SPT-PBXG-X150(D)

1.25Gb/s BiDi Single LC/SC, SMF, 1550nm DFB-LD, 1490nm APD, 150Km SFP Transceiver

Features

- Up to 1.25Gb/s Data Links
- Hot-Pluggable SFP footprint
- Single LC/SC for Bi-directional Transmission
- Built-in 1550nm DFB Laser
- 1490nm APD photo-detector
- Built-in digital diagnostic functions
- Up to 150Km on 9/125μm SMF
- Single +3.3V Power Supply
- Industrial /Extended/ Commercial operating temperature range: -40°C to 85°C/-5°C to 85°C/-0°C to 70°C Version available
- Very low EMI and excellent ESD protection
- RoHS compliant and Lead Free

Applications

- 1000Base-EZX Ethernet
- Metro/Access Networks
- 1×Fibre Channel
- Other Optical Link

Description

Sopto SPT-PBXG-X150(D) Bi-Directional transceiver is a high performance, cost effective module, which is compliant with LC/SC Optics interface with built in WDM for Bi-Directional serial optical data communication applications. This module is designed for Single-Mode single fiber, operates at the normal wavelength of 1550/1490nm.

The transmitter section incorporates DFB and driver IC with temperature compensation and automatic power control circuit, which makes the transmitter section output power and Extinction ration stabled in operation temperature.

The receiver section incorporates an efficient InGaAs photodiode and transimpedance with AGC for wide dynamic range.

Absolute Maximum Ratings

Parameter		Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	Industrial	TC	-40		+85	°C
	Extended					°C
	Commercial					°C
Supply Voltage		$V_{CCT, R}$	-0.5		4	V
Relative Humidity		RH	0		85	%

Electrical Characteristics

(T_{OP} = Tc, VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	Vcc	3.0	3.3	3.6	V	
Supply Current	Icc			180	mA	
Inrush Current	I_{surge}			Icc+30	mA	
Maximum Power	P_{max}			1.0	mW	
Transmitter Section:						
Input differential impedance	R_{in}	90	100	110		
Single ended data input swing	$V_{in\ PP}$	200		1200	mVp-p	
Transmit Disable Voltage	V_D	Vcc – 1.3		Vcc	V	2
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	
Transmit Disable Assert Time	$T_{dessert}$			10	us	
Receiver Section:						
Single ended data output swing	Vout,pp	300		800	mv	3
Data output rise time	t_r			260	ps	4
Data output fall time	t_f			260	ps	4
LOS Fault	$V_{losfault}$	Vcc – 0.5		V_{CC_host}	V	5
LOS Normal	$V_{los\ norm}$	V_{ee}		V_{ee}+0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6
Deterministic Jitter Contribution	RXΔDJ			51.7	ps	7
Total Jitter Contribution	RXΔTJ			122.4	ps	

Notes:
1.AC coupled.
2.Or open circuit.
3.Into 100 ohm differential termination.
4.20 – 80 %
5.LOS is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

6.All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000.
7.Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ and . DJ.

