

## Features



- Tri-rate 1~2.125Gbps data links
- Up to 300m transmission distance at 2.125Gbps  
550m transmission distance at 1.25Gbps
- 850nm VCSEL and PIN photodetector
- SFP MSA package with duplex LC connector
- With spring latch for high density application
- +3.3V single power supply
- Operating case temperature  
Standard: -5 to 70°C
- RoHS compliant

## Regulatory Compliance

**Table 1 - Regulatory Compliance**

Parameter	Standard	Compliance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B	Compliant with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2	Compliant with Class I laser product.
RoHS	2002/95/EC 4.1&4.2 2005/747/EC	Compliant with RoHS

## Absolute Maximum Ratings

**Table 2 - Absolute Maximum Ratings**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T <sub>s</sub>	-40	-	+85	°C	
Supply Voltage	V <sub>CC</sub>	-0.5	-	+3.6	V	
Operating Relative Humidity	RH	+5	-	+95	%	

## Recommended Operating Conditions

Table 3 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	$T_C$	-5	-	+70	°C	
Power Supply Voltage	$V_{CC}$	3.13	3.3	3.47	V	
Power Supply Current	$I_{CC}$	-		300	mA	
Data Rate		1.0625		2.125	Gbps	

## Optical Characteristics

Table 4 – Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Centre Wavelength	$\lambda_C$	830	850	860	nm	
Average Output Power	$P_{Out}$	-9.5		-3.5	dBm	1
$P_{Out}$ @TX Disable Asserted	$P_{Out}$			-30	dBm	1
Spectral Width (RMS)	$\sigma$			0.85	nm	
Extinction Ratio	EX	9			dB	
Rise/Fall Time (20%~80%)	$t_r/t_f$			150	ps	2
Total Jitter	$T_J$			0.44	UI	3
Deterministic Jitter	$D_J$			0.26	UI	3
Output Optical Eye	ANSI Fibre Channel and Gigabit Ethernet Compatible					4
Receiver						
Centre Wavelength	$\lambda_C$	770		860	nm	
Receiver Sensitivity	1.0625Gbps			-17	dBm	5
	2.125Gbps			-17		
	1.25Gbps			-17		
Receiver Overload		0			dBm	
Return Loss		12			dB	
LOS De-Assert	$LOS_D$			-18	dBm	
LOS Assert	$LOS_A$	-30			dBm	
LOS Hysteresis		0.5		4	dB	
Total Jitter (pk-pk)	$T_J$			0.64	UI	3
Deterministic Jitter (pk-pk)	$D_J$			0.39	UI	3

Notes:

1. The optical power is launched into MMF.
2. Unfiltered, measured with a PRBS  $2^7-1$  test pattern @2.125Gbps
3. Measured with a PRBS  $2^7-1$  test pattern@2.125Gbps, meet the specified maximum output jitter requirements if the specified maximum input jitter is present.

4. Measured with a PRBS  $2^7-1$  test pattern @2.125/1.0625/1.25Gbps.
5. Measured with a PRBS  $2^7-1$  test pattern @2.125/1.0625/1.25Gbps, extinction ratio ER=9dB, BER  $\leq 1 \times 10^{-12}$ .

## Electrical Characteristics

Table 5 – Electrical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Data Input Swing Differential	$V_{IN}$	500		2400	mV	1
Input Differential Impedance	$Z_{IN}$	90	100	110	$\Omega$	
Tx_DIS Disable	$V_D$	2.0		$V_{CC}$	V	
Tx_DIS Enable	$V_{EN}$	GND		GND+0.8	V	
TX_Fault (Fault)		2.0		$V_{CC}+0.3$	V	
TX_Fault (Normal)		0		0.8	V	
Receiver						
Data Output Swing Differential	$V_{OUT}$	370		2000	mV	1
Rx_LOS Fault	$V_{LOS-Fault}$	2.0		$V_{CC}+0.3$	V	
Rx_LOS Normal	$V_{LOS-Normal}$	GND		GND+0.8	V	

Notes:

