

Specification

Small Form Factor Pluggable

Duplex LC Receptacle – SFP

Optical Transceivers

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



Ordering Information

TSD-SxAA1-H11

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	Latch Color
TSD-S1AA1-H11	3.3V	With DDMI	FP / PIN	AC / AC Coupling	LVTTL	+0°C ~+70°C	30km	Blue
TSD-S2AA1-H11						-40°C ~+85°C		

Features

- ROHS Compliant
- Standard Small Form Factor Pluggable Package – SFP MSA Compliant
- Digital Diagnostic SFF-8472 Rev.10.2 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
- LVTTTL Loss of Signal
- Serial ID through I²C Interface
- 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 (TSD-S1AA1-H11)	Top	0	--	70	°C
Operating Case temperature (TSD-S2AA1-H11)		-40	--	85	
Total Current (Transmitter + Receiver)	I _{CC}	--	--	250	mA

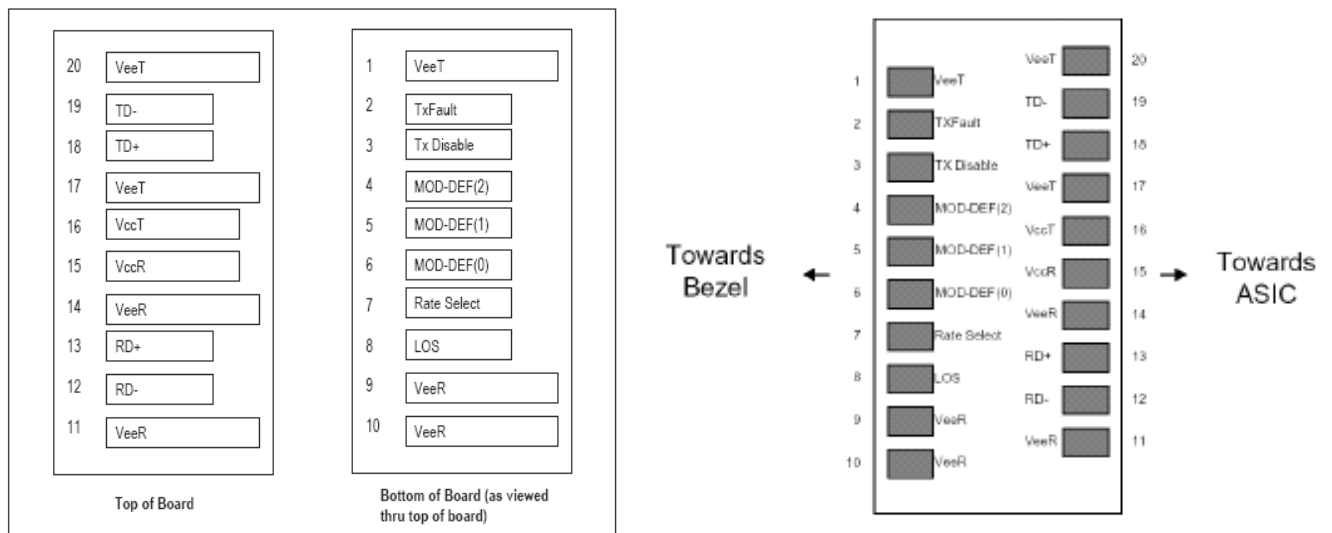
Transmitter Specifications ($V_{CC}=3.1V\sim 3.5V$; $T_{op}=0^{\circ}C\sim 70^{\circ}C$ / $T_{op}=-40^{\circ}C\sim 85^{\circ}C$)

Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Output Optical Power	P_o	-9	--	-3	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	λ	1270	1310	1355	nm
Spectral Width (RMS)	$\sigma\lambda$	--	--	3	nm
Rise/Fall time (10-90%)	$T_{r,f}$	--	--	2	ns
Relative Intensity Noise	RIN	--	--	-120	dB/Hz
Output Eye	Compliant with ITU-T G.957				
Max. P_{out} TX-DISABLE Asserted	P_{OFF}	--	--	-45	dBm
Electrical Characteristics					
Differential Input Voltage	V_{DIFF}	0.4	--	2.0	V
Tx_Disable_Input_High	V_{DISH}	2.0	--	$V_{CC}+0.3$	V
Tx_Disable_Input_Low	V_{DISL}	0	--	0.8	V
Tx_Fault_Output_High	V_{FH}	2.0	--	$V_{CC}+0.3$	V
Tx_Fault_Output_Low	V_{FL}	0	--	0.8	V

