

SHENZHENTIBTRONIX TECHNOLOGY Co., Ltd.



TSPLEG10D-XX

25Gb/s 10km CWDM SFP28 Transceiver
Hot Pluggable, Duplex LC, +3.3V, 1271~1371nm, CWDM DFB, Single mode

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Features:

- Supports up to 25.78Gbps bit rates
- Hot-pluggable SFP+ footprint
- 1271~1371nm CWDM DFB transmitter, PIN photo-detector, Up to 10km for SMF transmission
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- Single +3.3V power supply
- Power dissipation <1.5W
- Real Time Digital Diagnostic Monitoring
- Housing: Metal enclosure, low EMI design, with bail latch / connector latch
- Operating case temperature: Standard: 0 to +70°C

Applications:

- 25G Ethernet
- CPRI rate-10

Description:

The SFP28 transceivers are high performance, cost effective modules supporting data rate of 25.78Gbps and 10km transmission distance with SMF.

The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.

● Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T_S	-40		+85	°C
Case Operating Temperature	T_A	0		70	°C
Maximum Supply Voltage	Vcc	-0.5		4	V
Relative Humidity	RH	0		85	%

● Electrical Characteristics ($T_{OP} = 0$ to 70 °C, VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current	Icc			450	mA	
Power Consumption	P			1.5	W	
Transmitter Section:						
Input differential impedance	R_{in}		100		Ω	1
Tx Input Single Ended DC Voltage Tolerance (Ref VeeT)	V	-0.3		4	V	
Differential input voltage swing	$V_{in,pp}$	180		700	mV	2
Transmit Disable Voltage	V_D	2		Vcc	V	3
Transmit Enable Voltage	V_{EN}	Vee		Vee+0.8	V	
Receiver Section:						
Single Ended Output Voltage Tolerance	V	-0.3		4	V	
Rx Output Diff Voltage	V_o	300		850	mV	
Rx Output Rise and Fall Time	T_r/T_f	30			ps	4
LOS Fault	$V_{LOS\ fault}$	2		Vcc _{HOST}	V	5
LOS Normal	$V_{LOS\ norm}$	Vee		Vee+0.8	V	5

Note:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Per SFF-8431 Rev 3.0
3. Into 100 ohms differential termination.
4. 20%~80%
5. LOS is an open collector output. Should be pulled up with 4.7k – 10k Ω on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

● Optical Parameters(TOP = 0 to 70°C, VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λ_c	$\lambda-6.5$	1xx1	$\lambda+6.5$	nm	
spectral width	$\Delta\lambda$			1	nm	
Average Optical Power	Pavg	-1		+6	dBm	1
Laser Off Power	Poff			-30	dBm	
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	Rin			-128	dB/Hz	3
Optical Return Loss Tolerance		20			dB	
Receiver Section:						
Center Wavelength	λ_r	1260		1620	nm	
Receiver Sensitivity (OMA)	Sen			-14.4	dBm	4
Los Assert	LOS _A	-27		-	dBm	
Los Dessert	LOS _D			-15	dBm	
Los Hysteresis	LOS _H	0.5			dB	
Overload	Sat	0			dBm	5
Receiver Reflectance	Rrx			-12	dB	

Note:

- x is the last number of the part number
- Average power figures are informative onl.
- TWDP figure requires the host board to be SFF-8431compliant. TWDP is calculated using the Matlab code provided in clause 68.6.6.2 of IEEE802.3.
- 12dB reflection.
- Receiver sensitivity: ≤ -14.4 dBm @25.78125Gb/s, BER $\leq 5 \times 10^{-5}$

