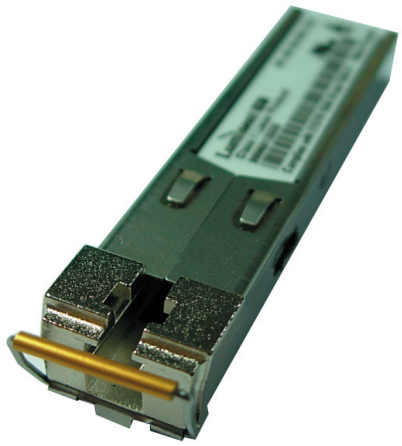
SFP Bi-Directional Transceiver
Preliminary

SPL-53-DR-IR1



Features

- **Compliant with OC-3/STM-1 and OC-12/STM-4 Standards**
- **Simplex LC connector**
- **Single 3.3 V supply**
- **15 km reach**
- **13 dB Minimum Link Budget**
- **1550nm DFB Laser**
- **Commercial temperature available (-Cxx)**
- **Industrial temperature available (-Txx)**
- **SFP MSA SFF-8074i compliant**
- **Telcordia GR-468 compliant**
- **Digital Diagnostic SFF-8472 compliant**
- **Color coded bail latch: Yellow**
- **RoHS compliant (lead free soldered)**

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[a]	PSR	100	-	-	mV_{p-p}
Operating Temperature (-Cxx)	T_{op}	-5	-	70	°C
Operating Temperature (-Txx)	T_{op}	-40	-	85	°C
Storage Temperature	T_{st}	-40	-	85	°C
Data Rate OC-3/STM-1	DR	-	155	-	Mbps
Data Rate OC-12/STM-4	DR	-	622	-	Mbps
Data Rate Fast Ethernet	DR	-	125	-	Mbps

a) 20Hz to 155MHz

Transmitter Specifications

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power	P_{OP}	-15	-11	-8	dBm
Average Launch Power Of Off Tx	P_{Off}	-	-	-45	dBm
Extinction Ratio	ER	8.2	-	-	dB
Eye Mask		IEEE 802.3 and SONET/SDH Compliant			
Optical Rise Time[b]	t_r	-	-	500	ps
Optical Fall Time[b]	t_f	-		500	ps
Mean Wavelength	λ	1480	-	1580	nm
Spectral Width (RMS)	Δλ	-	-	1	nm
Dispersion Penalty (at 15 Km)		-	0.5	1	dB
Relative Intensity Noise	RIN	-	-	-120	dB/Hz
Optical Crosstalk	XT	-	-	-45	dB
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Reflectance Tolerance	rp	-24	-	-	dB

b) 20%-80% values

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LUMNDS1689-Apr3007
Rev 0.1

Transmitter Specifications (Electical)

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	Vd	2	-	V_{cc}	V
TxDisable_Enable	Ven	V_{ee}	-	V_{ee}+0.8	V

Receiver Specifications

Parameter	Symbol	Min	Typical	Max	Unit
Receive Power Low[c]	$R_{sens,low}$	-	-30	-28	dBm
Receive Power High[c]	$R_{sens,high}$	-8	-	-	dBm
Damage Threshold For Receiver	$P_{in,damage}$	-	-	0	dBm
Wavelength	λ	1260	-	1360	nm
LOS Assert		-38	-	-	dBm
LOS De-assert		-	-	-28	dBm
LOS Hysteresis		0.5	-	-	dB
Receiver Reflectance	-	-	-	-12	dB

c) at 10^{-12} BER, FE unbalanced pattern, and 10^{-10} BER, 155.52 Mb/s & 622.08 Mb/s

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	-	-	500	ps
Data Output Fall Time	t_f	-	-	500	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

