Specification

Small Form Factor

Duplex LC Receptacle – SFF

Optical Transceivers

1000BASE-LX
1250Mbit/s



Ordering Information

T S P - F x C A 1 - F 2 1

Voltage / Temperature
1 : 3.3V / +0℃~ +70℃
2 : 3.3V / -40 ℃~ +85℃

Model Name	Voltage	Category	Device type	Interface	SD/LOS	Temperature	Distance
TSP-F1CA1-F21	3.3V	W/O DDMI	FP / PIN	DC / DC Coupling	LVPECL	+0°C~ +70°C	10Km
TSP-F2CA1-F21						-40°C~ +85°C	

Table 1

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Features

- **ROHS Compliant**
- **Standard Small Form Factor Package – SFF MSA Compliant**
- **Gigabit Ethernet Standard (IEEE802.3Z 1000BASE-LX) Compliant**
- **Fibre Channel Standard (100-SM-LC-L) Compliant**
- **Laser Class 1 Product – IEC60825-1 Compliant**
- **Standard Duplex LC Receptacle Optical Interface**
- **Single + 3.3 V Power Supply**
- **Differential LVPECL Data Input and Output**
- **LVPECL Signal Detect**
- **Low Power Consumption**

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Storage temperature	T_S	-40		85	°C
Supply voltage	V_{CC}	0		4	V
Operating Relative Humidity	-	5		95	%
Input voltage	V_{IN}	0		V_{CC}	V

Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	3.1	3.3	3.5	V
Operating Case temperature (TSP-F1CA1-F21)	Tc	0		70	ºC
Operating Case temperature (TSP-F2CA1-F21)		-40		85	
Total Current (Transmitter + Receiver)	Icc	-	-	250	mA
Hand Lead Soldering Temperature / Time	Th	-		260/10	ºC /sec
Wave Lead Soldering Temperature / Time	Tw	-		260/10	ºC /sec

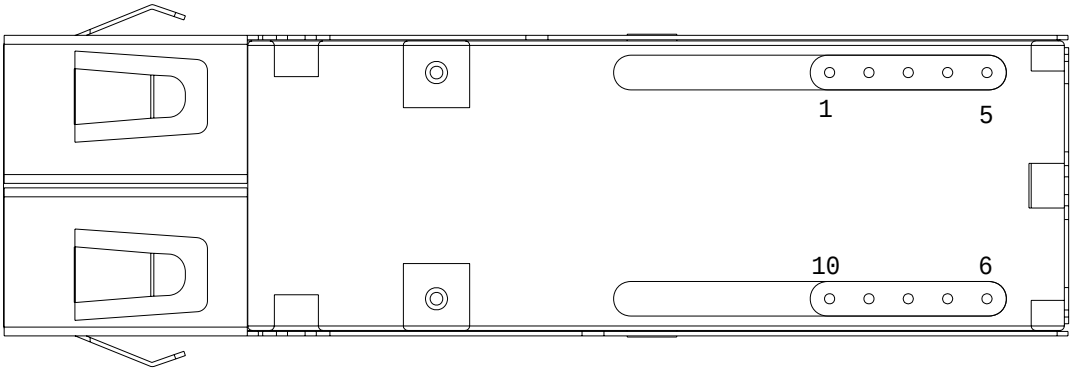
Transmitter Specifications (V_{CC}=3.1V~3.5V ; Tc= 0°C~70°C / Tc= -40°C~85°C)

Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Output Optical Power	P_{out}	-9	--	-3	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	λ_C	1260	1310	1360	nm
Spectral Width (RMS)	σ	--	--	4	nm
Rise/Fall time (20-80%)	$T_{r,f}$	--	--	260	ps
Relative Intensity Noise	RIN	--	--	-120	dB/Hz
Output Eye	Compliant with IEEE 802.3z				
Max. P_{out} TX-DISABLE Asserted	P_{OFF}	--	--	-45	dBm
Electrical Characteristics					
Transmitter Data Input Voltage - High	V_{IH} -Vcc	-1.1	--	-0.74	V
Transmitter Data Input Voltage - Low	V_{IL} -Vcc	-2.0		-1.58	V
Tx_Disable_Input_High	V_{DISH}	2.0	--	V_{CC}+0.3	V
Tx_Disable_Input_Low	V_{DISL}	0	--	0.8	V

Receiver Specifications (V_{CC}=3.1V~3.5V ; Tc= 0°C~70°C / Tc= -40°C~85°C)

Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Optical Input Power-maximum	P_{SATIN}	-3	--	--	dBm
Receiver Sensitivity (PRBS=2^7-1 ; BER≦10^{-12})	P_{SEN}	--	--	-21	dBm
Operating Center Wavelength	λ_c	1260	--	1610	nm
Signal Detect – Asserted	P_{SA}	--	--	-21	dBm
Signal Detect – De-asserted	P_{SD}	-45	--	--	dBm
Signal Detect – Hysteresis	P_{SH}	0.5		6	dB
Electrical Characteristics					
Differential Output Voltage	V_{DIFF}	0.4	--	2.0	V
Signal Detect Output Voltage - High	V_{OH} -Vcc	-1.1	--	-0.74	V
Signal Detect Output Voltage - Low	V_{OL} -Vcc	-2.0		-1.58	V

