SPT-PBXX-X40D

155Mbps SFP Bi-Directional Transceiver,40km Reach

1310nm TX / 1550 nm RX & 1550nm TX / 1310 nm RX

Features

- Up to155Mbps data rate
- Single +3.3V power supply
- Single LC receptacle optical
- Hot pluggable
- AC coupling of LVPECL signals
- Receiver Loss of Signal out
- Serial ID module on MOD(0~2)
- International Class 1laser safety certified
- Transmitter disable input
- Without DDM function
- RoHS compliant

Applications

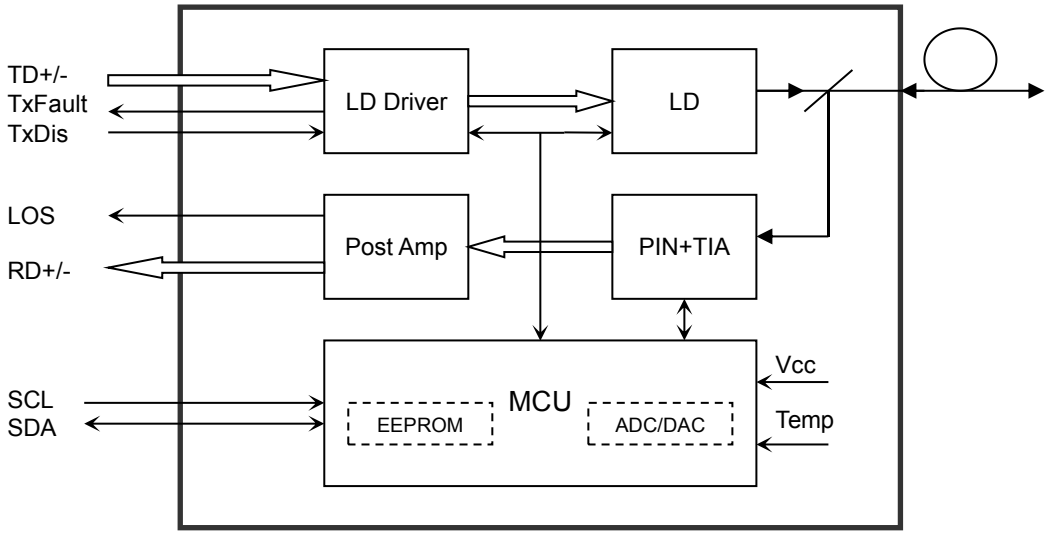
- SDH STM-1, S-1.1, L-1.1, L-1.2
- SONET OC-3 IR1, LR1, LR2
- Fast Ethernet
- Other optical links

Description

The SFP-BIDI transceivers are high performance, cost effective modules supporting data-rate of 155Mbps and 40km transmission distance with SMF.

The transceiver consists of three sections: a LP or 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 (MSA) and SFF-8472. For further information, please refer to SFP MSA.



Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	Tc	0		+70	°C
Power Supply Voltage		Vcc	3.13	3.3	3.47	V
Power Supply Current		Icc			160	mA
Data Rate				155		Mbps

Optical and Electrical Characteristics

(Tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Electrical Characteristics						
Supply Current(TX+RX)	Icc	mA			300	
Single Ended Data Input Swing		mV	150		1100	
Single Ended Data Output Swing		mV	300		600	
TX_fault/LOS output(TTL)	V_{OH}	V	2.0		Vcc	