Diagnostics

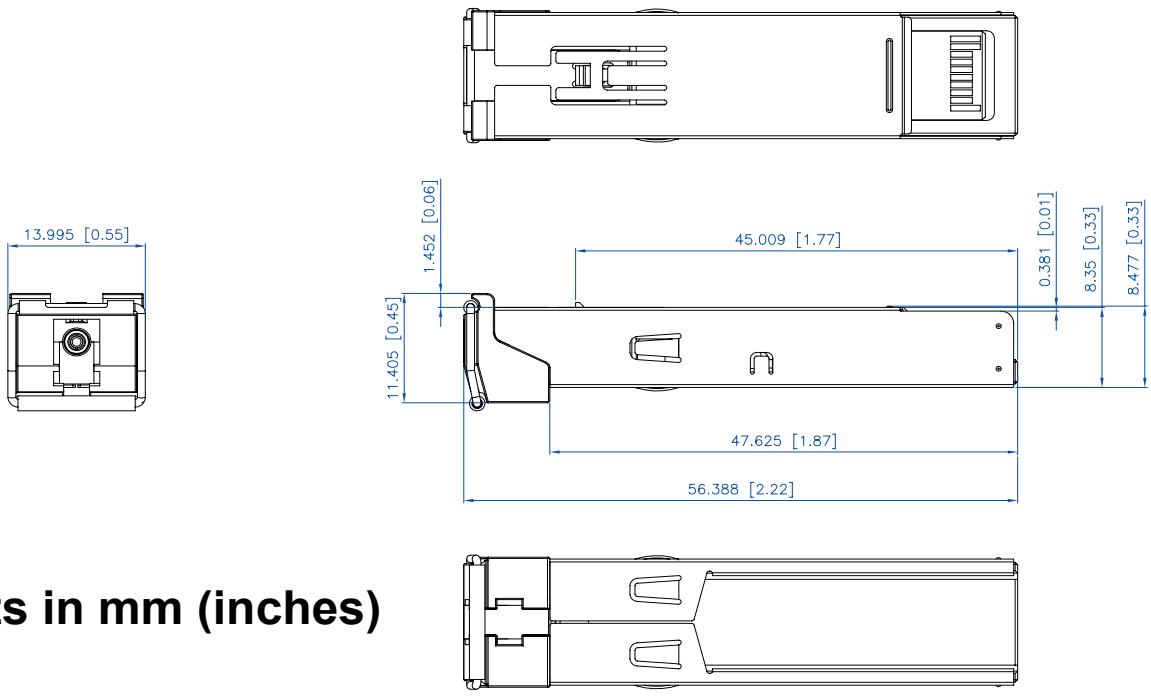
Parameter	Range	Accuracy	Unit	Calibration	Bit value	Formula
Temperature (-Cxx)	-5 to 70	±3	°C	Internal	1/256 C	Tc(C)=Tad(16 bit signed twos complement)/256
Temperature (-Txx)	-40 to 85	±3	°C	Internal	1/256 C	Tc(C)=Tad(16 bit signed twos complement)/256
Voltage	0 to V_{CC}	0.1	V	Internal	100 µV	V(Volts)=Vad(16 bit unsigned integer)*0.1
Bias current	0 to 120	5	mA	External	0.002mA	I(mA)=Islope*Iad(16 bit unsigned integer)+Ioffset
TX Power	-15 to -8	±2dB	dBm	External	0.1 µw	TX_PWR(µW)=TX_PWRslope*TX_PWRad(16 bit unsigned integer +TX_PWRoffset
RX Power	-28 to -8	±2dB	dBm	External	0.1 µw	RX_PWR(µW)=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-53-DR-IR1-CDA	40	53	S
		41	50	P
		42	4C	L
		43	35	5
		44	33	3
		45	44	D
		46	52	R
		47	49	I
		48	52	R
		49	31	1
		50	43	C
		51	44	D
		52	41	A

