

155Mbps SFP Transceiver

(For 20-40km transmission)

Features

- ◆ Data-rate for 155Mbps operation
- ◆ 1310nm FP laser and PIN photodetector
- ◆ 20km ~40km transmission with SMF
- ◆ Standard serial ID information Compatible with SFP MSA and SFF-8472
- ◆ Digital Diagnostic Monitoring
- ◆ SFP MSA package with duplex LC connector
- ◆ Very low EMI and excellent ESD protection
- ◆ +3.3V single power supply
- ◆ Operating case temperature:
Standard: 0 to +70°C
Industrial: -40 to +85°C

Applications

- ◆ SDH STM-1, S-1.1, L-1.1, L-1.2
- ◆ SONET OC-3, IR1, LR1, LR2
- ◆ Switched backplane application
- ◆ Other optical transmission systems

Description

The SFP transceiver is high performance, cost effective module supporting 155Mbps and from 20km to 40km transmission distance with SMF.

The transceiver consists of two sections: The transmitter section incorporates a FP laser. And the receiver section consists of a PIN photodiode integrated with a trans-impedance preamplifier (TIA). All modules satisfy class I laser safety requirements.

The optical output can be disabled by a TTL logic high-level input of Tx Disable. Tx Fault is

provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver.

The standard serial ID information compatible with SFP MSA describes the transceiver's capabilities, standard interfaces, manufacturer and other information. The host equipment can access this information via the 2-wire serial CMOS EEPROM protocol. For further information, please refer to SFP Multi-Source Agreement (MSA).

The SFP transceivers are compatible with RoHS.

Absolute Maximum Ratings

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

Table 2 - Absolute Maximum Ratings

Parameter	Symbol	Min	Max.	Unit
Storage Temperature	Ts	-40	+85	°C
Supply Voltage	Vcc	-0.5	4.5	V
Operating Relative Humidity	-	5	85	%

Recommended Operating Conditions

Table 3- Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	Standard	Tc	0	+70	°C
	Industrial	Tc	-40	+85	°C
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc		190	300	mA
Date Rate	STM1/OC3		155		Mbps

Table 4 –Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	unit	notes
Transmitter						
Centre Wavelength	λ_c	1270	1310	1355	nm	
Average Output Power	P _{out}	-15		-8	dBm	1
P _{out} @TXDisableAsserted	P _{out}			-45	dBm	1
Spectral Width (RMS)	σ		2	4	nm	
Extinction Ratio	ER	9			dB	
Rise/Fall Time(20%~80%)	t _r /t _f			0.26	ns	2
Output Optical Eye	IEEE 802.3z and ANSI Fibre Channel Compatible					3
Differential Data In Swing	V _{IN}	500		2000	mV	4
Differential Input Impedance	Z _{IN}	90	100	110	Ω	
TX Disable	Disable	2.0		Vcc	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		Vcc	V	
	Normal	0		0.8	V	
Receiver						
Centre Wavelength	λ_c	1260	1310	1570	nm	
Receiver Sensitivity				-34	dBm	5

Receiver Overload		-3			dBm	5
Return Loss		12			dB	
LOS De-Assert	LOS _D			-36	dBm	
LOS Assert	LOS _A	-46			dBm	
LOS Hysteresis		1		4	dB	
Differential Data Out Swing	V _{OUT}	370		1800	mV	4
LOS	High	2.0		V _{cc} +0.3	V	
	Low	0		0.8	V	

Notes:

