

## Specification

### Small Form Factor

Duplex LC Receptacle – SFF

### Optical Transceivers

STM-1 / OC-3 / 100BASE  
155.52Mbit/s



## Ordering Information

**TSP-F<sub>x</sub>AA1-D21**

↓  
Voltage / Temperature  
1 : 3.3V / +0 ~ +70°C  
2 : 3.3V / -40 ~ +85°C

Model Name	Voltage	Category	Device type	SD/LOS	Temperature	Media	Distance
TSP-F1AA1-D21	3.3V	W/O DDMI	FP / PIN	LVPECL	+0 ~ +70°C	Multi-Mode Fiber (50 μ m and 62.5μ m)	2Km
TSP-F2AA1-D21					-40 ~ +85°C		

## Features

- ROHS Compliant
- Standard Small Form Factor Package – SFF MSA Compliant
- SONET/SDH Standard Compliant
- Fast Ethernet Standard Compliant
- Laser Class 1 Product – IEC / EN 60825-1 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 <sub>s</sub>	-40		85	°C
Supply voltage	V <sub>CC</sub>	0		4	V
Operating Relative Humidity	RH	5		95	%
Input voltage	V <sub>IN</sub>	0		V <sub>CC</sub>	V

## Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	VCC	3.1	3.3	3.5	V
Operating Case temperature ( TSP-F1AA1-D21 )	Top	0		70	°C
Operating Case temperature ( TSP-F2AA1-D21 )		-40		85	
Current	Icc	-	-	250	mA
Soldering Temperature (10sec)	Tsold	-		260	°C

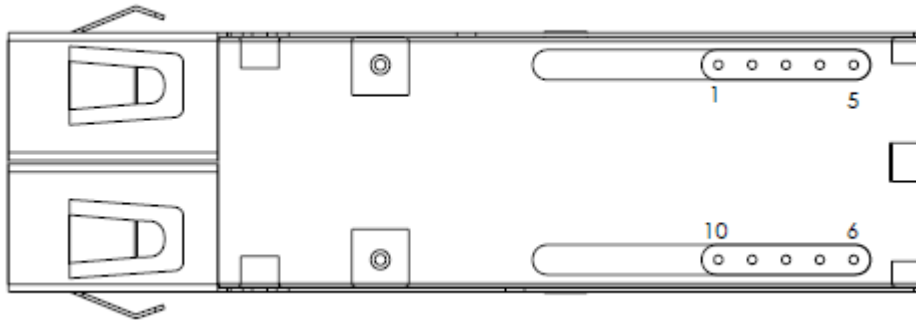
## Transmitter Specifications ( VCC = 3.1 ~ 3.5V ; Top= 0 ~70°C / Top= -40 ~ 85°C )

Parameter	Symbol	Min	Typ	Max	Unit
<b>Optical Characteristics</b>					
Output Optical Power	P <sub>out</sub>	-20	--	-12	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	λ	1260	1310	1360	nm
Spectral Width (RMS)	σλ	--	--	7	nm
Rise/Fall time (10-90%)	T <sub>r</sub> / T <sub>f</sub>	--	--	2	ns
Relative Intensity Noise	RIN	--	--	-120	dB/Hz
Output Eye	Compliant with IEEE 802.3z				
Max. P <sub>out</sub> TX-DISABLE Asserted	POFF	--	--	-45	dBm
<b>Electrical Characteristics</b>					
Transmitter Data Input Voltage - High	V <sub>IH</sub> -Vcc	-1.1	--	-0.74	V
Transmitter Data Input Voltage - Low	V <sub>IL</sub> -Vcc	-2.0		-1.58	V
Tx_Disable_Input_High	V <sub>DISH</sub>	2.0	--	VCC+0.3	V
Tx_Disable_Input_Low	V <sub>DISL</sub>	0	--	0.8	V

