

Mini-GBIC (SFP)

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

ONU Transceiver

- Distance: 0.5km, 2km, 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 FP/DFB laser diode and enable data transmission up to 80km on a single-mode (9/125μm) optical fiber. (0.5km on a multi-mode optical fiber)

FEATURES & BENEFITS

- 1.25G bi-directional single-fiber link
- Single LC receptacle
- 1310~1550nm FP/DFB transmitter
- 1310~1550nm PIN receiver
- 0.5km to 80km point-to-point transmission
- Compliant with IEEE802.3ah 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 (10km, 20km, 40km, 60km, 80km)

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)

Recommended Operating Conditions (0.5km, 2km)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tc	-10 / -40		70 / 85	°C	1
Supply Voltage	Vcc	3.15	3.3	3.45	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	0.5km	WDM1310	-10		0	dBm	1			
		WDM1550	-10		0					
	2km	WDM1310	-11		-3					
		WDM1550	-11		-3					
	10km	WDM1310	-9		-3					
		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 (0.5km: 8.2)					dB	
	Center Wavelength	0.5km	WDM1310	1270	1310			1355	nm	
WDM1550			1510	1550	1570					
2km		WDM1310	1270	1310	1355					
		WDM1550	1510	1550	1570					
10km		WDM1310	1270	1310	1355					
		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		0.5km	WDM1310			4	nm	RMS		
			WDM1550			4				
	2km	WDM1310			2.5					
		WDM1550			2.5					
	10km	WDM1310			2.5					
		WDM1550			1					
	20km	WDM1310			2.5					
		WDM1550			1					
	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	V _{dis}	2.0		V _{cc}	V	
Transmit Enable Voltage	V _{en}	GND		GND+0.8	V	

- Notes:** 1. The optical power is launched into a 9/125µm single-mode fiber. (2km, 10km, 20km, 40km, 60km, 80km)
 The optical power is launched into a 62.5/125µm multi-mode fiber. (Center Wavelength 1310nm, 0.5km)
 The optical power is launched into a 62.5/125µm single-mode fiber. (Center Wavelength 1550nm, 0.5km)

Receiver Electro-Optical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note			
Maximum Input Power		PINMAX	-3				1			
Receiver Sensitivity	0.5km	WDM1310	PINMIN		-20	dBm	1			
		WDM1550								
	2km	WDM1310								
		WDM1550								
	10km	WDM1310								
		WDM1550								
	20km	WDM1310			-23					
		WDM1550								
	40km	WDM1310			-23					
		WDM1550								
	60km	WDM1310			-24					
		WDM1550			-25					
	80km	WDM1490			-25					
		WDM1550								
Operating Center Wavelength	0.5km	WDM1310	1470		1600	nm				
		WDM1550	1250		1380					
	2km	WDM1310	1470		1600					
		WDM1550	1250		1380					
	10km	WDM1310	1470		1600					
		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	0.5km	WDM1310	LOS _D				-21	dBm	
			WDM1550							
		2km	WDM1310					-20		
WDM1550										
10km		WDM1310	-20							
		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 _H	0.5			dB				
Differential Data Output Voltage		V _{out, pp}	500		1200	mV				
Data Output Rise/Fall Time (20%~80%)		Tr/Tf			0.35	ns				
Receiver LOS Signal Output Voltage-Low		LOS _{V_L}	GND		GND+0.5	V				
Receiver LOS Signal Output Voltage-High		LOS _{V_H}	2.4		V _{cc}	V				

