

## Product Features

- ✧ Up to 155Mbps data rate operation
- ✧ 1310nm FP laser and PIN photo detector for 40km transmission with SMF
- ✧ Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- ✧ Digital Diagnostic Monitor Interface
- ✧ Very low EMI and excellent ESD protection
- ✧ Compatible with RoHS
- ✧ Temperature range:
  - Commercial: 0°C to 70°C
  - Industrial: -40°C to +85°C



## Applications

- ✧ SDH STM-1,S-1.1,L-1.1,L-1.2
- ✧ SONET OC-3 IR1,LR1,LR2
- ✧ Other optical links

## Ordering Information

Part Number	Output Power	Rec. Sens	Data Rate	Wavelength	Distance
FH-S3101CDL40	-9~-3dBm	-32dBm	155M	1310nm	40km

## General

The SFP transceivers are high performance, cost effective modules supporting data-rate of 155Mbps and 40km transmission distance with SMF. The transceiver consists of three sections: a FP laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	Vcc	-0.5	3.60	V	
Storage Temperature		-40	85	°C	
Relative Humidity		5	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			155		Mb/s	
Supply Voltage	Vcc	3.1	3.3	3.5	V	
Supply Current	Icc			200	mA	
Operating Case Temp.	Tc	0		70	°C	
		-45		85		

## Electrical Input/Output Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
<b>Transmitter</b>						
Diff. input voltage swing		300		1860	mVpp	1
Tx Disable input	H	V <sub>IH</sub>	2.0		V <sub>CC</sub> +0.3	V
	L	V <sub>IL</sub>	0		0.8	
Tx Fault output	H	V <sub>OH</sub>	2.0		V <sub>CC</sub> +0.3	V
	L	V <sub>OL</sub>	0		0.8	
Input Diff. Impedance	Z <sub>in</sub>		100		Ω	
<b>Receiver</b>						
Diff. output voltage swing		370		1800	mVpp	3
Rx LOS Output	H	V <sub>OH</sub>	2.0		V <sub>CC</sub> +0.3	V
	L	V <sub>OL</sub>	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 V<sub>CC</sub>+0.3V.

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

## Optical Characteristics

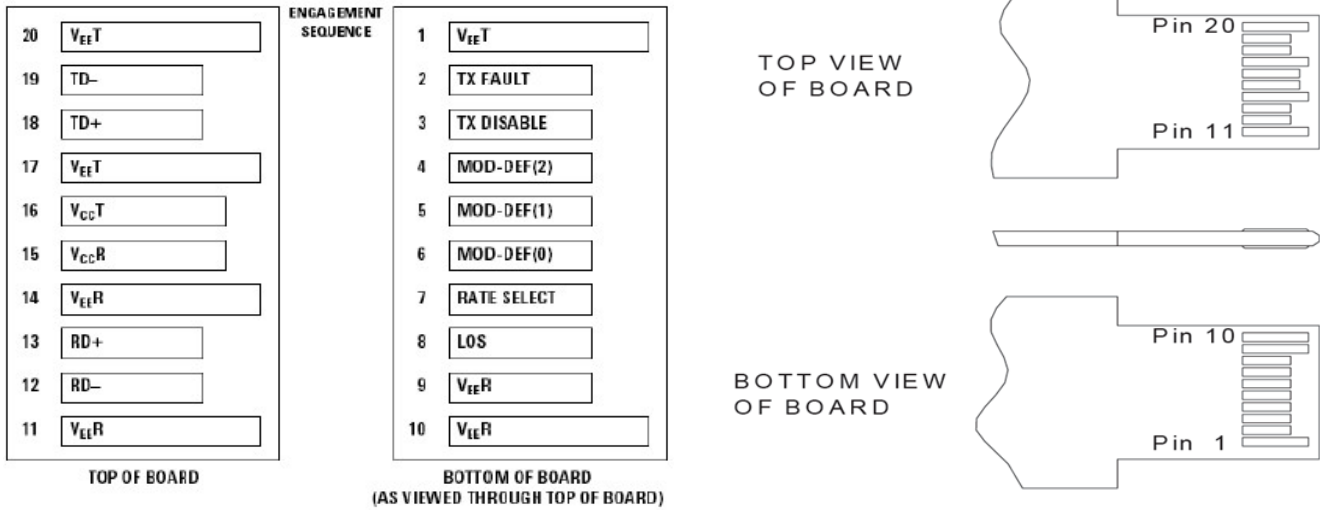
Parameter	Symbol	Min.	Typ	Max.	Unit	Note
<b>Transmitter</b>						
Operating Wavelength		1270	1310	1360	nm	
Ave. output power (Enabled)	Po	-9		-3	dBm	1
Extinction Ratio	ER	10			dB	2
Rise/Fall Time (20%-80%)	Tr-Tf			0.26	ns	
Spectral Width (RMS)				3	nm	
Output Optical Eye	Compliant with ITU-T G.957					
<b>Receiver</b>						
Operating Wavelength		1270		1610	nm	
Sensitivity	Psen			-32	dBm	3
Min. overload	Pimax	-3			dBm	
LOS Assert	Pa	-45			dBm	
LOS De-assert	Pd			-33	dBm	
LOS Hysteresis	Pd-Pa	0.5		6	dB	

