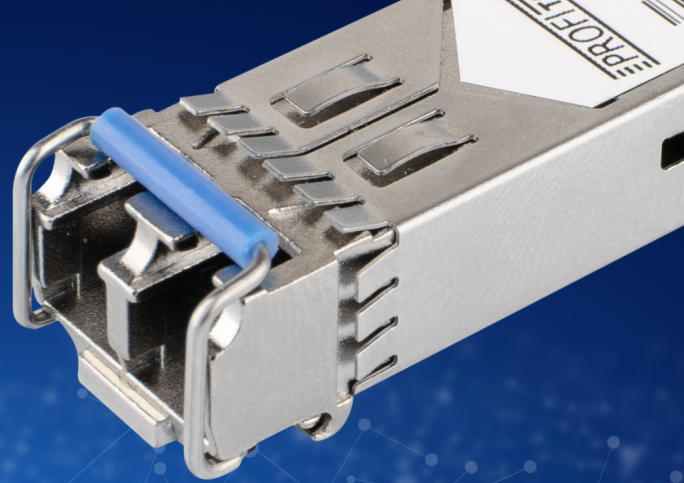


PT-1G-LX-31

DATASHEET



1. PRODUCT FEATURES

- ▶ Up to 1.25Gb/s data links
- ▶ 1310nm Fabry-Perot laser transmitter
- ▶ Up to 20km on 9/125µm SMF
- ▶ Hot-pluggable SFP footprint
- ▶ Duplex LC/UPC type pluggable optical interface
- ▶ Low power dissipation
- ▶ Metal enclosure, for lower EMI
- ▶ RoHS compliant and lead-free
- ▶ Digital diagnostic monitor interface compliant with SFF-8472
- ▶ Single +3.3V power supply
- ▶ Compliant with SFF-8472
- ▶ Operating case temperature commercial: 0°C to +70°C

APPLICATIONS

- ▶ Switch to Switch Interface
- ▶ Fast Ethernet
- ▶ Switched Backplane Applications
- ▶ Router/Server Interface
- ▶ Other Optical Links

COMPLIANCE

- ▶ SFP MSA
- ▶ SFF-8472
- ▶ IEEE802.3z
- ▶ RoHS

2. GENERAL DESCRIPTION

Profitap 1000BASE-LX/LH Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of four sections: the LD driver, the limiting amplifier, the 1310nm FP laser and the PIN photo-detector. The module supports data link up to 20KM in 9/125um single mode fiber.

This transceiver meets the Small Form Pluggable (SFP) industry standard package utilizing an integral LC-Duplex optical interface connector. An enhanced Digital Diagnostic Monitoring Interface compliant with SFF-8472 has been incorporated into the transceiver. It allows real time access to the transceiver operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage by reading a built-in memory with I2C interface.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

3. ORDERING INFORMATION

Product Part Number	Data Rate	Media	Wavelength	Transmission Distance	Temperature Range
PT-1G-LX-31	1250 Mbps	Single Mode Fiber	1310 nm	20	0°C to +70°C

