

# Mini-GBIC (SFP)

## 125M/1.25Gbps – 100/1000LX SFP Transceiver

- Distance: 10km
- Standard Operating Temperature: -10°C ~ 70°C



### OVERVIEW

Lantech 125M/1.25Gbps Small Form Factor Pluggable (SFP) transceiver module series is specifically designed for the high performance integrated duplex data link over single-mode optical fiber. These transceiver modules are compliant with the SFP Multisource Agreement (MSA). With the hot-swap ability, these modules offer an easy way to be installed into SFP MSA

compliant ports at any time without the interruption of the host equipments operating online. The high performance uncooled 1310nm FP transmitter and high sensitivity PIN receiver provide superior performance for both Fast Ethernet and Gigabit Ethernet applications up to 10km optical links.

### FEATURES & BENEFITS

- Support both 125Mbps and 1.25Gbps Ethernet bi-directional fiber link
- Compatible with IEEE802.3 100Base-LX10 Standard
- Compliant with IEEE802.3z Gigabit Ethernet Standard
- Compliant with SFP Multi-Source Agreement
- Hot Pluggable
- 1310nm FP laser transmitter
- Duplex LC connector
- 2-wire interface for management
- Single +3.3V Power Supply
- Transmission distance of 10km over SM fiber
- RoHS Compliant

### SPECIFICATION

#### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Storage Temperature	Ts	-40	+85	°C	
Supply Voltage	VccT, VccR	-0.5	4.0	V	
Storage Relative Humidity	RH	5	95	%	

#### Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tc	-10		70	°C	Refer to order information
		-40		85		
Supply Voltage	Vcc	3.15	3.3	3.45	V	
Supply Current	Icc			260	mA	

### Transmitter Electro-Optical Interface

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Differential Data Input Voltage	V <sub>DIFF</sub>	400		2000	mV	
Transmit Disable Voltage	V <sub>dis</sub>	2.0		V <sub>cc</sub>	V	
Transmit Enable Voltage	V <sub>en</sub>	GND		GND+0.8	V	
Optical Output Power	P <sub>o</sub>	-9		-3	dBm	1
Optical Extinction Ratio	ER	9			dB	
Center Wavelength	λ <sub>c</sub>	1280	1310	1365	nm	
Spectral Width (RMS)	Δ λ			4	nm	
Optical Rise / Fall Time	T <sub>r</sub> / T <sub>f</sub>			260	ps	2
Relative Intensity Noise	RIN			-120	dB/Hz	
Total Jitter	T <sub>J</sub>			227	ps	
Optical Eye Mask			IEEE802.3 and IEEE802.3z			

**Notes:** 1. Coupling into a 9/125μm single-mode fiber. 2. 20% to 80% value

### Receiver Electro-Optical Interface

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Differential Data Output Voltage	V <sub>out,pp</sub>	500		2000	mV	
Maximum Input Power	PINMAX	-3			dBm	1
Receiver Sensitivity @ 1.25Gbps	PINMIN			-20	dBm	1
Receiver Sensitivity @ 125Mbps	PINMIN			-29	dBm	2
Optical Center Wavelength	λ <sub>c</sub>	1260		1620	nm	
Optical Return Loss	ORL	12			dB	
LOS De-Assert @ 1.25Gbps	LOS <sub>D</sub>			-20	dBm	1
LOS De-Assert @ 125Mbps	LOS <sub>D</sub>			-29	dBm	2
LOS Assert	LOS <sub>A</sub>	-35			dBm	
LOS Hysteresis	LOS <sub>HY</sub>	0.5			dB	
Optical Rise / Fall Time	T <sub>r</sub> / T <sub>f</sub>			0.35	ns	3
Receiver LOS Signal Output Voltage - Low	LOS <sub>V<sub>L</sub></sub>	GND		GND+0.5	V	
Receiver LOS Signal Output Voltage - High	LOS <sub>V<sub>H</sub></sub>	2.4		V <sub>cc</sub>	V	

**Notes:** 1. Measured with a PRBS 2<sup>7</sup> -1 test pattern @ 1.25Gbps BER<10<sup>-12</sup>  
2. Measured with a PRBS 2<sup>7</sup> -1 test pattern @ 125Mbps BER<10<sup>-12</sup>  
3. 20% to 80% value