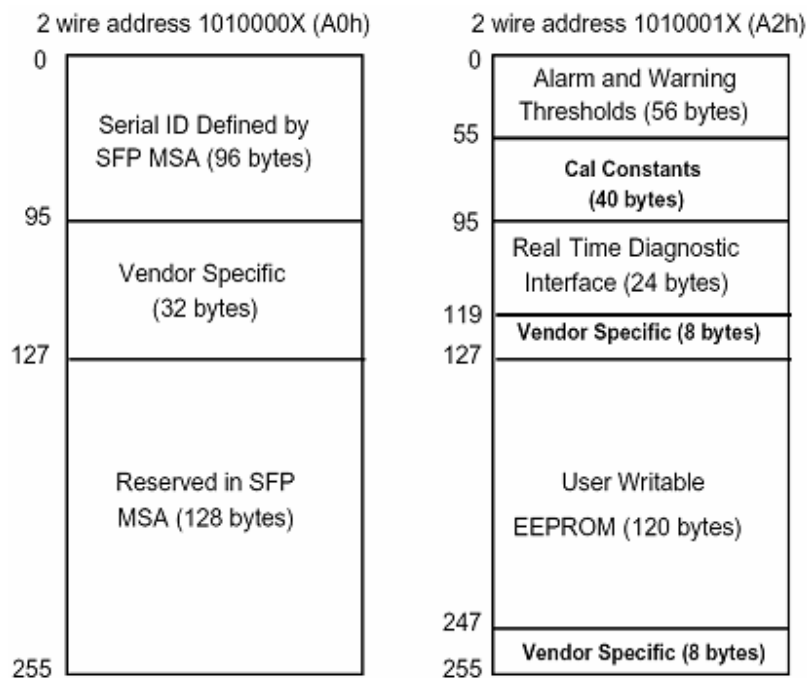
1. The optical power is launched into SMF.
2. Unfiltered, measured with a PRBS 2²³-1 test pattern @155Mbps
3. Measured with a PRBS 2²³-1 test pattern @155Mbps.
4. PECL logic, internally AC coupled.
5. Measured with a PRBS 2²³-1 test pattern @155Mbps, worst-case extinction ratio, BER $\leq 1 \times 10^{-10}$.

Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



Recommended Host Board Power Supply Circuit

Figure 1 shows the recommended host board power supply circuit.

