

## Specification

### Small Form Factor

Duplex LC Receptacle – SFF

### Optical Transceivers

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



## Ordering Information

**T S P - F x A A 1 - M 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-F1AA1-M21	3.3V	W/O DDMI	FP / PIN	DC / DC Coupling	LVPECL	+0°C ~ +70°C	60Km
TSP-F2AA1-M21						-40°C ~ +85°C	

Table 1

## Features

- ROHS Compliant
- Standard Small Form Factor Package – SFF MSA Compliant
- SONET/SDH Standard Compliant
- Fast Ethernet Standard 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-F1AA1-M21 )	$T_c$	0		70	°C
Operating Case temperature ( TSP-F2AA1-M21 )		-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

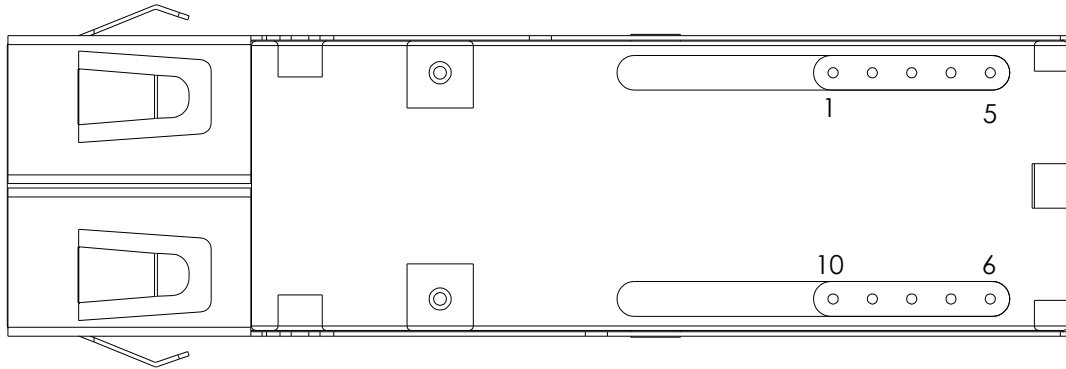
**Transmitter Specifications** (  $V_{CC}=3.1V\sim 3.5V$  ;  $T_C= 0^{\circ}C\sim 70^{\circ}C$  /  $T_C= -40^{\circ}C\sim 85^{\circ}C$  )

Parameter	Symbol	Min	Typ	Max	Unit
<b>Optical Characteristics</b>					
Output Optical Power	$P_{out}$	-5	--	0	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	$\lambda_C$	1270	1310	1355	nm
Spectral Width (RMS)	$\sigma$	--	--	2.5	nm
Rise/Fall time (10-90%)	$T_{r,f}$	--	--	2	ns
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= $2^{23}-1$ ; BER $\leq 10^{-10}$ )	$P_{SEN}$	--	--	-35	dBm
Operating Center Wavelength	$\lambda_C$	1260	--	1610	nm
Signal Detect – Asserted	$P_{SA}$	--	--	-35	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