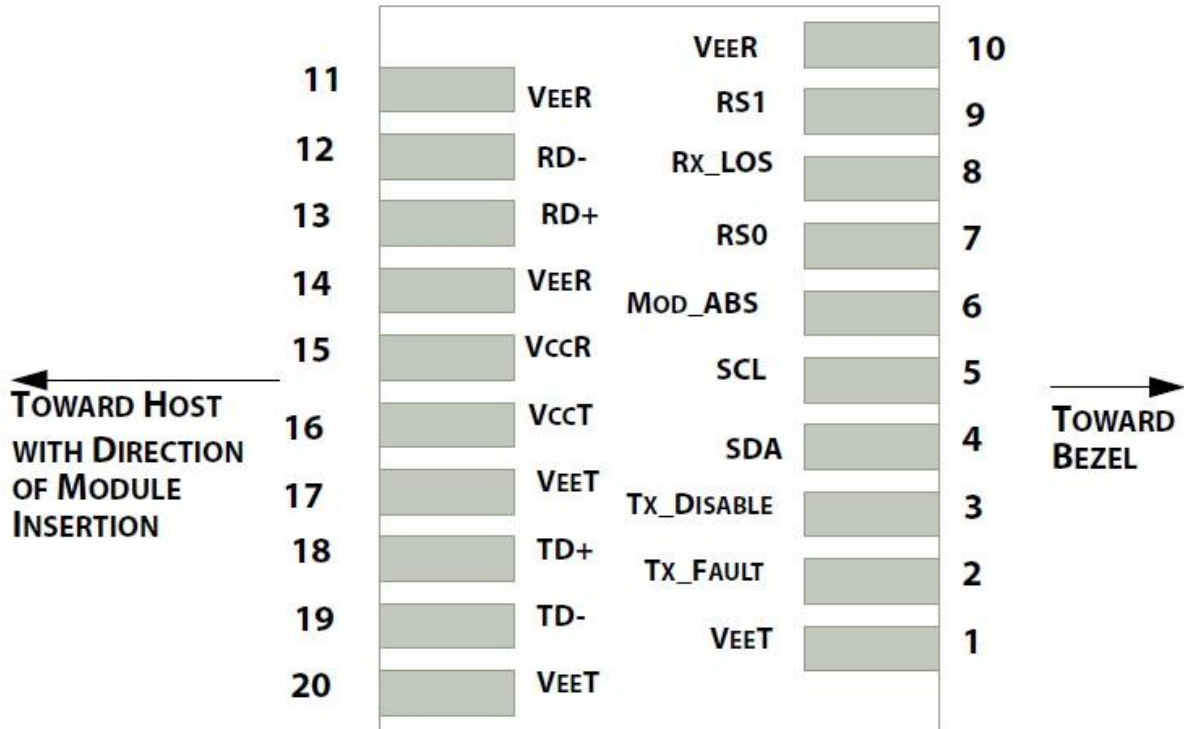
● Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_off			10	us
TX_Disable Negate Time	t_on			1	ms
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms
TX_FAULT from Fault to Assertion	t_fault			100	us
TX_Disable Time to Start Reset	t_reset	10			us
Receiver Loss of Signal Assert Time	T _{A,RX_LOS}			100	us

Receiver Loss of Signal Deassert Time	T_{d,RX_LOS}			100	us
Rate-Select Chage Time	$t_{ratesel}$			10	us
Serial ID Clock Time	$t_{serial-clock}$			100	kHz

● Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name



● Pin Function Definitions

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	2
7	RS0	Rate select0, optionally control SFP+ receiver. When high, input data rate >4.5Gb/ s; when low, input data rate <=4.5Gb/s	
8	LOS	Receiver Loss of Signal Indication	4

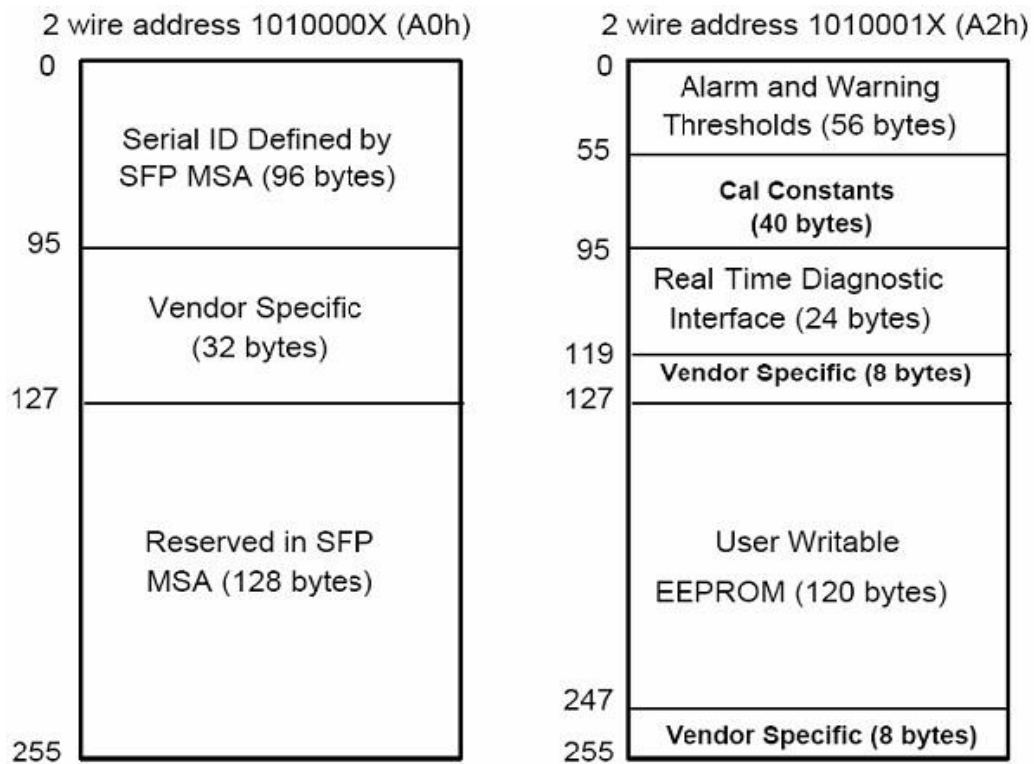
9	RS1	Rate select0, optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	1