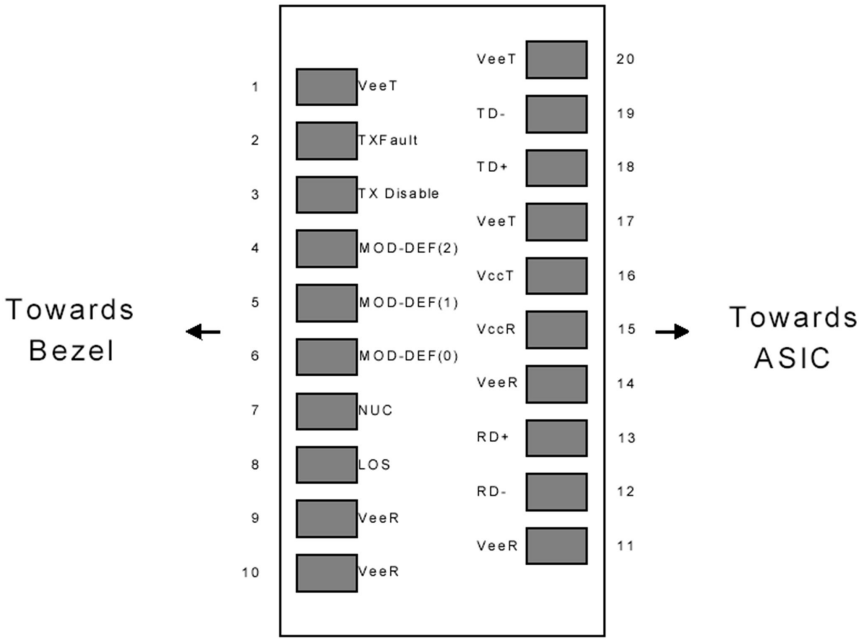
Optical Parameters

(T_{OP} = Tc, VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λ_c	1530	1550	1570	nm	1
Spectral Width	σ			1	nm	
Optical Output Power	P_{out}	3			dBm	2
Optical Rise/Fall Time	t_r / t_f			260	ps	3
Extinction Ratio	ER	9			dB	
Deterministic Jitter Contribution	TXΔDJ			56.5	ps	4
Total Jitter Contribution	TXΔTJ			119	ps	3
Eye Mask for Optical Output	Compliant with Eye Mask Defined in IEEE 802.3 standard					
Relative Intensity Noise	RIN			-120	dB/Hz	
Receiver Section:						
Optical Input Wavelength		1470	1490	1510	nm	
Receiver Overload	P_{ol}	-1			dBm	5.6
RX Sensitivity	Sen			-30	dBm	5.6
RX_LOS Assert	LOS_A	-41			dBm	
RX_LOS Deassert	LOS_D			-31	dBm	
RX_LOS Hysteresis	LOS_H	0.5	2	5	dB	
General Specifications						
Data Rate	BR		1.25		Gb/s	
Bit Error Rate	BER			10^{-12}		
Max. Supported Link Length on 9/125μm SMF@1.25G	LMAX		150		km	7
Total System Budget	LB	30			dB	8

Note:
1. The optical power is launched into SMF.
2. 20-80%.
3. Contributed total jitter is calculated from DJ and RJ measurements using TJ = RJ + DJ. Contributed RJ is calculated for 1x10-12 BER by multiplying the RMS jitter (measured on a single rise or fall edge) from the oscilloscope by 14. Per FC-PI, the actual contributed RJ is allowed to increase above its limit if the actual contributed DJ decreases below its limits, as long as the component output DJ and TJ remain within their specified FC-PI maximum limits with the worst case specified component jitter input.
4. Measured with PRBS 27-1 at 10-12 BER

Pin Assignment



Pin Description

Pin No	Name	Function	Plug Seq	Notes
1	VeeT	Transmitter Ground	**1**	**1**
2	TX Fault	Transmitter Fault Indication	**3**	
3	TX Disable	Transmitter Disable	**3**	2
4	MOD-DEF2	Module Definition	**2**	3
5	MOD-DEF1	Module Definition 1	**3**	3
6	MOD-DEF0	Module Definition 0	**3**	3
7	Rate Select	Not Connected	**3**	**4**
8	LOS	Loss of Signal	**3**	5
9	VeeR	Receiver Ground	**1**	**1**
10	VeeR	Receiver Ground	**1**	**1**
11	VeeR	Receiver Ground		**1**
12	RD-	Inv. Received Data Out	**3**	**6**
13	RD+	Received Data Out	**3**	**6**
14	VeeR	Receiver Ground	**3**	**1**
15	VccR	Receiver Power	**2**	**1**
16	VccT	Transmitter Power	**2**	
17	VeeT	Transmitter Ground	**1**	
18	TD+	Transmit Data In	**3**	6
19	TD-	Inv. Transmit In	**3**	6
20	VeeT	Transmitter Ground	**1**	

Notes:

