

Product Features

- Specifications according to SFF-8074i and SFF-8472, revision 9.5
- Digital Diagnostic Monitoring available
- 850nm Vertical Cavity Surface Emitting Laser (VCSEL)
- Up to 4.25Gb/s bi-directional data links
- Up to 150m on 50/125µm MMF, 70m on 62.5/125µm MMF
- Duplex LC connector compliant
- Single +3.3V DC power supply
- Hot-pluggable SFP footprint
- Class 1 laser safety certified
- Operating temperature Options
 - (Commercial) 0°C to +70°C
 - (Industrial) -40°C to +85°C
- RoHS Compliant



Applications

- 1X/2X/4X Fiber Channel

Descriptions

LX1041xDR SFP transceivers, according to Small Form Factor Pluggable Multi-Sourcing Agreement (MSA) SFF-8074i and SFF-8472, revision 9.5, are designed for data communication on multimode fiber up to 150m. They are compliant with Fiber Channel FC- PI-2 Rev.8.0.

LX1041xDR SFP transceivers offer a wide range of design options, including Digital Diagnostic Monitoring (DDM) features and two temperature options (commercial or industrial).

LX1041xDR are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX1041CDR	850nm VCSEL	-6 ~ -1dBm	PIN	< -15dBm	150m	0 ~ 70°C	Available	Compliant
LX1041IDR	850nm VCSEL	-6 ~ -1dBm	PIN	< -15dBm	150m	-40 ~ 85°C	Available	Compliant

Pin Description

Table 2. Pin Description

Pin	Name	Function/Description	Engagement order (Insertion)	Notes
1	VeeT	Transmitter Ground	1	-
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable-Module disables on high or open	3	2
4	MOD-DEF2	Module Definition 2-Two wire serial ID interface	3	3
5	MOD-DEF1	Module Definition 1-Two wire serial ID interface	3	3
6	MOD-DEF0	Module Definition 0-Grounded in module	3	3
7	Rate Select	Not Connected	3	-
8	LOS	Loss of Signal	3	4
9	VeeR	Receiver Ground	1	-
10	VeeR	Receiver Ground	1	-
11	Veer	Receiver Ground	1	-
12	RD-	Inverse Received Data out	3	5
13	RD+	Received Data out	3	5
14	VeeR	Receiver Ground	1	-
15	VccR	Receiver Power - +3.3V±5%	2	6
16	VccT	Transmitter Power - +3.3 V±5%	2	6
17	VeeT	Transmitter Ground	1	-
18	TD+	Transmitter Data In	3	7
19	TD-	Inverse Transmitter Data In	3	7
20	VeeT	Transmitter Ground	1	-

Notes:

- TX Fault is open collector/drain output which should be pulled up externally with a 4.7KΩ-10KΩ resistor on the host board to supply $V_{ccT} + 0.3V$ or $V_{ccR} + 0.3V$. When high, this output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <math>< 0.8V</math>.
- TX Disable input is used to shut down the laser output per the state table below. It is pulled up within the module with a 4.7KΩ-10KΩ resistor.

Low (0 – 0.8V):	Transmitter on
Between (0.8V and 2V):	Undefined
High (2.0 – VccT):	Transmitter Disabled
Open :	Transmitter Disabled
- Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7KΩ-10KΩ resistor on the host board to supply less than $V_{ccT} + 0.3V$ or $V_{ccR} + 0.3V$.

Mod-Def 0 is grounded by the module to indicate that the module is present.

Mod-Def 1 is clock line of two wire serial interface for optional serial ID.

Mod-Def 2 is data line of two wire serial interface for optional serial ID.
- LOS (Loss of signal) is an open collector/drain output which should be pulled up externally with a 4.7KΩ-10KΩ resistor on the host board to supply $V_{ccT} + 0.3V$ or $V_{ccR} + 0.3V$. 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 <math>< 0.8V</math>.
- RD-/+ : These are the differential receiver outputs. They are terminated with 100Ω differential at the user SERDES. AC coupled 100Ω differential lines which should be terminated with 100Ω differential at the user SERDES. The AC coupling is done inside the module and thus not

required on the host board.

6. VccR and VccT are the receiver and transmitter power supplies. They are defined as $3.3V \pm 5\%$ at the SFP connector pin. The in-rush current will typically be no more than 30mA above steady state supply current after 500ns.
7. TD-/+ : These are the differential transmitter inputs. They are AC coupled differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on host board.