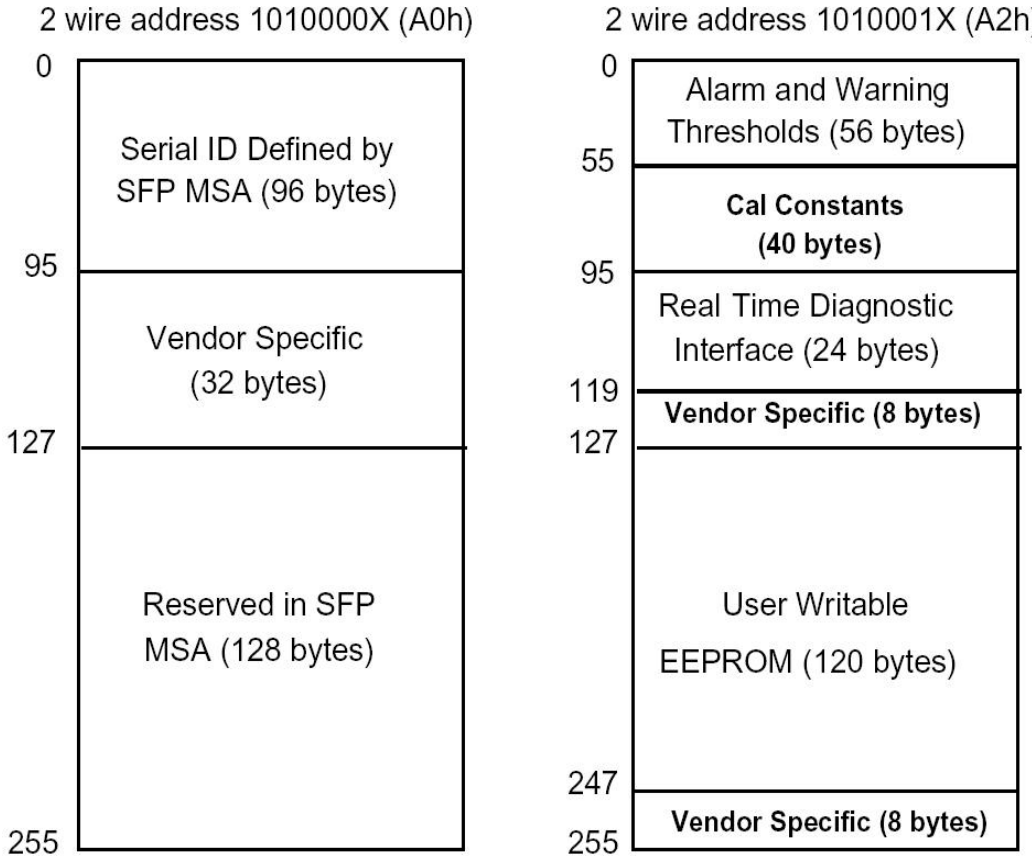
	V_{OL}	V	0		0.8	
TX_disable input(TTL)	V_{OH}	V	2.0		Vcc	
	V_{OL}	V	0		0.8	
Optical transmitter Characteristics						
Launch Optical Power	P0	dBm	-9		-3	
Center Wavelength Range	λc	nm	1270	1310	1355	1310nmFP-LD
			1500	1550	1580	1550nm DFB-LD
Spectral Width	Δλ	nm			6	1310nmFP-LD
					3	1550nm DFB-LD
Extinction Ratio	EXT	dB	8.2	10		
Side Mode Suppression Ratio	SMSR	dB	30			DFB-LD
Relative Intensity Noise	RIN	dB/Hz			-116	
Optical receiver Characteristics						
Receiver Sensitivity	Sen	dBm			-35	
Overload Input Optical Power	Pin	dBm	-3			
LOS Optical Dessert		dBm			Sen	
LOS Optical Assert		dBm	-40			
LOS Hysteresis		dB	0.5	3	5	

Notes:
Optical transition time is the time interval required for the rising or falling edge of an optical pulse to transition between the 20% and 80% amplitudes relative to the logical 1 and 0 levels

Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.
The digital diagnostic memory map specific data field defines as following.