1. Internally AC coupled

## Recommended Host Board Power Supply Circuit

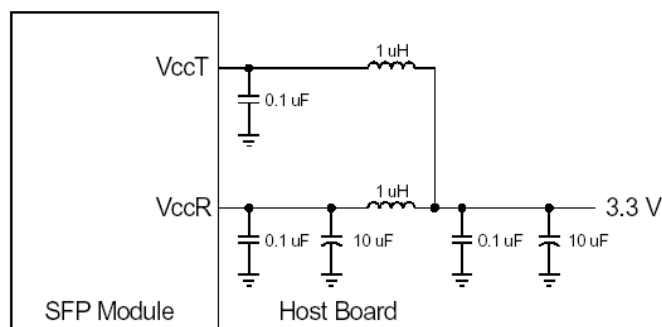


Figure 1, Recommended Host Board Power Supply Circuit

### Recommended Interface Circuit

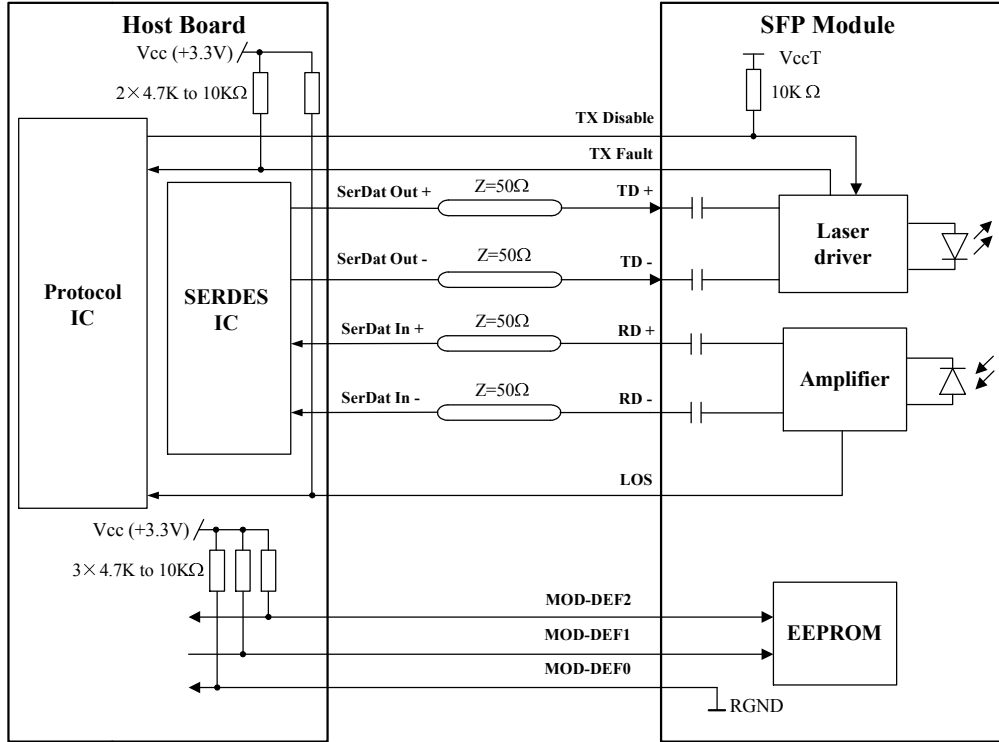


Figure 2, Recommended Interface Circuit

### Pin Definitions

Figure 3 below shows the pin numbering of SFP electrical interface. The pin functions are described in Table 6 with some accompanying notes.

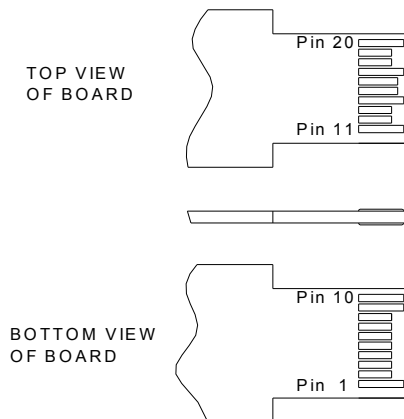


Figure 3, Pin View

Table 6 - 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	VccR	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:**

- 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.
- 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
- 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 wires serial interface for serial ID  
 MOD-DEF 2 is the data line of two wires serial interface for serial ID
- 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.
- 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.
- These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module.