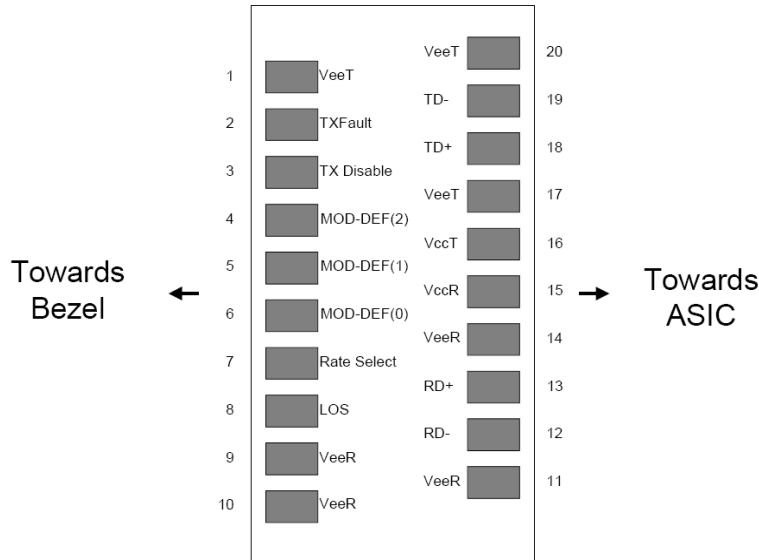


Figure 1. Diagram of Host Board Connector Block Pin Numbers and Names

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 _s	-40	85	°C
Relative Humidity	RH	5	95	%
Supply Voltage	V _{cc}	-0.5	4.0	V

Recommended Operating Conditions

Table 4. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	
Operating Case Temperature	LX1041CDR	Tc	0	25	70	°C
	LX1041IDR	Tc	-40	25	85	°C
Supply Voltage	Vcc	3.135	3.3	3.465	V	
Data Rate	-	-	1.0625/2.125/ 4.25	-	Gb/s	

Transceiver Electrical Characteristics

Table 5. Transceiver Electrical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Module Supply Current	Icc	-	-	300	mA	-
Transmitter Differential Input Voltage (TD +/-)	-	300	-	2200	mV _{P-P}	1
Receiver Differential Output Voltage (RD +/-)	-	600	-	1200	mV _{P-P}	2
Low speed output: Transmitter Fault(TX_FAULT) / Loss of Signal (LOS)	VOH	2.0	-	Vcc	V	3
	VOL	0	-	0.8	V	-
Low speed input: Transmitter Disable (TX_DISABLE), MOD_DEF 1, MOD_DEF 2	VIH	2.0	-	Vcc	V	4
	VIL	0	-	0.8	V	-

Notes:

1. Internally AC coupled and terminated to 100Ω differential load.
2. Internally AC coupled, but requires a 100Ω differential termination or internal to Serializer/Deserializer.
3. Pulled up externally with a 4.7KΩ-10KΩ resistor on the host board to V_{CCT,R}.
4. Mod_Def1 and Mod_Def2 must be pulled up externally with a 4.7KΩ-10KΩ resistor on the host board to V_{CCT,R}.

Transmitter Optical Characteristics

Table 6. Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launch Optical Power	Po	-6	-	-1	dBm	1
Center Wavelength Range	λc	830	850	860	nm	-
Extinction Ratio	EX	3.5	-	-	dB	-
Spectral Width(RMS)	Δλ	-	-	0.85	nm	-
Total Jitter	TJ	-	-	0.44	UI	-
Optical Rise/Fall Time	T _{rise} /T _{fall}	-	-	90	ps	-
Pout @TX-Disable Asserted	P _{off}	-	-	-30	dBm	-
Eye Diagram				FC- PI-2 Rev.8.0. compatible		

Receiver Optical Characteristics

Table 7. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Receiver Sensitivity@4.25G	S	-	-	-15	dBm	1
Receiver Overload	P _{OL}	-1	-	-	dBm	1
Optical Return Loss	ORL	12	-	-	dB	-
LOS De-Assert	LOS _D	-	-	-16	dBm	-
LOS Assert	LOS _A	-35	-	-	dBm	-
LOS Hysteresis	-	0.5	-	5	dB	-

Notes:

1. 50/125µm fiber with NA = 0.2, 62.5/125µm fiber with NA = 0.275.