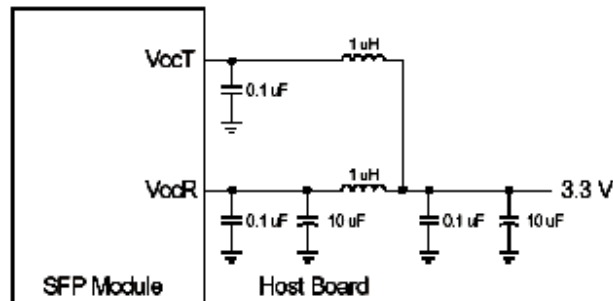


Figure 1, Recommended Host Board Power Supply Circuit

Recommended Interface Circuit

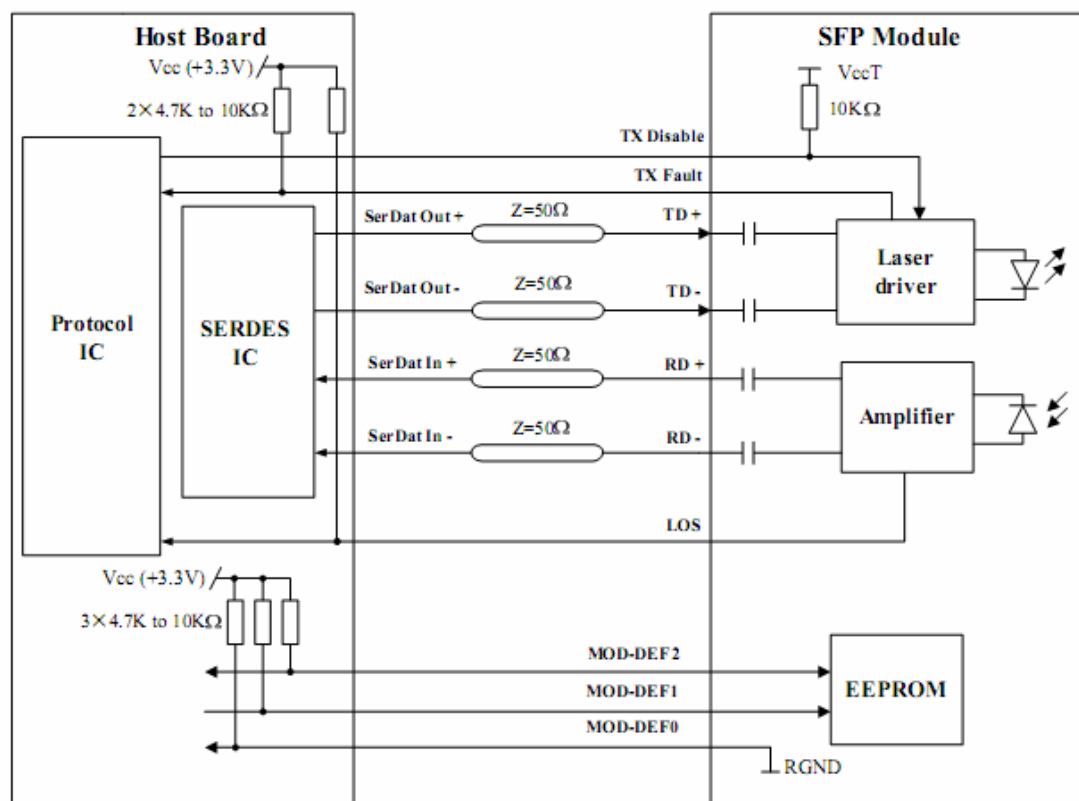


Figure 2, Recommended Interface Circuit

Figure 2 shows the recommended interface circuit.

Note A: Circuit assumes open emitter output

Note B: Circuit assumes high impedance internal bias @Vcc-1.3V

Pin Definitions

Figure 3 below shows the pin numbering of SFP electrical interface. The pin functions are described in Table 7 with some accompanying notes.

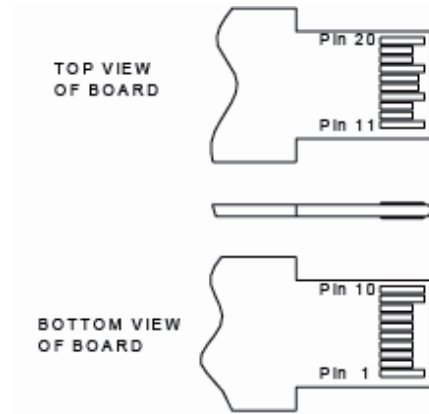


Figure 3, Pin View

Table 7– Pin Function Definitions

Pin No.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2
4	MOD-DEF2	Module Definition 2	3	Note 3
5	MOD-DEF1	Module Definition 1	3	Note 3
6	MOD-DEF0	Module Definition 0	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	VeeR	Receiver Ground	1	
15	VeeR	Receiver Power	2	
16	VccT	Transmitter Power	2	
17	VeeT	Transmitter Ground	1	

18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	VeeT	Transmitter Ground	1	

Notes:

1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

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 4.7k~10kΩ resistor. Its states are:

Low (0~0.8V): Transmitter on

(>0.8V, <2.0V): Undefined

High (2.0~3.465V): Transmitter Disabled

Open: Transmitter Disabled

3. MOD-DEF 0,1,2 are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.

MOD-DEF 0 is 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. LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates loss of signal. In the low state, the output will be pulled to less than 0.8V.

5. These are the differential receiver output. They are internally AC-coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES.

6. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential

Mechanical Design Diagram

The mechanical design diagram is shown in Figure 4.