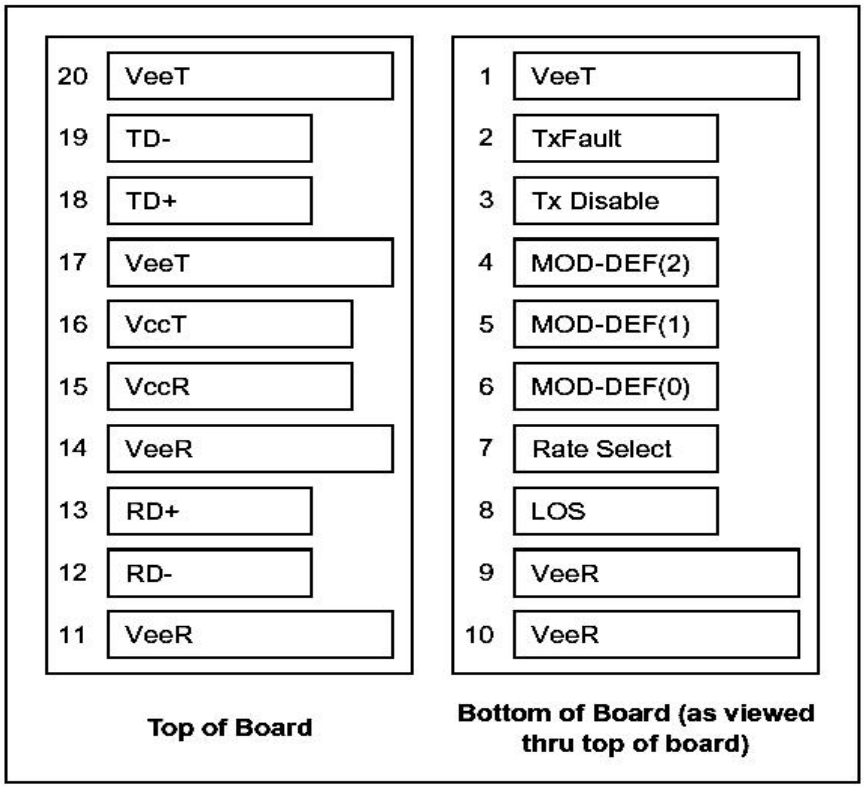
EEPROM Serial ID Memory Contents

Data Address	Size (Bytes)	Name of Field	Contents(Hex)	Description
0	1	Identifier	03	SFP
1	1	Ext.Identifier	04	SFP function is defined by serial ID only
2	1	Connector	07	LC Connector
3~10	8	Transceiver		Transceiver Codes
11	1	Encoding	03	NRZ
12	1	BR,Nominal	01	155Mbit/s
13	1	Reserved	00	
14	1	Length(9um)km		Transceiver transmit distance
15	1	Length(9um)100m		
16	1	Length(50um)10m		
17	1	Length62.5um)10m		
18	1	Length(Copper)	00	Not compliant
19	1	Reserved	00	

20~35	16	Vendor name	Not detailed	“SOPTO” ASSCII
36	1	Reserved	00	
37~39	3	Vendor OUI	00 00 00	
40~55	16	Vendor PN	Not detailed	Transceiver part number
56~59	4	Vendor rev	20 20 20	
60~61	2	wavelength		Transceiver wavelength
62	1	Reserved	00	
63	1	CC_BASE	Check Sum(Variable)	Check code for Base ID Fields
EXTENDED ID FIELDS				
64~65	2	Options	00 1A	TX_DISABLE,TX_FAULT and LOSS of Signal implemented
66	1	BR,max	00	
67	1	BR,min	00	
68~83	16	Vendor SN		Serial Number of transceiver (ASSCII)
84~91	8	Date code		Manufactory date code
92~94	3	Reserved	00 00 00	
95	1	CC_EXT	Check Sum(Variable)	Check sum for Extended ID Field
VENDOR SPECIFIC ID FIELDS				
96~127	32	Vendor Specific	Read only	Depends on customer information
128~255	128	Reserved	Read only	Filled by zero

Pin Definitions

Pin Diagram



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	VEET	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	VEER	Receiver ground	1	
10	VEER	Receiver ground	1	
11	VEER	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	VEER	Receiver ground	1	
15	VCCR	Receiver Power Supply	2	
16	VCCT	Transmitter Power Supply	2	
17	VEET	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	VEET	Transmitter Ground	1	

Notes:

