Mini-GBIC (SFP)

1.25Gbps, WDM1310~1550, Single Fiber Bi-directional SFP,

ONU Transceiver

- *Distance: 10km, 20km, 40km, 60km, 80km*
- *Standard Operating Temperature: -10°C ~ 70°C*
- *Wide Operating Temperature: -40°C ~ 85°C*

OVERVIEW

Lantech 1.25Gbps Bi-directional (BiDi) Small Form Factor Pluggable (SFP) transceiver module series is specifically designed for the high performance integrated duplex data link over a single optical fiber. These transceiver modules are compliant with the SFP Multisource Agreement (MSA). With the hot pluggability, 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.

Lantech 1.25Gbps BiDi SFP transceiver module series using a long wavelength DFB laser diode and enable data transmission up to 80km on a single-mode (9/125μm) optical fiber.

FEATURES & BENEFITS

- **1.25G bi-directional single-fiber link**
- **Single LC receptacle**
- **1310~1550nm FP/DFB transmitter**
- **1310~1550nm PIN receiver**
- **10km to 80km point-to-point transmission**
- **Compliant with IEEE802.3ah 1000Base-BX10-U Standard**
- **Compliant with SFF8472 diagnostic monitoring interface**
- **Compliant with SFP MSA**
- **Hot Pluggable**
- **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 / -40		70 / 85	°C	1
Supply Voltage	Vcc	3.1	3.3	3.5	V	
Supply Current	Icc		180	280	mA	

Notes: 1. Standard Operating Temperature / Wide Operating Temperature (-E model)

Transmitter Electro-Optical Characteristics

Parameter			Symbol	Min.	Typ.	Max.	Unit	Note
Optical Launch Power	10km	WDM1310	Po	-9		-3	dBm	1
		WDM1550		-9		-3		
	20km	WDM1310		-8		-2		
		WDM1550		-8		-2		
	40km	WDM1310		-3		+2		
		WDM1550		-5		0		
	60km	WDM1310		0		+5		
		WDM1550		-3		+4		
	80km	WDM1490		-2		+4		
		WDM1550		-2		+4		
Optical Extinction Ratio			ER	9			dB	
Center Wavelength	10km	WDM1310	λC	1270	1310	1355	nm	
		WDM1550		1510	1550	1570		
	20km	WDM1310		1270	1310	1355		
		WDM1550		1510	1550	1570		
	40km	WDM1310		1270	1310	1355		
		WDM1550		1510	1550	1570		
	60km	WDM1310		1270	1310	1355		
		WDM1550		1510	1550	1570		
	80km	WDM1490		1480	1490	1500		
		WDM1550		1530	1550	1570		
Spectral Width	10km	WDM1310	Δ λ			2.5	nm	RMS
		WDM1550				1		-20dB
	20km	WDM1310				2.5		RMS
		WDM1550				1		-20dB
	40km	WDM1310				1		
		WDM1550				1		
	60km	WDM1310				1		
		WDM1550				1		
	80km	WDM1490				1		
		WDM1550				1		
Optical Rise / Fall Timet			tr / tf			260	ps	
Relative Intensity Noise			RIN			-120	dB/Hz	
Total Contributed Jitter			TJ			227	ps	
Optical Eye Mask				IEEE802.3z				
Differential Data Input Noise			V_{DIFF}	400		2000	mV	
Transmit Disable Voltage			Vdis	2.0		Vcc	V	
Transmit Enable Voltage			Ven	GND		GND+0.8	V	

Notes: **1.** The optical power is launched into a 9/125μm single-mode fiber.