4. PIN DIAGRAM

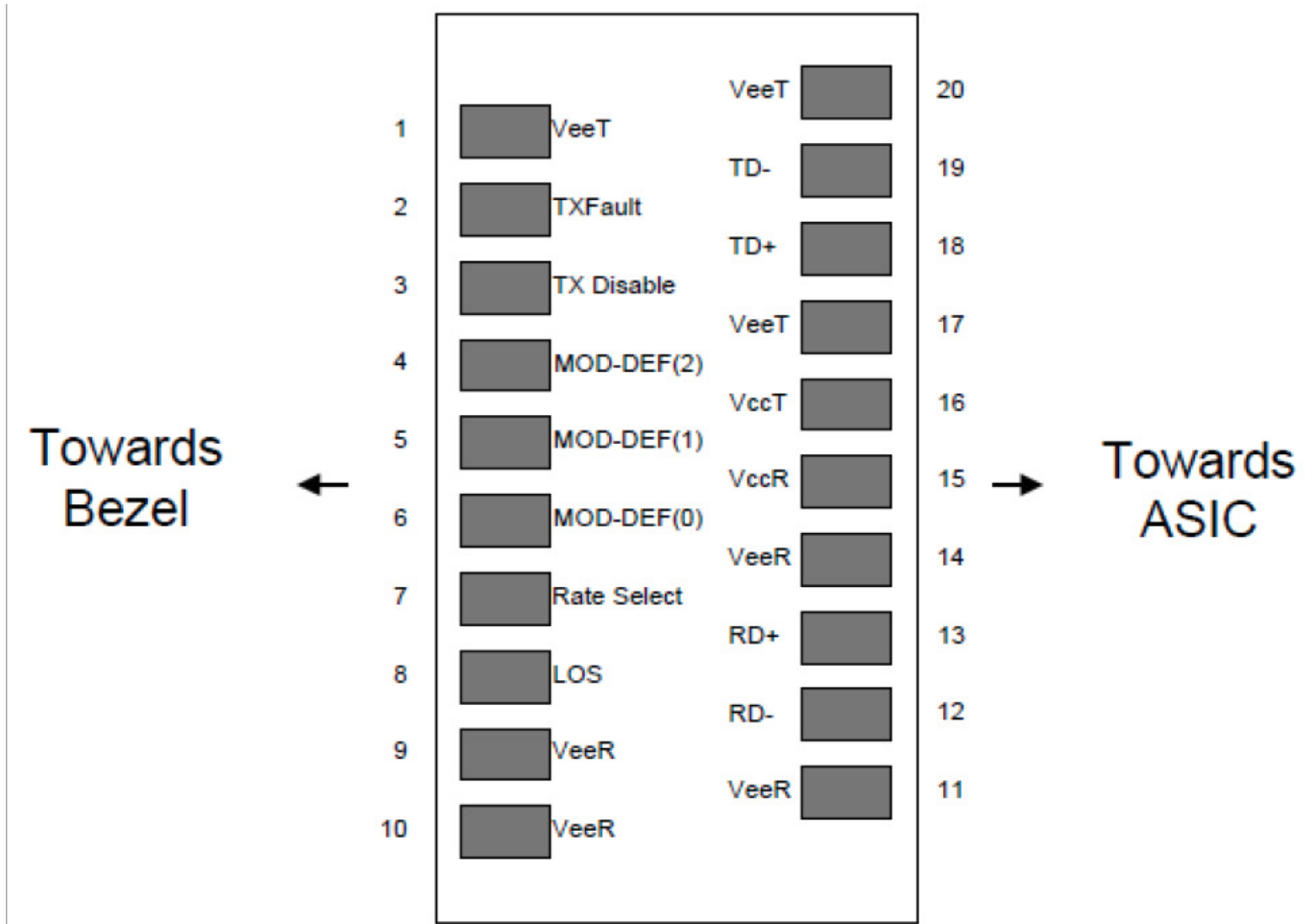


Figure2. Pin out of Connector Block on Host Board

5. PIN DESCRIPTIONS

Pin	Logic	Name/Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault. Open Drain. Logic 0 indicates normal operation.	2
3	TDIS	Transmitter Disable. Laser output disabled on high or open.	3
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	4
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	4
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	4
7	Rate Select	No connection required.	
8	LOS	Loss of Signal indication. Open Drain. Logic 0 indicates normal operation.	5
9	VEER	Receiver Ground (Common with Transmitter Ground)	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out(CML). AC Coupled	
13	RD+	Receiver Non-inverted DATA out(CML). AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	7
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

NOTE

1. Circuit ground is internally isolated from chassis ground.
2. TX Fault is an open drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V. When sensing an improper power level in the laser driver, the SFP sets this signal high and turns off the laser. TX-FAULT can be reset with the TX-DISABLE line. The signal is in TTL level.
3. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10 KΩ resistor. Its states are: Low (0 – 0.8V): Transmitter on; (>0.8, < 2.0V): Undefined; High (2.0 – 3.465V): Transmitter Disabled; Open: Transmitter Disabled. The TX-DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on when TX-DISABLE is low (TTL logic "0").
4. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V.
MOD_DEF (0) pulls line low to indicate module is plugged in.
5. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
The RX-LOS is high (TTL logic "1") when there is no incoming light from the companion transceiver.
This signal is normally used by the system for the diagnostic purpose. The signal is operated in TTL level.

