



## Features

- 1.25Gbps bi-directional data links
- Up to 10km point-point transmission
- 1310nm FP transmitter and 1490nm PIN receiver for SPL-34-GB-BX-CDFM
- 1490nm DFB transmitter and 1310nm PIN receiver for SPL-43-GB-BX-CDFM
- Digital diagnostic monitor interface compatible with SFF-8472
- SFP MSA package with single LC receptacle
- +3.3V single power supply
- Power consumption less than 1W
- Operating case temperature:-5~+70°C
- RoHS compliant

## Regulatory Compliance

**Table 1 - Regulatory Compliance**

Feature	Standard	Performance
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	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2	Compatible with Class I laser product.
RoHS	2011/65/EU	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	-	+4	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			1.25		Gbps	

## Optical Characteristics

**Table 4 – Optical Characteristics: SPL-34-GB-BX-CDFM**

Transmitter							
Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Centre Wavelength		$\lambda_C$	1260	1310	1360	nm	
Average Output Power		P <sub>OUT</sub>	-9	-6	-3	dBm	1
Spectral Width (RMS)	1260nm	$\Delta\lambda$			2.09	nm	
	1270nm				2.52		
	1280nm				3.13		
	1286nm				3.50		
	1343nm						
	1350nm				3.06		
	1360nm				2.58		
Extinction Ratio		EX	6			dB	
Rise/Fall Time (20%~80%)		tr /tf			0.26	ns	
Deterministic Jitter		DJ			200	ps	
Total Jitter		TJ			385	ps	
Optical Eye Mask		IEEE 802.3ah Compatible					2
Receiver							
Centre Wavelength		$\lambda_C$	1480	1490	1500	nm	
Receiver Sensitivity		P <sub>IN</sub>			-19.5	dBm	3
Receiver Overload		P <sub>IN</sub>	-3			dBm	3
LOS Assert		LOS <sub>A</sub>	-35			dBm	
LOS Deassert		LOS <sub>D</sub>			-20	dBm	
LOS Hysteresis			0.5		5	dB	

Notes:

1. The optical power is launched into SMF
2. Measured with a PRBS  $2^7-1$  test pattern @1.25Gbps.
3. Measured with a PRBS  $2^7-1$  test pattern@1.25Gbps,  $BER \leq 1 \times 10^{-12}$

**Table 5 – Optical Characteristics: SPL-43-GB-BX-CDFM**

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Centre Wavelength	$\lambda_C$	1480	1490	1500	nm	
Average Output Power	P <sub>OUT</sub>	-9	-6	-3	dBm	1
Spectral Width (-20dB)	$\Delta\lambda$			0.88	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	EX	6			dB	
Rise/Fall Time (20%~80%)	tr /tf			0.26	ns	
Deterministic Jitter	DJ			200	ps	
Total Jitter	TJ			385	ps	
Optical Eye Mask	IEEE 802.3ah Compatible					2
Receiver						
Centre Wavelength	$\lambda_C$	1260	1310	1360	nm	
Receiver Sensitivity	P <sub>IN</sub>			-19.5	dBm	3
Receiver Overload	P <sub>IN</sub>	-3			dBm	3
LOS Assert	LOS <sub>A</sub>	-35			dBm	
LOS Deassert	LOS <sub>D</sub>			-20	dBm	
LOS Hysteresis		0.5		5	dB	

Notes:

1. The optical power is launched into SMF
2. Measured with a PRBS  $2^7-1$  test pattern @1.25Gbps.
3. Measured with a PRBS  $2^7-1$  test pattern@1.25Gbps,  $BER \leq 1 \times 10^{-12}$

## Electrical Characteristics

**Table 6 – Electrical Characteristics**

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Data Input Swing Differential	$V_{IN}$	500		2400	mV	1
Input Differential Impedance	$Z_{IN}$	80	100	120	$\Omega$	
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		Vcc+0.3	V	
TX_ Fault (Normal)		0		0.8	V	
Receiver						
Data Output Swing Differential	$V_{OUT}$	370		1600	mV	1