Receiver Electro-Optical Characteristics

Parameter			Symbol	Min.	Typ.	Max.	Unit	Note
Maximum Input Power			PINMAX	-3				1
Receiver Sensitivity	10km	WDM1310	PINMIN			-20	dBm	1
		WDM1550						
	20km	WDM1310				-23		
		WDM1550						
	40km	WDM1310				-23		
		WDM1550						
	60km	WDM1310				-24		
		WDM1550				-25		
	80km	WDM1490				-25		
		WDM1550						
Operating Center Wavelength	10km	WDM1310	λc	1470		1600	nm	
		WDM1550		1250		1380		
	20km	WDM1310		1470		1600		

		WDM1550		1250		1380		
	40km	WDM1310		1470		1600		
		WDM1550		1250		1380		
	60km	WDM1310		1470		1600		
		WDM1550		1250		1380		
	80km	WDM1490		1530	1550	1570		
		WDM1550		1470	1490	1510		
Optical Return Loss			ORL	12			dB	
LOS De-Assert	10km	WDM1310	LOS_D			-20	dBm	
		WDM1550						
	20km	WDM1310				-23		
		WDM1550						
	40km	WDM1310				-23		
		WDM1550						
	60km	WDM1310				-24		
		WDM1550				-25		
	80km	WDM1490				-25		
		WDM1550						
LOS Assert			LOS_A	-35			dBm	
LOS Hysteresis			LOS_{HY}	0.5			dB	
Differential Data Output Voltage			Vout, pp	500		1200	mV	
Data Output Rise/Fall Time (20%~80%)			Tr/Tf			0.35	ns	
Receiver LOS Signal Output Voltage-Low			$LOSV_L$	GND		GND+0.5	V	
Receiver LOS Signal Output Voltage-High			$LOSV_H$	2.4		Vcc	V	

Notes: **1.** Measured with a PRBS 2^7 -1 test pattern @ 1.25Gbps BER < 10^{-12}

Pin Assignment

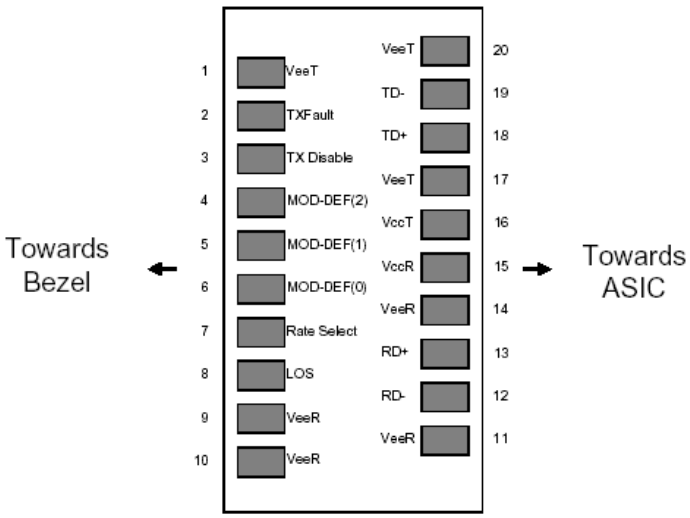


Diagram of Host Board Connector Block Pin Numbers and Name

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 – LVTTL 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 <VccT+0.3V or VccR+0.3V. 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 <0.8V.

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~ VccT): 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 VccT+0.3V or VccR+0.3V. 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 <VccT+0.3V or VccR+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.

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:

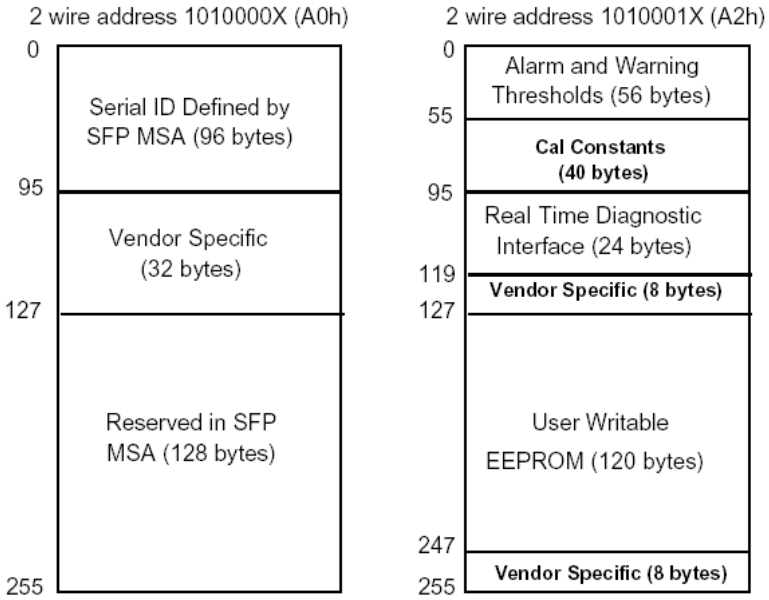
- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