Digital Diagnostic Memory Map

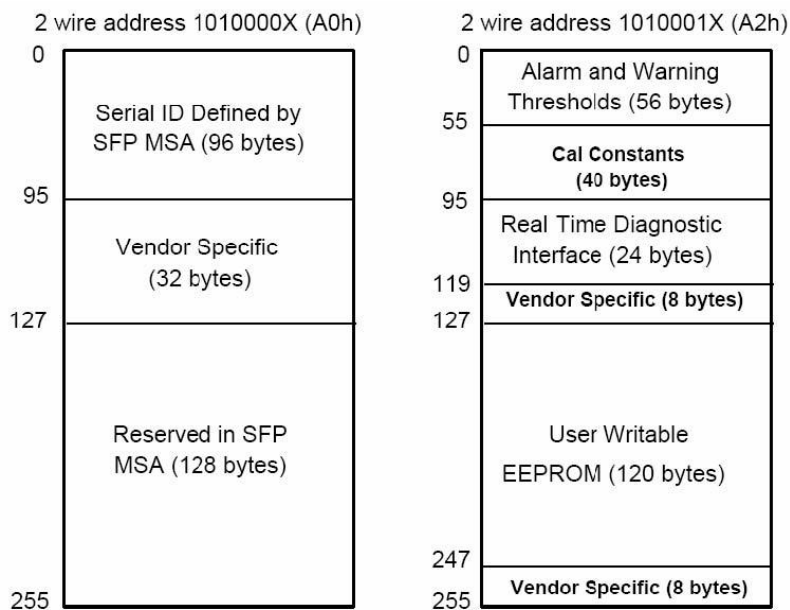


Figure 2. Digital Diagnostic Memory Map Specific Data Field Descriptions

Diagnostic Monitor Specifications

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 2. 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 8.

Table 8. Diagnostic Monitor Specifications

Parameter	Range	Accuracy	Calibration
Temperature	LX1041CDR	-15 to +80°C	±3°C
	LX1041HDR	-45 to +95°C	±3°C
Voltage	3.0 to 3.6V	±3%	Internal
Bias Current	0 to 15mA	±10%	Internal

TX Power	-7 to 0dBm	±3dB	Internal
RX Power	-16 to +1dBm	±3dB	Internal

Required Host Board Components

The MSA power supply noise rejection filter is required on the host PCB to meet data sheet performance. The MSA filter incorporates an inductor which should be rated 400mA DC and 1Ω serial resistance or better. It should not be replaced with a ferrite. The required filter is illustrated in Figure 3.

The MSA also specifies that 4.7KΩ to 10KΩ pull-up resistors for TX_FAULT, LOS, and MOD_DEF0,1,2 are required on the host PCB. Figure is the suggested transceiver/host interface.

Figure 3 shows the recommended host board power supply circuit.