Note 1) Measured at 155 Mb/s with PRBS  $2^{23} - 1$  NRZ test pattern.

Note 2) Unfiltered, measured with a PRBS  $2^{23} - 1$  test pattern @155Mbps

Note 3) Measured at 155 Mb/s with PRBS  $2^{23} - 1$  NRZ test pattern for BER <  $1 \times 10^{-10}$

## Pin Definitions And Functions



PIN #	Name	Function	Notes
1	VeeT	Tx ground	
2	Tx Fault	Tx fault indication, Open Collector Output, active “H”	Note 1
3	Tx Disable	LVTTL Input, internal pull-up, Tx disabled on “H”	Note 2
4	MOD-DEF2	2 wire serial interface data input/output (SDA)	Note 3
5	MOD-DEF1	2 wire serial interface clock input (SCL)	Note 3
6	MOD-DEF0	Model present indication	Note 3
7	Rate select	No connection	
8	LOS	Rx loss of signal, Open Collector Output, active “H”	Note 4
9	VeeR	Rx ground	
10	VeeR	Rx ground	
11	VeeR	Rx ground	
12	RD-	Inverse received data out	Note 5
13	RD+	Received data out	Note 5
14	VeeR	Rx ground	
15	VccR	Rx power supply	
16	VccT	Tx power supply	
17	VeeT	Tx ground	
18	TD+	Transmit data in	Note 6
19	TD-	Inverse transmit data in	Note 6
20	VeeT	Tx ground	

1. When high, this output indicates a laser fault of some kind. Low indicates normal operation. And should be pulled up with a 4.7 – 10KΩ resistor on the host board.

2. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10K $\Omega$  resistor. Its states are:

Low (0 – 0.8V): Transmitter on                      (>0.8, < 2.0V): Undefined  
 High (2.0V~Vcc+0.3V): Transmitter Disabled    Open: Transmitter Disabled

3. Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10K $\Omega$  resistor on the host board. The pull-up voltage shall be between 2.0V~Vcc+0.3V.

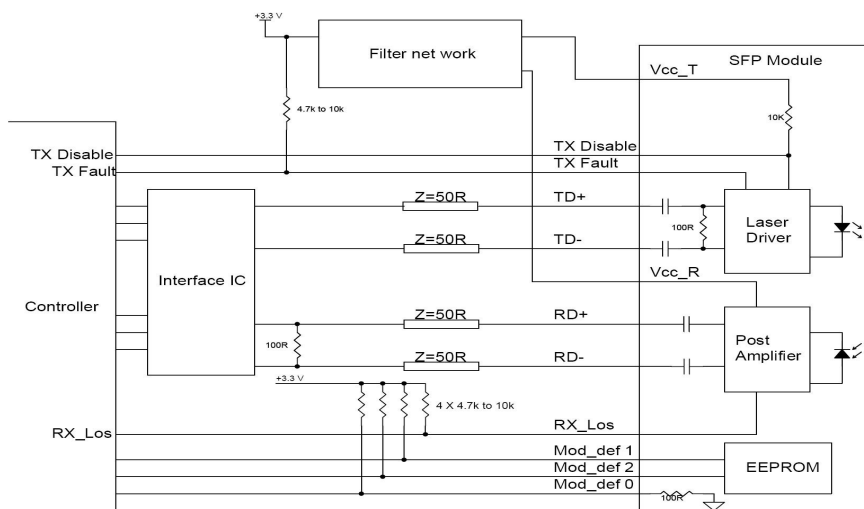
- Mod-Def 0 has been grounded by the module to indicate that the module is present
- Mod-Def 1 is the clock line of two wire serial interface for serial ID
- Mod-Def 2 is the data line of two wire serial interface for serial ID

