Specification

Small Form Factor Pluggable

Duplex LC Receptacle – SFP

Optical Transceivers

1000BASE-LX
1250Mbit/s

Ordering Information

T S D – S x C A 1 – F 1 1

Model Name	TSD-S1CA1-F11	TSD-S2CA1-F11
Voltage	3.3V	
Device type	FP / PIN	
Interface	AC / AC Coupling	
SD/LOS	LVTTL	
Temperature	+0°C~+70°C	-40°C~+85°C
Distance	10km SMF-28	
Latch Color	Blue	

Features

- **ROHS Compliant**
- **Standard Small Form Factor Pluggable Package – SFP MSA Compliant**
- **Digital Diagnostic SFF-8472 Rev.10.2 Compliant**
- **Gigabit Ethernet Standard (IEEE802.3Z 1000BASE-LX) Compliant**
- **Fibre Channel Standard (100-SM-LC-L) Compliant**
- **Laser Class 1 Product –IEC/EN 60825-1 Compliant**
- **Standard Duplex LC Receptacle Optical Interface**
- **The module is designed for single mode fiber**
- **Single + 3.3 V Power Supply**
- **Differential LVPECL Data Input and Output**
- **LVTTL Loss of Signal**
- **Serial ID through I^2C 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-S1CA1-F11)	Top	0	-	70	°C
Operating Case temperature (TSD-S2CA1-F11)		-40		85	
Total Current (Transmitter + Receiver)	Icc	-	-	250	mA

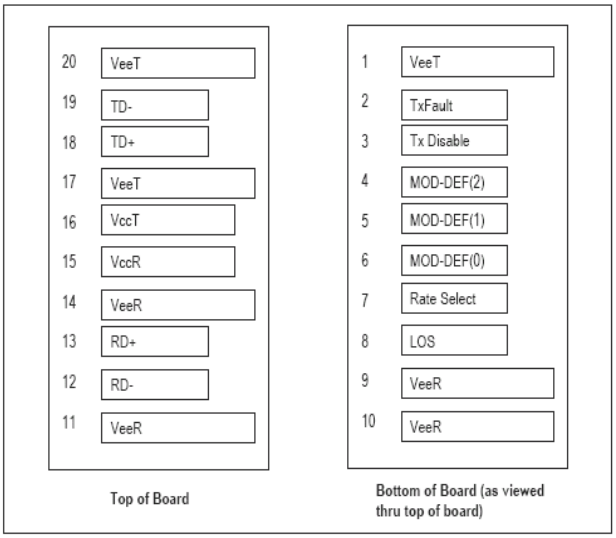
Transmitter Specifications (V_{CC}=3.1V~3.5V；Top= 0°C~70°C / Top= -40°C~85°C)

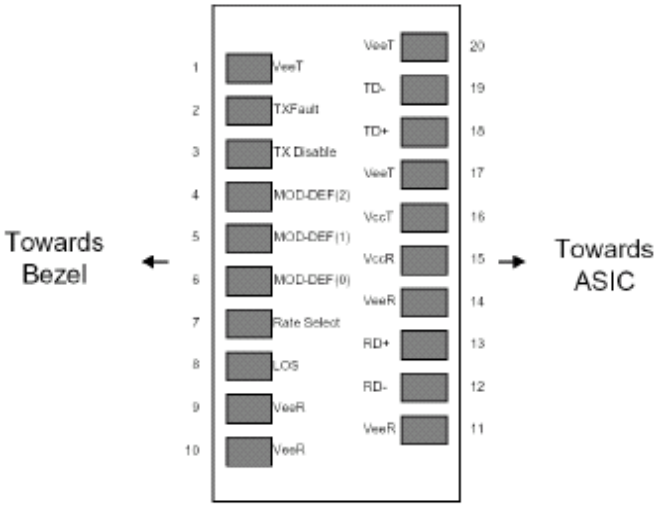
Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Output Optical Power	P_o	-9		-3	dBm
Extinction Ratio	ER	9			dB
Center Wavelength	λ	1270	1310	1355	nm
Spectral Width (RMS)	σλ			4	nm
Rise/Fall time (20-80%)	$T_{r,f}$			260	ps
Relative Intensity Noise	RIN			-120	dB/Hz
Output Eye	Compliant with IEEE 802.3z				
Max. P_{out} TX-DISABLE Asserted	P_{OFF}			-45	dBm
Electrical Characteristics					
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~3.5V ; Top= 0°C~70°C / Top= -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	1260		1610	nm
Optical Return Loss	ORL	12			dB
Loss of Signal – De-asserted	P_{LD}			-21	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_{LOSH}	0		0.8	V
Receiver Loss of Signal Output Voltage -High	V_{LOSL}	2		V_{CC}+0.3	V