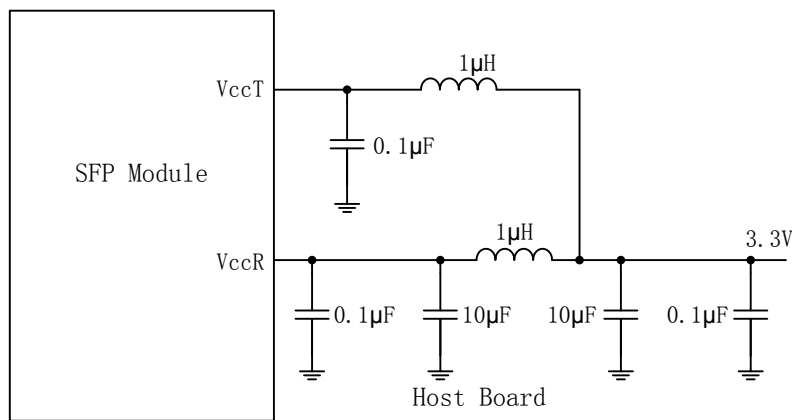


Figure 3. Recommended Host Board Power Supply Circuit

Recommended Application Interface Circuit

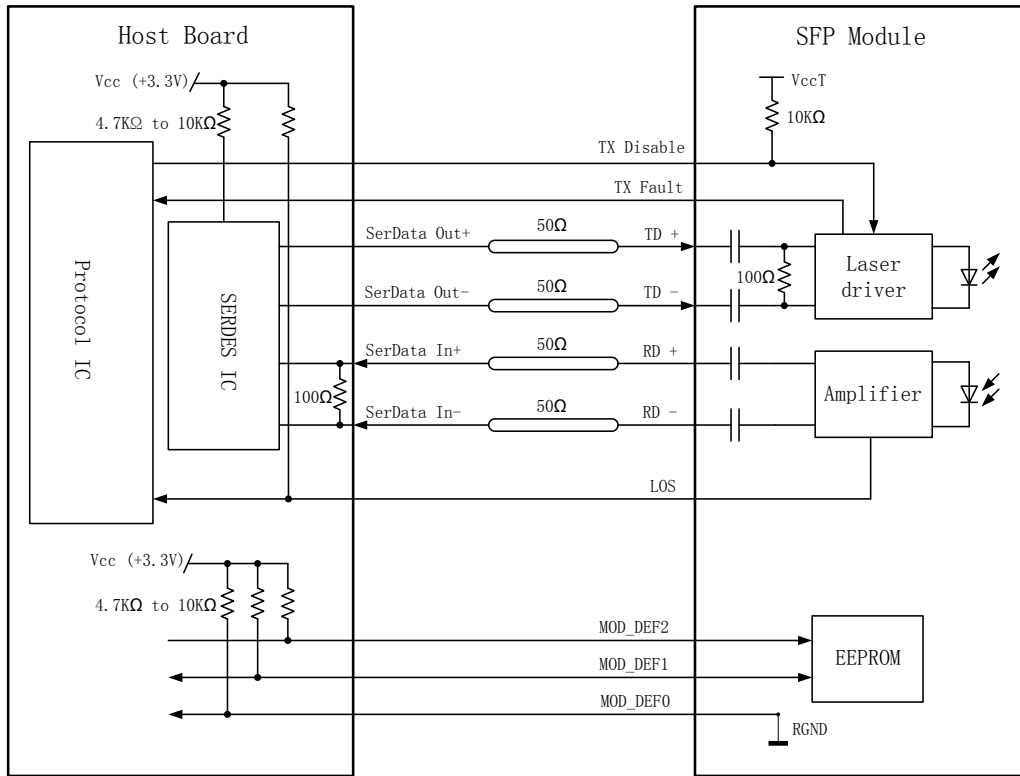


Figure 4. Recommended Application Interface Circuit

Mechanical specifications

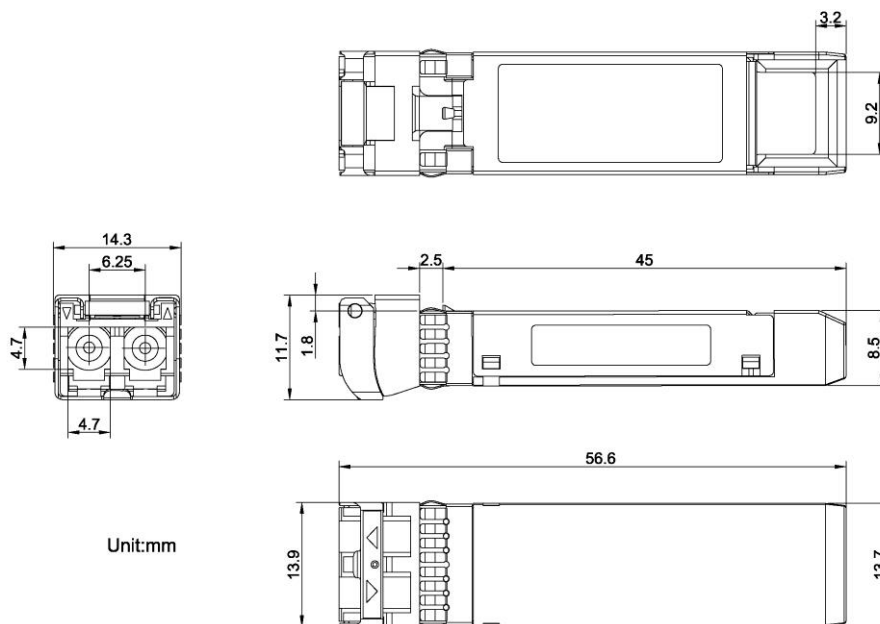


Figure 5. Outline Drawing

PCB layout recommendation

- Notes:
1. Datum and basic dimensions established by customer
 2. Pads and vias are chassis ground, 11 places
 3. Thru holes, plating optional