**Receiver Specifications** ( VCC = 3.1 ~ 3.5V ; Top= 0 ~70°C / Top= -40 ~ 85°C )

Parameter	Symbol	Min	Typ	Max	Unit
<b>Optical Characteristics</b>					
Optical Input Power-maximum	Pmax	-3	--	--	dBm
Receiver Sensitivity ( PRBS=2 <sup>23</sup> -1 ; BER ≤ 10 <sup>-10</sup> )	Sens	--	--	-30	dBm
Operating Center Wavelength	λ	1260	--	1610	nm
Signal Detect – Asserted	PSA	--	--	-30	dBm
Signal Detect – De-asserted	PSD	-45	--	--	dBm
Signal Detect – Hysteresis	PSH	0.5		6	dB
<b>Electrical Characteristics</b>					
Differential Output Voltage	V <sub>DIFF</sub>	0.4	--	2.0	V
Signal Detect Output Voltage - High	V <sub>OH</sub> -V <sub>CC</sub>	-1.1	--	-0.74	V
Signal Detect Output Voltage - Low	V <sub>OL</sub> -V <sub>CC</sub>	-2.0		-1.58	V

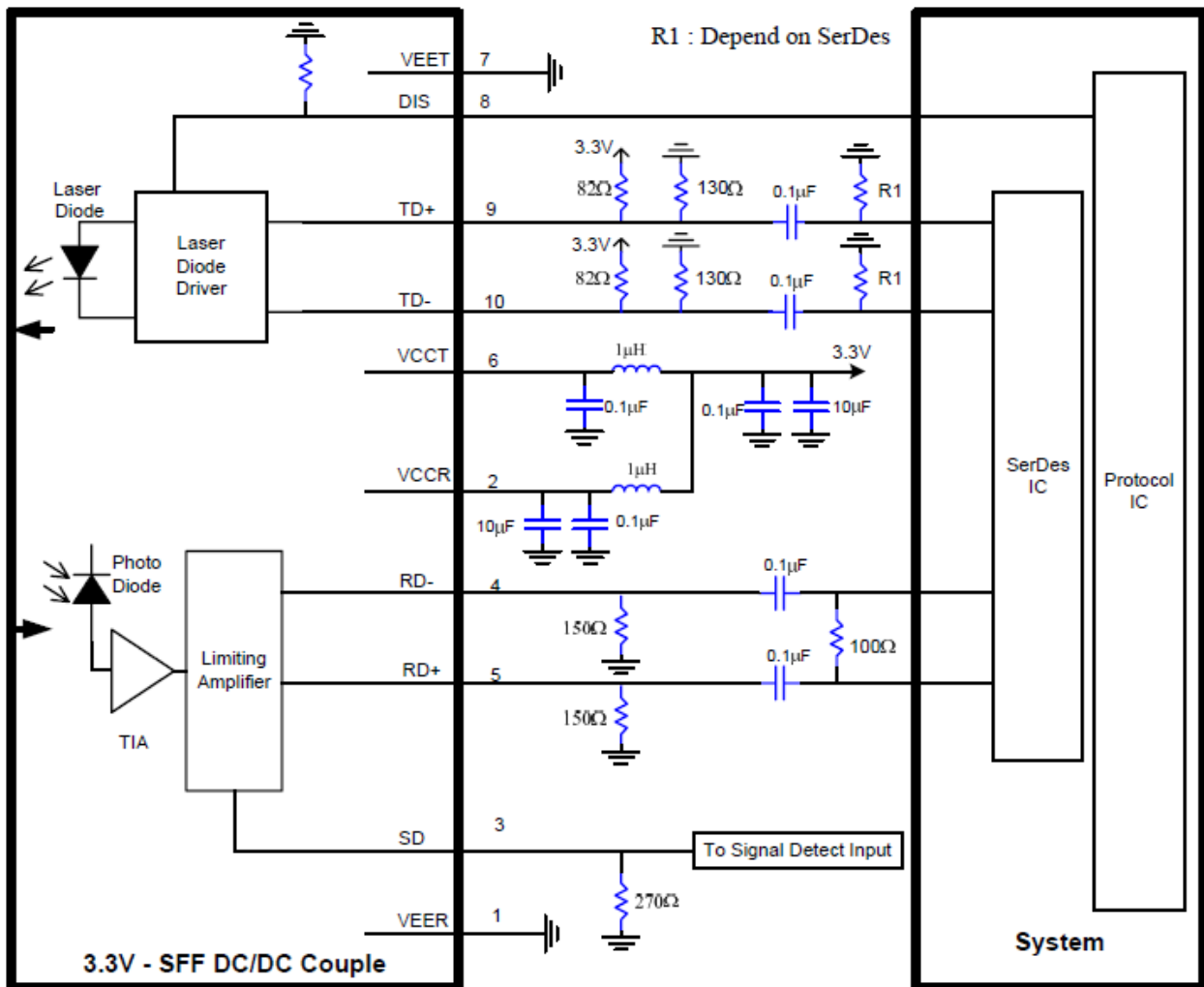
**Pin Definition and Descriptions**



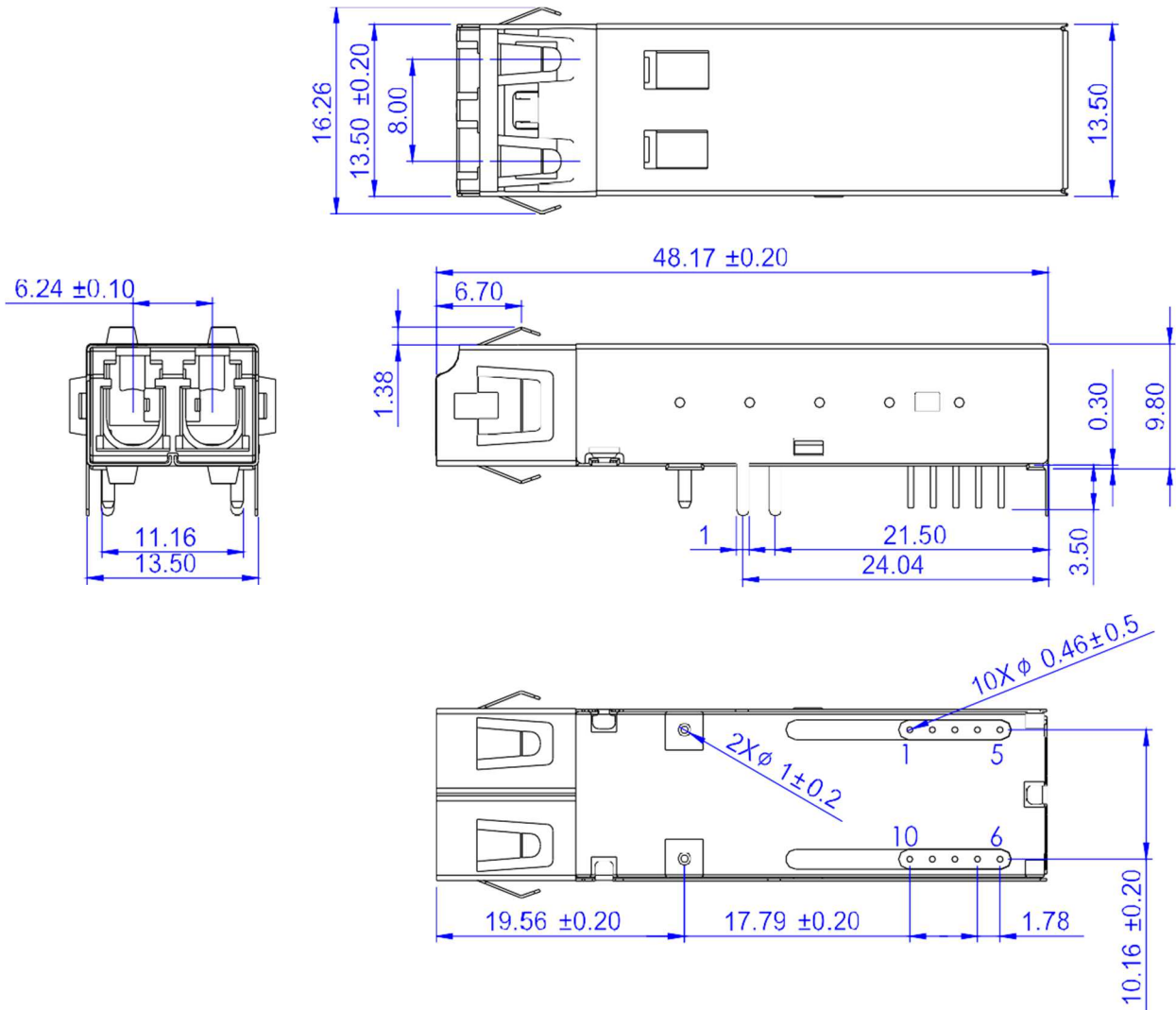
**Bottom View**

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)





## ESD

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

### Contact Information

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