Rx_LOS Fault	V <sub>LOS-Fault</sub>	2.0		V <sub>cc</sub> +0.3	V	
Rx_LOS Normal	V <sub>LOS-Normal</sub>	GND		GND+0.8	V	

Notes:

1. Internally AC coupled

## Recommended Host Board Power Supply Circuit

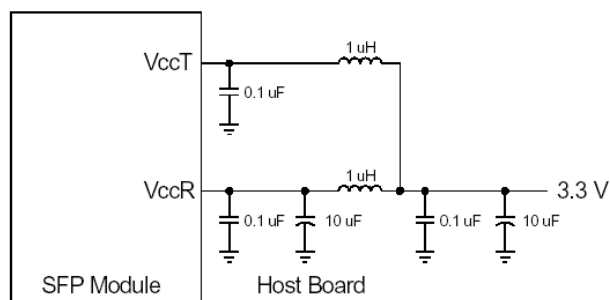


Figure 1, Recommended Host Board Power Supply Circuit

## Recommended Interface Circuit

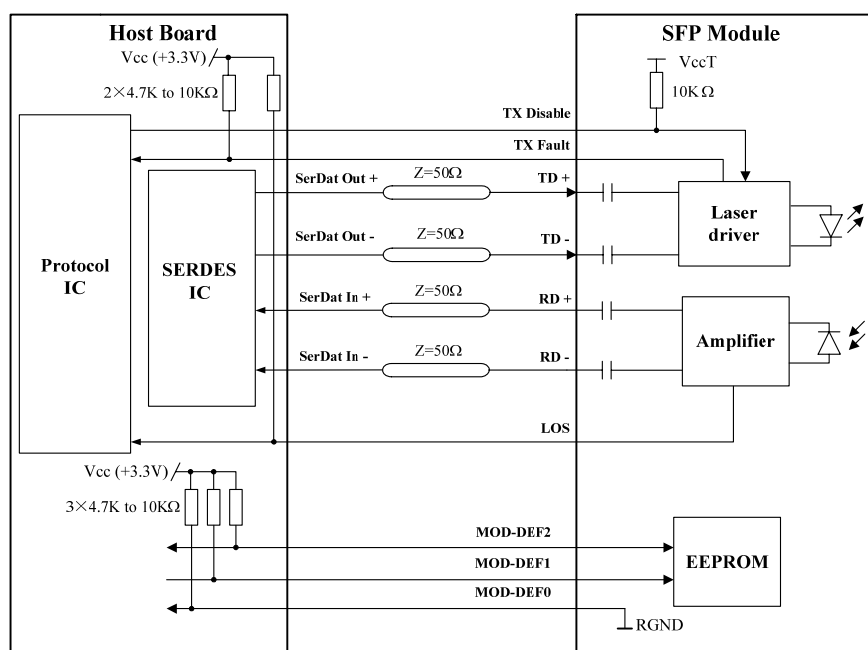


Figure 2, Recommended Interface Circuit

## Pin Definitions

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

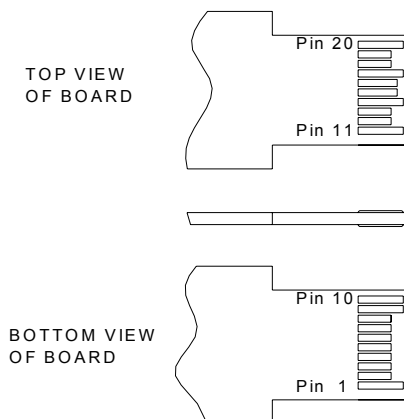


Figure 3, Pin View

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	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 8.

Table 8 - 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 40 00 00 00 00	Transmitter Code
11	1	Encoding	01	8B10B
12	1	BR, nominal	0D	1.25Gbps
13	1	Reserved	00	
14	1	Length (9um)-km	0A	10km
15	1	Length (9um)	64	10 km
16	1	Length (50um)	00	
17	1	Length (62.5um)	00	
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 4E49 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 4C xx xx 47 42 42 58 43 44 46 4D 20 20 20	SPL34GBBXCDFM SPL43GBBXCDFM
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/05 D2	1310/1490nm
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	58	Diagnostics(Ext.Cal)
93	1	Enhanced option	B0	Diagnostics (Optional Alarm/warning flags, Soft TX_FAULT and Soft TX_LOS monitoring)
94	1	SFF-8472	02	Diagnostics(SFF-8472 Rev 9.4)
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.

