TIBTRONIX TECHNOLOGY CO., LTD.

TSBLXG10D-I -23/32

10Gb/s 10km BiDi SFP+ Transceiver
Hot Pluggable, Single LC, +3.3V, 1270nm/1330nm CWDM DFB, DDM

2013/6/1

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Features:

- ✧ Supports 9.95Gb/s to 11.3Gb/s bit rates
- ✧ Hot-pluggable SFP+ footprint
- ✧ Single LC for Bi-Directional Transmission,Single Mode
- ✧ SMF links over 10km
- ✧ Built-in 1270/1330 WDM Filter
- ✧ Complies with IEEE 802.3 or higher; 10G Base-LR; SFP+ MSA; SFF-8472. CPRI, OBSAI
- ✧ Power dissipation <1.5W
- ✧ No Reference Clock required
- ✧ Built-in digital diagnostic functions
- ✧ Temperature range:-40~85°C
- ✧ Very low EMI and excellent ESD protection
- ✧ RoHS Compliant Part

Applications:

- ✧ 10GBASE-LR/LW Ethernet
- ✧ SONET OC-192 / SDH
- ✧ 10G Fibre Channel

Description:

TIBTRONIX' TSBLXG10D-I-23 & TSBLXG10D-I-32 Bi-directional 10Gb/s (SFP+) transceivers are compliant with the current SFP+ Multi-Source Agreement (MSA) Specification. They comply with 10GBASE-LR/LW Ethernet, SONET OC-192 / SDH and 10G Fibre Channel 1200-SM-LL-L. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the SFP+ MSA and SFF-8472. Compatible with Nokia, Cisco, Huawei, Juniper, ZTE, Ericsson devices, as well as other equipment brands available on the market.

● Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T_S	-40		+85	°C
Supply Voltage	$V_{CC}T$, R	-0.5		4	V
Relative Humidity	RH	0		85	%

● Recommended Operating Environment:

Parameter	Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	T_C	-40		+85	°C
Supply Voltage	$V_{CCT, R}$	+3.135		+3.465	V
Supply Current	I_{CC}			450	mA
Power Dissipation	P_D			1.5	W

● Electrical Characteristics (T_{OP} = -40 to 85 °C, VCC = 3.135 to 3.465 Volts)

Parameter		Symbol	Min	Typ	Max	Unit	Note
Transmitter:							
Differential input voltage swing			180		700	mV	1
Transmit Disable Input	H	V_{IH}	2.0		Vcc+0.3	V	
	L	V_{IL}	0		0.8	V	
Transmit Enable Output	H	V_{OH}	2.4		Vcc+0.3	V	
	L	V_{OL}	0		0.4	V	2
Input Differential Impedance		Zin	80	100	120	Ω	
Receiver							
Differential output voltage swing			300		850	mV	3
LOS Output	H	V_{OH}	2.4		Vcc+0.3	V	2
	L	V_{OL}	0		0.4	V	
Output Differential Impedance		Zon	80	100	120	Ω	

Notes:

Note 1) TD+/- are internally AC coupled with 100Ω differential termination inside the module.

Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.

Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

● Optical Parameters(T_{OP} = -40 to 85°C, VCC = 3.135 to 3.465 Volts)

