

## Product Features

- Compliant with 1000BASE BX20 IEEE802.3ah
- Support 125M data links
- Digital Diagnostic Monitoring available
- Specifications according to SFF-8472
- Uncooled 1490nm DFB Laser
- Up to 1.25Gb/s bi-directional data links
- Up to 20km on 9/125µm SMF
- Simplex LC connector compliant
- Single +3.3V DC power supply
- Hot-pluggable CSFP footprint
- Class 1 laser safety certified
- Operating temperature Options
  - (Industrial) -40°C to +85°C
- RoHS6 Compliant



## Applications

- 1000BASE BX20 IEEE802.3ah
- Point to Point FTTH
- Switched Backplane Applications
- Router/Server Interface
- Switch to Switch Interface
- Other Optical Links

## Descriptions

LX2502IMR CSFP transceivers, according to Compact Small Form Factor Pluggable Multi-Sourcing Agreement (MSA) option 2, The transceiver consists of 2-channel Bi-directional Optical Transceiver unit with five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the 1490nm DFB laser and the PIN photo-detector .The module data link up to 20KM in 9/125um single mode fiber.

LX2502IMR CSFP transceivers offer a wide range of design options, including Digital Diagnostic Monitoring (DDM) features.

LX2502IMR are compliant with RoHS.

## Ordering Information

**Table 1. Ordering Information**

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX2502IMR	1490nm DFB	-9 ~ -3dBm	1310nm PIN	< -19.5dBm	20km	-40 ~ 85 °C	Available	Compliant

## Pin Description

**Table 2. Pin Description**

Pin	Name	Function/Description	Notes
1	VEE	Transceiver Ground	VEE may be internally connected within the SFP module
2	TX Fault	Transmitter Fault Indication	TX Fault is an open collector/ drain output, which should be pulled up with a 4.7K–10K resistor on the host board. Note 1 for more information
3	TX1_Disable	Transmitter Disable of Ch A	Module channel A disables function
4	MOD-DEF2	Two-wires interface Data	2 wire serial ID interface, SDA
5	MOD-DEF1	Two-wires interface Clock	2 wire serial ID interface, SCL
6	TD2-	Inverted Transmit Data Input of Ch B	These are the differential transmitter puts. They are AC-coupled, differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board
7	TD2+	Transmit Data Input of Ch B	
8	LOS1	Loss of Signal of Ch A	Loss of Signal detected function. Note 2 for more information.
9	RD2+	Received Data Output of Ch B	These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100(differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
10	RD2-	Inverted Received Data Output of Ch B	
11	VEE	Transceiver Ground	VEE may be internally connected within the SFP module.
12	RD1-	Inverted Received Data Output of Ch A	These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100(differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
13	RD1+	Received Data Output of Ch A	
14	LOS2	Loss of Signal of CH B	Loss of Signal detected function. Note 2 for more information.
15	VCCR	Receiver Power	3.3V± 5%. Note 3 for more information
16	VCCT	Transmitter Power	3.3V± 5%. Note 3 for more information
17	TX2_Disable	Transmitter Disable of Ch B	Module channel B disables function
18	TD1+	Transmit Data Input of Ch A	These are the differential transmitter puts. They are AC-coupled, differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board
19	TD1-	Inverted Transmit Data Input of Ch A	
20	VEE	Transceiver Ground	VEE may be internally connected within the SFP module.

**Notes:**

1. When high, output indicates a laser fault of some kind either in Channel A or Channel B. The Host shall read Channel A/B for details: TX Fault from channel A if bit 2 is set in [A2H:110]; TX Fault from channel B if bit 2 is set in [B2H: 110]. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
2. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.
3. VccT VccR are the power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 400Ma@3.3V. Vcc may be internally connected within the SFP transceiver module.

