

# SPT-P131G-20(D)

#### 1.25Gbps SFP Optical Transceiver, 20km Reach

#### Features

- Dual data-rate of 1.25Gbps/1.063Gbps operation
- 1310nm FP laser and PIN photo detector for 20km transmission
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitoring: Internal Calibration or External Calibration
- Compatible with SONET OC-24-LR-1
- Compatible with ROHS
- +3.3V single power supply
- Operating case temperature:
  - Standard: 0 to +70°C
  - Industrial: -40 to +85°C

#### Applications

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

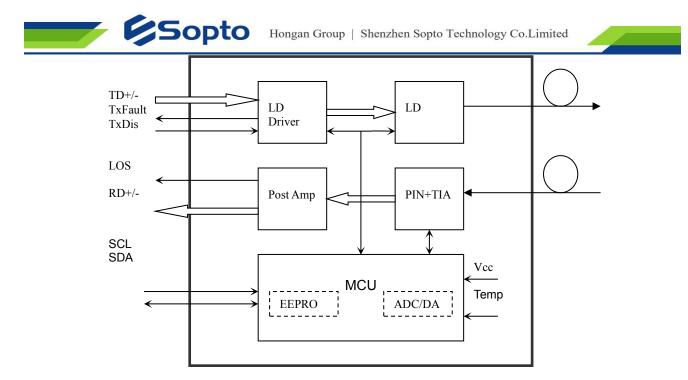
#### Description

The SFP transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 20km transmission distance with SMF.

The transceiver consists of three sections: a FP 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.

#### **Module Block Diagram**



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

Para	Parameter		Min	Typical	Max	Unit
Operating Case	Standard	Та	0		+70	°C
Temperature	Industrial	Tc	-40		+85	°C
Power Sup	Power Supply Voltage		3.13	3.3	3.47	V
Power Supply Current		Icc			170	mA
Data Data	Gigabit Ethernet			1.25		Chra
Data Rate	Fiber Channel			1.063		Gbps

# **Optical and Electrical Characteristics** SPT-P131G-20D: (FP and PIN, 1310nm, 20km Reach)

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Centre Wavelength	λc	1260	1310	1360	nm	
Spectral Width (RMS)	σ			4	nm	
Average Output Power	Pout	-9		-3	dBm	1

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on Ratio	ER	9			dB	
se/Fall Time ~80%)	tr/tf			0.26	ns	
out Swing rential	VIN	400		1800	mV	2
tial Impedance	ZIN	90	100	110	Ω	
Disable		2.0		Vcc	V	
Enable		0		0.8	V	
Fault		2.0		Vcc	V	
Normal		0		0.8	V	
Receiver						
avelength	λc	1260		1580	nm	
Sensitivity				-24	dBm	3
Overload		-1			dBm	3
e-Assert	LOSD			-26	dBm	
LOS Assert		-36			dBm	
LOS Hysteresis		1		4	dB	
Data Output Swing Differential		400		1800	mV	4
25	High	2.0		Vcc	V	
05	Low			0.8	V	
	e/Fall Time ~80%) ut Swing rential tial Impedance Disable Enable Fault Normal avelength Sensitivity Overload e-Assert Assert ysteresis put Swing	e/Fall Time -80%) tr/tf iut Swing rential VIN ital Impedance ZIN Disable 2 Enable 3 Fault 3 Normal 3 Avelength λc Sensitivity 3 Overload 3 e-Assert 1 Sensitivity 1 Overload 3 e-Assert 1 Sensitivity 3 Overload 3 continue 1 Sensitivity 3 Overload 3 continue 1 Sensitivity 3 Overload 3 continue 1 Sensitivity 3 Continue 1 Continue 1	e/Fall Time -80%)tr/tfut Swing rentialVIN400ut Swing rentialVIN400tial ImpedanceZIN90Disable2.0Enable0Fault2.0Normal0Receivavelength $\lambda c$ Sensitivity-1coverload-1e-AssertLOSDAssertLOSA-36ysteresisput Swing rentialVout400High2.0	e/Fall Time -80%)tr/tfIwing rentialVIN400ut Swing rentialVIN400tial ImpedanceZIN90100Disable2.0100Enable0100Fault2.0100Normal0100Receiveravelength $\lambda_c$ 1260Sensitivity11Overload-11e-AssertLOSD-36systeresis11put Swing rentialVout400OSHigh2.0	e/Fall Time -80%)In/tIIe/Fall Time -80%)tr/tf0.26ut Swing rentialVIN4001800tial ImpedanceZIN90100110Disable2.0VccEnable00.8Fault2.0VccNormal00.8Receiveravelength $\lambda_c$ 12601580Sensitivity-1-24Overload-1-26AssertLOSD-36-26AssertLOSA-361800vsteresis14put Swing rentialVout4001800OSHigh2.0Vcc	e/Fall Time -80%)         tr/tf $100$ $0.26$ ns           ut Swing rential         VIN         400         1800         mV           tial Impedance         ZIN         90         100         110 $\Omega$ Disable         ZIN         90         100         110 $\Omega$ Disable         2.0         Vcc         V           Enable         0         0.88         V           Fault         2.0         Vcc         V           Normal         0         0.88         V           Sensitivity         0         0.88         V           avelength $\lambda c$ 1260         1580         nm           Sensitivity         -24         dBm         dBm           Overload         -1         dBm         dBm           e-Assert         LOSD         -26         dBm           ysteresis         1         4         dB           put Swing rential         Vout         400         1800         mV