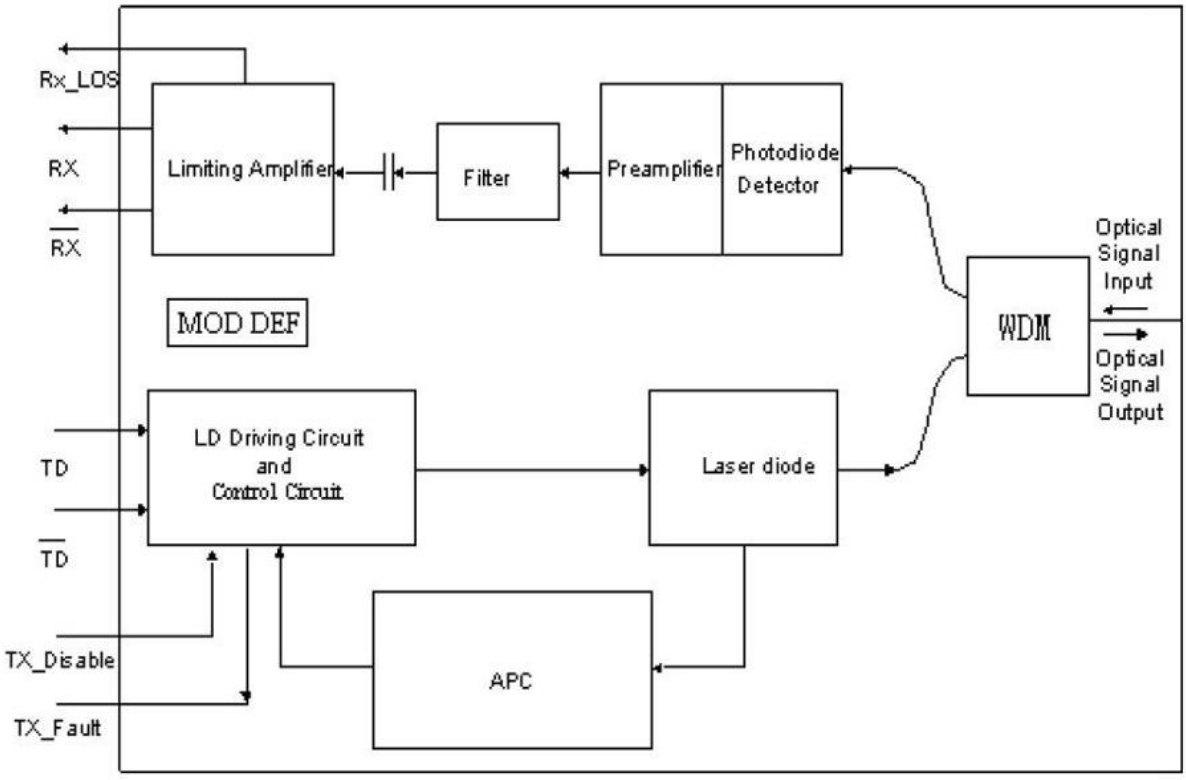
Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board

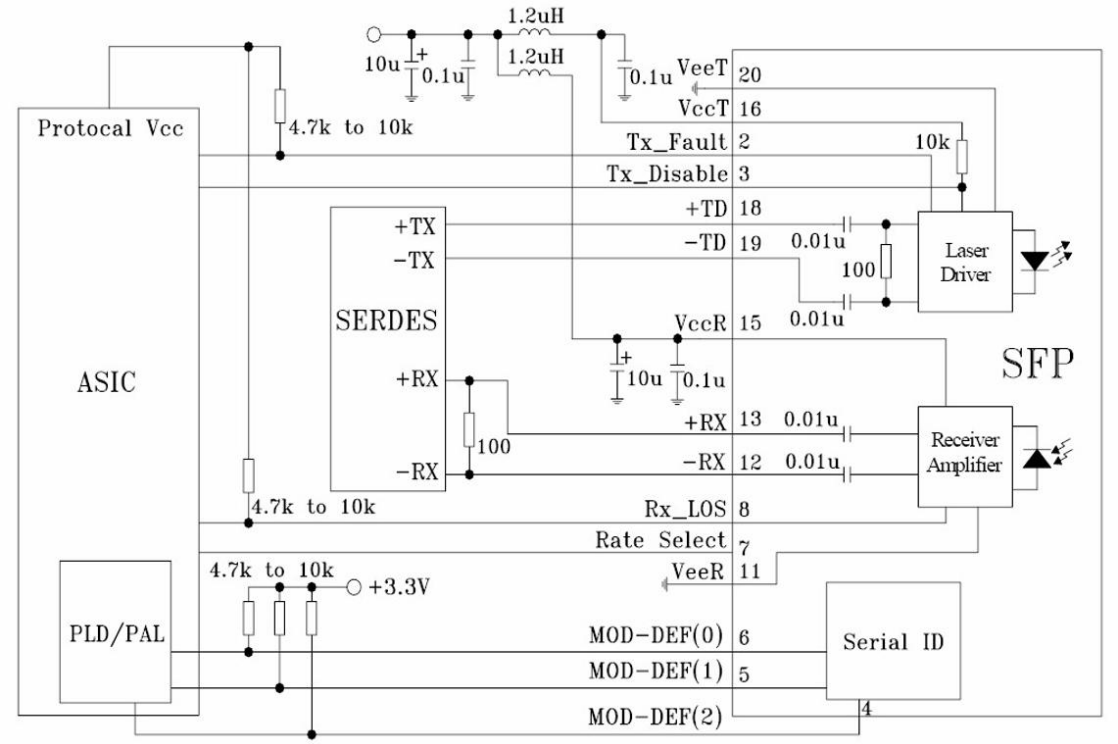
to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

2) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:
   Low (0 to 0.8V): Transmitter on
   (>0.8V, < 2.0V): Undefined
   High (2.0 to 3.465V): Transmitter Disabled
   Open: Transmitter Disabled
3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.
   Mod-Def 0 is grounded by the module to indicate that the module is present
   Mod-Def 1 is the clock line of two wire serial interface for serial ID
   Mod-Def 2 is the data line of two wire serial interface for serial ID
4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
5) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Block diagram

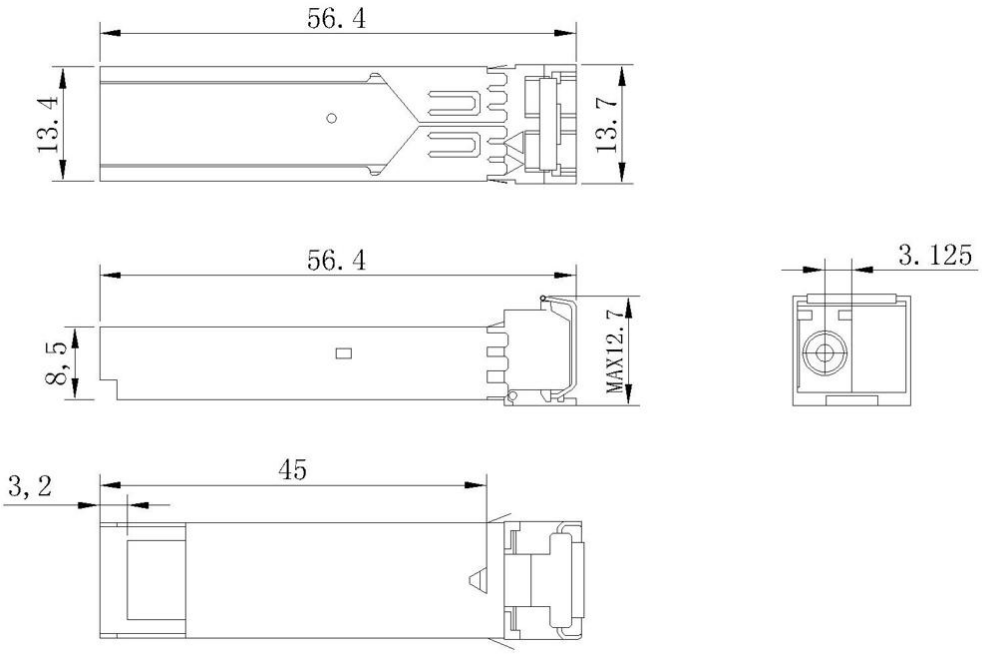


Typical Application Circuit

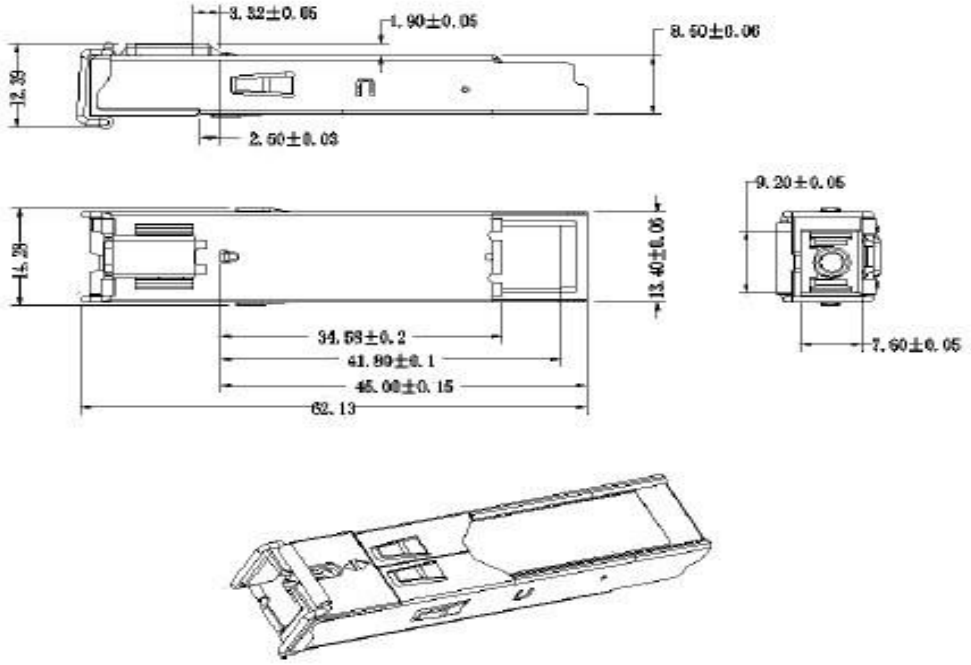