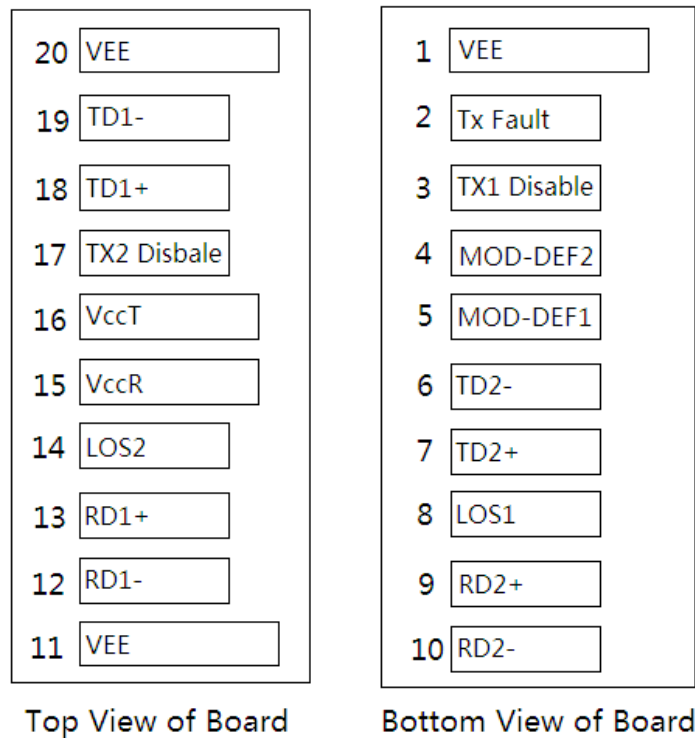


Figure 1. Pin out of Connector Block on Host Board

## Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

**Table 3. Absolute Maximum Ratings**

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	T <sub>s</sub>	-40	85	°C
Relative Humidity	RH	5	95	%
Supply Voltage	V <sub>cc</sub>	-0.5	4	V

## Recommended Operating Conditions

**Table 4. Recommended Operating Conditions**

Parameter	Symbol	Min	Typ	Max	Unit	
Operating Case Temperature	LX2502IMR	T <sub>c</sub>	-40	-	85	°C
Supply Voltage	V <sub>cc</sub>	3.15	3.3	3.45	V	
Data Rate	-	-	0.125/0.125 1.25/1.25	-	Gb/s	

## Transceiver Electrical Characteristics

**Table 5. Transceiver Electrical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Module Supply Current	I <sub>cc</sub>	-	-	450	mA	-
Low speed output: Transmitter Fault(TX_FAULT) / Loss of Signal (LOS)	VOH	2.0	-	V <sub>cc</sub> +0.3	V	3
	VOL	0	-	0.8	V	-
Low speed iutput: Transmitter Disable (TX_DISABLE), MOD_DEF 1, MOD_DEF 2	VIH	2.0	-	V <sub>cc</sub> +0.3	V	4
	VIL	0	-	0.8	V	-

**Notes:**

1. Pulled up externally with a 4.7KΩ-10KΩ resistor on the host board to V<sub>CCT,R</sub>.
2. Mod\_Def1 and Mod\_Def2 must be pulled up externally with a 4.7KΩ-10KΩ resistor on the host board to V<sub>CCT,R</sub>.

## Transmitter Optical Characteristics

**Table 6. Transmitter Optical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launch Optical Power	P <sub>o</sub>	-9	-	-3	dBm	-
Center Wavelength Range	λ <sub>c</sub>	1470	1490	1510	nm	-
Extinction Ratio	EX	9	-	-	dB	-
Spectral Width (RMS) @1310nm	Δλ	-	-	1	nm	-
P <sub>out</sub> @TX-Disable Asserted	P <sub>off</sub>	-	-	-45	dBm	-
Eye Diagram	Compliant with IEEE802.3 ah (class 1 laser safety)					

## Receiver Optical Characteristics

**Table 7. Receiver Optical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Wavelength Range	-	1290	1310	1330	nm	-
Receiver Sensitivity	S	-	-	-19.5	dBm	1
		-	-	-32	dBm	2
Receiver Overload	P <sub>OL</sub>	-3	-	-	dBm	1
Optical Return Loss	ORL	12	-	-	dB	-
LOS De-Assert	LOS <sub>D</sub>	-	-	-22	dBm	1
		-	-	-33	dBm	2

