

LXP-H31-40D

SFP+ 10Gb/s 1310nm Single-mode 40km DDM

PRODUCT FEATURES

- Up to 11.3Gbps Data Links
- 1310nm DFB laser transmitter and PIN/TIA receiver
- Up to 40km on 9/125µm SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Support Digital Diagnostic Monitor interface
- Single +3.3V power supply
- Compliant with SFF-8472
- Case operating temperature
Commercial: 0°C to +70°C



APPLICATIONS

- 10GBASE-ER/EW
- 10G SONET/SDH, OTU2/2e

Compliance

- SFF-8472 SFP+ MSA.
- SFP+ SFF-8431 and SFF-8432.
- IEEE802.3ae
- RoHS



PRODUCT DESCRIPTION

LXP-H31-40D SFP+ transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the 1310nm DFB laser and the PIN/TIA. The module data link up to 40km in 9/125um Single-mode fiber.

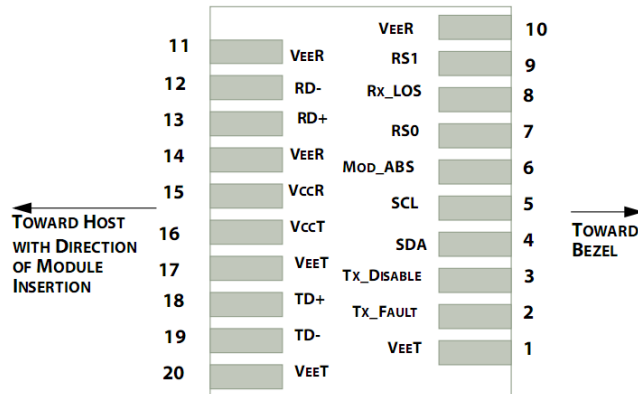
This transceiver meets the SFP+ industry standard package utilizing an integral LC-Duplex optical interface connector. An enhanced Digital Diagnostic Monitoring Interface compliant with SFF-8472 has been incorporated into the transceiver. It allows real time access to the transceiver operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage by reading a built-in memory with I²C interface.

The optical output can be disabled by a LVTTTL logic high-level input of Tx Disable, and the system also can disable the module via I²C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I²C register access.

Ordering information

Package	Product part NO.	Data Rate (Gbps)	Media	Wavelength (nm)	Transmission Distance(km)	Temperature Range (°C)	
SFP+	LXP-H31-40D	10.3125	single-mode fiber	1310	40	0~70	Commercial

I. Pin Diagram



Pin out of Connector Block on Host Board

II. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault.	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	No connection required	
8	LOS	Loss of Signal indication. Logic "0" indicates normal operation.	5
9	RS1	No connection required	
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. TX Fault is an open drain output, which should be pulled up with 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V to $V_{ccT/R}+0.3V$. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to $< 0.8V$. When sensing an improper power level in the laser driver, the SFP sets this signal high and turns off the laser. TX-FAULT can be reset with the TX-DISABLE line. The signal is in LVTTTL level.
3. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with 4.7K – 10KΩ resistor. Its states are: Low (0 – 0.8V): Transmitter on; ($>0.8, < 2.0V$): Undefined; High (2.0V to $V_{ccT/R}+0.3V$): Transmitter Disabled; Open: Transmitter Disabled. The TX-DISABLE signal is high (LVTTTL logic “1”) to turn off the laser output. The laser will turn on when TX-DISABLE is low (LVTTTL logic “0”).
4. Should be pulled up with 4.7K - 10KΩ on host board to a voltage between 2.0V to $V_{ccT/R}+0.3V$. MOD_ ABS pulls line low to indicate module is plugged in.
5. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with 4.7K – 10KΩ resistor. Pull up voltage between 2.0V to $V_{ccT/R}+0.3V$. 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 $< 0.8V$.

The RX-LOS is high (LVTTTL logic “1”) when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in LVTTTL level.

III. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Storage Temperature	T_s	-40		85	°C	
Storage Ambient Relative Humidity	H_A	0		85	%	
Power Supply Voltage	V_{cc}	-0.5		4	V	
Signal Input Voltage		-0.3		$V_{cc}+0.3$	V	
Receiver Damage Threshold		+3			dBm	
Lead Soldering Temperature/Time	TSOLD			260/10	°C/sec	Note (1)
Lead Soldering Temperature/Time	TSOLD			360/10	°C/sec	Note (2)



Note (1): Suitable for wave soldering.

Note (2): Only for soldering by iron.

IV. Recommended Operating Conditions

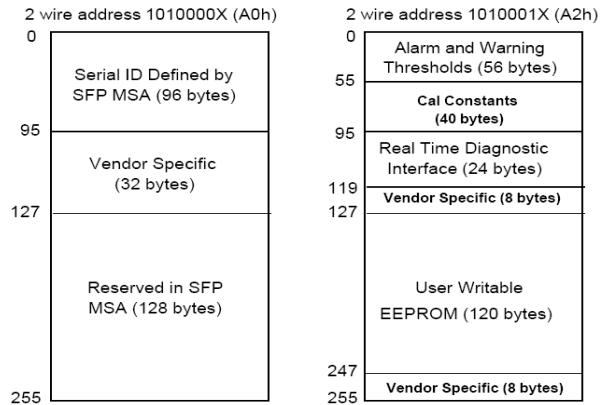
Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.	
Case Operating Temperature	T_{case}	0		70	°C	LXP-H31-40D	
Ambient Humidity	H_A	5		70	%	Non-condensing	
Data Rate			10.3125/10.3125		Gbps	TX Rate/RX Rate	
Transmission Distance				40	km		
Coupled Fiber		Single mode fiber					9/125um G.652

V. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.	
Transmitter							
Average Output Power	P_{OUT}	-3		+3	dBm		
Extinction Ratio	ER	6			dB		
Center Wavelength	λ_C	1290	1310	1330	nm	DFB Laser	
Side Mode Suppression Ratio	SMSR	30			dBm		
Spectrum Width (RMS)	σ			1	nm		
Transmitter OFF Output Power	P_{Off}			-30	dBm		
Output Eye Mask		Compatible with IEEE 802.3ae					
Receiver							
Input Optical Wavelength	λ_{IN}	1260		1600	nm	LXP-H31-40D	
Rx Sensitivity	R_{SENS}			-15.8	dBm	Note (1)	
Rx Sensitivity(OMA)	R_{SENS}			-11.3	dBm		
Input Saturation Power (Overload)	$PSAT$	-3			dBm		
Loss of Signal Assert	P_A	-45			dBm		
Loss of Signal De-assert	P_D			-16.8	dBm		
LOS Hysteresis	$P_D - P_A$	0.5		6	dB		

Note (1): With worst-case extinction ratio. Measured with a PRBS 2³¹-1 test pattern, @10.3125Gb/s, BER<10⁻¹².

VI. Digital Diagnostic Memory Map



VII. Digital Diagnostic Monitoring Information

Parameter	Unit	Accuracy
Case Temperature	°C	±3
Supply Voltage	V	±3%
Tx Bias Current	mA	±10%
Tx Optical Power	dB	±3
Rx Optical Power	dB	±3