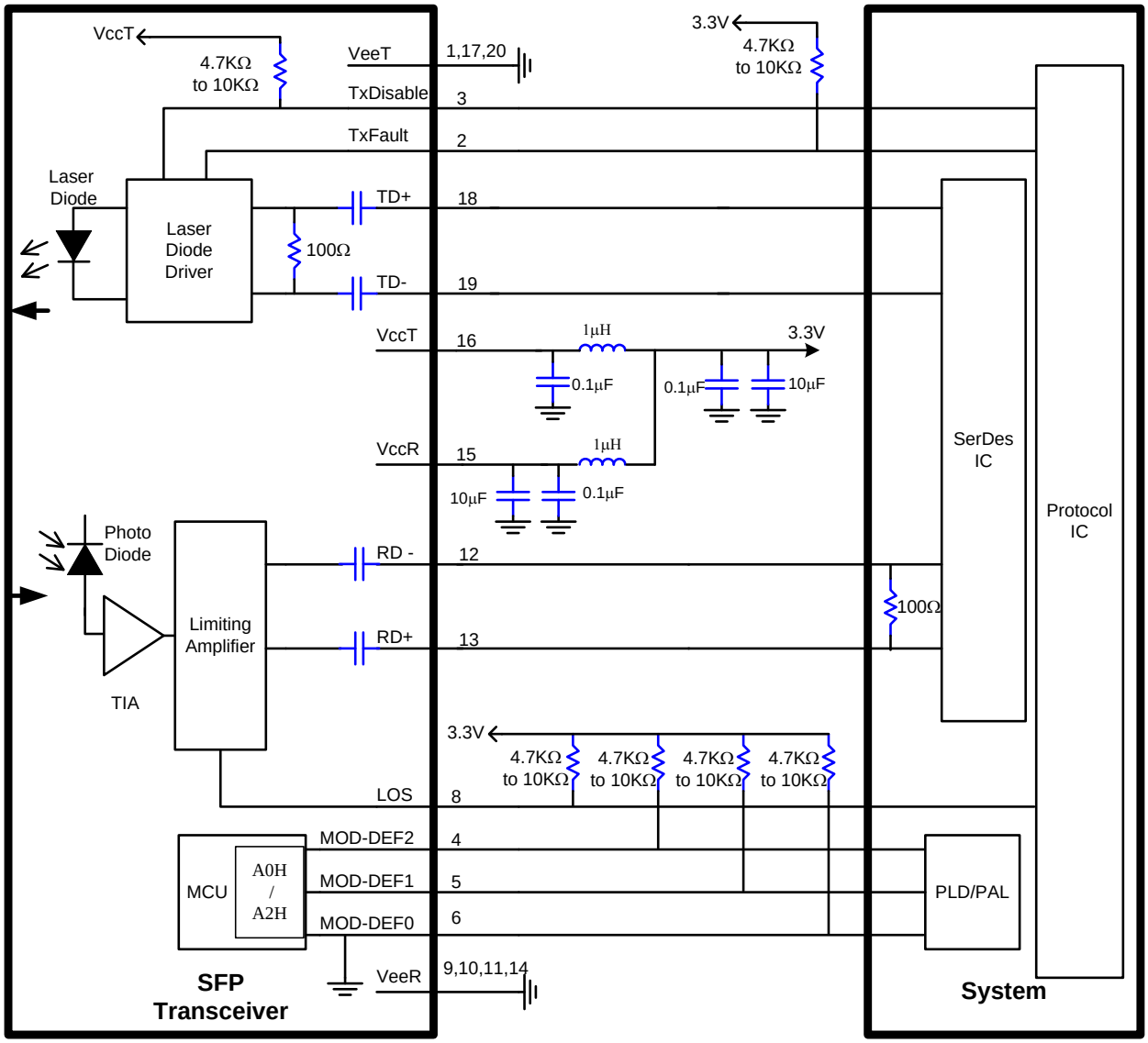
Pin Definition and Descriptions





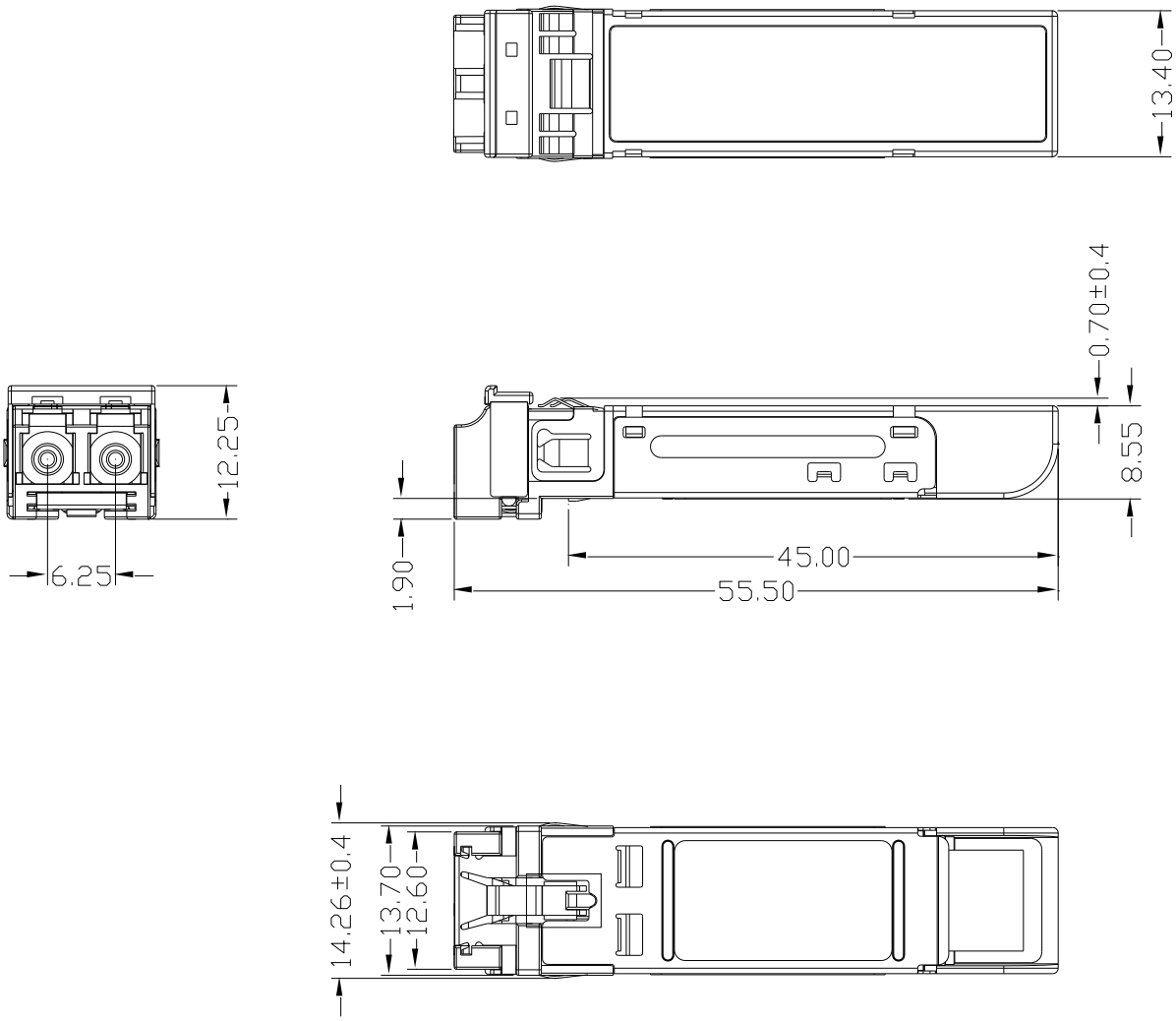
Pin	Name	Input/Output Level	Description
1	VeeT	Input	Transmitter ground
2	TXFault	Output/LVTTL	Laser failure indication. High level indicates "laser failure". Externally pulled up
3	TXDisable	Input/LVTTL	Transmitter disable, High signal/open disables TX laser output. Low level enables TX output, internally 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/LVPECL	Inverted receiver data output (AC coupled)
13	RD +	Output/LVTTL	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.

LASER Safety

This is a Class 1 Laser Product according to IEC/EN60825-1:2014 (Third Edition). This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 56, dated MAY 8, 2019.

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Attention: L'utilisation de commandes ou de réglages ou l'exécution de procédures autres que celles spécifiées dans le document peut entraîner une exposition à des radiations dangereuses.

Contact Information

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Revision History

Date	Version	Description of Changes
03/04/2019	2.2	1. Footer style change. 2. Contact information has been added on the last page.
04/23/2020	2.3	Add laser safety description
05/13/2020	2.4	1. To correct laser notice from No. 50 to No. 56. 2. Caution has been added by dual language on the LASER Safety section.
12/29/2020	2.5	1.Update the format 2.Add the module is designed for single mode fiber from page.2