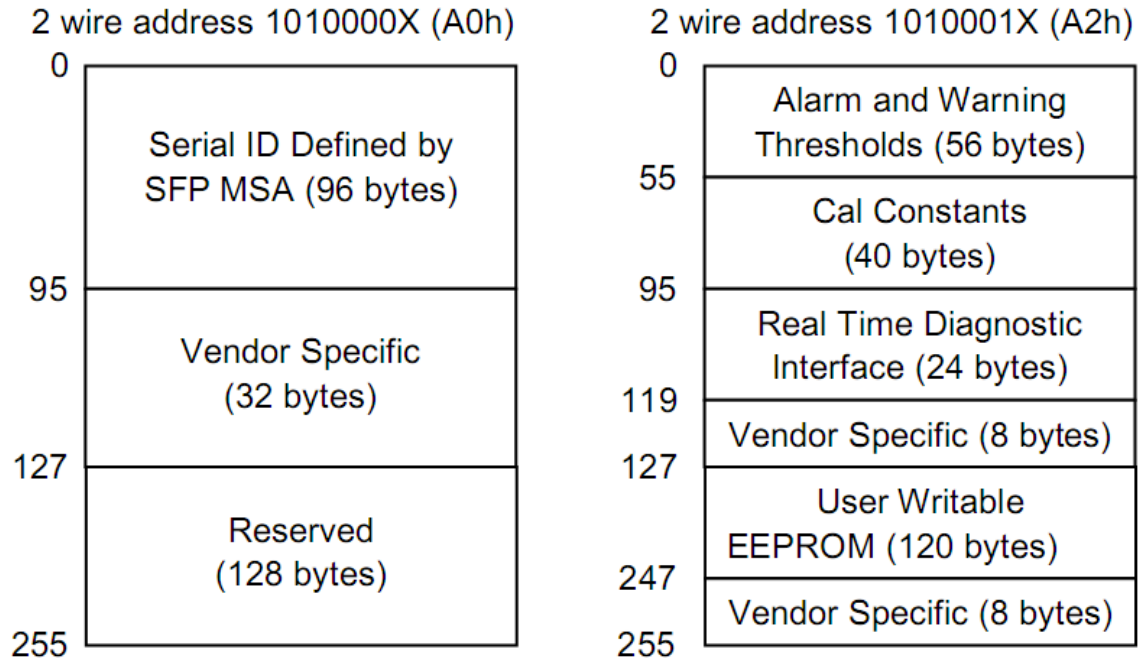
LOS Assert	LOS <sub>A</sub>	-35	-	-	dBm	1
		-45			dBm	2
LOS Hysteresis	-	0.5	2	5	dB	-

**Notes:**

1. Measured with PRBS 2<sup>7</sup>-1 test pattern, 1.25Gb/s, EX=9dB, BER<10<sup>-10</sup>.
2. Measured with PRBS 2<sup>23</sup>-1 test pattern, 125Mb/s, EX=9dB, BER<10<sup>-10</sup>.

