

XP-LXXB1-40D(A)

25Gb/s LAN-WDM SFP28 40km Transceiver

PRODUCT FEATURES

- Supports 24.3Gb/s to 26.5Gb/s bit rates
- Up to 40km transmission on SMF
- EML Laser and APD receiver
- Metal enclosure, for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Specifications compliant with SFF 8472
- Compliant with SFP+ MSA with LC connector
- Single 3.3V power supply
- Power dissipation < 1.8 W
- Case operating temperature range: Commercial: 0°C to +70°C
Industrial: -40°C to +85°C

APPLICATIONS

- 25G Ethernet
- CPRI 10

STANDARD

- Compliant to SFF-8431
- Compliant to SFF 8472
- Compliant to IEEE 802.3 CC
- RoHS Compliant.

I Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|--|--------|------|------|------|------|------|
| Storage Temperature | Ts | -40 | - | 85 | °C | |
| Relative Humidity | RH | 5 | - | 95 | % | |
| Power Supply Voltage | VCC | -0.3 | - | 4 | V | |
| Receive Input Optical Power (Damage threshold) | Pdmg | | | 3.5 | dBm | |

II Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|----------------------------|-------------------|------|-------|------|------|-------------|
| Case Operating Temperature | Tcase | 0 | | 70 | °C | commercial |
| | | -40 | | 85 | °C | Industrial |
| Power Supply Voltage | VCC | 3.14 | 3.3 | 3.47 | V | |
| Power Supply Current | ICC | | | 500 | mA | commercial |
| | | | | 550 | mA | Industrial |
| Data Rate | BR | 24.3 | 25.78 | 26.5 | Gbps | |
| Transmission Distance | TD | | - | 40 | km | |
| Coupled fiber | Single mode fiber | | | | | 9/125um SMF |

III Optical Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit | NOTE |
|-----------------------------|-----------|---------|---------|---------|------|-----------------|
| Transmitter | | | | | | |
| Output Opt. Power | POUT | -1.6 | | 6 | dBm | 1 |
| Optical Wavelength (2) | λ | 1285.65 | 1286.66 | 1287.69 | nm | XP-L86B1-40D(A) |
| | | 1290.09 | 1291.10 | 1292.13 | nm | XP-L91B1-40D(A) |
| | | 1294.53 | 1295.56 | 1296.59 | nm | XP-L95B1-40D(A) |
| | | 1299.02 | 1300.05 | 1301.09 | nm | XP-L00B1-40D(A) |
| | | 1303.54 | 1304.58 | 1305.63 | nm | XP-L04B1-40D(A) |
| | | 1308.09 | 1309.14 | 1310.19 | nm | XP-L09B1-40D(A) |
| Spectral Width (-20dB) | σ | | | 1 | nm | |
| Side-mode suppression ratio | SMSR | 30 | | | dB | |
| Optical Extinction Ratio | ER | 4 | | | dB | |
| Power off Tx disable | POFF | | | -30 | dBm | 1 |
| Transmitter reflection | | | | -12 | dB | |

| | | | | | | |
|-----------------------------------|-------------------------------|------|------|-------|-------|---|
| RIN (OMA) | | | | -130 | dB/Hz | |
| Transmitter eye mask | {0.31,0.4,0.45,0.34,0.38,0.4} | | | | | |
| Receiver | | | | | | |
| Rx Sensitivity | RSENS | | | -19.0 | dBm | 3 |
| Input Saturation Power (Overload) | Psat | -5 | | | dBm | |
| Receiver reflection | | | | -26 | dBm | |
| Wavelength Range | λ_c | 1260 | 1310 | 1355 | nm | |
| LOS De -Assert | LOSD | | | -20 | dBm | |
| LOS Assert | LOSA | -38 | | | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |

Notes:

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. “XX” is:86,91,95,00,04,09, from wavelength 1286.66, 1291.10, 1295.56, 1300.05, 1304.58, 1309.14;
3. Measured with a PRBS $2^{31}-1$ test pattern, @25.78Gb/s, BER@ $5*10^{-5}$.

