

Product Features

- ✧ Supports 9.95Gb/s to 10.3Gb/s data rates
- ✧ Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
- ✧ Digital Diagnostic SFF-8472 Compliant
- ✧ Hot pluggable
- ✧ 1310 nm FP Laser transmitter, 1310 nm receiver
- ✧ Up to 3km on 9/125um SMF
- ✧ Compliant with IEEE 802.3ae 10GBASE-LR and 10GBASE-LX
- ✧ SFP+ MSA SFF-8431 Compliant
- ✧ Operating case temperature: 0 to 70 °C



Applications

- ✧ 10GBASE-LX at 10.3125Gbps
- ✧ 10GBASE-LW at 9.953Gbps
- ✧ Other optical links

Ordering Information

Part Number	Output Power	Rec. Sens	Data Rate	Wavelength	Distance
FH-SPB311TCDL3	-5 ~ -1 db	-10 db	10.3125G	TX/RX1310nm	3km

General Descriptions

FH-SPB311TCDL3 Series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-LX defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability. Module is designed for single mode fiber and operates at a nominal wavelength of 1290 (1310) nm The transmitter section uses a multiple quantum well FP, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature		-40	85	°C	
Relative Humidity			85	%	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the module

General Operating Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Data Rate	Ethernet		10.3125		Gb/s	
	Fiber Channel		10.518			
Supply Voltage	Vcc	3.13	3.3	3.47	V	
	Vcc				V	
Supply Current	Icc ₅				mA	
	Icc ₃			300	mA	
Operating Case Temp.	Tc	0		70	°C	

Electrical Input/Output Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Diff. input voltage swing		120		820	mVpp	1
Tx Disable input	H	VIH	2.0	Vcc+0.3	V	
	L	VIL	0	0.8		
Tx Fault output	H	VOH	2.0	Vcc+0.3	V	2
	L	VOL	0	0.8		
Input Diff. Impedance	Zin		100		Ω	
Receiver						
Diff. output voltage swing		340	650	800	mVpp	3
Rx LOS Output	H	VOH	2.0	Vcc+0.3	V	2
	L	VOL	0	0.8		

Note 1) TD+/- are internally AC coupled with 100Ω differential termination inside the module.

Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.

Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

Optical Characteristics

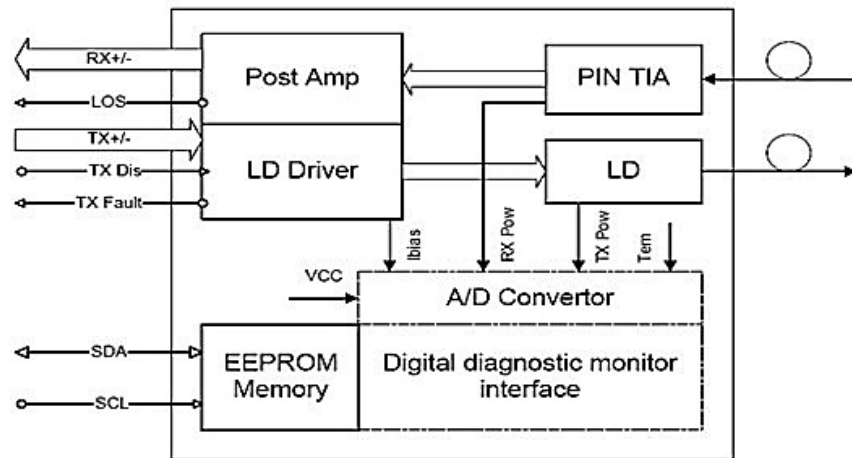
Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Operating Wavelength			1310		nm	
Ave. output power (Enabled)	Po	-5		-1	dBm	1
Extinction Ratio	ER	4			dB	1
RMS spectral width	$\Delta\lambda$			1	nm	
Rise/Fall time (20%~80%)	Tr/Tf			50	ps	2
Optical modulation amplitude	OMA	-6.2			dBm	
Dispersion penalty				1	dB	
Output Optical Eye	Compliant with IEEE 0802.3ae					
Receiver						
Operating Wavelength			1310		nm	
Sensitivity	Psen			-10	dBm	3
Min. overload	Pimax	0.5			dBm	
LOS Assert	Pa	-30			dBm	
LOS De-assert	Pd			-15	dBm	
LOS Hysteresis	Pd-Pa	0.5		4	dB	

Note 1) Measured at 10.3125b/s with PRBS $2^{31} - 1$ NRZ test pattern.