4. When high, this output indicates loss of signal (LOS). Low indicates normal operation.

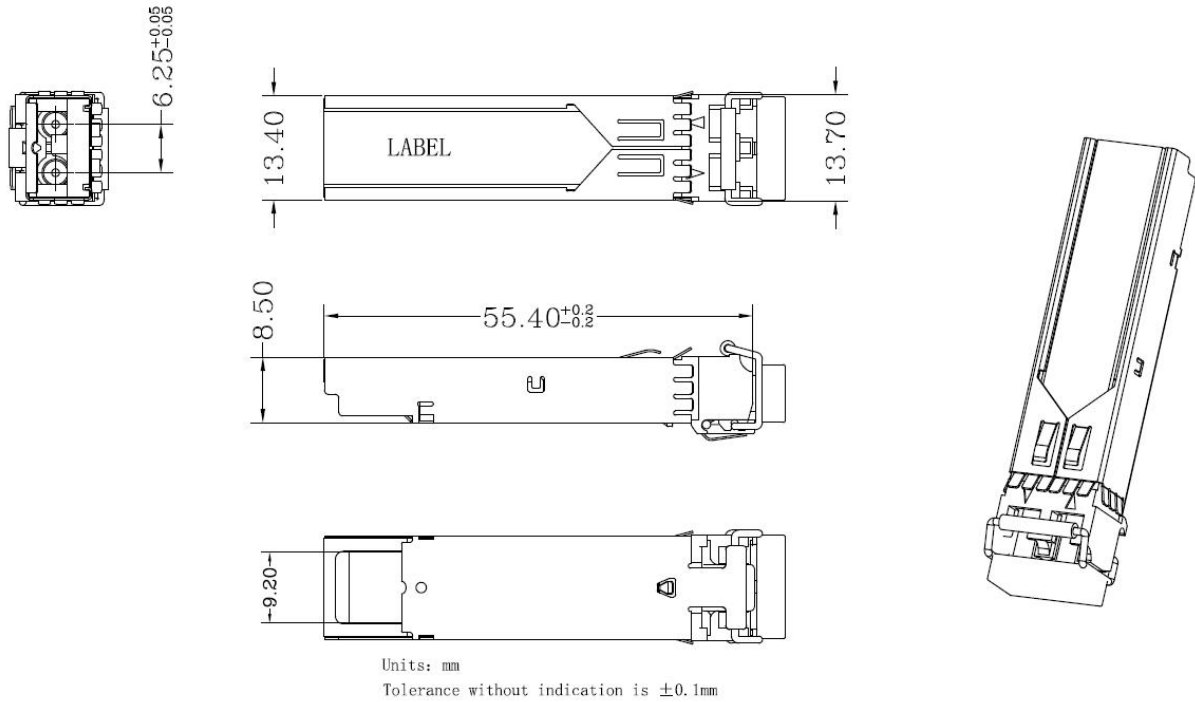
5. RD+/-: These are the differential receiver outputs. They are AC coupled 100 $\Omega$  differential lines which should be terminated with 100 $\Omega$  (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

6. TD+/-: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 $\Omega$  differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

## Typical Interface Circuit



## Package Dimensions



## Diagnostics

### Diagnostics Specification

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70 -40 to +85	°C	$\pm 3^\circ\text{C}$	Internal/ External
Voltage	3.0 to 3.6	V	$\pm 3\%$	Internal/ External
Bias Current	2 to 80	mA	$\pm 10\%$	Internal/ External
TX Power	-9 to -3	dBm	$\pm 3\text{dB}$	Internal/ External
RX Power	-35 to 0	dBm	$\pm 3\text{dB}$	Internal/ External



*FH-S3101CDL40  
155M SFP 1310nm LC 40km DDMI*

## **For More Information**

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