### Pin Assignment

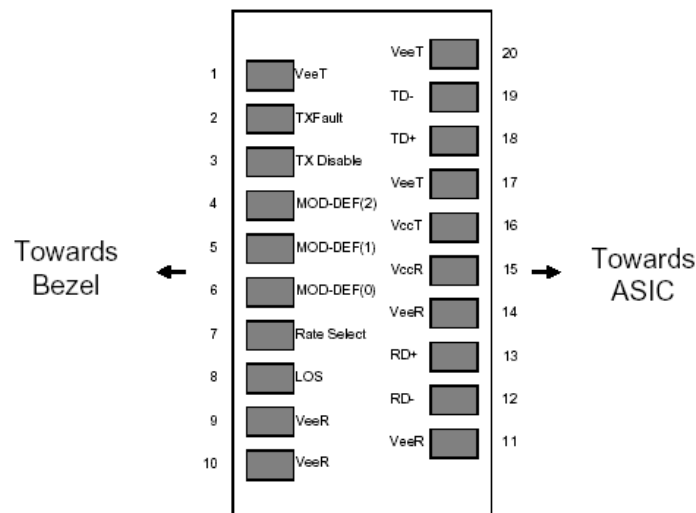


Diagram of Host Board Connector Block Pin Numbers and Name

### Pin Description

Pin	Name	Function / Description
1	VeeT	Transmitter Ground
2	TX_Fault	Transmitter Fault Indication (1)
3	TX_Disable	Transmission Disable – Module disables on high or open (2)

4	MOD-DEF(2)	Module Definition 2 – SDA: Serial Data Signal
5	MOD-DEF(1)	Module Definition 1 – SCL: Serial Clock Signal
6	MOD-DEF(0)	Module Definition 0 – LVTTTL Low (3)
7	Rate Select	Not Connected – Open Circuit
8	LOS	Receiver Loss of Signal (4)
9	VeeR	Receiver Ground
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Inverse Received Data out, Differential LVPECL, AC coupled
13	RD+	Received Data out, Differential LVPECL, AC coupled
14	VeeR	Receiver Ground
15	VccR	Receiver Power
16	VccT	Transmitter Power
17	VeeT	Transmitter Ground
18	TD+	Transmitter Data In, Differential LVPECL, AC coupled
19	TD-	Inverse Transmitter Data In, Differential LVPECL, AC coupled
20	Veet	Transmitter Ground

**Note1:** TX Fault is open collector/drain output which should be pulled up externally with a 4.7K~ 10KΩ resistor on the host board to supply <math>V\_{ccT}+0.3V</math> or <math>V\_{ccR}+0.3V</math>. When high, this output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <math><0.8V</math>.

**Note2:** TX Disable input is used to shut down the laser output per the state table below. It is pulled up within the module with a 4.7K~10KΩ resistor.

1)Low(0~0.8V): Transmitter on; 2)Between(0.8V and 2V): Undefined; 3)High (2.0~  $V_{ccT}$ ): Transmitter Disabled; 4)Open: Transmitter Disabled

**Note3:** 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 to supply less than <math>V\_{ccT}+0.3V</math> or <math>V\_{ccR}+0.3V</math>. Mod-DEF(0) is grounded by the module to indicate that the module is present. Mod-DEF(1) is clock line of two wire serial interface for optional serial ID. Mod-DEF(2) is data line of two wire serial interface for optional serial ID.

**Note4:** LOS (Loss of signal) is an open collector/drain output which should be pulled up externally with a 4.7K~10KΩ resistor on the host board to supply <math><V\_{ccT}+0.3V</math> or <math>V\_{ccR}+0.3V</math>. 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 <math><0.8V</math>.

## Digital Diagnostic Functions

As defined by the SFP MSA (SFF-8472) Lantech's SFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