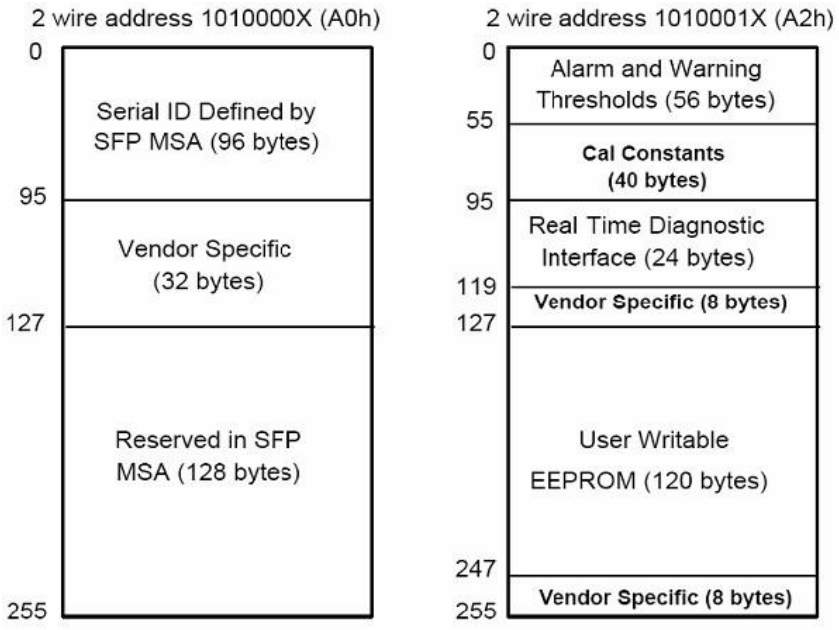
1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k - 10 kohms on host board to a voltage between 2.0V and 3.6V.MOD_DEF(0) pulls line low to indicate module is plugged in.
4. Rate select is not used

5. LOS is open collector output. Should be pulled up with 4.7k – 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. AC Coupled

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 is 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)



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	
11	1	Encoding	NRZ(03h)
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13	1	Reserved	(0000h)

14	1	Length(9um,km)	Link length supported for 9/125um fiber, units of km
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:
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: “xxxxxxx” (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-61	2	Wavelength	Laser wavelength
62	1	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	Manufacturing date code
92	1	Diagnostic Type	Diagnostics
93	1	Enhanced Options	Diagnostics
94	1	SFF-8472	Diagnostics
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	Vendor specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

Digital Diagnostic Monitor

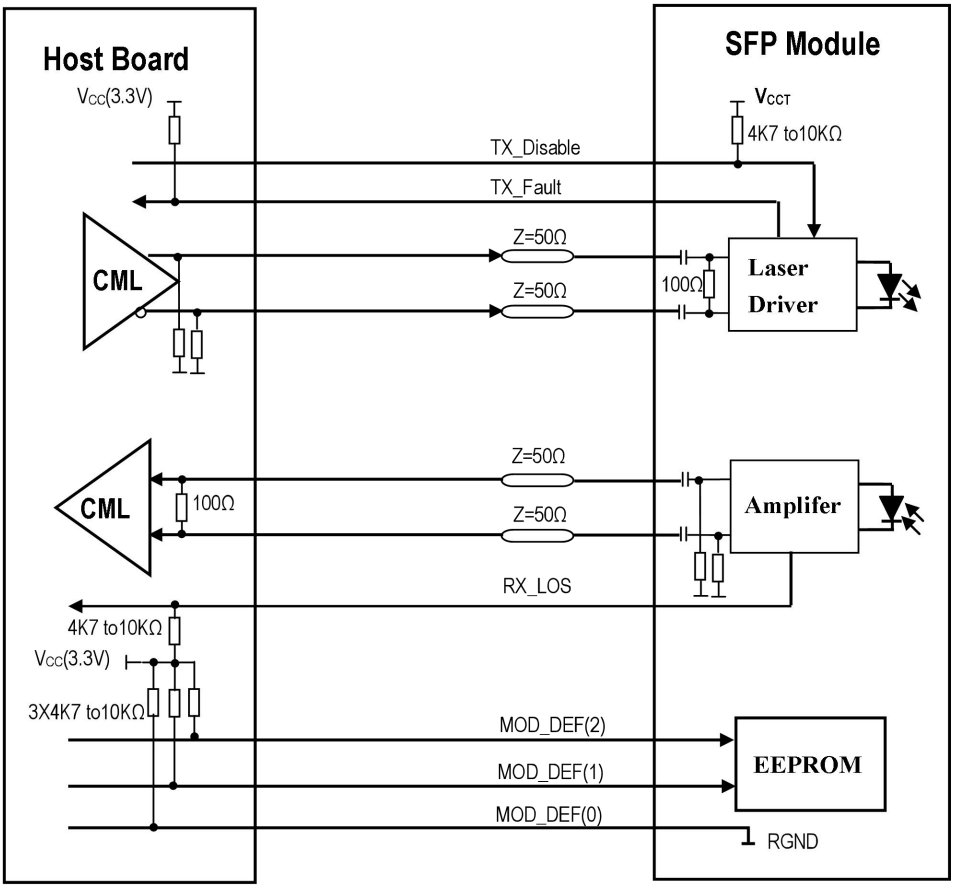
Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	±3.0	°C
98-99	VCC3 Internal Supply Voltage	±3.0	%
100-101	Laser Bias Current	±10	%
102-103	Tx Output Power	±3.0	dBm
104-105	Rx Input Power	±3.0	dBm