VIII. Electrical Interface Characteristics

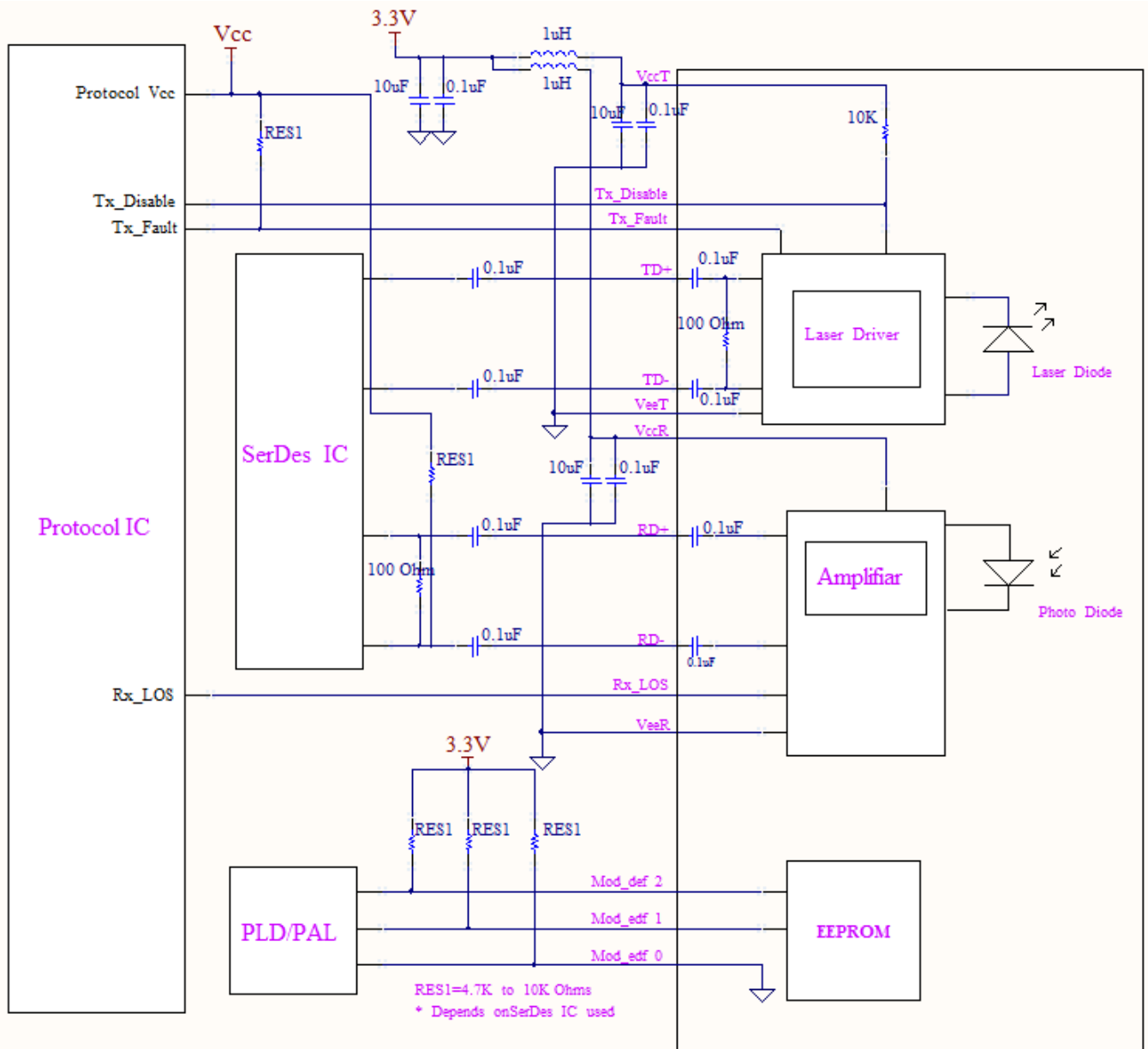
Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Supply Voltage	V _{CC}	3.13	3.30	3.47	V	
Supply Current	I _{CC}			460	mA	
Transmitter						
Input different impedance	R _{in}	90	100	110	Ω	Note (1)
Single ended data input swing	V _{in,pp}	120		850	mV	
Transmitter Disable Voltage	V _{DIS}	2		V _{CC}	V	
Transmitter Enable Voltage	V _{EN}	0		0.8	V	
Receiver						
Output different impedance	R _{out}	90	100	110	Ω	Note (1)
Single ended data output swing	V _{out,pp}	300		850	mV	Note (2)
LOS Asserted	V _{LOSA}	2		V _{CCHOST}	V	Note (3)
LOS De-asserted	V _{LOSD}	0		0.8	V	Note (3)

Note (1): Connected directly to TX data input pins. AC coupled thereafter.

