

Mini-GBIC (SFP)

10G SFP+ LR Transceiver

- Hot Pluggable, Duplex LC, 1310nm DFB-LD, Single Mode, DDM
- Distance: 10KM
- Standard Operating Temperature: -10°C ~ 70°C
- Wide Operating Temperature: -40°C ~ 85°C



OVERVIEW

10GBase SFP+ LR Small Form Factor Pluggable SFP+ transceivers are compliant with the current SFP+ Multi-Source Agreement (MSA) Specification. The high Performance uncooled 1310nm DFB

transmitter and high sensitivity PIN receiver provide superior performance for 10GBase-LR/LW applications up to 10km optical links.

FEATURES & BENEFITS

- Compliant with IEEE802.3ae 10GBase-LR Ethernet Standard
- Compliant with SFF8472 diagnostic monitoring interface
- 1310nm DFB laser transmitter.
- Duplex LC connector
- 2-wire interface for management and diagnostic monitor
- Single +3.3V power supply voltages
- Transmission distance of 10km over single mode fiber
- RoHS Compliant Part

SPECIFICATION

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Storage Temperature	Ts	-40	+85	°C	
Operating Temperature	Top	-10	+70	°C	
Supply Voltage	Vcc	-0.5	+4.0	V	
Storage Relative Humidity	RH	5	95	%	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Top	-10		+70	°C	1
Supply Voltage	Vcc	+3.15	+3.3	+3.046	V	
Supply Current	Icc		250	300	mA	

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

Transmitter Electro-Optical Interface

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	9.953	10.3125		Gb/s	
Bit Error Rate	BER			10 ⁻¹²		
Optical Launch Power	Po	-8.2		+0.5	dBm	1
Optical Launch Power (OMA)	Po-OMA	-5.2			dBm	1
Center Wavelength	λ	1260	1310	1355	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	3.5			dB	
Average Launch power of OFF Transmitter	POFF			-30	dBm	
Optical Eye Mask		IEEE802.3ae				
Relative Intensity Noise	RIN			-128	dB/Hz	
Differential data input voltage	VDIFF	120		1200	mV	
Transmit Disable Voltage	Vdis	2.0		Vcc	V	
Transmit Enable Voltage	Ven	Vee		Vee+0.8	V	