Regulatory Compliance

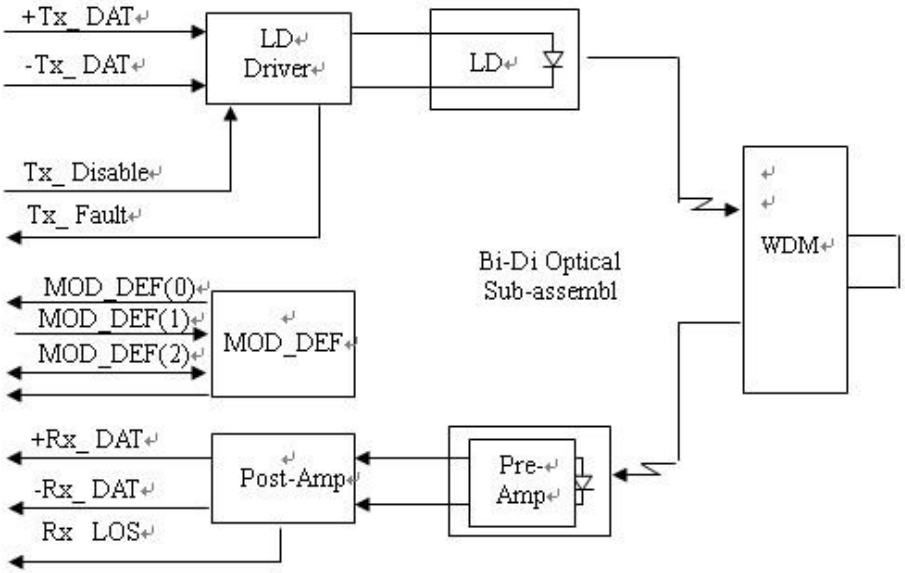
The transceiver complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) 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

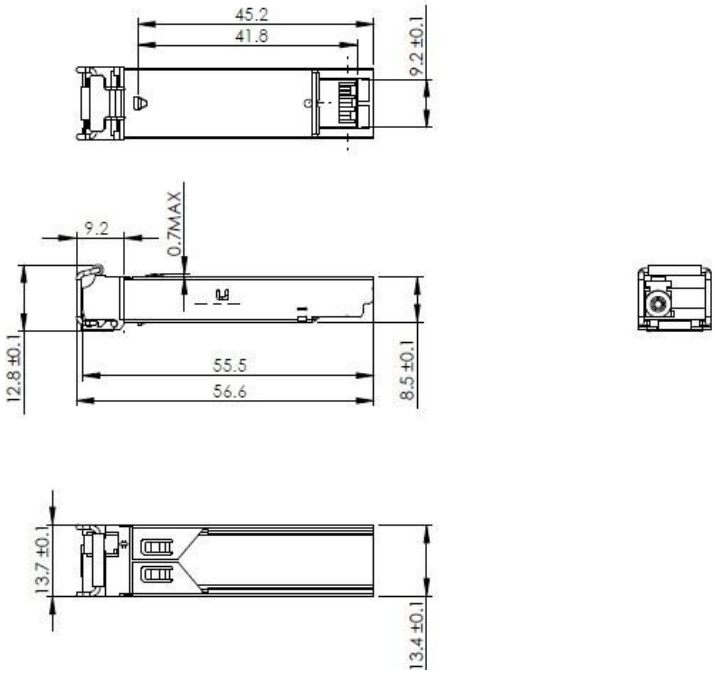


SFP Host Recommended Circuit



Block Diagram

Mechanical Dimensions



Mechanical Drawing

Ordering information

Part Number	Product Description
SPT-PB541G-L150D	Transceiver SFP BIDI 1550nmTx/1490nmRx 1.25G 150km LC Interface with DDM Commercial Temperature

SPT-PB451G-L150D	Transceiver SFP BIDI 1490nmTx/1550nmRx 1.25G 150km LC Interface with DDM Commercial Temperature

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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Web : http://www.sopto.com.cn