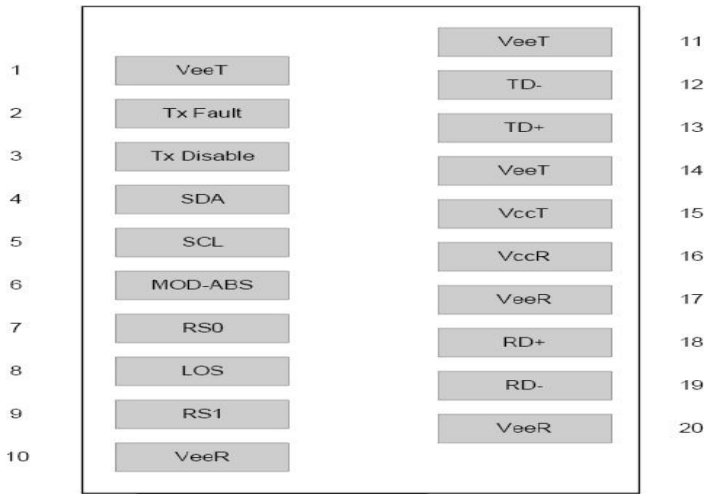
Parameter		Symbol	Min	Typ	Max	Unit	Ref.
Transmitter							
Bit Rate		BR	9.9		11.3	Gb/s	
Optical Wavelength	TSBLXG10D-I-23	λ	1260	1270	1280	nm	
	TSBLXG10D-I-32		1320	1330	1340		
Average output power		Po	-6		-1	dBm	
Optical Extinction Ratio		ER	3.5			dB	
Spectral width		Δλ			1	nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Optical Eye Mask			Compliant with IEEE802.3ae				
Receiver							
Bit Rate		BR	9.9		11.3	Gb/s	
Optical Wavelength	TSBLXG10D-I-23	λ	1320	1330	1340	nm	
	TSBLXG10D-I-32		1260	1270	1280		
Receiver Sensitivity		Sen			-14.5	dBm	1
Maximum Input Power		P_{MAX}	0			dBm	
LOS De-Assert		LOS_D			-15	dBm	
LOS Assert		LOS_A	-25			dBm	
LOS Hysteresis		LOS_H	0.5		4	dB	

Notes:

Note 1) Measured with a PRBS of 2^{31}-1 at 1 x 10^{-12} BER .

● 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.

Note 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.

Note 3) This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.

Note 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 I^2C 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)

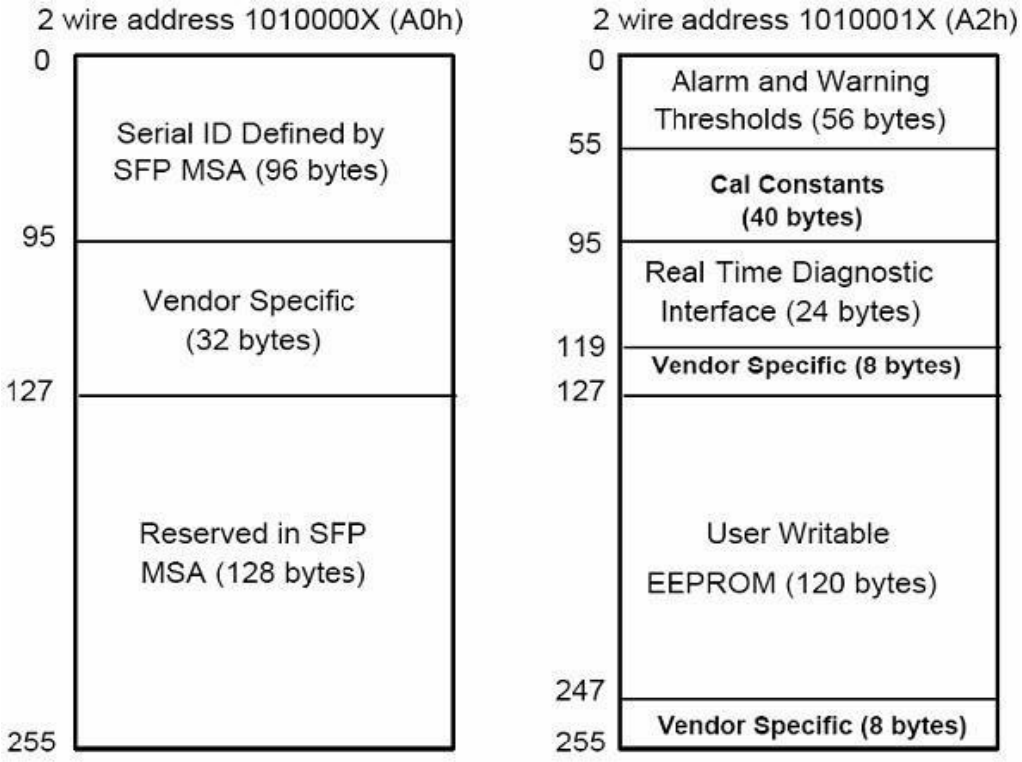


Table 2 - EEPROM Serial ID Memory Contents (**A0h**)