6. ABSOLUTE MAXIMUM RATINGS

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	Ts	-40	85	°C	
Storage Ambient Humidity	HA	5	95	%	
Power Supply Voltage	VCC	-0.5	4	V	
Signal Input Voltage		-0.3	Vcc+0.3	V	
Receiver Damage Threshold		0		dBm	
Lead Soldering Temperature/Time	TSOLD		260/10	°C/sec	1
Lead Soldering Temperature/Time	TSOLD		360/10	°C/sec	2

NOTE

1. Suitable for wave soldering.
2. Only for soldering by iron.

7. RECOMMENDED OPERATING CONDITIONS

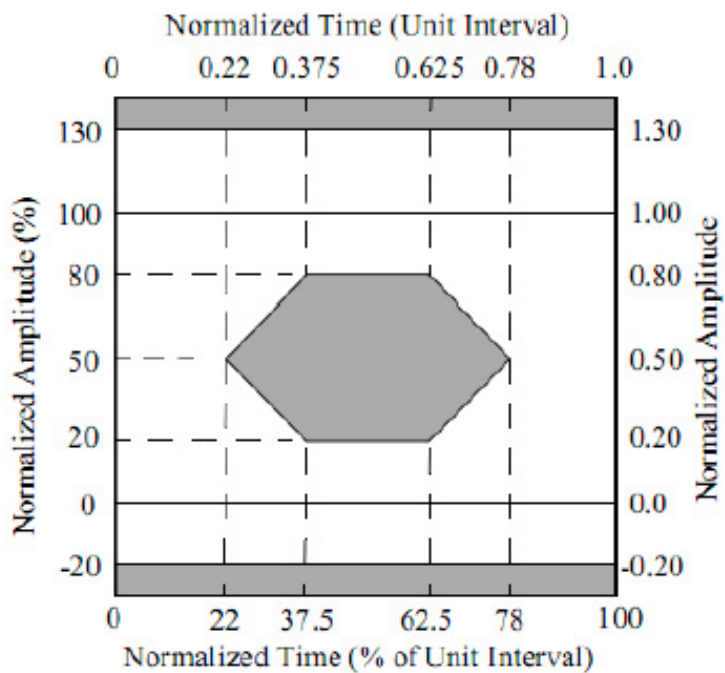
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Center Wavelength	λ_t	840	850	860	nm	
RMS Spectral Width	Pm	-	0.5	0.65	nm	
Average Optical Power, each Lane	Pavg	-8	-2.5	+1	dBm	
Optical Modulation Amplitude (OMA)	Poma	-6	-	+3	dBm	
Peak Power, each Lane	PPt			4	dBm	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-7	-		dB	
TDP, each Lane				4	dB	
Extinction Ratio	ER	3	-	-	dB	
Relative Intensity Noise	Rin	-	-	-128	dB/Hz	12dB Reflection
Optical Return Loss Tolerance		-	-	12	dB	
Encircled Flux			>86% at 19um < 30% at 4.5um			
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		0.23, 0.34, 0.43, 0.27, 0.33, 0.4				
Average Launch Power OFF Transmitter, each Lane	Poff	-		-30	dBm	

8. RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Average Output Power	POUT	-9		-3	dBm	
Extinction Ratio	ER	8.2			dB	
Center Wavelength	λ_t	1270	1310	1360	nm	FP Laser
Spectrum Width (RMS)	σ	-6	-	7	nm	
Transmitter OFF Output Power	POff			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ohm	
Optical Rise/Fall Time	tr/tf			3	ns	1
Total Jitter	tj			1	ns	2
Output Eye Mask	Compliant with IEEE802.3 z (class 1 laser safety)					3