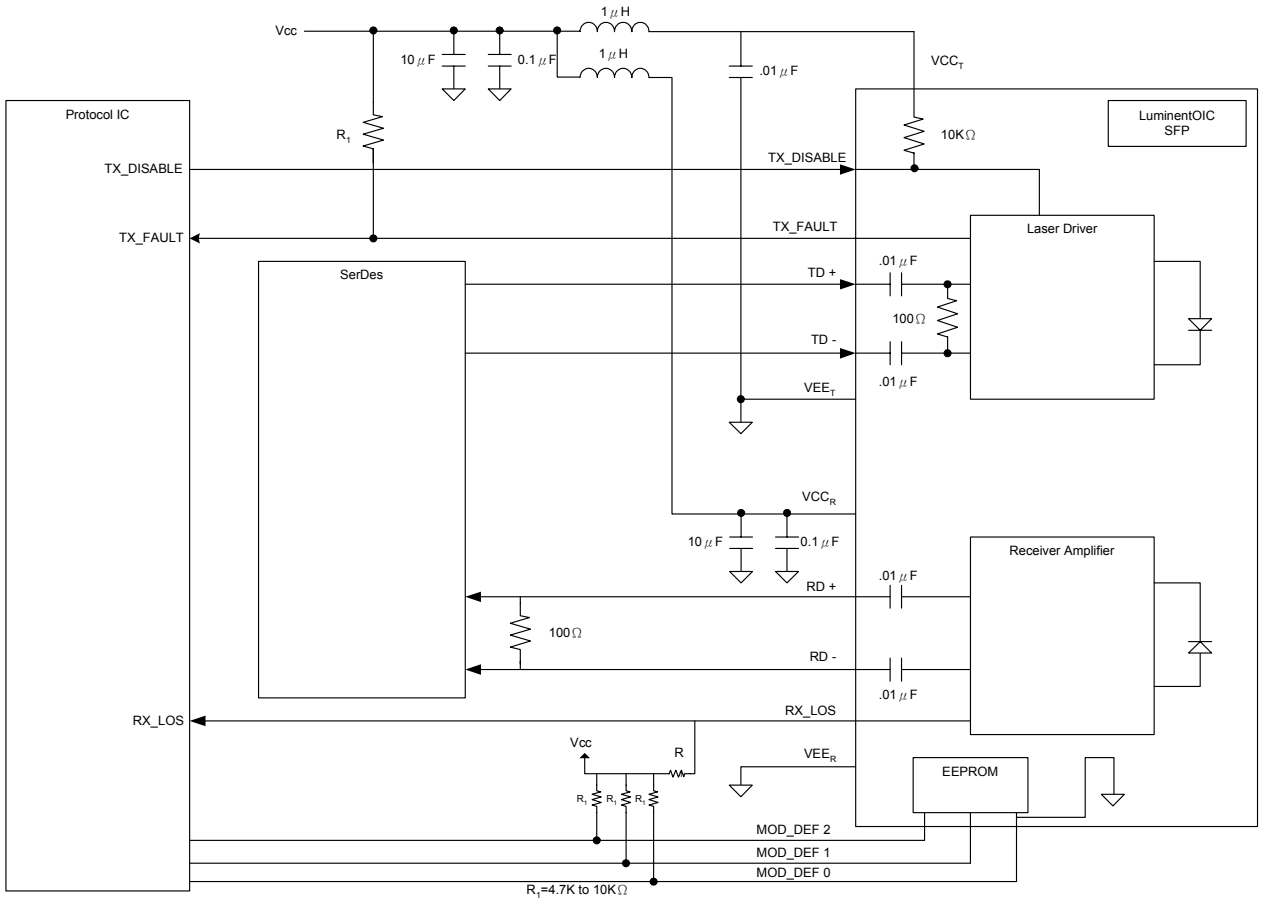
Pin	Function	Notes
1	$V_{ee}T$	TX Ground
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	$V_{ee}R$	RX Ground
10	$V_{ee}R$	RX Ground
11	$V_{ee}R$	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	$V_{ee}R$	RX Ground
15	V_{ccR}	RX Power
16	V_{ccT}	TX Power
17	$V_{ee}T$	TX Ground
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	$V_{ee}T$	TX Ground

Outline drawing



Units in mm (inches)

Suggested Transceiver Interface



Ordering Information

Available Options:
SPL-53-DR-IR1-CDA
SPL-53-DR-IR1-CNA
SPL-53-DR-IR1-TDA
SPL-53-DR-IR1-TNA

Part numbering Definition:

SPL - 53 - DR - IR1 - Temperature Diagnostic Revision

- **SPL = LC connector**
- **53 = Tx 1550nm/Rx 1310nm**
- **DR = Dual Rate 155M/622M**
- **IR1 = Reach 15 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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