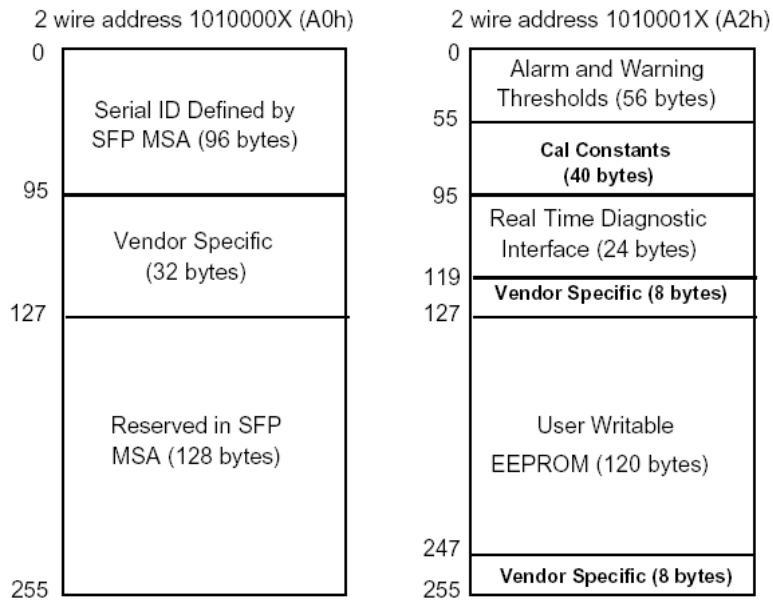
- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Controller (DDC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

For more detailed information including memory map definitions, please see the SFP MSA (SFF-8472) Specification.

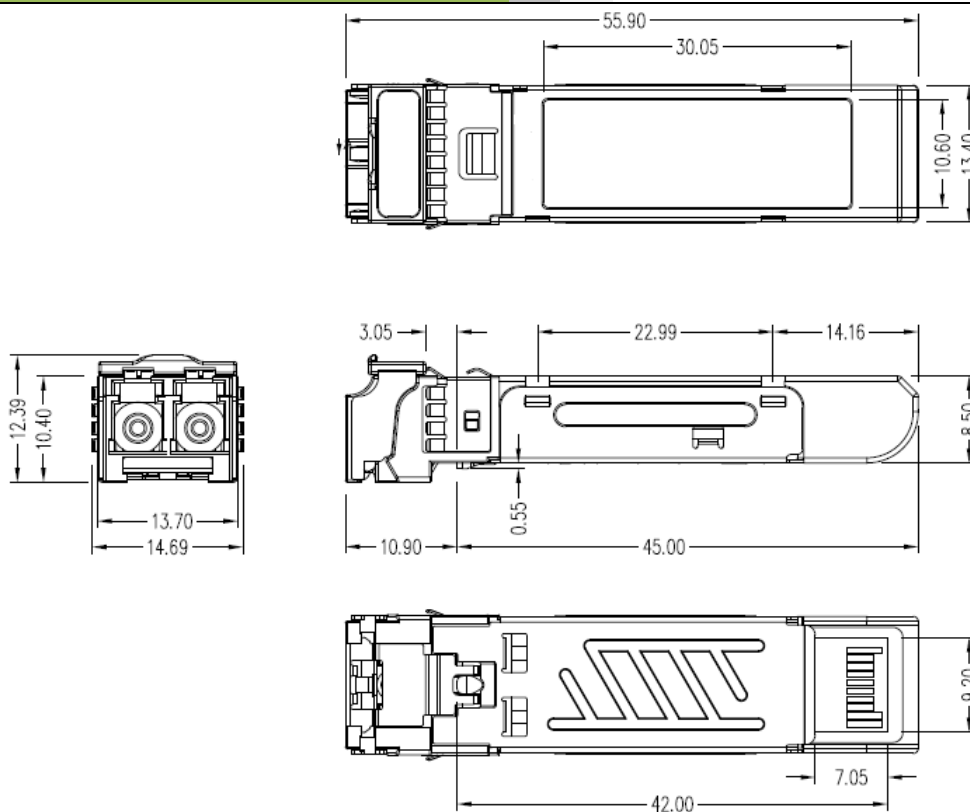
### Digital Diagnostic Memory Map



### Digital Diagnostic Monitoring Characteristics

Parameter	Accuracy	Unit	Note
Temperature	±3	°C	
Supply Voltage	±0.1	V	
TX Bias Current	±5	mA	
TX Output Power	±3	dB	
RX Received Optical Power	±3	dB	

**DIMENSIONS (unit=mm)**



\*All dimensions are ±0.2mm unless otherwise specified

**ORDERING INFORMATION**

Part Number	Wavelength	LD	IO	LOS	Mode	Link	Temp.
8330-191	1310 nm	FP	AC/AC	TTL	Single-mode	10km	-10~70°C
8330-191-E	1310 nm	FP	AC/AC	TTL	Single-mode	10km	-40~85°C

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