## Digital Diagnostic Memory Map

### Channel 1:



### Channel 2:

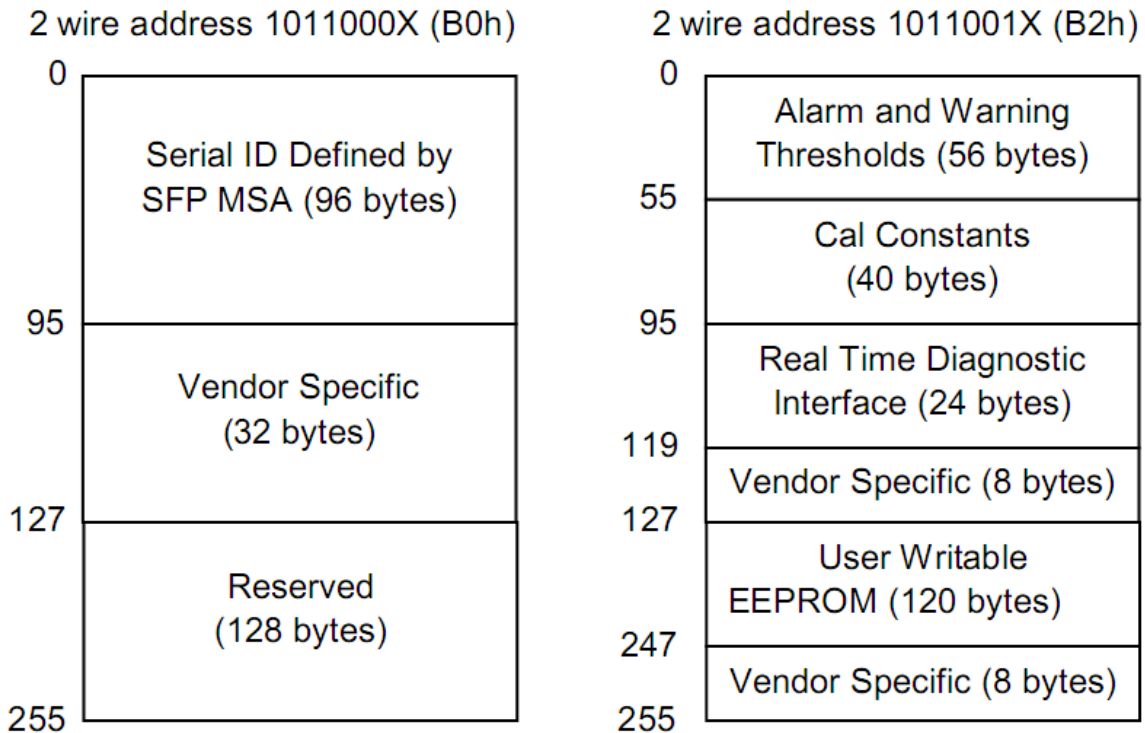


Figure 2. Memory map of 2ch Compact SFP(option 2)

