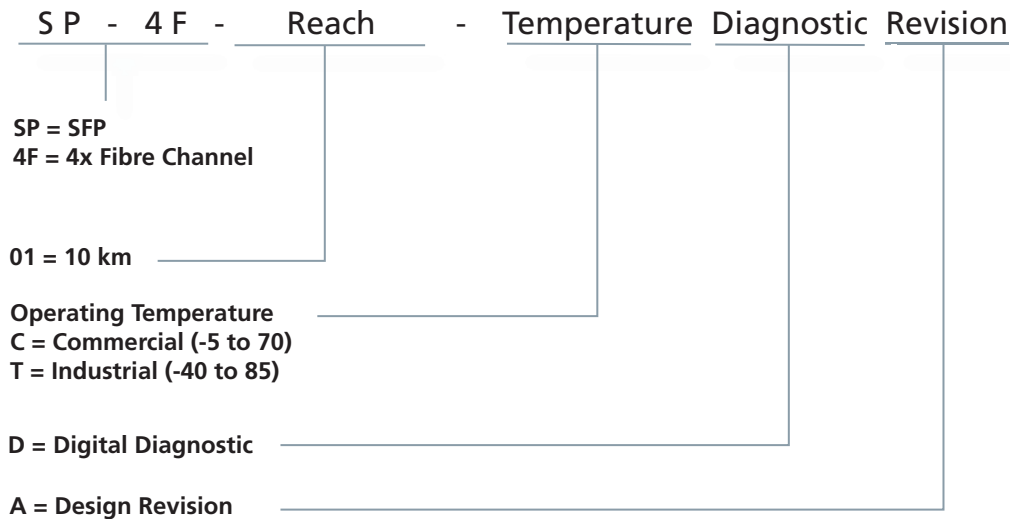
SP-4F-01-xDA

Ordering Information

Available Options:

- SP-4F-01-CDA
- SP-4F-01-TDA

Part Numbering Definition:



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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