Note:

- 1.The module ground pins shall be isolated from the module case.
- 2.This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.
- 3.This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
- 4.This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

● SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I²C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, “Digital Diagnostic Monitoring Interface for Optical Transceivers”. The DDM parameters have been internally calibrated.

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

● Digital Diagnostic Monitor Characteristics

Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	±3.0	°C
98-99	VCC3 Internal Supply Voltage	±3.0	%
100-101	Laser Bias Current	±10	%
102-103	Tx Output Power	±3.0	dB
104-105	Rx Input Power	±3.0	dB

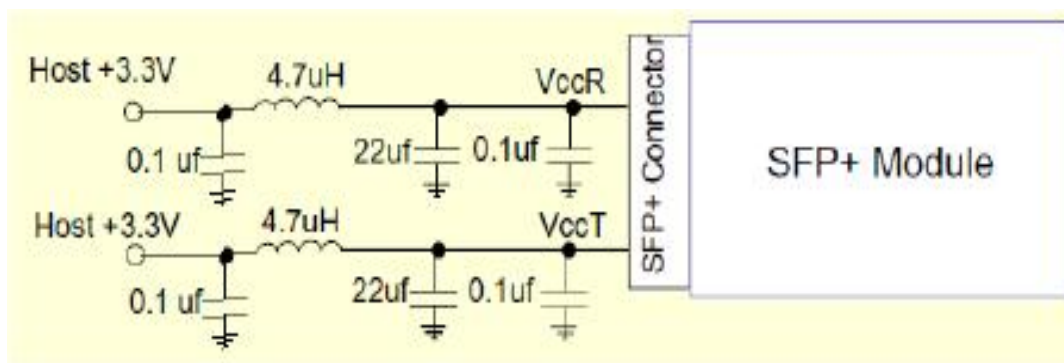
● Regulatory Compliance

The TSPLEG10D-xx complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

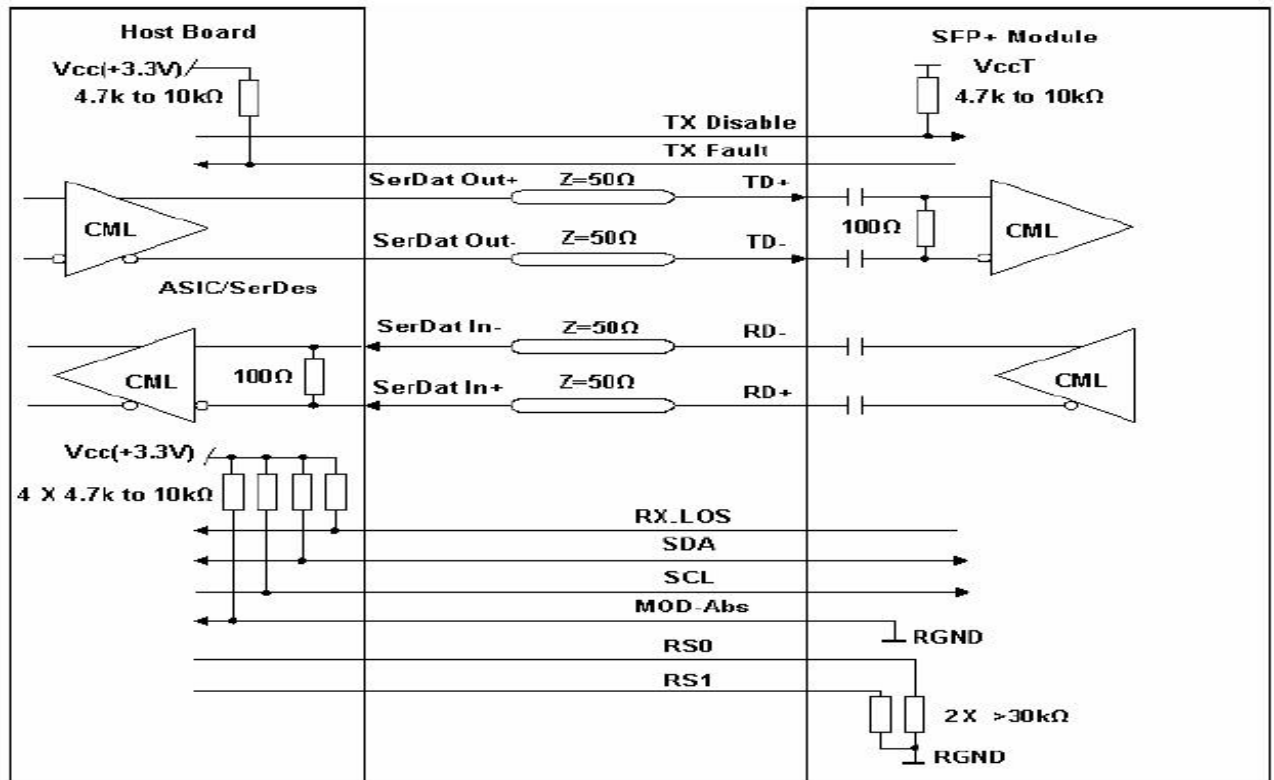
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
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Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