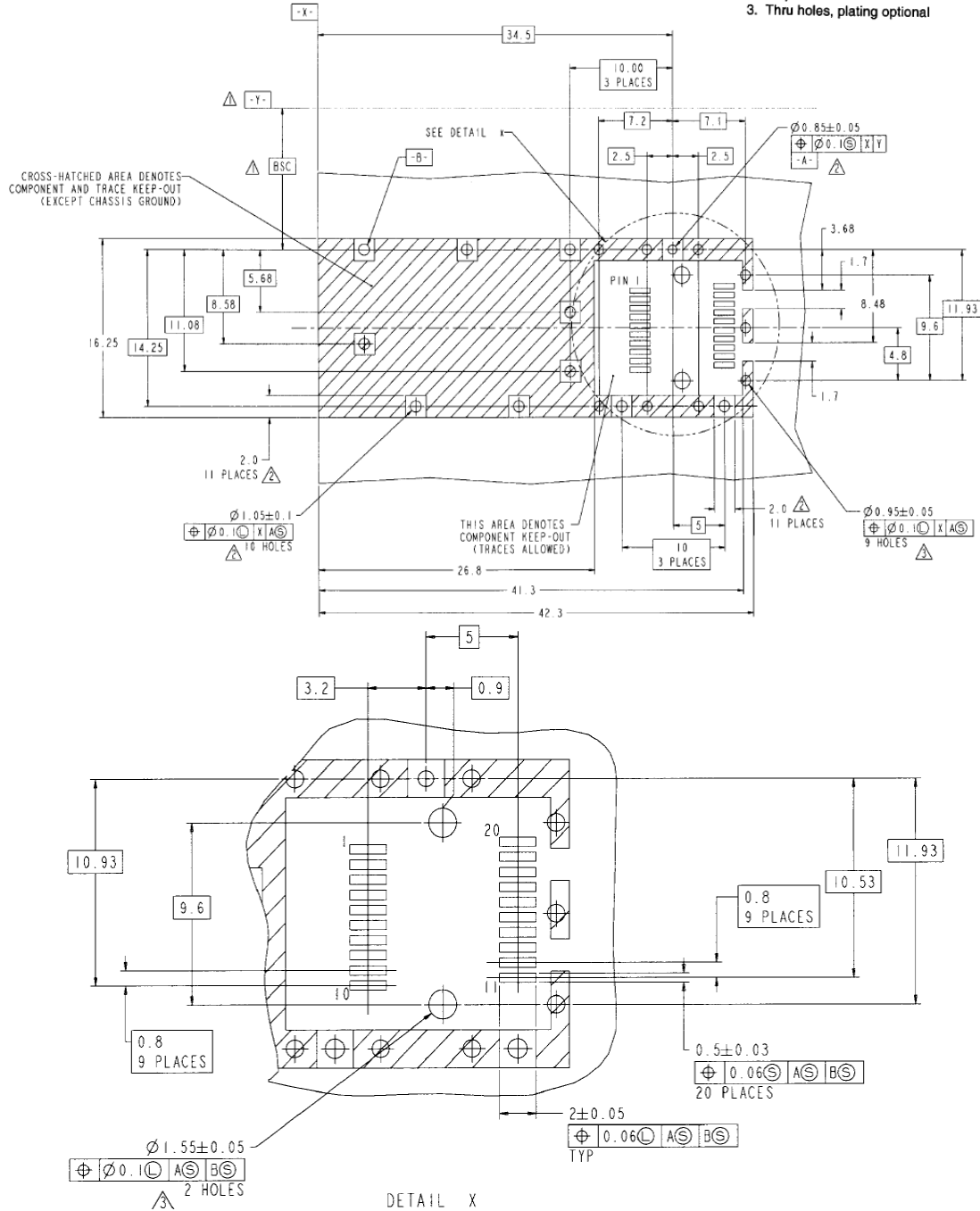


Figure 6. PCB layout recommendation



LX1041xDR
4.25Gb/s Multi-Mode SFP Transceiver
1.0625/2.125/4.25Gb/s Fiber Channel

For More Information

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