IV. Electrical Characteristics

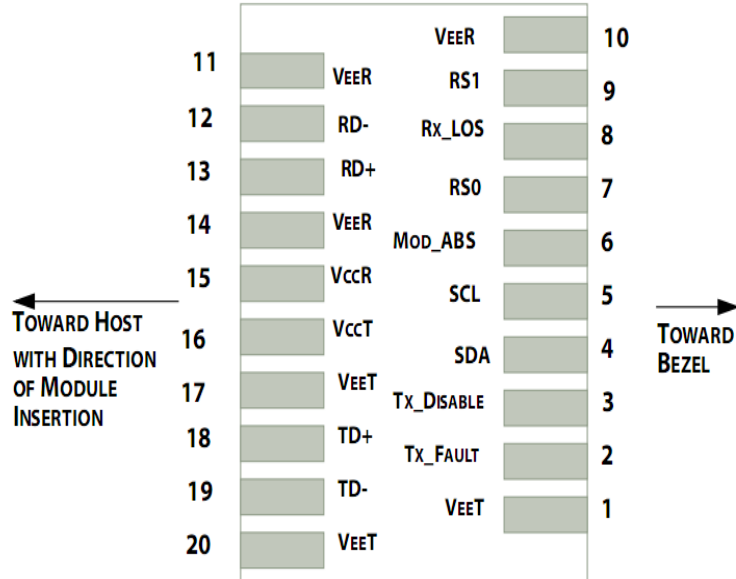
| Parameter | Symbol | Min | Typ | Max | Unit | NOTE |
|--------------------------------|------------|------|-----|---------|----------|------------|
| Supply Voltage | Vcc | 3.14 | 3.3 | 3.46 | V | |
| Supply Current | Icc | | | 500 | mA | commercial |
| | | | | 550 | mA | Industrial |
| Transmitter | | | | | | |
| Input differential impedance | Rin | | 100 | | Ω | 1 |
| Differential data input swing | Vin,pp | 300 | | 800 | mV | |
| Transmit Disable Voltage | VD | 2.0 | | Vcc+0.3 | V | |
| Transmit Enable Voltage | VEN | -0.3 | | 0.8 | V | 2 |
| Receiver | | | | | | |
| Differential data output swing | Vout,pp | 500 | | 900 | mV | 3 |
| LOS Fault | VLOS fault | 2.4 | | Vcc+0.3 | V | 4 |
| LOS Normal | VLOS norm | -0.3 | | 0.4 | V | 4 |

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Into 100 ohms differential termination.

4. Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

V. Pin Assignment



Pin out of Connector Block on Host Board

| Pin | Symbol | Name/Description | NOTE |
|-----|-------------|--|------|
| 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 | Rate Select 0 | 5 |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation. | 6 |
| 9 | RS1 | No connection required | 1 |
| 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. T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host

board if intended for use. Pull up voltage should be between 2.0V to $V_{cc} + 0.3V$. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm threshold. A low output indicates normal operation. In the low state, the output is pulled to $<0.8V$.

3. Laser output disabled on $T_{DIS} > 2.0V$ or open, enabled on $T_{DIS} < 0.8V$.
4. Should be pulled up with 4.7k Ω - 10k Ω host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It should be pulled up with 4.7k Ω – 10k Ω on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

VI. Digital Diagnostic Functions

XGIGA XP-LXXB1-40D(A) transceivers support the 2-wire serial communication protocol as defined in the SFP+ MSA.

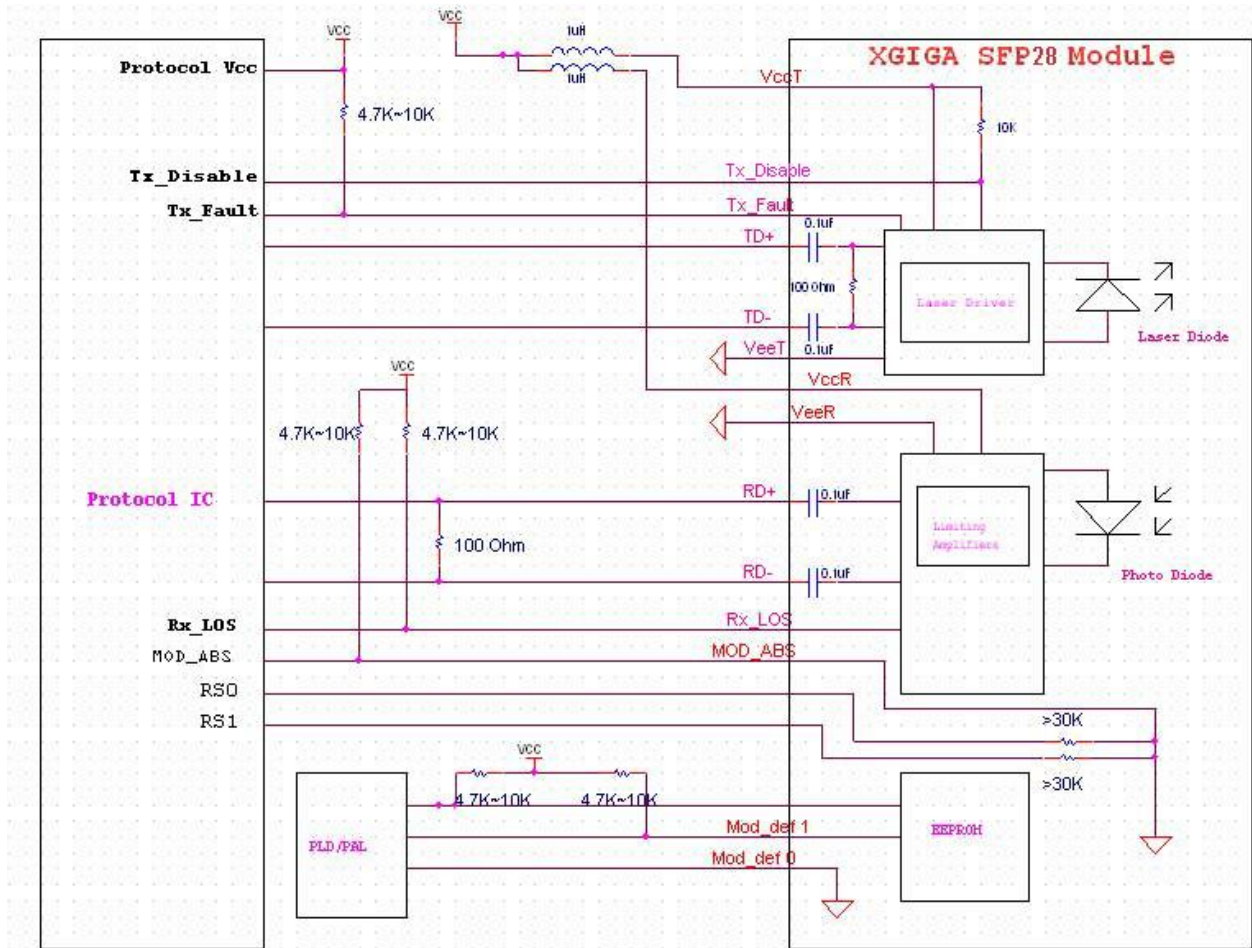
The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, XGIGA SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

