



125~155Mbps SFP Transceiver with Spring Latch

(For 2km multimode transmission)

Members of Flexon™ Family



Description

Sourcephotonics 125~155Mbps spring-latch SFP transceiver is high performance, cost effective module that supports data-rate of up to 155Mbps and transmission distance up to 2km.

Features

- ◆ Up to 155Mbps data-rate
- ◆ 1310nm FP laser and PIN photodetector for 2km multimode transmission
- ◆ Standard serial ID information compatible with SFP MSA
- ◆ SFP MSA package with duplex LC connector
- ◆ With spring latch for easily removing
- ◆ +3.3V single power supply
- ◆ Operating case temperature
Standard : -5 to +70°C
Industrial : -40 to +85°C

Applications

- ◆ SDH STM-1, I-1.1
- ◆ SONET OC-3 SR1
- ◆ Fast Ethernet
- ◆ Other optical links

Standard

- ◆ Compatible with SFP MSA
- ◆ Compatible with FCC 47 CFR Part 15, Class B
- ◆ Compatible with FDA 21 CFR 1040.10 and 1040.11, Class I
- ◆ Compliant with RoHS

The transceiver consists of two sections: The transmitter section incorporates FP laser, and the receiver section consists of 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 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 two-wire serial CMOS EEPROM protocol. For further information, please refer to SFP Multi-Source Agreement (MSA).

Regulatory Compliance

The transceivers have been tested according to American and European product safety and electromagnetic compatibility regulations (See Table 1). For further information regarding regulatory certification, please refer to Sourcephotronics regulatory specification and safety guidelines, or contact with Sourcephotronics, Inc. America sales office listed at the end of the documentation.

Table 1- Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 2(>2000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Immunity	IEC 61000-4-3	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.
Component Recognition	UL and CSA	Compatible with standards
RoHS	2002/95/EC 4.1&4.2 2005/747/EC	Compliant with standards ^{note}

Note:

In light of item 5 in Annex of 2002/95/EC, "Pb in the glass of cathode ray tubes, electronic components and fluorescent tubes." and item 13 in Annex of 2005/747/EC, "Lead and cadmium in optical and filter glass.", the two exemptions are being concerned for Sourcephotronics's transceivers, because Sourcephotronics's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

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	T _S	-40	+85	°C
Supply Voltage	V _{CC}	-0.5	3.6	V
Operating Relative Humidity	-	5	95	%

Recommended Operating Conditions

Table 3- Recommended Operating Conditions

Parameter		Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	Standard	T_C	-5		+70	°C
	Industrial		-40		+85	
Power Supply Voltage		V_{CC}	3.13		3.47	V
Power Supply Current		I_{CC}			300	mA
Data Rate				125/155		Mbps

Optical and Electrical Characteristics

All parameters are specified at overall operating case temperature and power supply range, unless otherwise stated.

SP-FE-FX-CNFF SP-FE-FX-INFF (1310nm FP and PIN, 2km multimode transmission)

Table 4 - Optical and Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Centre Wavelength		λ_C	1270	1310	1380	nm	
Average Output Power		P_{Out}	-20		-14	dBm	1
$P_{Out}@TX$ Disable Asserted		P_{Out}			-45	dBm	1
Spectral Width (RMS)		σ			7.7	nm	
Extinction Ratio		EX	10			dB	
Rise/Fall Time (20%~80%)		t_r/t_f			3	ns	2
Output Optical Eye		Compliant with Eye Mask Bellcore TR-NWT-000253 for 100BASE-LX					3
Data Input Swing Differential		V_{IN}	500		2400	mV	4
Input Differential Impedance		Z_{IN}	80	100	120	Ω	
TX Disable	Disable		2.0		V_{CC}	V	
	Enable		Vee		Vee+0.8	V	
TX Fault	Fault		2.0		V_{CC}	V	
	Normal		Vee		Vee+0.5	V	
Receiver							
Centre Wavelength		λ_C	1260	1310	1570	nm	
Receiver Sensitivity					-30	dBm	5
Receiver Overload			-10			dBm	5
Return Loss			12			dB	
LOS De-Assert					-31	dBm	
LOS Assert			-45			dBm	
LOS Hysteresis			0.5		4.5	dB	
Total Jitter		T_J			0.43	UI	

Data Output Swing Differential		V_{OUT}	370		2000	mV	6
LOS	High		2.0		$V_{cc}+0.3$	V	
	Low		Vee		$V_{ee}+0.5$	V	

Notes:

1. The optical power is launched into MMF 62.5/125um.
2. Unfiltered, measured with 4B/5B code for 125Mbps.
3. Measured with 4B/5B code for 125Mbps.
4. Internally AC coupled, connected with 100 ohm differential load.
5. Measured with a PRBS $2^{23}-1$ test pattern @155Mbps, extinction ratio EX=10dB, BER $\leq 1 \times 10^{-10}$.
6. Internally AC coupled.