NOTE

1. These are unfiltered 20-80% values.
2. Measure at 2⁷-1 NRZ PRBS pattern.
3. Transmitter eye mask definition.



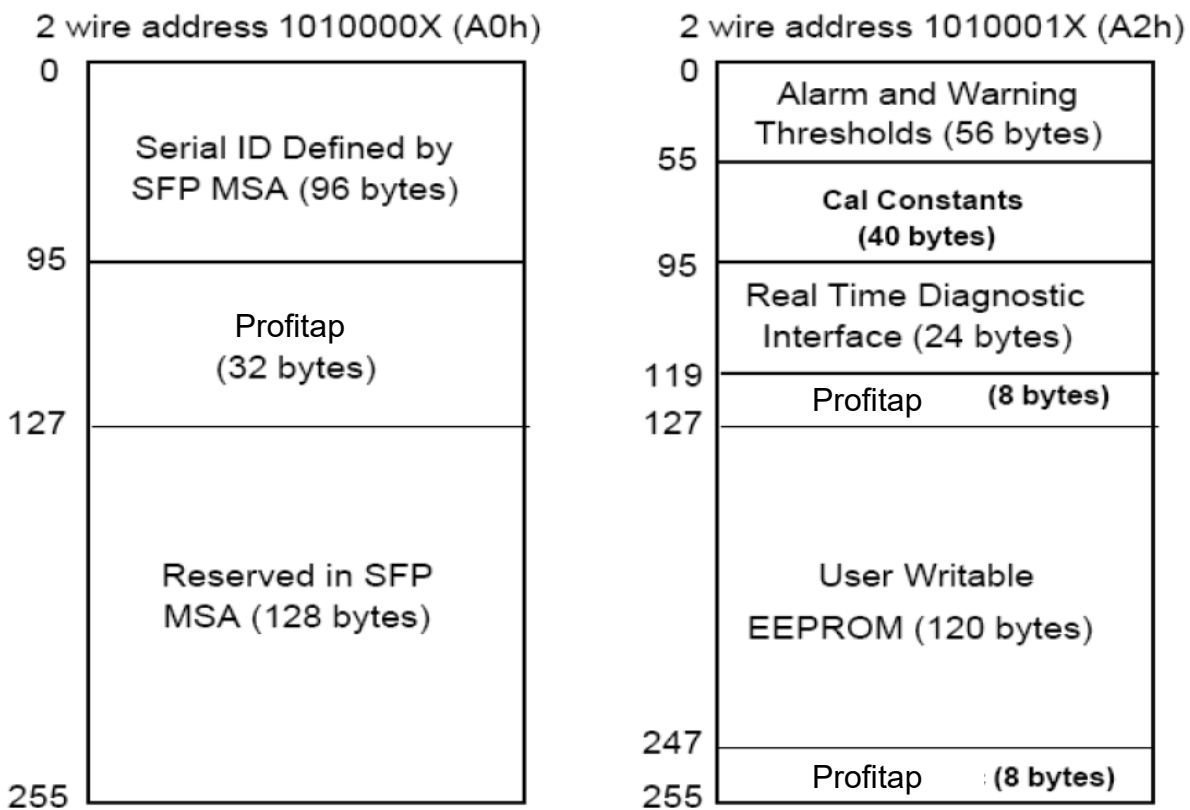
9. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Storage Temperature	λt	1270	1310	1360	nm	PIN-TIA
Relative Humidity (non-condensation)	PIN			-24	dBm	1
Operating Case Temperature	PSAT	-5			dBm	
Supply Voltage	PA			-25	dBm	
Voltage on LVTTL Input	PD	-40			dBm	2
LVTTL Output Current	PA-PD	0.5	2	6	dB	
Voltage on Open Collector Output	tr/tf			2.5	ns	3

NOTE

1. Measured with Light source 1310nm, ER=8.2dB; Measured with PRBS 2⁷-1 at 10-12 BER
2. When SD De-Assert, the RX-LOS output is High-level (fixed)
3. These are 20%~80% values.

