SPT-PBXG-X40D

1.25Gbps SFP Bi-Directional Transceiver, 40km Reach

1310nm Tx/ 1490 nm Rx & 1490nm Tx/ 1310 nm Rx

1310nm Tx/ 1550 nm Rx & 1550nm Tx/ 1310 nm Rx

Features

- Dual data-rate of 1.25Gbps/1.063Gbps operation

- 1310nm，1490nm or 1550nm DFB laser and PIN photo detector for 40km transmission

- Compliant with SFP MSA and SFF-8472 with simplex LC or SC receptacle

- Digital Diagnostic Monitoring: Internal Calibration or External Calibration

- Compatible with SONET OC-24-LR-1

- Compatible with ROHS

- +3.3V single power supply

- Compatible with the patch cords ITU G.652D, G.657A and G.657B (in the impact part) and the core/cladding of bidirectional transmission on single-mode optical fiber is 9/125 μm.

- Comply with ITU G.984.1, ITU G.984.2, ITU G.984.3, ITU G.984.4 and ITU G.988 standards.

- "Hot plug" with LC type optical interface connector.

- The range of up to 40 km shall be allowed according to IEEE802.3ah standard.

- According to SFF-8074i Multi-Source Protocol (MSA), SFP is an industry standard.

- Observe the digital diagnosis monitoring interface.

- Comply with CE and FCC certification.

- Operating case temperature

- Standard:

  Commercial Temperature：0 to +70°C

  Industrial Temperature：-40 to +85°C

Applications

- Gigabit Ethernet

- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

Description

The SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 40km 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 (MSA) and SFF-8472. For further information, please refer to SFP MSA.
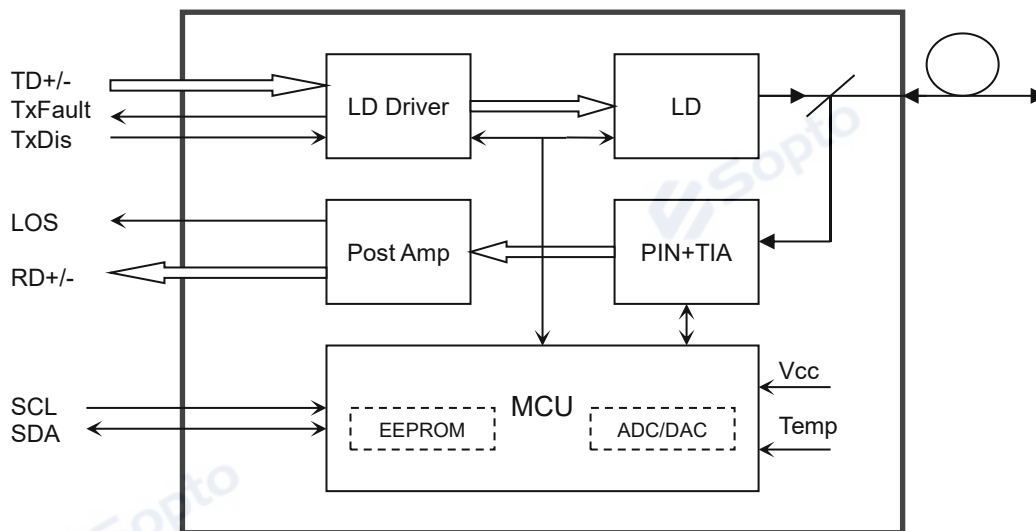
Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case	Standard	Tc	0		+70	°C

Temperature	Industrial		-40		85	°C
Power Supply Voltage	Vcc	3.13	3.3		3.47	V
Power Supply Current	Icc				170	mA
Data Rate	Gigabit Ethernet			1.25		Gbps
	Fiber Channel			1.063		

Optical and Electrical Characteristics

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Centre Wavelength		λc	1280	1310	1340	nm	1310nm Tx
			1480	1490	1500	nm	1490nm Tx
			1500	1550	1580	nm	1550nm TX
Spectral Width (RMS)		Δλ			0.88	nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		Pout	-3		0	dBm	
Extinction Ratio		ER	9			dB	
Optical Rise/Fall Time (20%~80%)		tr/tf			0.26	ns	
Data Input Swing Differential		V_{IN}	400		1800	mV	2
Input Differential Impedance		Z_{IN}	90	100	110	Ω	
TxDisable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TxFault	Fault		2.0		Vcc	V	
	Normal		0		0.8	V	
Receiver							
Receiver Sensitivity					-26	dBm	3
Receiver Overload			-1			dBm	3
LOS De-Assert	LOS_D				-27	dBm	
LOS Assert	LOS_A		-38			dBm	
LOS Hysteresis			0.5	3	5	dB	
Data Output Swing Differential		Vout	400		1800	mV	4
LOS	High		2.0		Vcc	V	
	Low				0.8	V	

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2^7-1 test pattern @1250Mbps, BER $\leq 1 \times 10^{-12}$.
4. Internally AC-coupled.

Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
TxDisable Negate Time	t_on			1	ms
TxDisable Assert Time	t_off			10	µs
Time To Initialize, including Reset of TxFault	t_init			300	ms
TxFault Assert Time	t_fault			100	µs
TxDisable To Reset	t_reset	10			µs
LOS Assert Time	t_loss_on			100	µs
LOS De-assert Time	t_loss_off			100	µs
Serial ID Clock Rate	f_serial_clock			400	KHz
MOD_DEF (0:2)-High	VH	2		Vcc	V
MOD_DEF (0:2)-Low	VL			0.8	V

Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TxPower	-3 to 0	dBm	±3dB	Internal / External
Rx Power	-26 to -1	dBm	±3dB	Internal / External

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).
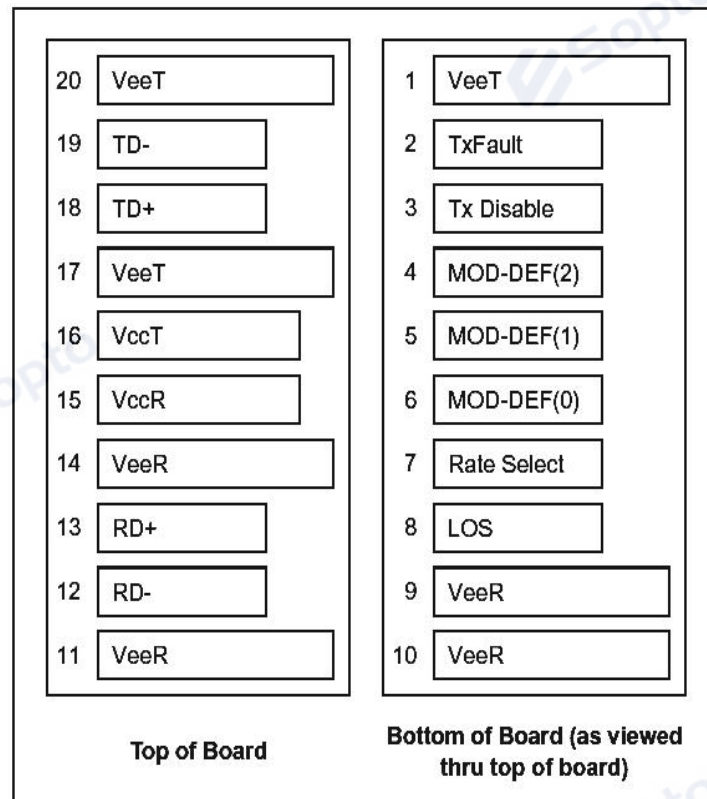
The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.

2 wire address 1010000X (A0h)

0	
	Serial ID Defined by SFP MSA (96 bytes)
95	
	Vendor Specific (32 bytes)
127	
	Reserved in SFP MSA (128 bytes)
255	

2 wire address 1010001X (A2h)

0	
	Alarm and Warning Thresholds (56 bytes)
55	
	Cal Constants (40 bytes)
95	
	Real Time Diagnostic Interface (24 bytes)
119	
127	**Vendor Specific (8 bytes)**
	User Writable EEPROM (120 bytes)
247	
255	**Vendor Specific (8 bytes)**
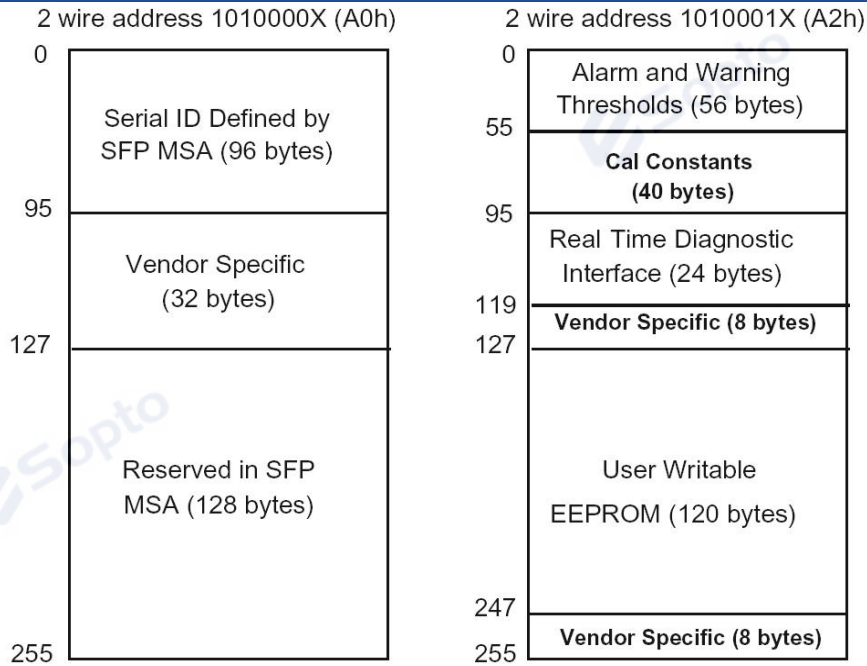
Pin Definitions