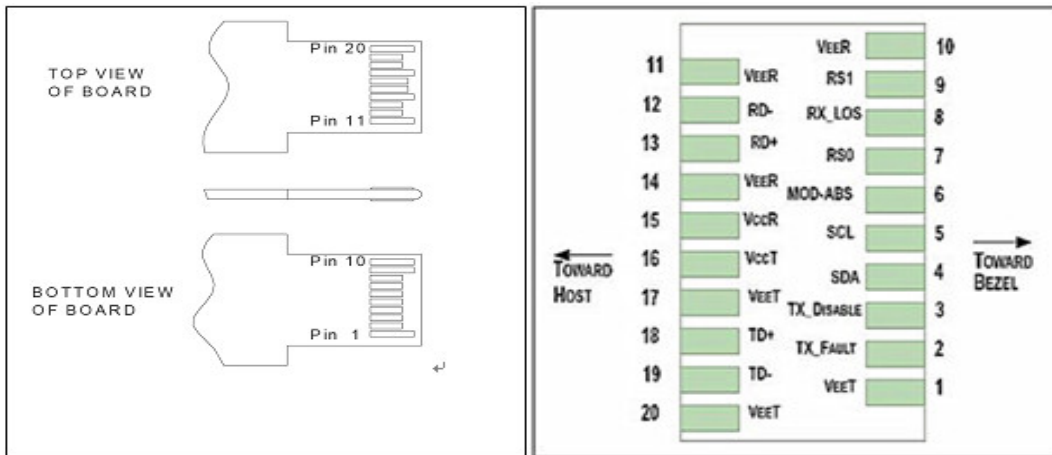
Note 2) 20%~80%

Note 3) Under the ER worst case, measured at 10.3125 Gb/s with PRBS $2^{31} - 1$ NRZ test pattern for BER $< 1 \times 10^{-12}$

Functional Diagram



Pin Definitions And Functions



Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground □
2	Tx_FAULT [2]	Transmitter Fault □
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open □
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line □
6	MOD_ABS [4]	Module Absent. Grounded within the module □
7	RS0 [5]	Rate Select 0

8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	Rate Select 1 <input type="checkbox"/>
10	VEER [1]	Receiver Ground <input type="checkbox"/>
11	VEER [1]	Receiver Ground <input type="checkbox"/>
12	RD-	Receiver Inverted DATA out. AC Coupled <input type="checkbox"/>
13	RD+	Receiver DATA out. AC Coupled <input type="checkbox"/>
14	VEER [1]	Receiver Ground <input type="checkbox"/>
15	VCCR	Receiver Power Supply <input type="checkbox"/>
16	VCCT	Transmitter Power Supply <input type="checkbox"/>
17	VEET [1]	Transmitter Ground <input type="checkbox"/>
18	TD+	Transmitter DATA in. AC Coupled <input type="checkbox"/>
19	TD-	Transmitter Inverted DATA in. AC Coupled <input type="checkbox"/>
20	VEET [1]	Transmitter Ground <input type="checkbox"/>

Notes: [1] Module circuit ground is isolated from module chassis ground within the module.

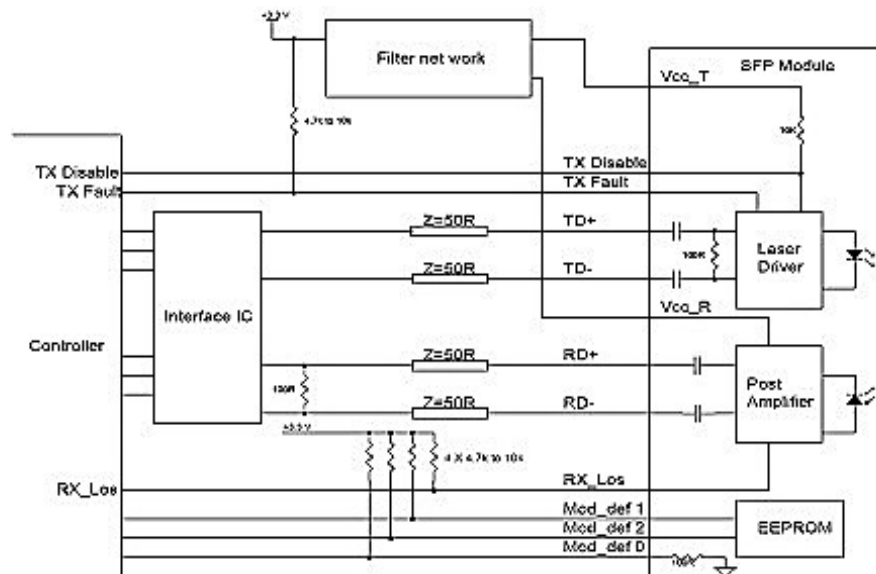
[2].should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

[3]Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.