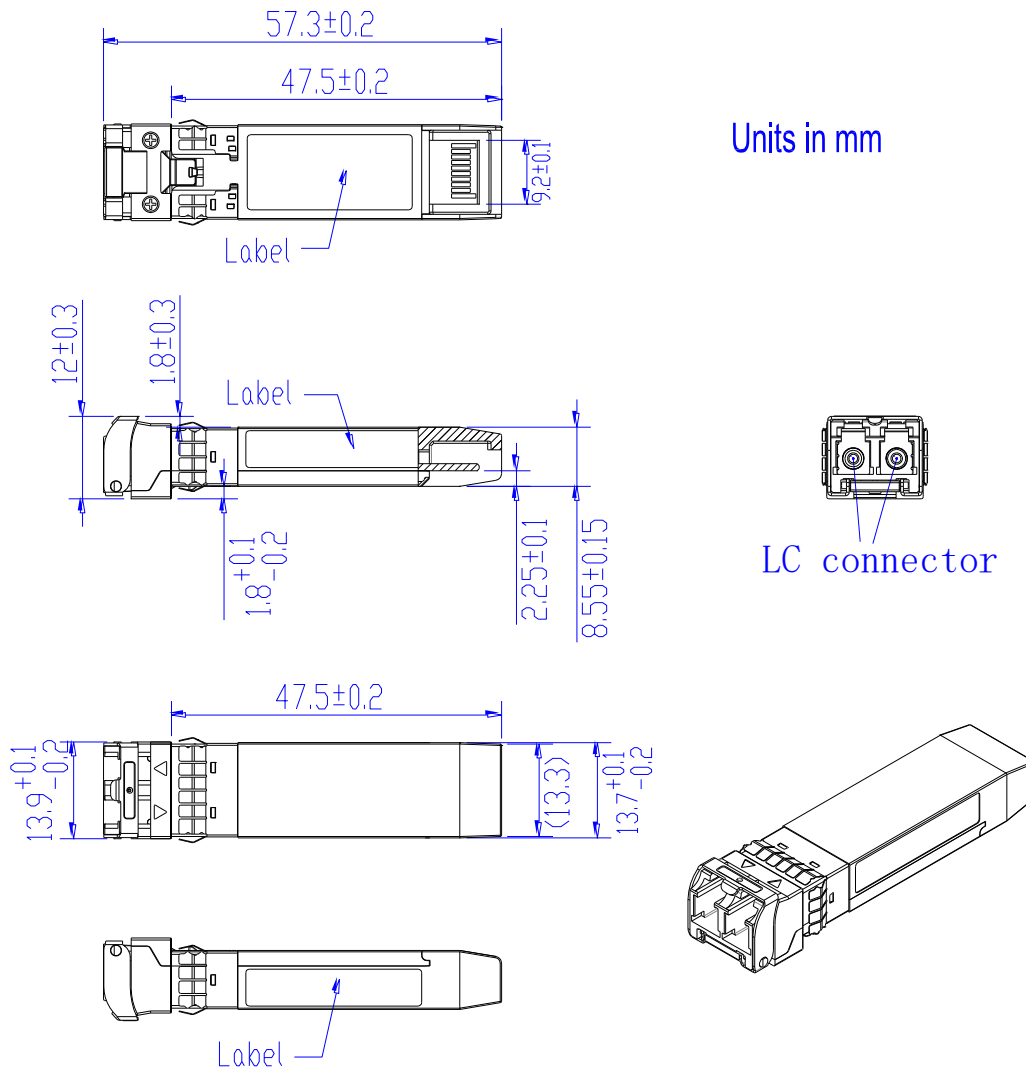
The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

VII. Host - Transceiver Interface Block Diagram



VIII. Outline Dimensions



Appendix A. Document Revision

| Version No. | Date | Description |
|-------------|------------|-----------------------|
| 1.0 | 2018-12-11 | Preliminary datasheet |