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	10G Base-LR
11	1	Encoding	64B/66B
12	1	BR, Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	

20-35	16	Vendor Name	SFP vendor name: TIBTRONIX
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "TSBLXG10D-I-23" or "TSBLXG10D-I-32" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	TIBTRONIX's Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	TIBTRONIX specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

● 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

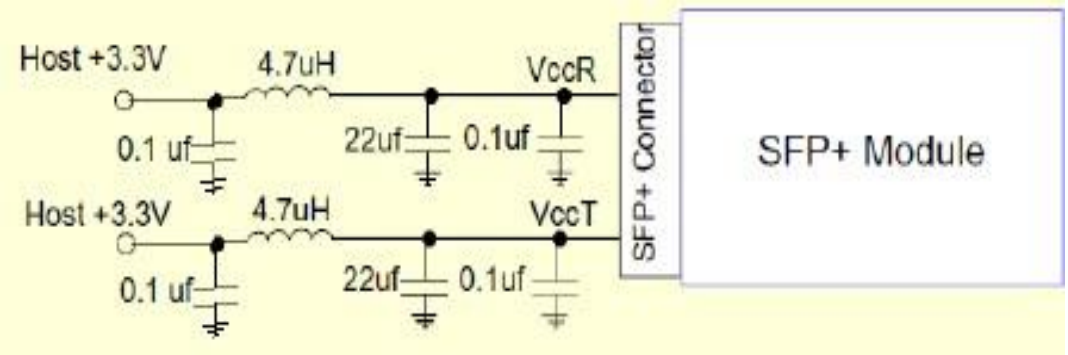
● Regulatory Compliance

The TSBLXG10D-I-23 /32 complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

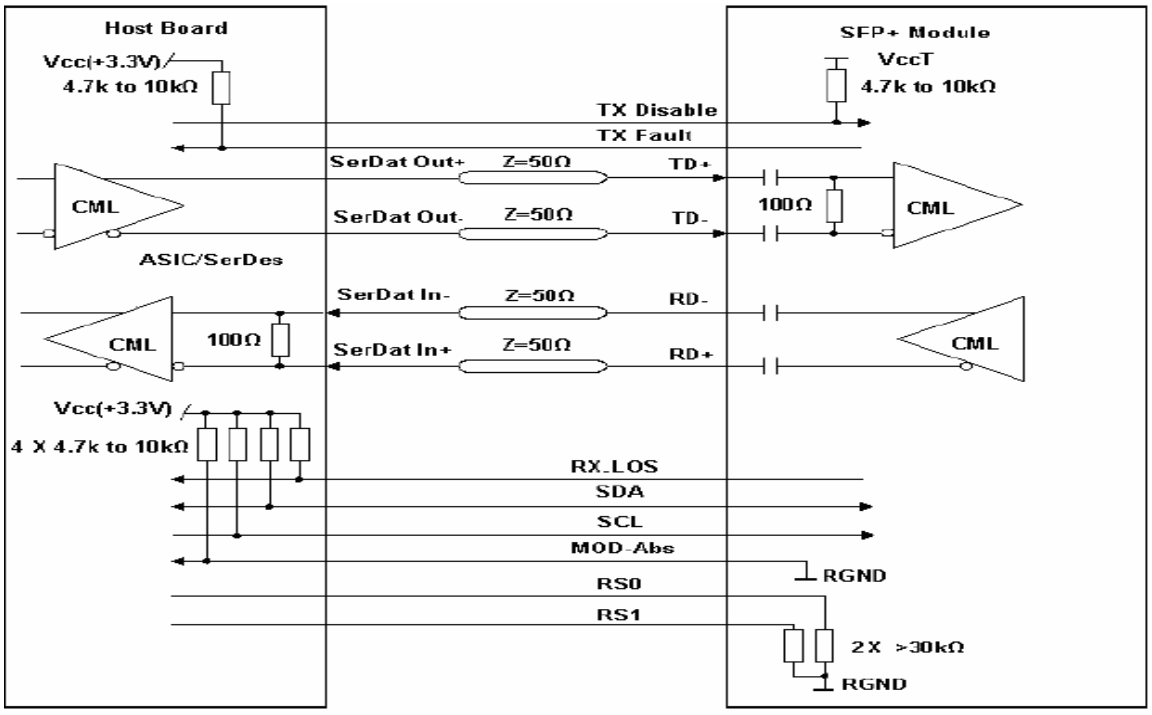
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD)	IEC 61000-4-2	Compatible with standards