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

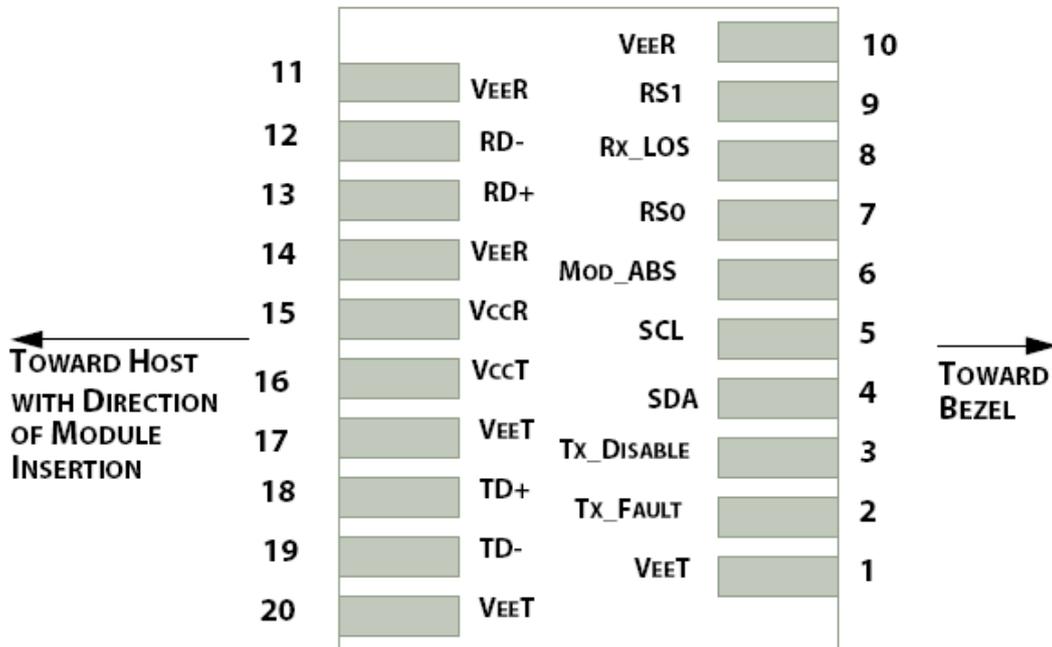
Receiver Electro-Optical Interface

Vcc= 3.15V to 3.46V, T_{op} = -10 °C to 70 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	9.953	10.3125		Gb/s	
Receiver Sensitivity	PIN_min			-14.4	dBm	1
Maximum Input Power	PIN_max			+0.5	dBm	1
Optical Center Wavelength	λ_C	1200	1310	1600	nm	
Receiver Reflectance	RR			-14	dB	
LOS De-Assert	LOSD			-15	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis	LOSHY	0.5			dB	
Differential data output voltage	Vout,pp	500		800	mV	
Data Output Rise/Fall Time (20%~80%)	Tr/Tf			30	ps	
Receiver LOS Signal Output Voltage-Low	LOSVL	Vee		0.5	V	
Receiver LOS Signal Output Voltage-High	LOSVH	2.4		Vcc	V	

Note1: Measured with a PRBS 2³¹-1 test pattern @10.3125Gbps BER<10⁻¹²

Pin Assignment



Host PCB SFP+ pad assignment top view

*All dimensions are $\pm 0.2\text{mm}$ unless otherwise specified

Pin Description

Pin	Name	Function / Description
1	VeeT	Transmitter Ground
2	TX_Fault	Transmitter Fault Indication (1)
3	TX_Disable	Transmitter Disable – Turns off transmitter laser output (2)
4	SDA	2-wire Serial Interface Data Line (SDA: Serial Data Signal) (3)
5	SCL	2-wire Serial Interface Clock (SCL: Serial Clock Signal) (3)
6	Mod_ABS	Module Absent, connected to VeeT or VeeR in the module (3)
7	RS0	Rate Select 0, optionally controls SFP+ module receiver (5)
8	Rx_LOS	Receiver Loss of Signal Indication (4)
9	RS1	Rate Select 1, optionally controls SFP+ module transmitter (5)
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Receiver Inverted Data output, Differential LVPECL, AC coupled
13	RD+	Receiver Non-Inverted Data output, Differential LVPECL, AC coupled
14	VeeR	Receiver Ground
15	VccR	Receiver 3.3V Power Supply
16	VccT	Transmitter 3.3V Power Supply
17	VeeT	Transmitter Ground
18	TD+	Transmitter Non-Inverted Data Input, Differential LVPECL, AC coupled
19	TD-	Transmitter Inverted Data Input, 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~10K Ω 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 $<0.8V$.

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: 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-ABS is grounded by the module to indicate that the module is present.

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.

Note5: No connect on this module.