- Notes:** 1. Measured with a PRBS 2⁷-1 test pattern @ 1.25Gbps BER < 10⁻¹²

Pin Assignment

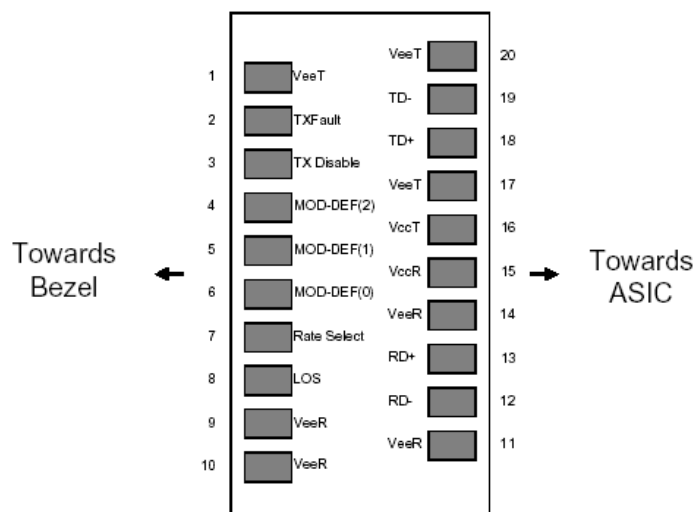


Diagram of Host Board Connector Block Pin Numbers and Name

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 – 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 $V_{ccT}+0.3V$ or $V_{ccR}+0.3V$. 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 <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~ 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 $V_{ccT}+0.3V$ or $V_{ccR}+0.3V$. 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 $V_{ccT}+0.3V$ or $V_{ccR}+0.3V$. 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 <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:

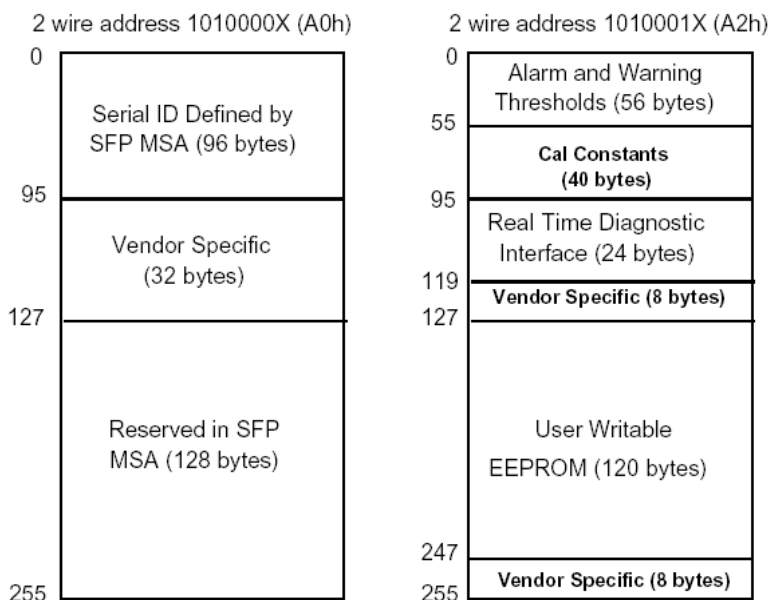
- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

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.