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

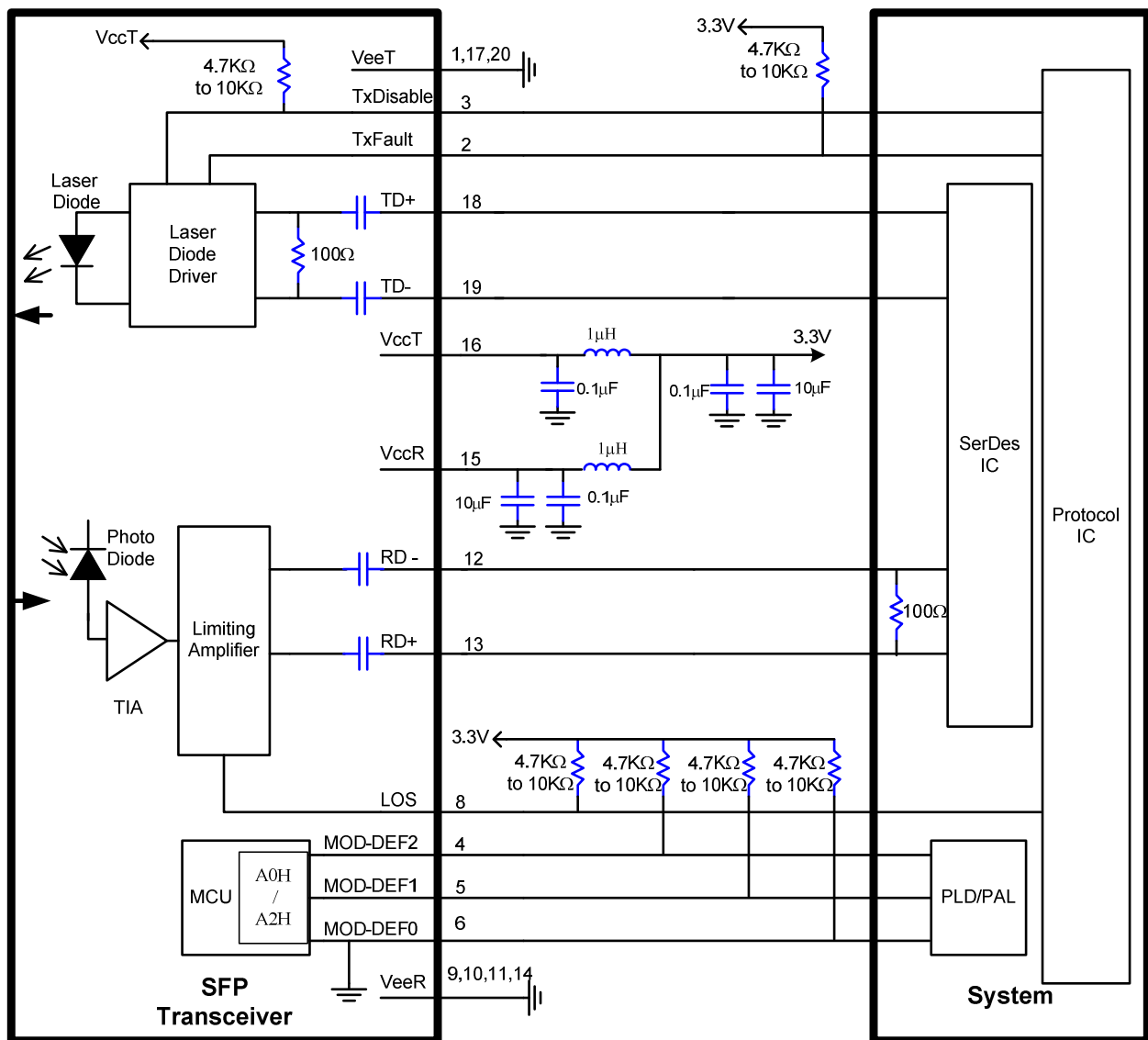
Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Optical Input Power-maximum	P_{SATIN}	-3	--	--	dBm
Receiver Sensitivity (PRBS=2 ²³ -1 ; $BER \leq 10^{-10}$)	P_{SAN}	--	--	-34	dBm
Operating Center Wavelength	λ	1260	--	1610	nm
Optical Return Loss	ORL	12	--	--	dB
Loss of Signal – De-asserted	P_{LD}	--	--	-34	dBm
Loss of Signal - Asserted	P_{LA}	-45	--	--	dBm
Loss of Signal - Hysteresis	P_{LH}	0.5	--	6	dB
Electrical Characteristics					
Differential Output Voltage	V_{DIFF}	0.4	--	2.0	V
Receiver Loss of Signal Output Voltage -Low	V_{LosL}	0	--	0.8	V
Receiver Loss of Signal Output Voltage -High	V_{LosH}	2	--	$V_{CC}+0.3$	V