## EEPROM Information

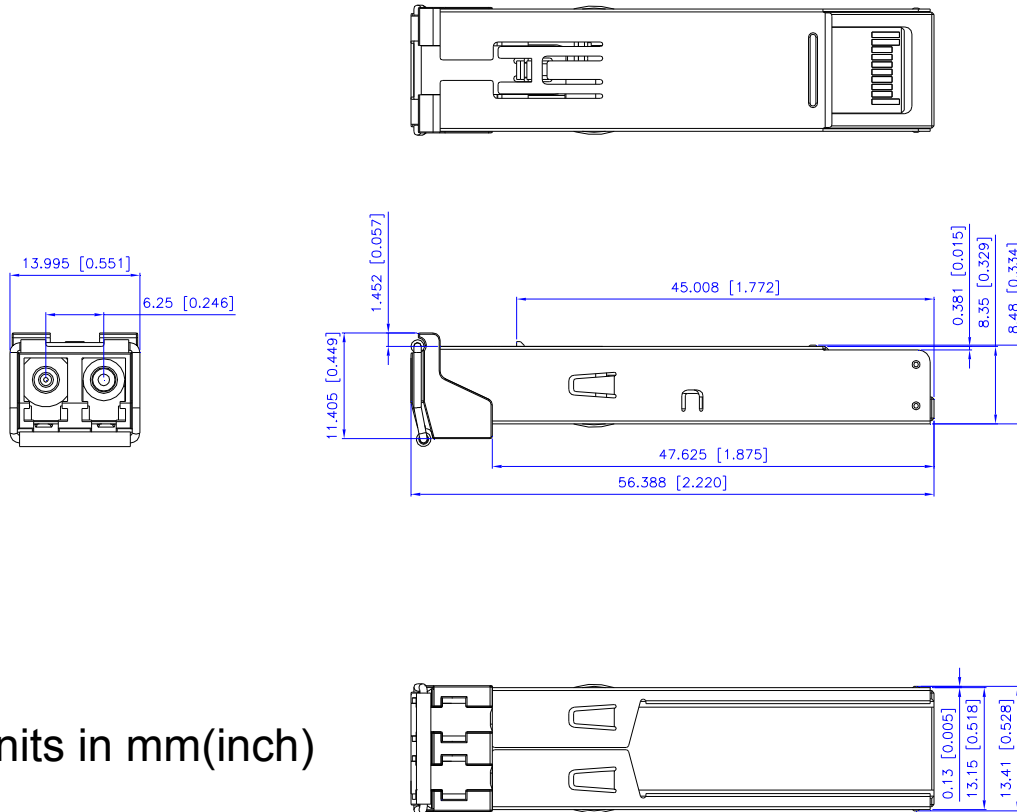
The SFP MSA defines a 256-byte memory map in EEPROM describing the transceiver's capabilities, standard interfaces, manufacturer, and other information, which is accessible over a 2 wire serial interface at the 8-bit address 1010000X (A0h). The memory contents refer to Table 7.

Table 7 - EEPROM Serial ID Memory Contents (A0h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	MOD4
2	1	Connector	07	LC
3—10	8	Transceiver	00 00 00 01 20 40 0C 05	Transceiver codes
11	1	Encoding	01	8B10B
12	1	BR, nominal	15	2.125Gbps
13	1	Reserved	00	
14	1	Length (9um)-km	00	
15	1	Length (9um)	00	
16	1	Length (50um)	1E	300m
17	1	Length (62.5um)	0F	150m
18	1	Length (copper)	00	
19	1	Reserved	00	
20—35	16	Vendor name	53 4F 55 52 43 45 50 48 4F 54 4F 4E 49 43 53 20	"SOURCEPHOTONICS"(ASC II)
36	1	Reserved	00	
37—39	3	Vendor OUI	00 1F 22	
40—55	16	Vendor PN	53 50 54 52 53 58 43 4E 46 42 20 20 20 20 20 20	"SPTRSXCNFB" (ASC II)
56—59	4	Vendor rev	31 30 20 20	ASC II ("31 30 20 20" means 1.0 revision)
60-61	2	Wavelength	03 52	850nm
62	1	Reserved	00	
63	1	CC BASE	xx	Check sum of bytes 0 - 62
64—65	2	Options	00 1A	LOS, TX_FAULT and TX_DISABLE
66	1	BR, max	00	
67	1	BR, min	00	
68—83	16	Vendor SN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	ASC II .
84—91	8	Vendor date code	xx xx xx xx xx xx 20 20	Year (2 bytes, Month (2 bytes), Day (2 bytes))
92—94	3	Reserved	00 00 00	
95	1	CC EXT	xx	Check sum of bytes 64 - 94
96—255	160	Vendor specific		

Note: The "xx" byte should be filled in according to practical case. For more information, please refer to the related document of *SFP Multi-Source Agreement (MSA)*.

## Mechanical Diagram



Units in mm(inch)

Figure 5, Mechanical Design Diagram of the SFP

## Order Information

Table 8 – Order Information

Part No.	Application	Data Rate	Laser Source	Fiber Type
SP-TR-SX-CNFB (C-temp)	Fibre Channel	Tri-rate 1.0625/2.125/1.25Gbps	850nm VCSEL	MMF

## Warnings

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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