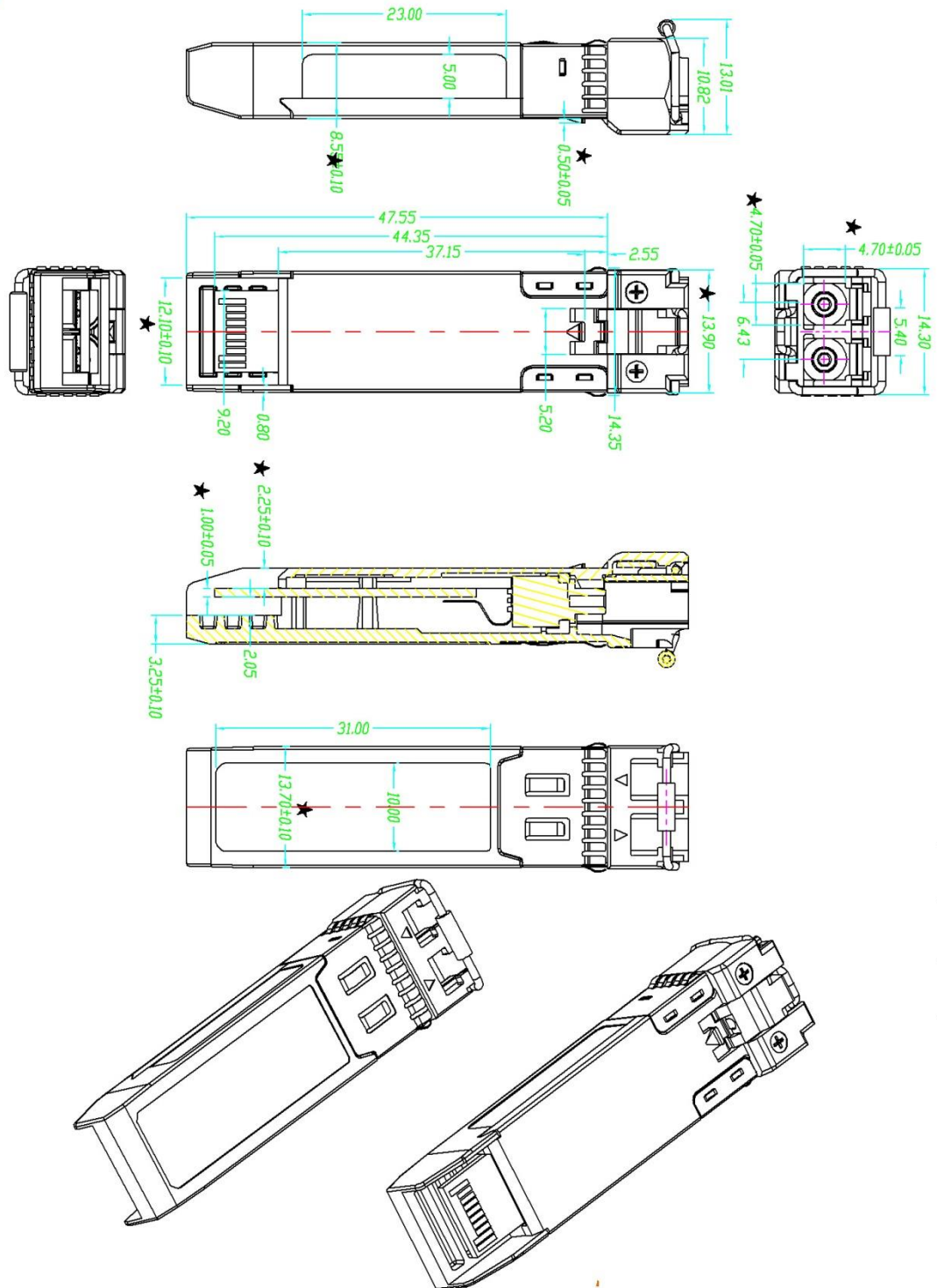
Note (2): Into 100Ω differential termination.

Note(3): Loss Of Signal is LVTTTL. Logic “0” indicates normal operation; logic “1” indicates no signal detected.

IX. Recommend Circuit Schematic



X. Mechanical Specifications (Unit: mm)



LXP-H31-40D

XI. Regulatory Compliance

Feature	Reference	Performance
EMC	EN61000-3	Compatible with standards
Electrostatic Discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1 ,EC/EN 60825-2	Class 1 laser product
Component Recognition	IEC/EN 60950 ,L 60950	Compatible with standards
ROHS	2002/95/EC	Compatible with standards

Revision History

Version No.	Date	Description
1.0	June 24, 2019	Preliminary datasheet