## Recommended Application Interface Circuit

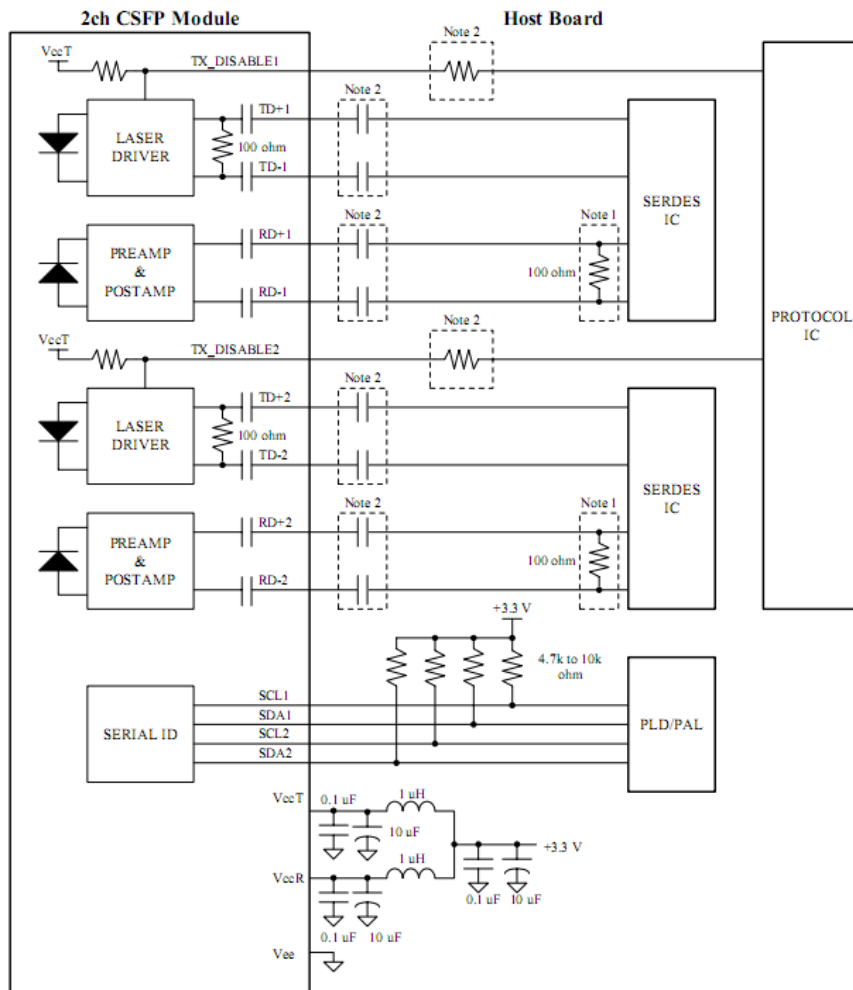


Figure 3. Recommended Application Interface Circuit

**Note1:** Recommendation 100Ω series resistance on host board.

## Mechanical specifications

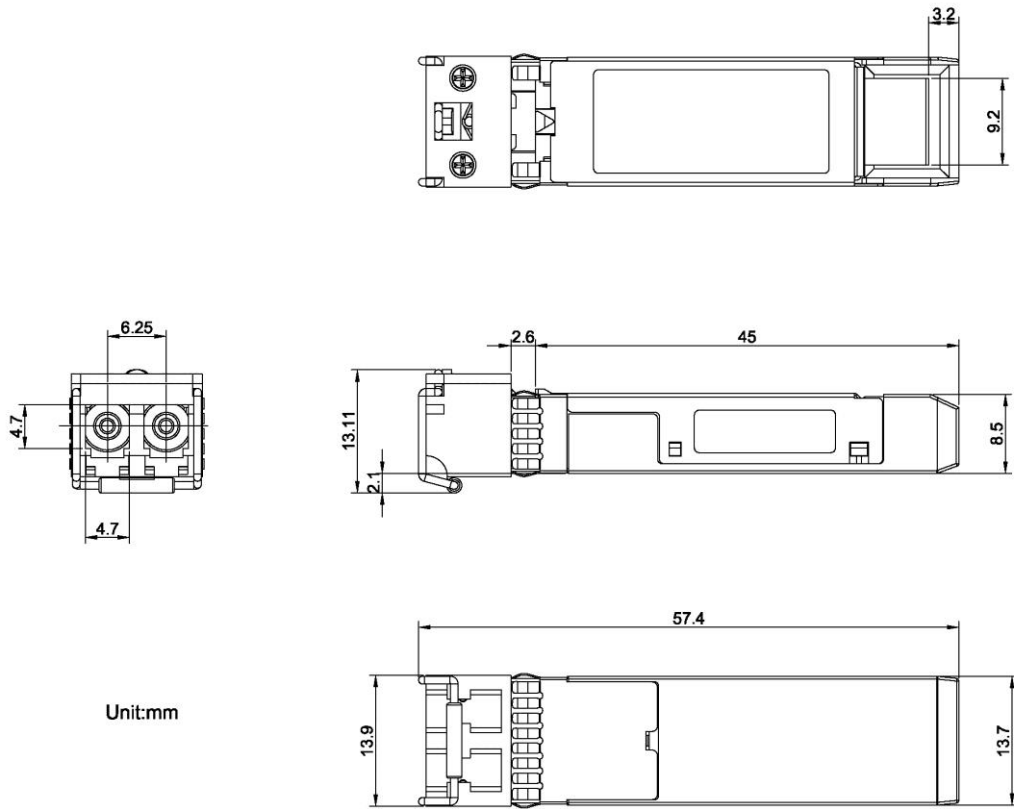


Figure 5. Outline Drawing



## **For More Information**

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