Pin Diagram

Top of Board

20	VeeT
19	TD-
18	TD+
17	VeeT
16	VccT
15	VccR
14	VeeR
13	RD+
12	RD-
11	VeeR

Bottom of Board (as viewed thru top of board)

1	VeeT
2	TxFault
3	Tx Disable
4	MOD-DEF(2)
5	MOD-DEF(1)
6	MOD-DEF(0)
7	Rate Select
8	LOS
9	VeeR
10	VeeR

Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes

1	V_EET	Transmitter Ground	1	
2	TxFAULT	Transmitter Fault Indication	3	Note 1
3	TxDISABLE	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	V_EER	Receiver ground	1	
10	V_EER	Receiver ground	1	
11	V_EER	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V_EER	Receiver ground	1	
15	V_CCR	Receiver Power Supply	2	
16	V_CCT	Transmitter Power Supply	2	
17	V_EET	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V_EET	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1) TxFault 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) TxDisable 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.
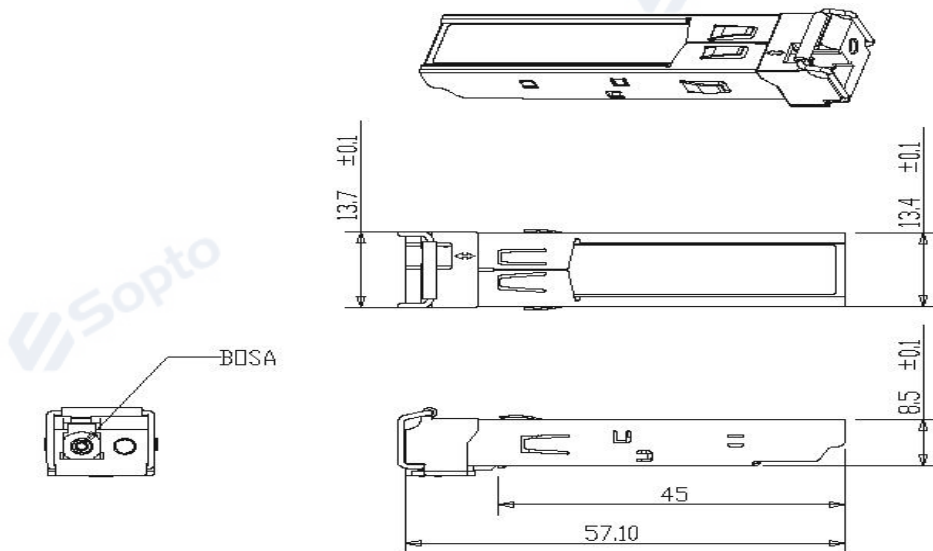
6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.
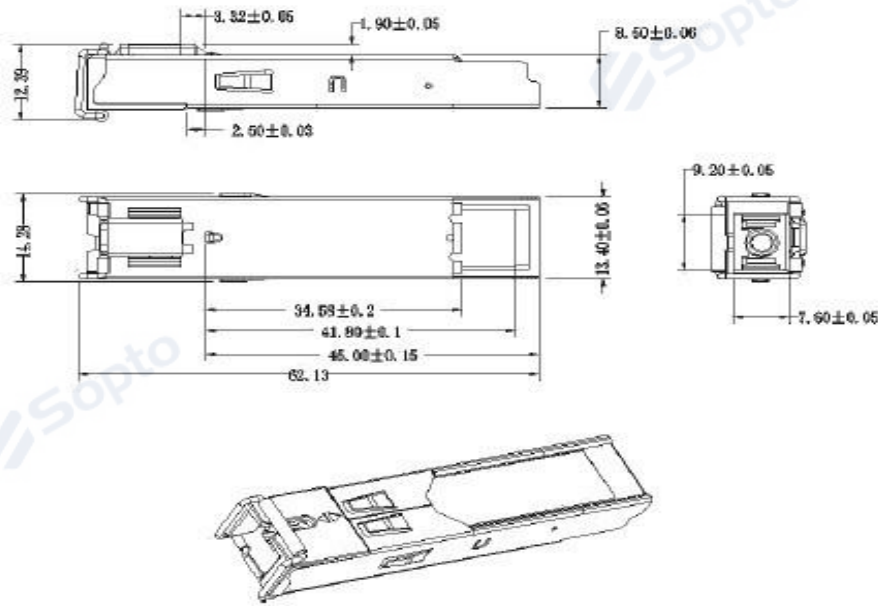
Recommended Interface Circuit
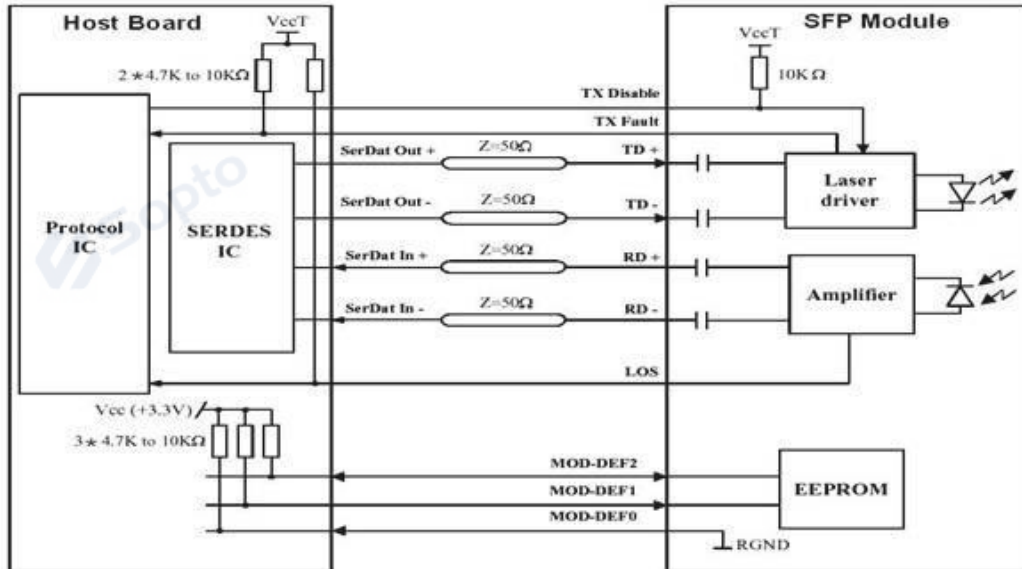
Mechanical Dimensions