to the Single LC Receptacle	GR-1089-CORE	
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

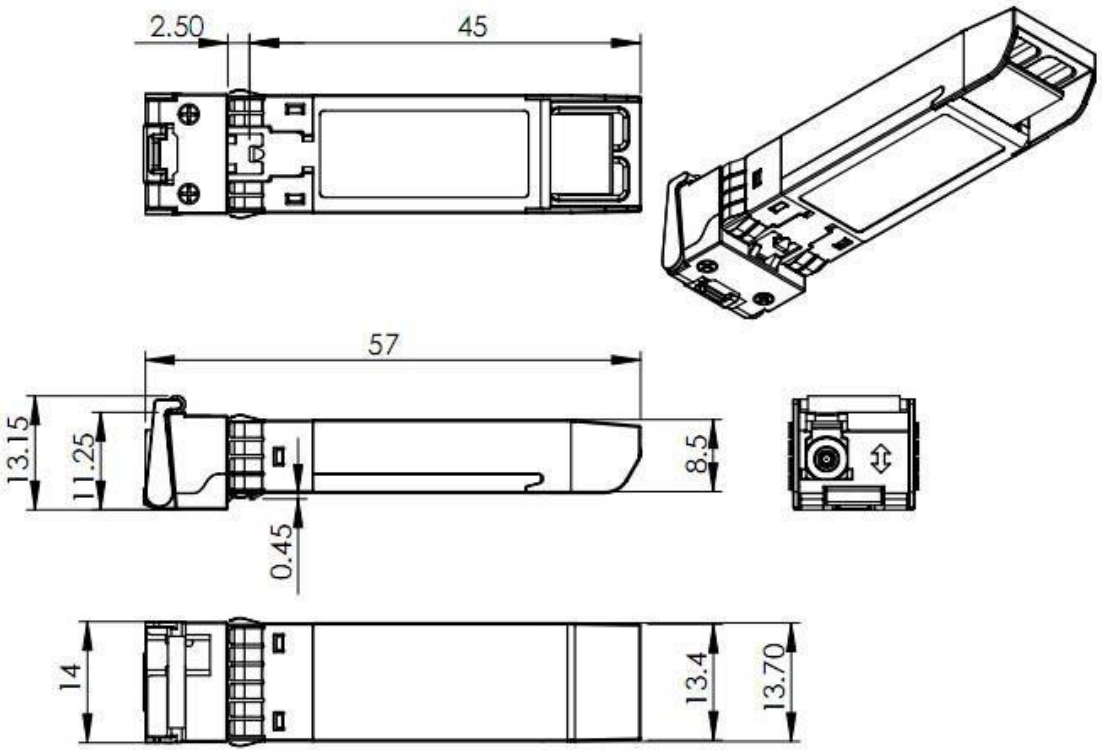


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

Mechanical Dimensions



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