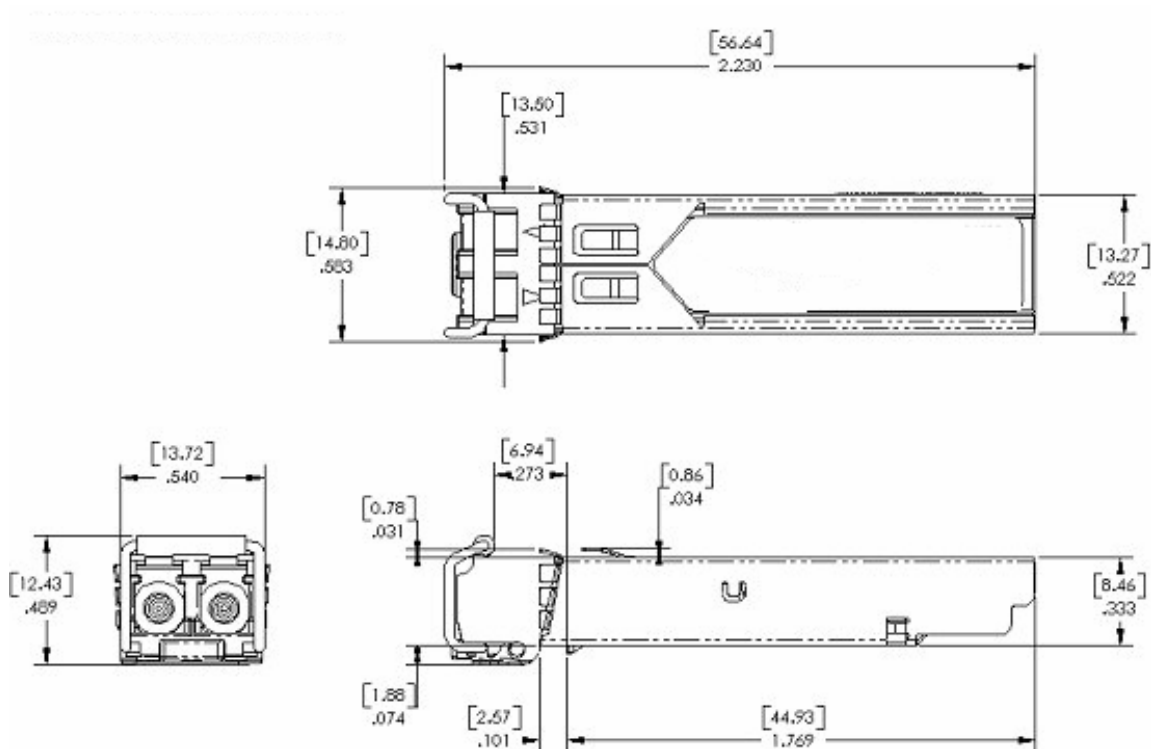
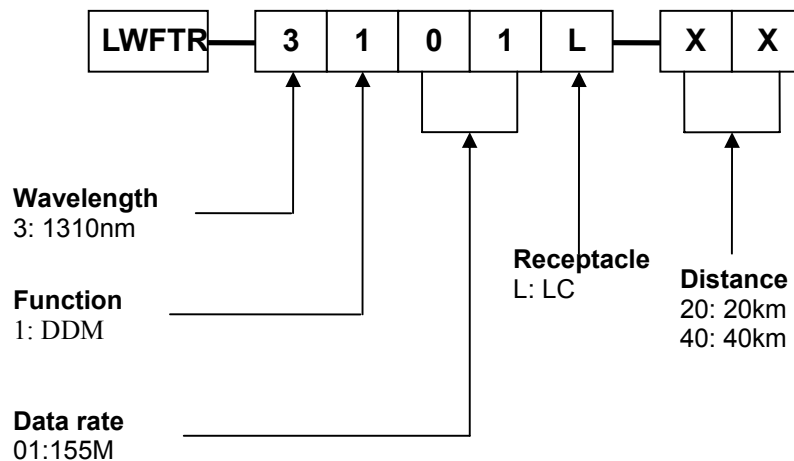


Figure 4, Mechanical Design Diagram of SFP with Spring-Latch

Ordering Information



Note: 1.The "Distance" bit may be omitted when it is "20".

2.The "Temperature" bit may be omitted when it is standard temp.

Part No.	Product Description
LWFTR-3101L-20	1310nm, 155Mbps, 20km, SFP with DDM, 0°C~+70°C
LWFTR-3101L-40	1310nm, 155Mbps, 40km, SFP with DDM, 0°C~+70°C
LWFTR-3101LI-20	1310nm, 155Mbps, 20km, SFP with DDM, -40°C~+85°C
LWFTR-3101LI-40	1310nm, 155Mbps, 40km, SFP with DDM, -40°C~+85°C