● Recommended Circuit

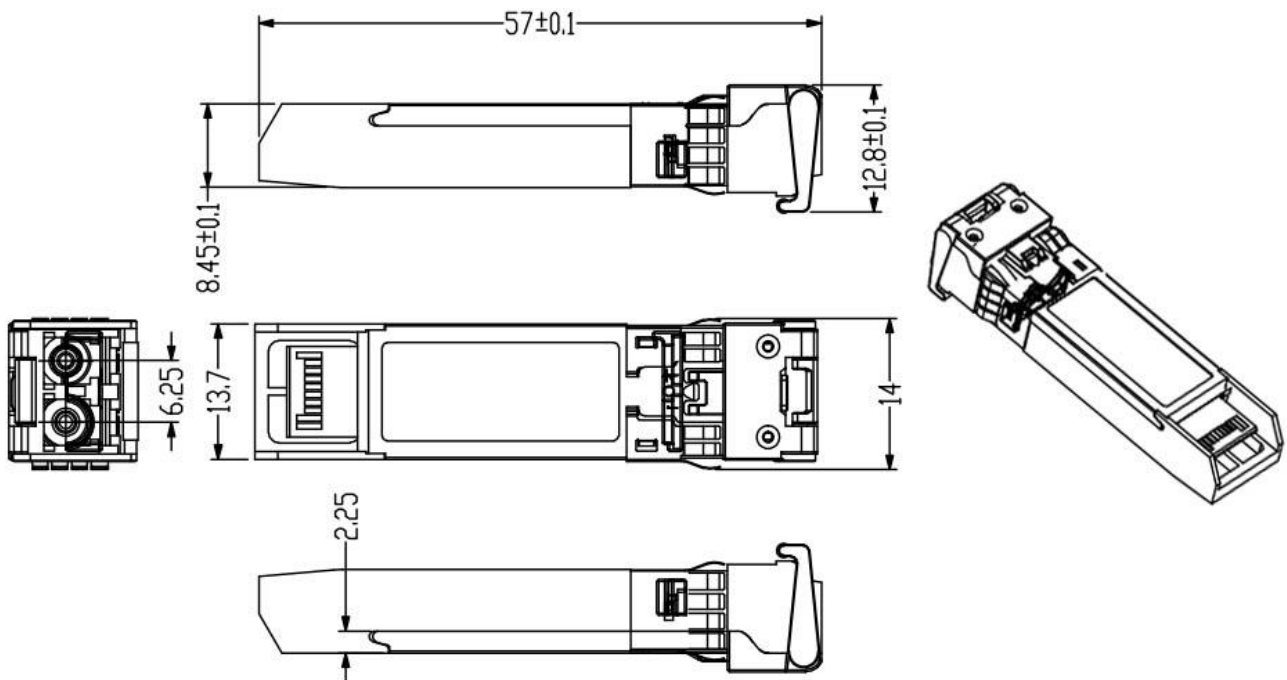


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

● Mechanical Dimensions



● Order Information:

In the Part No. of TSPLEG10D-xx, xx stands for central wavelength, such as:

27: for Tx1271nm/Rx1291nm; 29: for Tx1291nm/Rx1271nm

31: for Tx1311nm/Rx1331nm; 33: for Tx1331nm/Rx1311nm

35: for Tx1351nm/Rx1371nm; 37: for Tx1371nm/Rx1351nm

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