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.

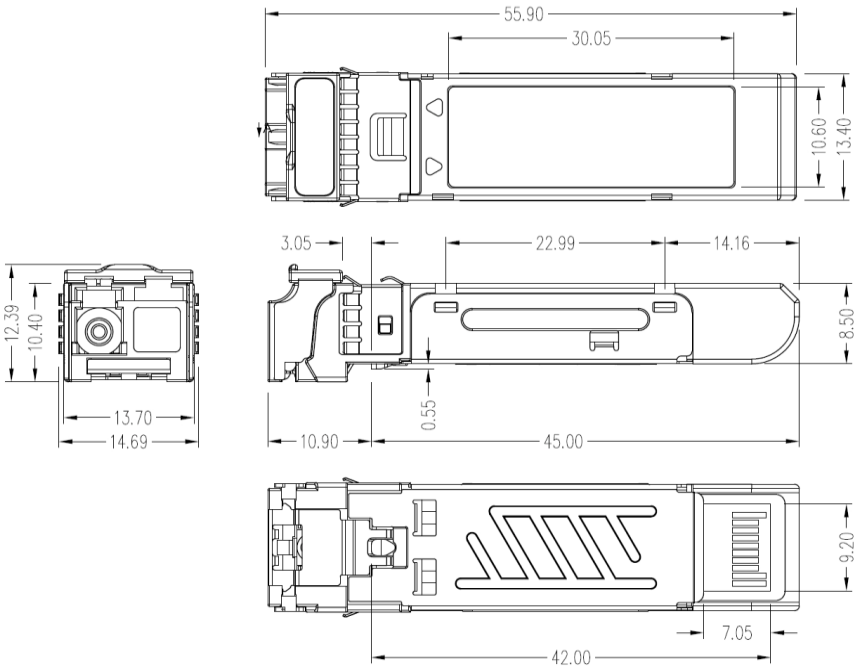
Digital Diagnostic Memory Map



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 INFOMATION

All SFP ended with D are with Diagnostic function

Part Number	TX	LD	RX	IO	LOS	Link	Temp.
8330-188	1310nm	FP	1550nm	AC/AC	TTL	10km	-10~70°C
8330-186		FP				20km	
8330-180		DFB				40km	
8330-181		DFB				60km	
8330-184	1490nm	DFB				80km	

Part Number	TX	LD	RX	IO	LOS	Link	Temp.
8330-188-E	1310nm	FP	1550nm	AC/AC	TTL	10km	-40~85°C
8330-186-E		FP				20km	
8330-180-E		DFB				40km	
8330-181-E		DFB				60km	
8330-184-E	1490nm	DFB				80km	

Part Number	TX	LD	RX	IO	LOS	Link	Temp.
8330-189	1550nm	DFB	1310nm	AC/AC	TTL	10km	-10~70°C
8330-187						20km	
8330-182						40km	
8330-183						60km	
8330-185			1490nm			80km	

Part Number	TX	LD	RX	IO	LOS	Link	Temp.
8330-189-E	1550nm	DFB	1310nm	AC/AC	TTL	10km	-40~85°C
8330-187-E						20km	
8330-182-E						40km	
8330-183-E						60km	
8330-185-E			1490nm			80km	

Note: Distances are indicative only. To calculate a more precise link budget based on specific conditions in your application, please refer to the optical characteristics.

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