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 5.

Table 5 - 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 20 00 00 00 00	100BASE-FX
11	1	Encoding	02	4B/5B
12	1	BR, nominal	01	100BASE-FX
13	1	Reserved	00	
14	1	Length (9um)-km	00	
15	1	Length (9um)	00	
16	1	Length (50um)	C8	2km
17	1	Length (62.5um)	C8	2km
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 00 00	
40—55	16	Vendor PN	53 50 46 45 46 58 xx 4E 46 46 20 20 20 20 20 20	"SPFEFXCNFF SPFEFXINFF" (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	05 1E	1310nm
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	1	Diagnostic type	00	
93	1	Enhanced option	00	
94	1	SFF-8472	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 SFF-8472 Rev 9.5.

Recommended Host Board Power Supply Circuit

Figure 1 shows the recommended host board power supply circuit.

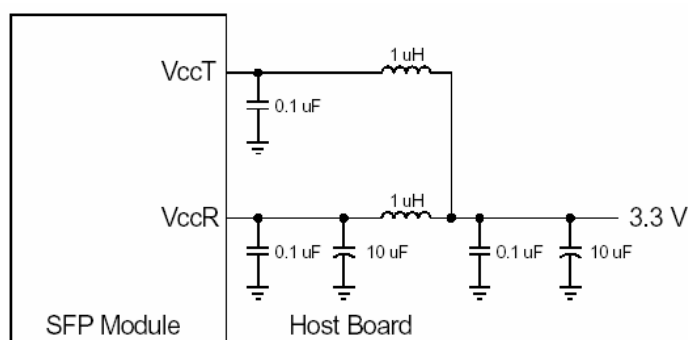


Figure 1, Recommended Host Board Power Supply Circuit

Recommended Interface Circuit

Figure 2 shows the recommended interface circuit.

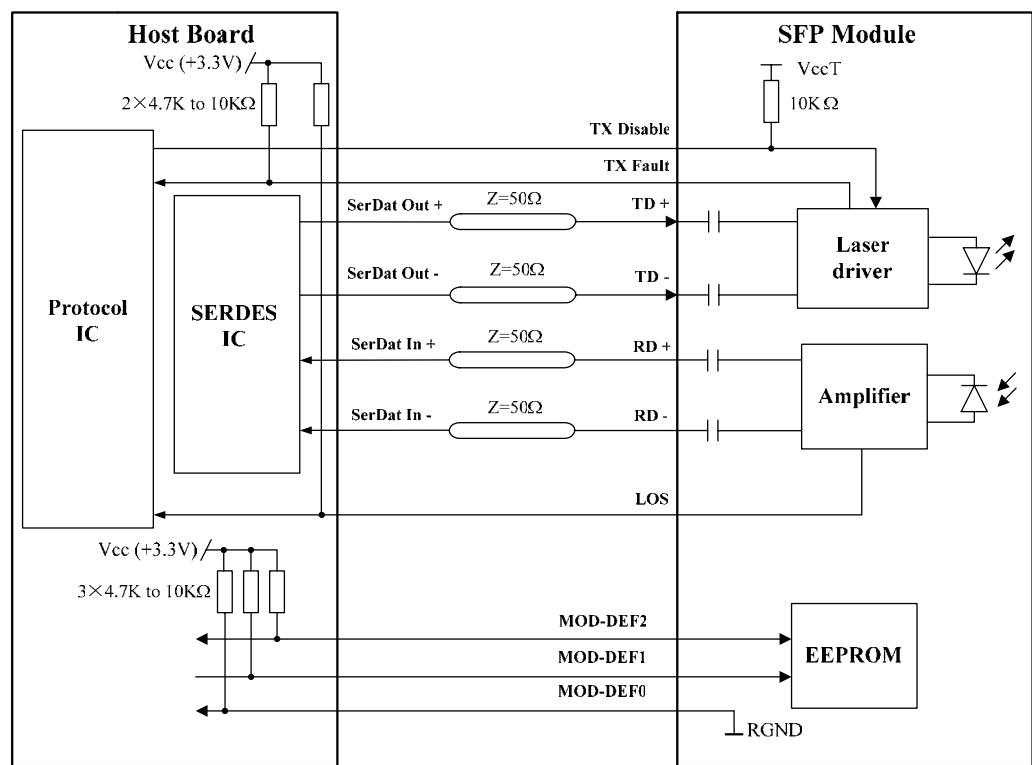


Figure 2, Recommended Interface Circuit

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.