A．LC Receptacle

B．SC Receptacle

Ordering information

Part Number	Product Description
1310nm Tx/ 1490 Rx	
SPT-PB341G-L40D	1310nm TX, 1.25Gbps, LC, 40km, 0°C~+70°C, With DDM
SPT-PB341G-S40D	1310nm TX, 1.25Gbps, SC, 40km, 0°C~+70°C, With DDM
SPT-PB341G-L40TD	1310nm TX, 1.25Gbps, LC, 40km, -40°C~+85°C, With DDM
SPT-PB341G-S40TD	1310nm TX, 1.25Gbps, SC, 40km, -40°C~+85°C, With DDM
1490nm Tx/ 1310 nm Rx	
SPT-PB431G-L40D	1490nm TX, 1.25Gbps, LC, 40km, 0°C ~ +70°C, With DDM
SPT-PB431G-S40D	1490nm TX, 1.25Gbps, SC, 40km, 0°C ~ +70°C, With DDM
Part Number	Product Description
1310nm Tx/ 1550 nm Rx	
SPT-PB351G-L40D	1310nm TX, 1.25Gbps, LC, 40km, 0°C~+70°C, With DDM
SPT-PB351G-S40D	1310nm TX, 1.25Gbps, SC, 40km, 0°C~+70°C, With DDM
1550nm Tx/ 1310 nm Rx	
SPT-PB531G-L40D	1550nm TX, 1.25Gbps, LC, 40km, 0°C ~ +70°C, With DDM
SPT-PB531G-S40D	1550nm TX, 1.25Gbps, 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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