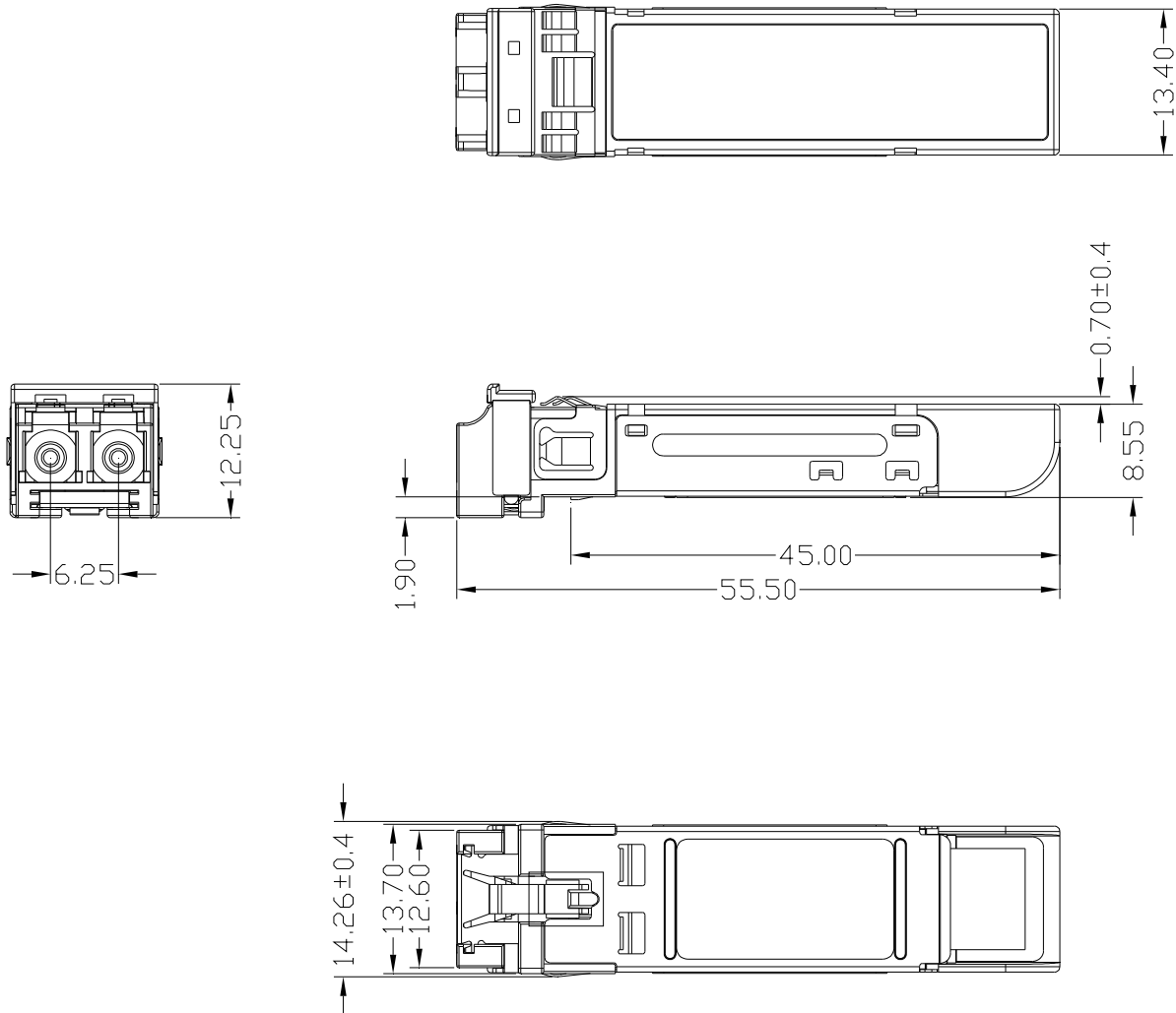
Pin Definition and Descriptions



Pin	Name	Input/Output Level	Description
1	VeeT	Input	Transmitter ground
2	TXFault	Output/LVTTL	Laser failure indication. High level indicates "laser failure". Externally pulled up
3	TXDisable	Input/LVTTL	Transmitter disable, High signal/open disables TX laser output. Low level enables TX output, internally pulled up.
4	MOD-DEF(2)	Input/output	Module definition 2, SDA, Data line for I2C bus. Externally pulled up
5	MOD-DEF(1)	Input	Module definition 1, SCL, Clock for I2C bus. Externally pulled up
6	MOD-DEF(0)	Output	Module definition 0, Module present. Ground inside module.
7	Rate Select	-	No connection.
8	LOS	Output/LVTTL	Receiver loss of signal indication. Low signal indicates optical signal is present at RX input. Should be Externally pulled up.
9	VeeR	Input	Receiver ground
10	VeeR	Input	Receiver ground
11	VeeR	Input	Receiver ground
12	RD -	Output/CML	Inverted receiver data output (AC coupled)
13	RD +	Output/CML	Non-inverted receiver data output (AC coupled)
14	VeeR	Input	Receiver ground
15	VccR	Input	Receiver power supply
16	VccT	Input	Transmitter power supply
17	VeeT	Input	Transmitter ground
18	TD +	Input/LVPECL	Non-inverted transmitter data input (AC coupled)
19	TD -	Input/LVPECL	Inverted transmitter data input (AC coupled)
20	VeeT	Input	Transmitter ground

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.



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