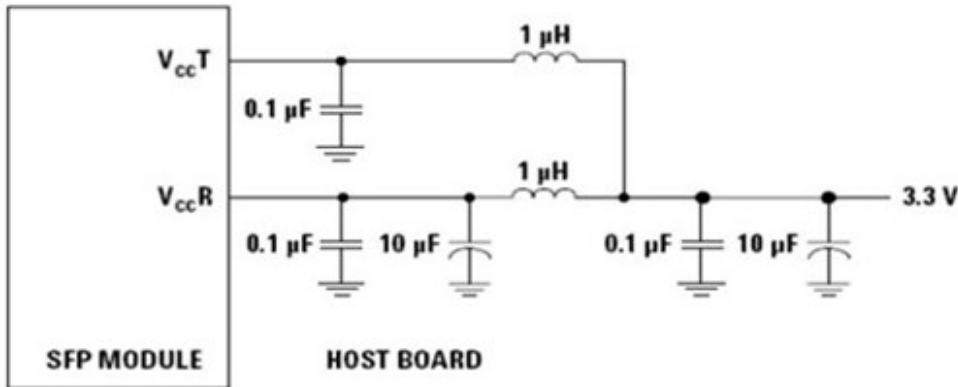
[4]Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ.Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.

Typical Interface Circuit

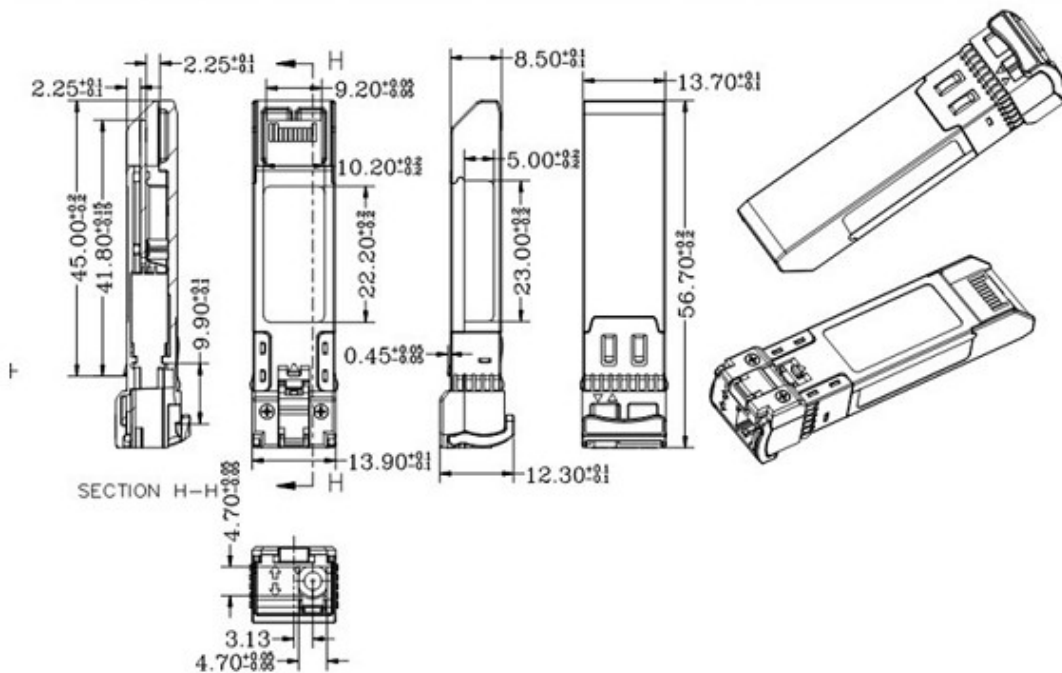


Recommended power supply filter



Note: Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value

Package Dimensions



For More Information

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