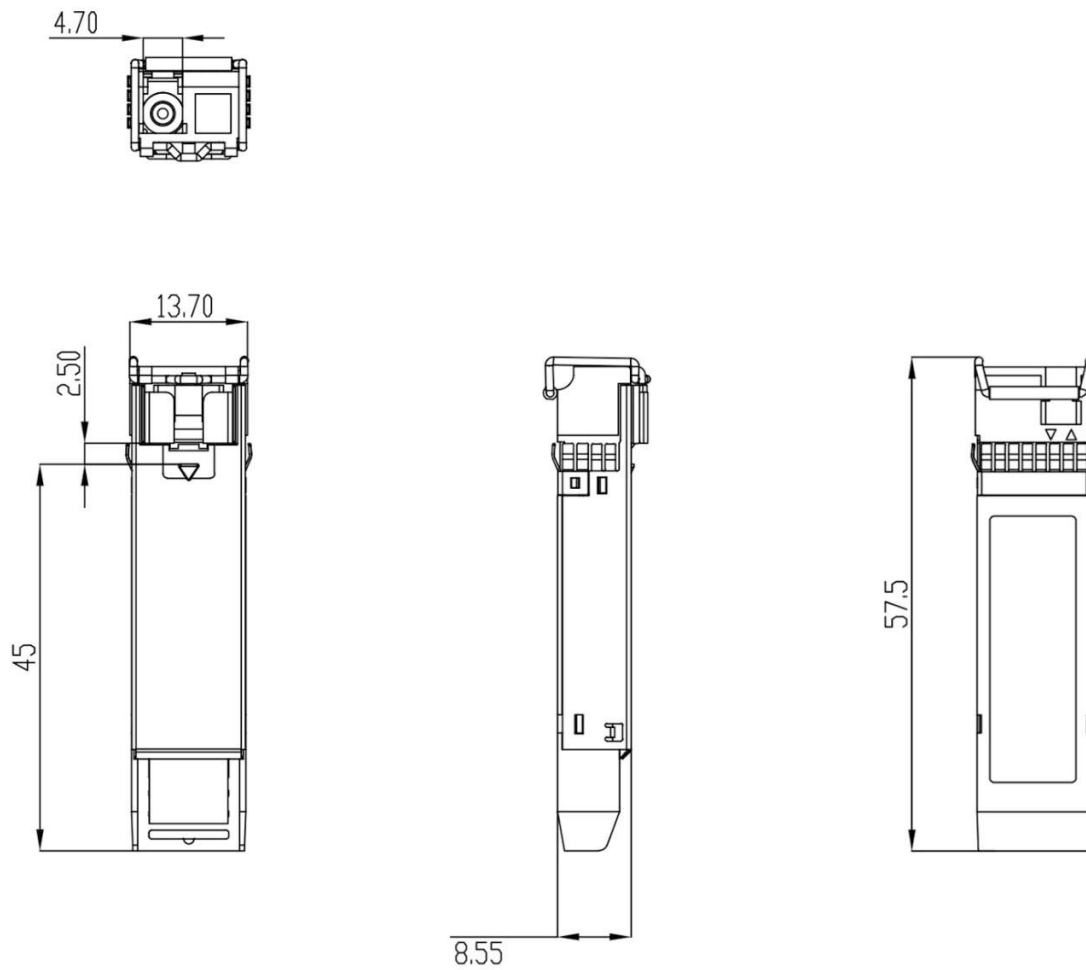
Digital Diagnostic Memory Map



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

All SFP ended with D are with Diagnostic function

Part Number	TX	LD	RX	IO	LOS	Link	Mode	Temp.
8330-197-V1	1310nm	FP	1550nm	AC/AC	TTL	0.5km	Multi-mode	-10~70°C
8330-195-V1		FP				2km	Single-mode	
8330-188-V1		FP				10km	Single-mode	
8330-186-V1		FP				20km	Single-mode	
8330-180-V1		DFB				40km	Single-mode	
8330-181-V1		DFB				60km	Single-mode	
8330-184-V1		DFB				80km	Single-mode	
		1490nm						

Part Number	TX	LD	RX	IO	LOS	Link	Mode	Temp.
8330-197E-V1	1310nm	FP	1550nm	AC/AC	TTL	0.5km	Multi-mode	-40~85°C
8330-195E-V1		FP				2km	Single-mode	
8330-188E-V1		FP				10km	Single-mode	
8330-186E-V1		FP				20km	Single-mode	
8330-180E-V1		DFB				40km	Single-mode	
8330-181E-V1		DFB				60km	Single-mode	
8330-184E-V1	1490nm	DFB				80km	Single-mode	

Part Number	TX	LD	RX	IO	LOS	Link	Mode	Temp.	
8330-198-V1	1550nm	FP	1310nm	AC/AC	TTL	0.5km	Multi-mode	-10~70°C	
8330-196-V1						2km	Single-mode		
8330-189-V1						10km	Single-mode		
8330-187-V1						20km	Single-mode		
8330-182-V1		DFB				40km	Single-mode		
8330-183-V1						60km	Single-mode		
8330-185-V1						1490nm	80km		Single-mode

Part Number	TX	LD	RX	IO	LOS	Link	Mode	Temp.	
8330-198E-V1	1550nm	FP	1310nm	AC/AC	TTL	0.5km	Multi-mode	-40~85°C	
8330-196E-V1						2km	Single-mode		
8330-189E-V1						10km	Single-mode		
8330-187E-V1						20km	Single-mode		
8330-182E-V1		DFB				40km	Single-mode		
8330-183E-V1						60km	Single-mode		
8330-185E-V1						1490nm	80km		Single-mode

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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