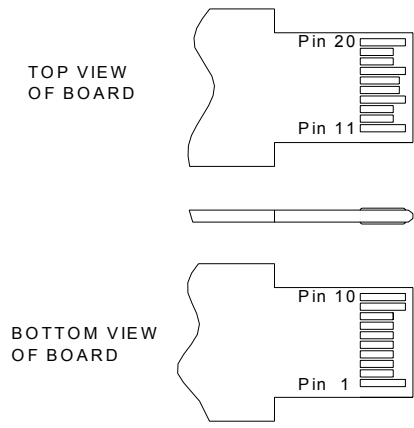


Figure 3, Pin View

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.

Mechanical Design Diagram

The mechanical design diagram is shown in Figure 4.

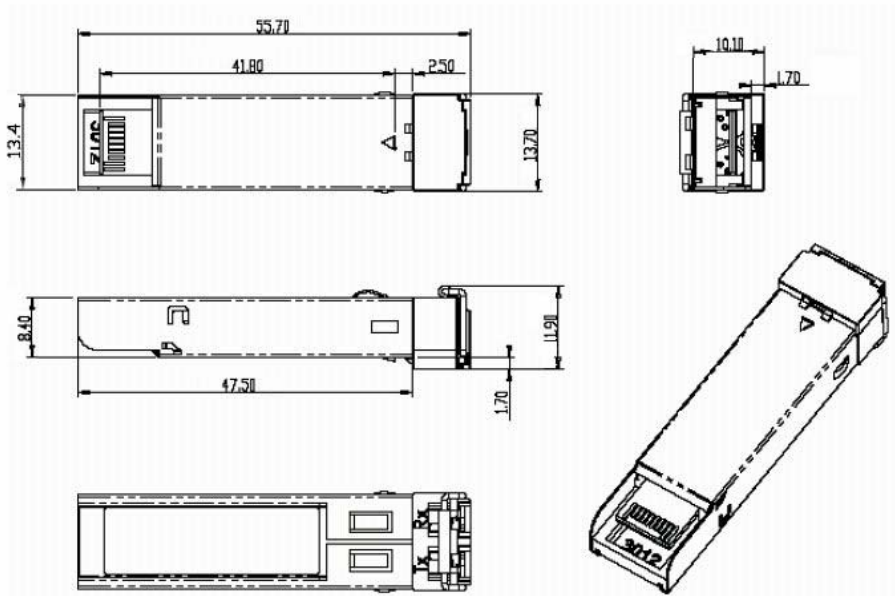
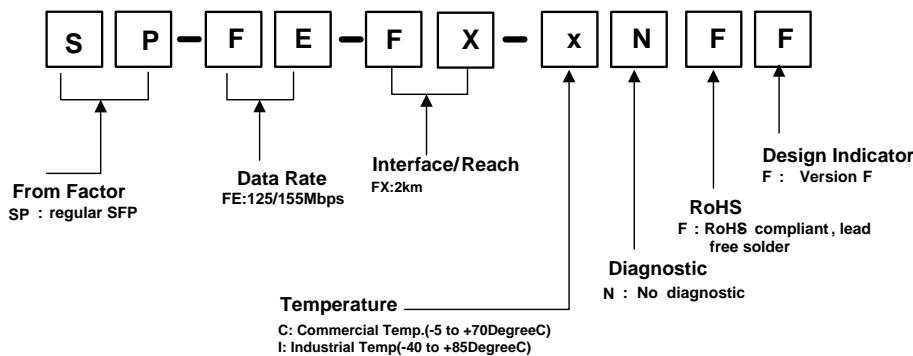


Figure 4, Mechanical Design Diagram of the SFP with Spring-Latch

Ordering information



Part No.	Product Description
SP-FE-FX-CNFF	1310nm, 125/155Mbps, 2km Multimode transmission, SFP with Spring Latch, -5°C~+70°C, RoHS compliance
SP-FE-FX-INFF	1310nm, 125/155Mbps, 2km Multimode transmission, SFP with Spring Latch, -40°C~+85°C, RoHS compliance

Related Documents

For further information, please refer to the following documents:

- *Sourcephotronics SFP Application Notes*
- *SFP Multi-Source Agreement (MSA)*
- *SFF-8472 Rev 9.5*

Obtaining Document

You can visit our website:

<http://www.Sourcephotronics.com>

Or contact Sourcephotronics, Inc. America Sales Office listed at the end of the documentation to get the latest documents.

Revision History

Revision	Initiate	Review	Approve	Subject	Release Date
00	Solaris Zhu	Simon Jiang	Walker.Wei	Initial datasheet	June 05, 2008

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