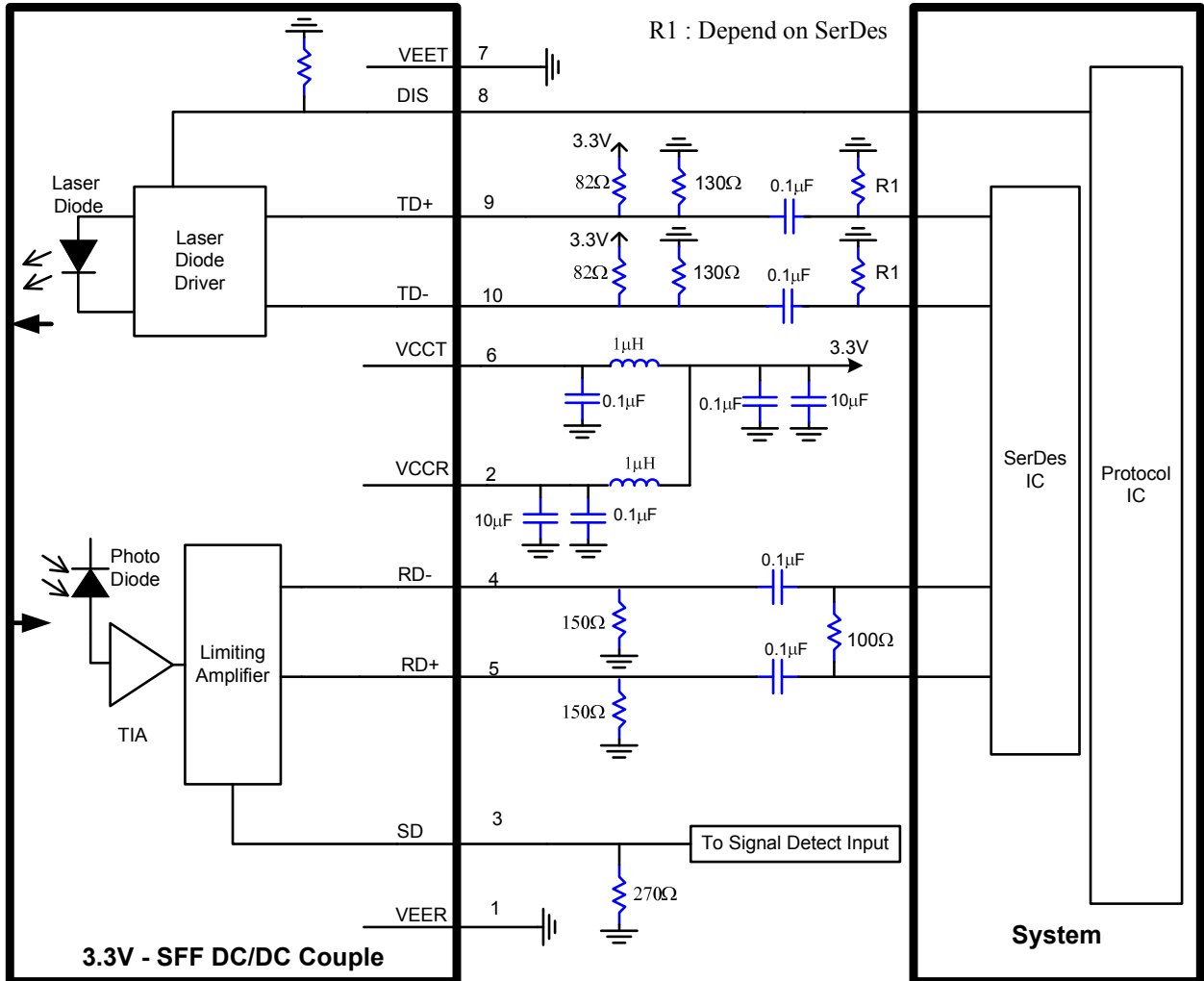
### Pin Definition and Descriptions



**Bottom View**

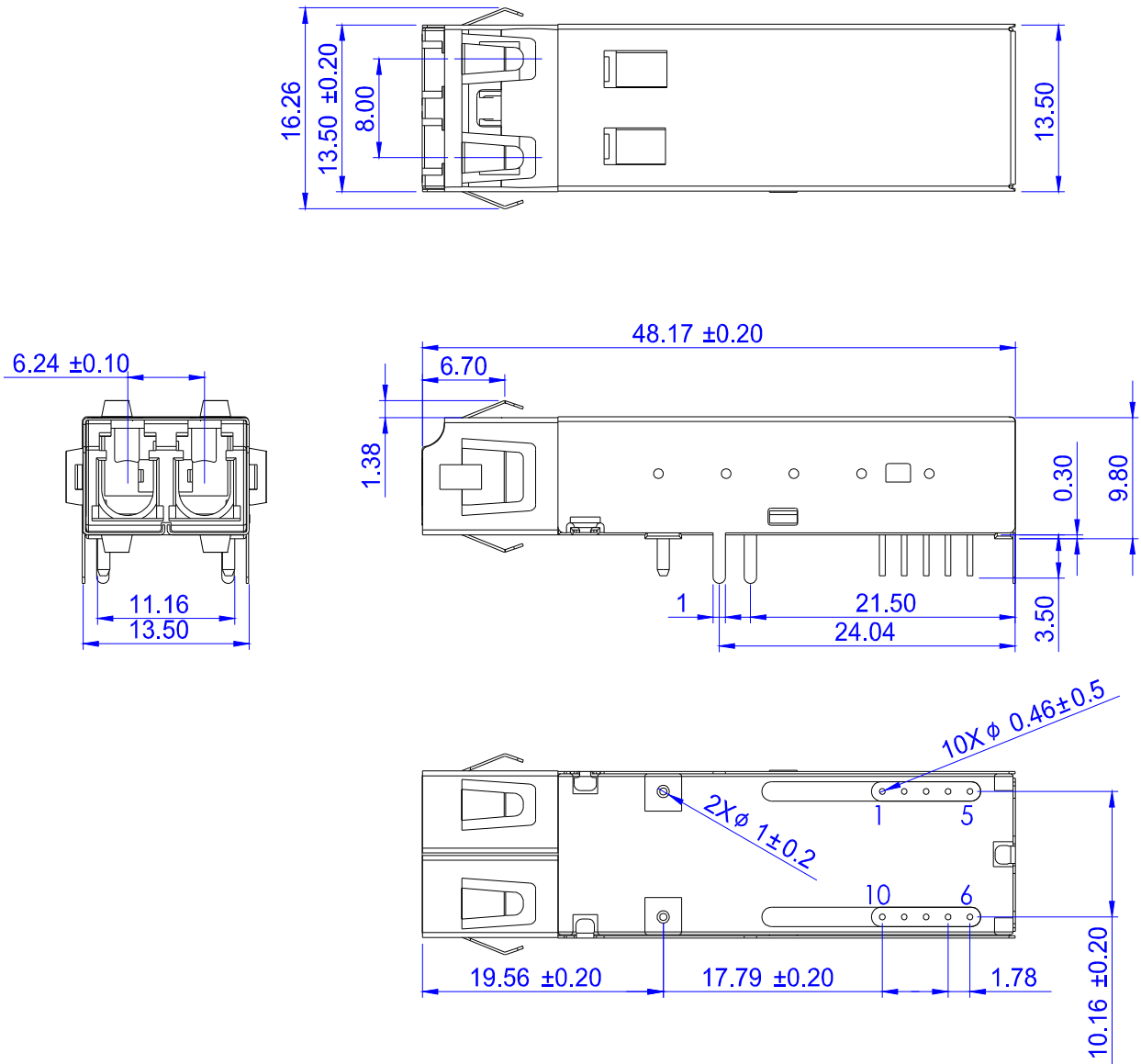
Pin	Name	Input-Output /Level	Description	Ref.
1	VEER	Input	Receiver ground	
2	VCCR	Input	Receiver power supply	
3	SD	Output/LVPECL	Receiver signal detect. High signal indicates optical signal is present at receiver input.	
4	RD-	Output/LVPECL	Inverted receiver data output	
5	RD+	Output/LVPECL	Non-inverted 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 )



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