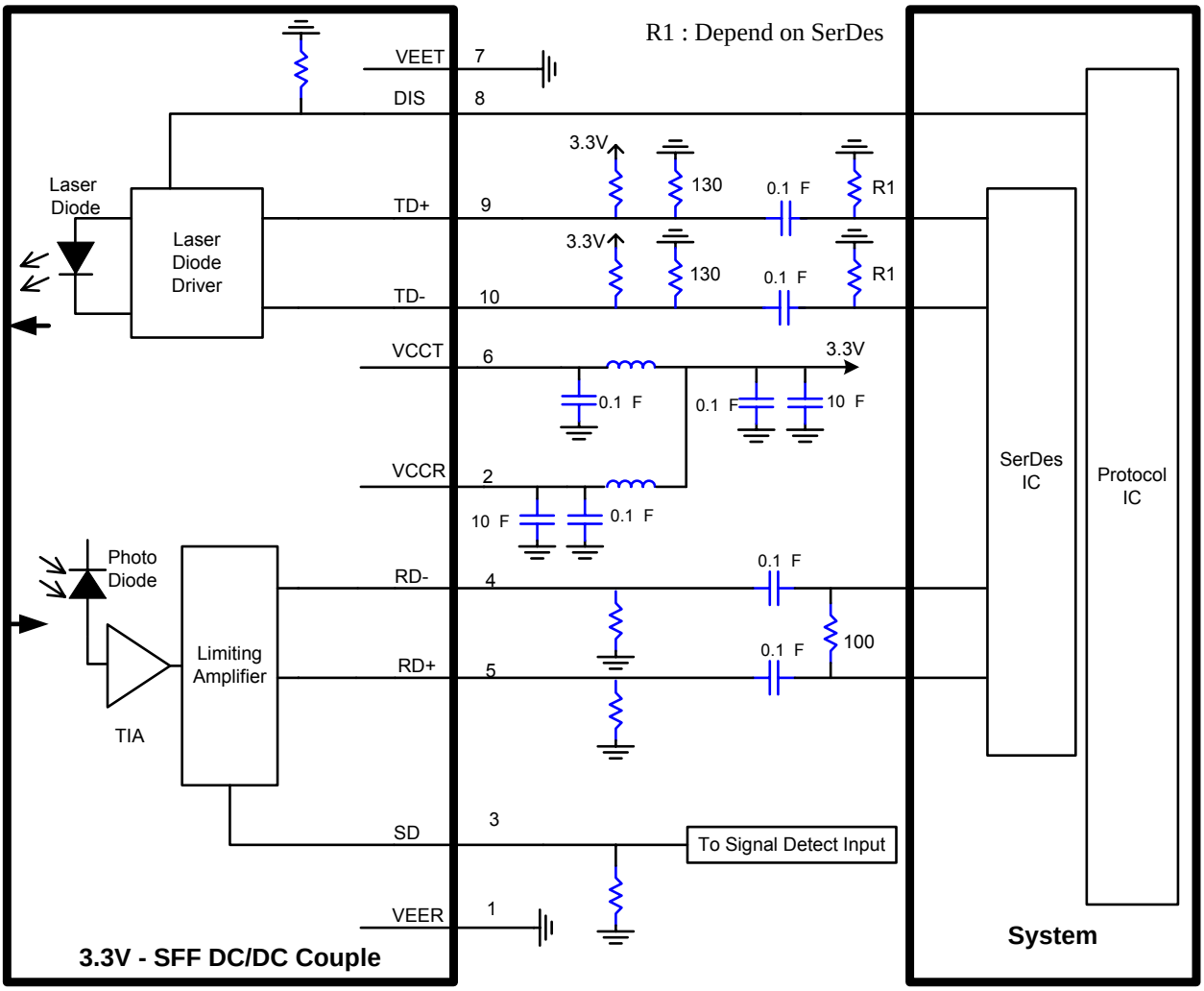
Pin Definition and Descriptions



Bottom View

Pin	Name	Input-Output /Level	Description	Ref.
1	VEER	Input	Receiver ground	
2	VCCR	Input	Receiver power supply	
3	SD	Output/LVPECL	Receiver signal detect. High signal indicates optical signal is present at receiver input.	
4	RD-	Output/LVPECL	Inverted receiver data output	
5	RD+	Output/LVPECL	Non-inverted receiver data output	
6	VCCT	Input	Transmitter power supply	
7	VEET	Input	Transmitter ground	
8	DIS	Input/LVTTL	Transmitter Disable Control	
9	TD+	Input/LVPECL	Transmitter non-inverted data input	
10	TD-	Input/LVPECL	Transmitter inverted data input	

Recommended Circuit Diagram



Mechanical Outlines

(Unit : mm)

