



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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## 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°C ~ +70°C

2: 3.3V / -40°C ~ +85°C

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

## 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 )	$T_c$	0		70	°C
Operating Case temperature ( TSP-F2CA1-F21 )		-40		85	
Total Current ( Transmitter + Receiver )	$I_{CC}$	-	-	250	mA
Hand Lead Soldering Temperature / Time	$T_h$	-		260/10	°C /sec
Wave Lead Soldering Temperature / Time	$T_w$	-		260/10	°C /sec

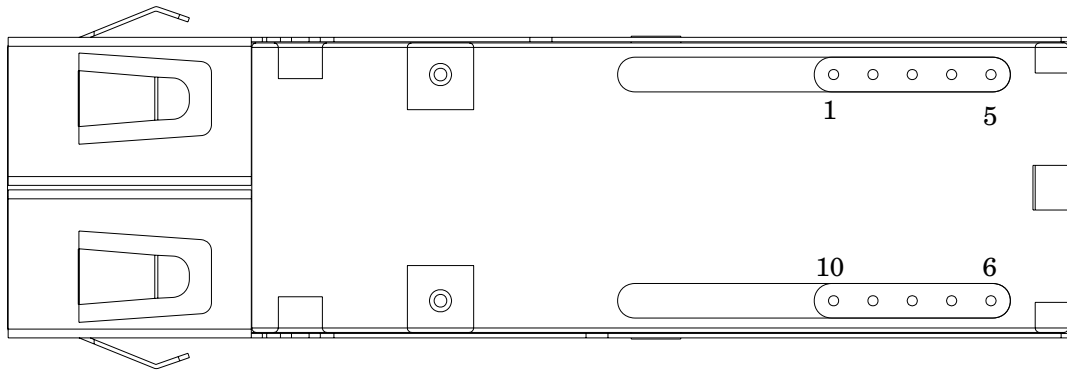
**Transmitter Specifications** (  $V_{CC}=3.1V\sim 3.5V$  ;  $T_C=0^{\circ}C\sim 70^{\circ}C$  /  $T_C=-40^{\circ}C\sim 85^{\circ}C$  )

Parameter	Symbol	Min	Typ	Max	Unit
<b>Optical Characteristics</b>					
Output Optical Power	$P_{out}$	-9	--	-3	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	$\lambda_C$	1260	1310	1360	nm
Spectral Width (RMS)	$\sigma$	--	--	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
<b>Electrical Characteristics</b>					
Transmitter Data Input Voltage - High	$V_{IH}-V_{CC}$	-1.1	--	-0.74	V
Transmitter Data Input Voltage - Low	$V_{IL}-V_{CC}$	-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** (  $V_{CC}=3.1V\sim 3.5V$  ;  $T_C=0^{\circ}C\sim 70^{\circ}C$  /  $T_C=-40^{\circ}C\sim 85^{\circ}C$  )

Parameter	Symbol	Min	Typ	Max	Unit
<b>Optical Characteristics</b>					
Optical Input Power-maximum	$P_{SATIN}$	-3	--	--	dBm
Receiver Sensitivity ( PRBS= $2^7-1$ ; $BER \leq 10^{-12}$ )	$P_{SEN}$	--	--	-21	dBm
Operating Center Wavelength	$\lambda_C$	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
<b>Electrical Characteristics</b>					
Differential Output Voltage	$V_{DIFF}$	0.4	--	2.0	V
Signal Detect Output Voltage - High	$V_{OH}-V_{CC}$	-1.1	--	-0.74	V
Signal Detect Output Voltage - Low	$V_{OL}-V_{CC}$	-2.0	--	-1.58	V

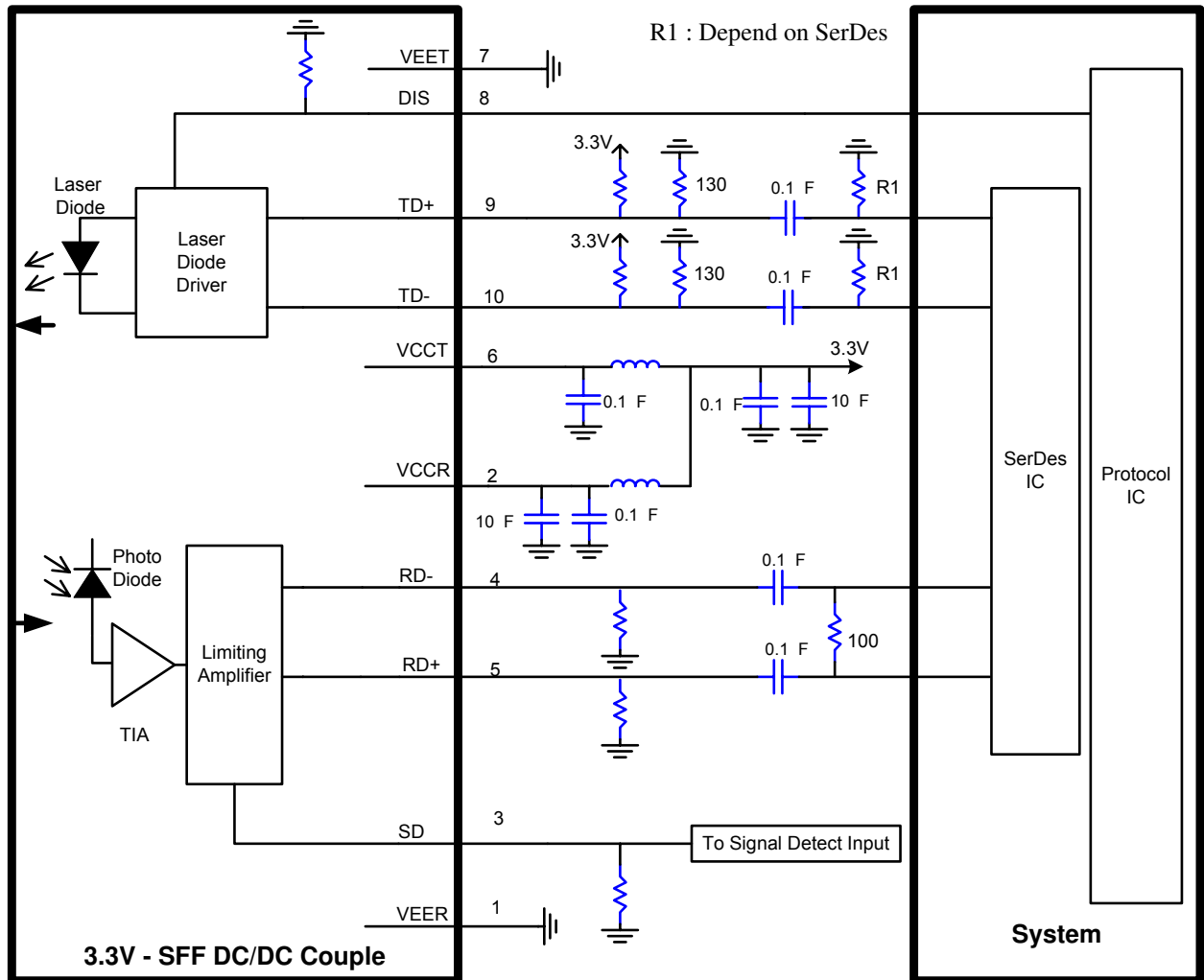
**Pin Definition and Descriptions**



**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 )