10. DIGITAL DIAGNOSTIC MEMORY MAP



11. DIGITAL DIAGNOSTIC MONITORING INFORMATION

Parameter	Unit	Accuracy
Temperature	°C	±5
Supply Voltage	V	±0.1
Tx Bias Current	mA	±10%
Tx Optical Power	dB	±2.5
Rx Optical Power	dB	±2.5

12. ELECTRICAL INTERFACE CHARACTERISTICS

TRANSMITTER

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Total Supply Current	ICC			A	mA	1
Transmitter Disable Input-High	VDISH	2		V _{CC} +0.3	V	
Transmitter Disable Input-Low	VDISL	0		0.8	V	
Transmitter Fault Input-High	VDISL	2		V _{CC} +0.33	V	
Transmitter Fault Input-Low	VTxFH	0		0.8	V	

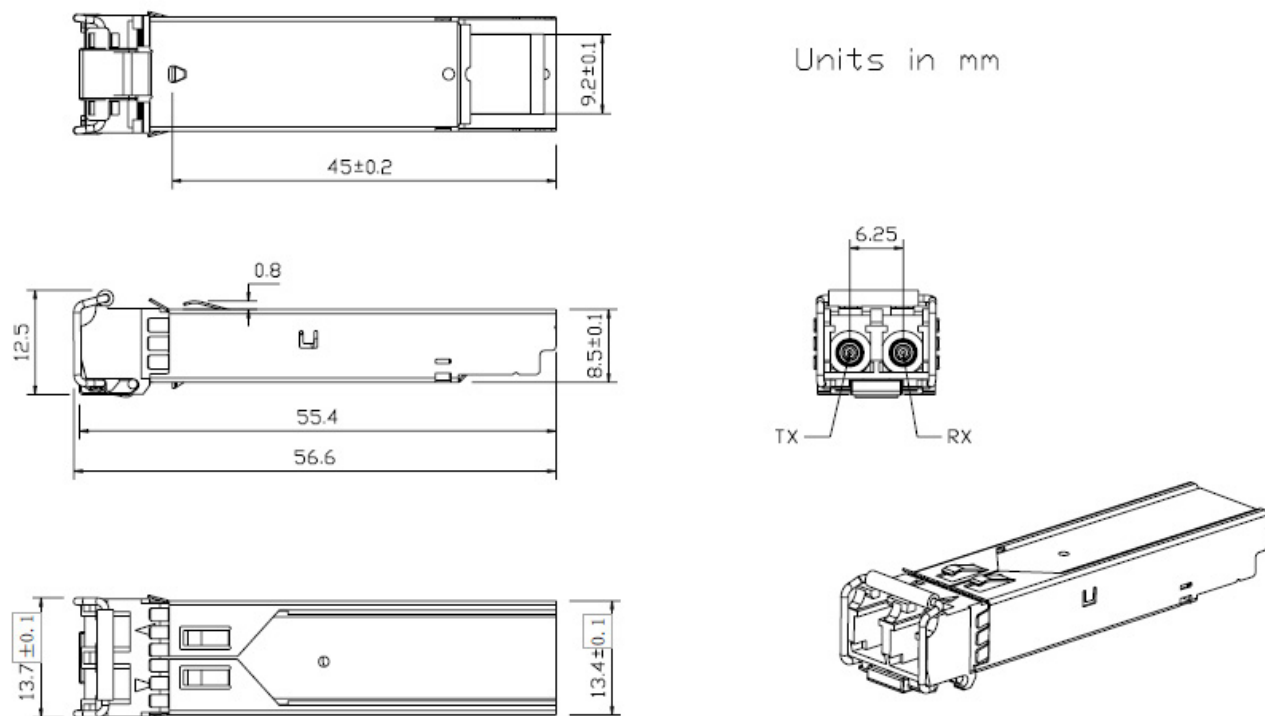
RECEIVER

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Total Supply Current	ICC			B	mA	1
LOSS Output Voltage-High	VLOSH	2		V _{CC} +0.3	V	LVTTL
LOSS Output Voltage-Low	VLOSL	0		0.8	V	

NOTE

1. A (TX) + B (RX) = 280mA (Not include termination circuit)

13. MECHANICAL SPECIFICATIONS (UNIT:mm)



14. REGULATORY COMPLIANCE

Feature	Reference	Min
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7 EIA-JESD22-A114	Class 1
Electrostatic Discharge (ESD) to the Simplex Receptacle	IEC/EN 61000-4-2	Compatible with standards
Stressed Eye J9 Jitter, each Lane	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1 IEC/EN 60825-2	Class 1 laser product
Component Recognition	IEC/EN 60950 UL 60950	Compatible with standards
ROHS	2002/95/EC	Compatible with standards