Mechanical Dimensions

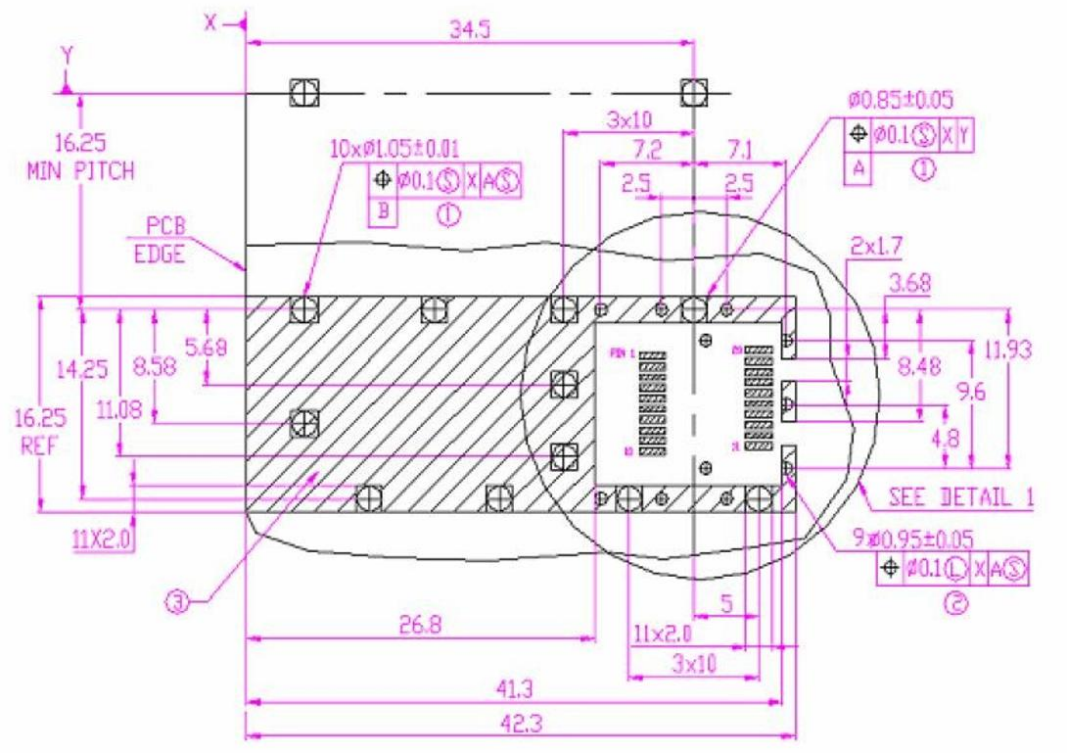
A.LC

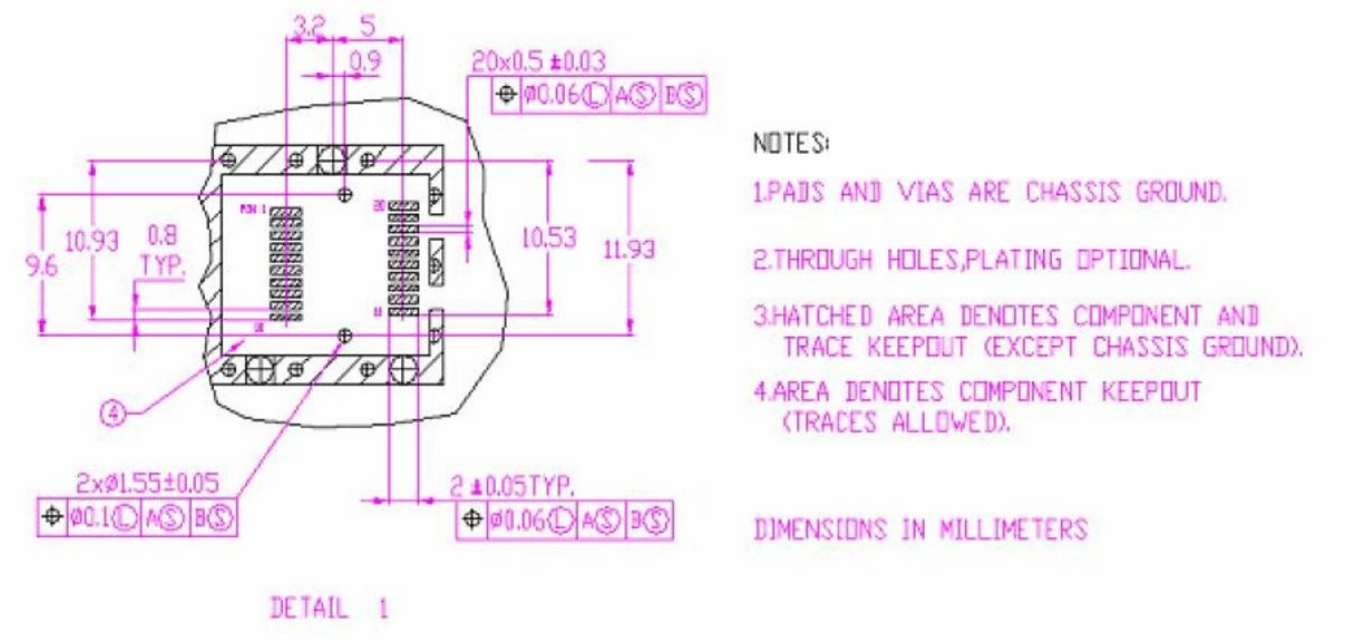


B.SC



PCB layout Recommendation





Regulatory Compliance

Feature	Test Method	Performance
Electrostatic Discharge (ESD)to the Electrical Pins	MIL-STD-833E Method 3015.7	Class1(>1.5kV)-Human Body Model
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class2(>4.0kV)
Electromagnetic	CISPR22 ITE Class B	Compliant with standard
Interference(EMI)	FCC Class B CENELEC EN55022 VCCI Class 1	
Immunity	IEC61000-4-3 Class 2	Typically show no measurable effect from a 3V/m field swept from 80 to 1000MHZ applied to the transceiver without a chassis enclosure.
Safety	FDA 0322110-00 CDRH 21-CFR 1040 Class1	
	UL E239070	
	TUV-GS B0501 54481 001	
	CE E8 0501 54481 004	

Ordering information

Part Number	Product Description

1310nm TX / 1550 nm RX	
SPT-PB3503-L40D	1310nm Tx, 155Mbps, LC, 40km, 0°C~+70°C, With DDM
SPT-PB3503-S40D	1310nm Tx, 155Mbps, SC, 40km, 0°C~+70°C, With DDM
1550nm TX / 1310 nm RX	
SPT-PB5303-L40D	1550nm Tx, 155Mbps , LC, 40km, 0°C ~ +70°C, With DDM
SPT-PB5303-S40D	1550nm Tx, 155Mbps , SC, 40km, 0°C ~ +70°C, With DDM

Note:

1、Default operating case temperature is 0 ~ 70℃. If you need -40 ~85℃ products , please contact us.

2、If you need more customized services, please contact us.

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