Digital Diagnostic Functions

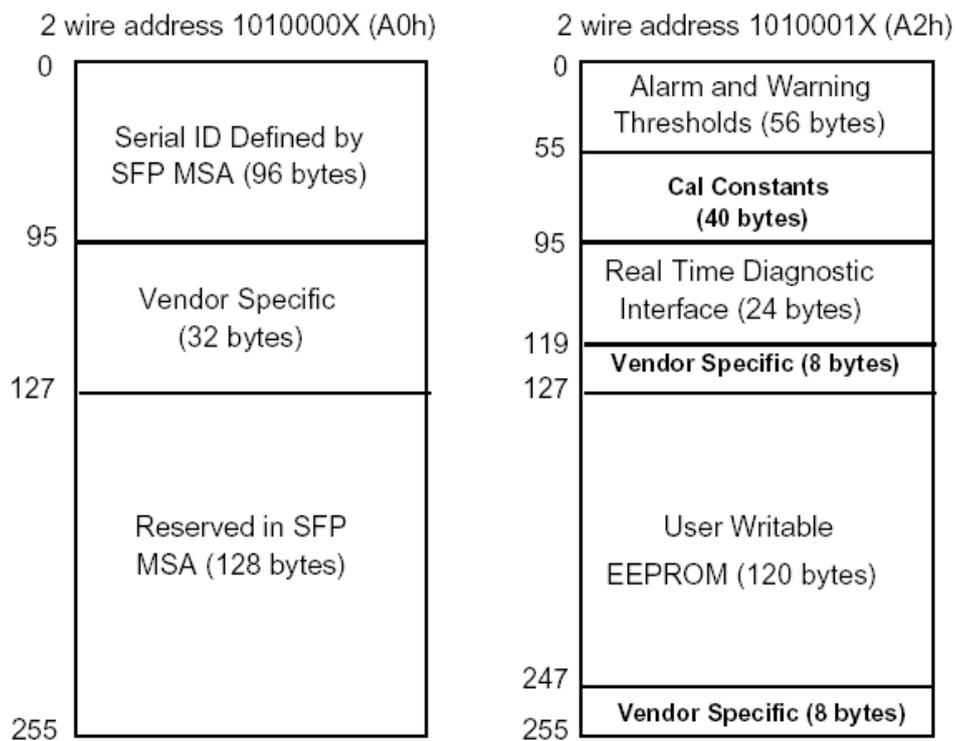
As defined by the SFP MSA (SFF-8472) Lantech's SFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- 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.

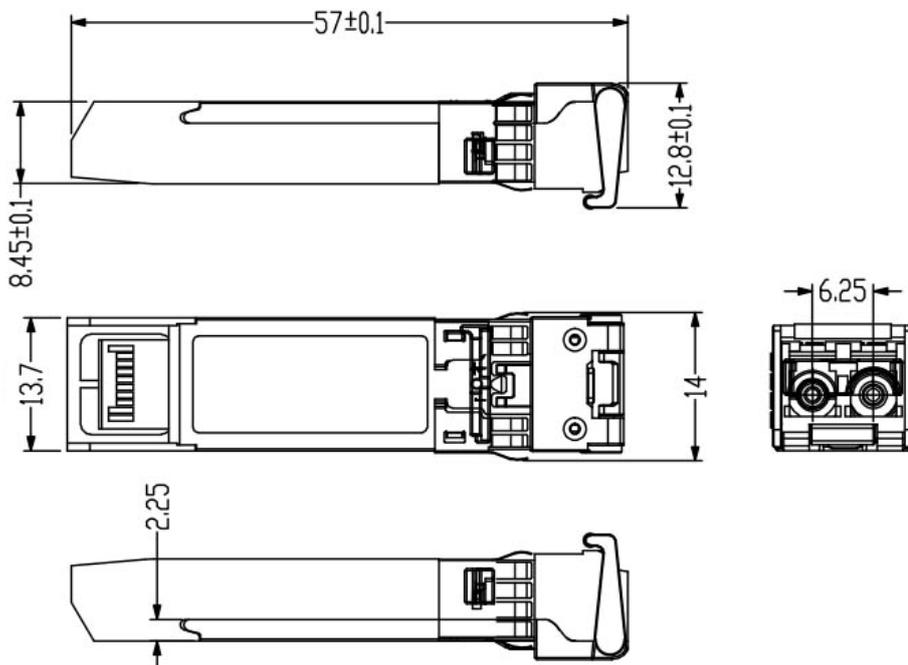
The operating and diagnostics information is monitored and reported by a Digital Diagnostics Controller (DDC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive 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.

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	

Mechanical Dimensions


Part Number	TX	RX	Link	DDM	Temp.
8330-194D	1310nm	1310nm	10km	Yes	-10~70°C

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