Notes:

1. The optical power is launched into SMF.

2. PECL input, internally AC-coupled and terminated.

3. Measured with a PRBS 2<sup>7</sup>-1 test pattern @2125Mbps, BER  $\leq 1 \times 10^{-12}$ .

4. Internally AC-coupled.

# **Timing and Electrical**

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	μs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	μs
Tx Disable To Reset	t_reset	10			μs
LOS Assert Time	t_loss_on			100	μs
LOS De-assert Time	t_loss_off			100	μs

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Serial ID Clock Rate	f_serial_clo ck		400	KHz
MOD_DEF (0:2)-High	VH	2	Vcc	V
MOD_DEF (0:2)-Low	VL		0.8	V

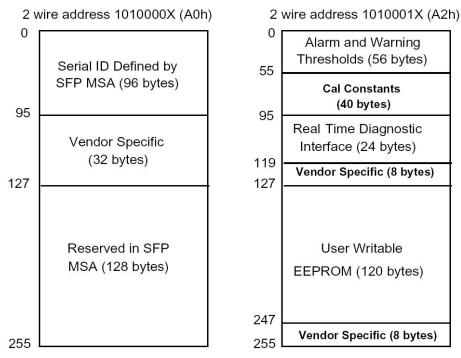
Diagnostics					
Parameter	Range	Unit	Accuracy	Calibration	
Temperature	0 to +70	°C	±3°C	Internal / External	
Temperature	-40 to +85		±5 C	Internar / Externar	
Voltage	3.0 to 3.6	V	±3%	Internal / External	
Bias Current	0 to 100	mA	±10%	Internal / External	
TX Power	-9 to -3	dBm	±3dB	Internal / External	
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.



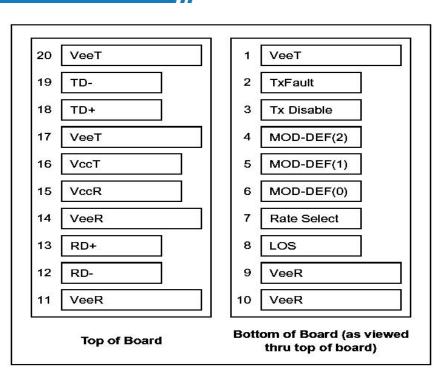
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# **Pin Definitions**

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	

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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.

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1) TX Fault is an open collector output, which should be pulled up with a  $4.7k\sim10k\Omega$  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  $4.7k\sim10k\Omega$  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  $4.7k\sim10k\Omega$  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  $4.7k\sim10k\Omega$  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  $100\Omega$  (differential) at the user SERDES.

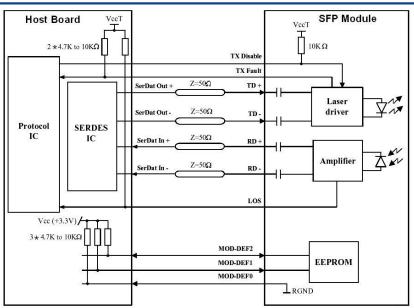
6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with  $100\Omega$  differential termination inside the module.

### **Recommended Interface Circuit**

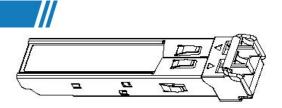


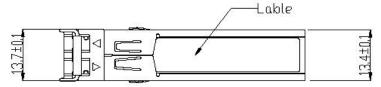


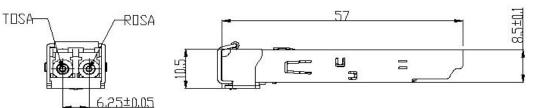
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**Mechanical Dimensions** 







Unit:mm

# **Ordering information**

Part Number	Product Description
SPT-P131G-20	1310nm, 1.25Gbps, 20km, 0°C ~ +70°C
SPT-P131G-20D	1310nm, 1.25Gbps, 20km, 0°C ~ +70°C, DDM
SPT-P131G-20TD	1310nm, 1.25Gbps, 20km, -40°C ~+85°C, DDM
SPT-P131G-20T	1310nm, 1.25Gbps, 20km, -40°C ~+85°C

Note: If you need more customized services, please contact us.

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