## Monitoring Specification

The digital diagnostic monitoring interface also defines another 256-byte memory map in EEPROM, which makes use of the 8 bit address 1010001X (A2h). Please see Figure 4. For detail EEPROM information, please refer to the related document of SFF-8472 Rev 9.5. The monitoring specification of this product is described in Table 9.



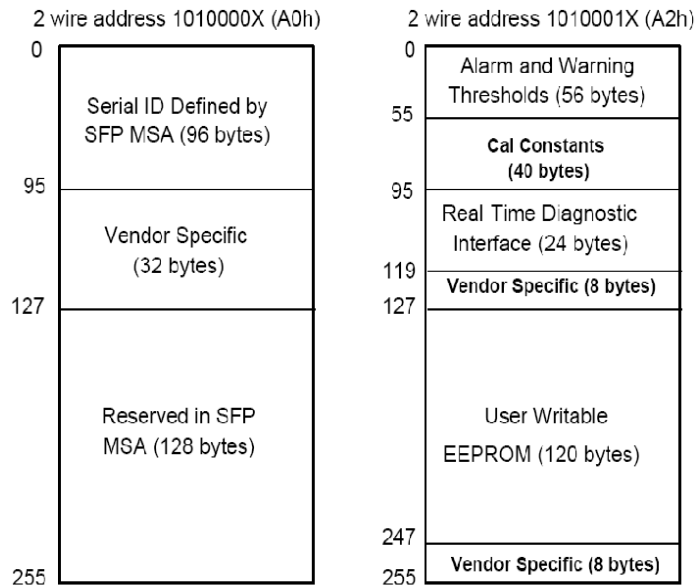


Figure 4, EEPROM Memory Map Specific Data Field Descriptions

Table 9- Monitoring Specification

Parameter	Range	Accuracy	Calibration
Temperature	-10 to + 80°C	±3°C	External
Voltage	2.97 to 3.63V	±3%	External
Bias Current	3mA to 80mA	±10%	External
TX Power	-9 to -3dBm	±3dB	External
RX Power	-19.5 to -3dBm	±3dB	External

## Mechanical Diagram

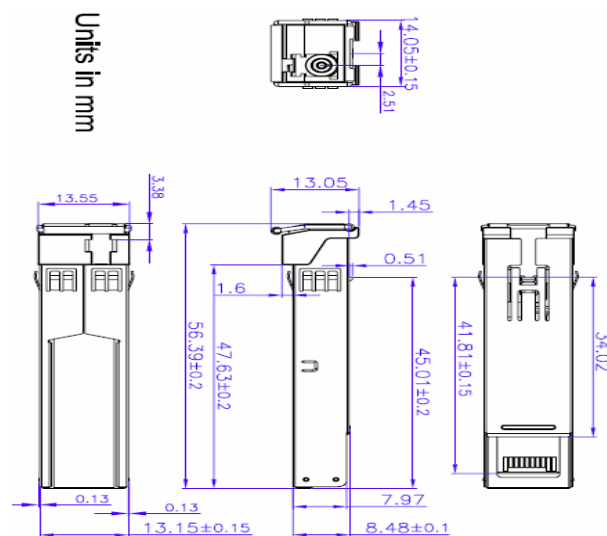


Figure 5, Mechanical Design Diagram of the SFP with Spring-Latch



## Order Information

**Table 10 – Order Information**

Part No.	Application	Data Rate	Laser Source	Fiber Type
SPL-34-GB-BX-CDFM	1000BASE-BX10	1.25G	1310nm FP Tx/1490nm PIN Rx	SMF
SPL-43-GB-BX-CDFM	1000BASE-BX10	1.25G	1490nm DFB Tx/1310nm PIN Rx	SMF

## 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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