

Product Features

- Compliant with IEEE Std 802.3-2005
10G Ethernet 10GBase-ZR/ZW
- Electrical interface specifications per SFF-8431
- Management interface specifications per SFF-8431 and SFF-8472
- SFP+ MSA package with duplex LC connector
- Cooled EML Laser
- Up to 10.3Gb/s bi-directional data links
- Single +3.3V power supply
- Class 1 laser safety certified
- Commercial operating temperature:-40°C to +85°C
- Up to 80km on 9/125µm SMF
- RoHS Compliant



Applications

- 10G Ethernet 10GBASE-ZR/ZW
- 80km 10G CWDM Network

Descriptions

LX435xIDR SFP+ transceivers, according to Enhanced 8.5 and 10 Gigabit Small Form Factor Pluggable “SFP+” Multi-Sourcing Agreement (MSA) SFF-8431 and SFF-8472, revision 10.4, are designed for CWDM 10G ethernet data communications up to 80km over single mode fiber. They are compliant with IEEE Std 802.3-2005 10Gb Ethernet 10GBase-ZR/ZW.

LX435xIDR are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

| Part Number | Transmitter | Output Power | Receiver | Sensitivity | Reach | Temp | DDM | RoHS |
|-------------|-------------|--------------|----------|-------------|-------|-------------|-----------|-----------|
| LX4351IDR | 1471nm EML | 0 ~ +4dBm | APD | < -24dBm | 80km | -40 ~ 85 °C | Available | Compliant |
| LX4352IDR | 1491nm EML | 0 ~ +4dBm | APD | < -24dBm | 80km | -40 ~ 85 °C | Available | Compliant |
| LX4353IDR | 1511nm EML | 0 ~ +4dBm | APD | < -24dBm | 80km | -40 ~ 85 °C | Available | Compliant |
| LX4354IDR | 1531nm EML | 0 ~ +4dBm | APD | < -24dBm | 80km | -40 ~ 85 °C | Available | Compliant |
| LX4355IDR | 1551nm EML | 0 ~ +4dBm | APD | < -24dBm | 80km | -40 ~ 85 °C | Available | Compliant |
| LX4356IDR | 1571nm EML | 0 ~ +4dBm | APD | < -24dBm | 80km | -40 ~ 85 °C | Available | Compliant |
| LX4357IDR | 1591nm EML | 0 ~ +4dBm | APD | < -24dBm | 70km | -40 ~ 85 °C | Available | Compliant |
| LX4358IDR | 1611nm EML | 0 ~ +4dBm | APD | < -24dBm | 70km | -40 ~ 85 °C | Available | Compliant |

Pin Description

Table 2. Pin Description

| Pin | Name | Function/Description | Notes |
|-----|------------|--|-------|
| 1 | VeeT | Transmitter Ground | 1 |
| 2 | TX_Fault | Transmitter Fault (LVTTTL-O) - High indicates a fault condition | 2 |
| 3 | TX_Disable | Transmitter Disable (LVTTTL-I) – High or open disables the transmitter | 3 |
| 4 | SDA | Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2) | 4 |
| 5 | SCL | Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1) | 4 |
| 6 | MOD_ABS | Module Absent (Output), connected to VeeT or VeeR in the module | 5 |
| 7 | RS0 | Rate Select 0 – Not used, Presents high input impedance | - |
| 8 | RX_LOS | Receiver Loss of Signal (LVTTTL-O) | 2 |
| 9 | RS1 | Rate Select 1 – Not used, Presents high input impedance | - |
| 10 | VeeR | Receiver Ground | 1 |
| 11 | VeeR | Receiver Ground | 1 |
| 12 | RD- | Inverse Received Data out (CML-O) | - |
| 13 | RD+ | Received Data out (CML-O) | - |
| 14 | VeeR | Receiver Ground | - |
| 15 | VccR | Receiver Power - +3.3V | - |
| 16 | VccT | Transmitter Power - +3.3 V | - |
| 17 | VeeT | Transmitter Ground | 1 |
| 18 | TD+ | Transmitter Data In (CML-I) | - |
| 19 | TD- | Inverse Transmitter Data In (CML-I) | - |
| 20 | VeeT | Transmitter Ground | 1 |

Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7K Ω to 10K Ω pull-up resistor to VccHost.
3. This input is internally biased high with a 4.7K Ω to 10K Ω pull-up resistor to VccT.
4. Two-Wire Serial interface clock and data lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that on the host board requires a 4.7K Ω to 10K Ω pull-up resistor to VccHost.

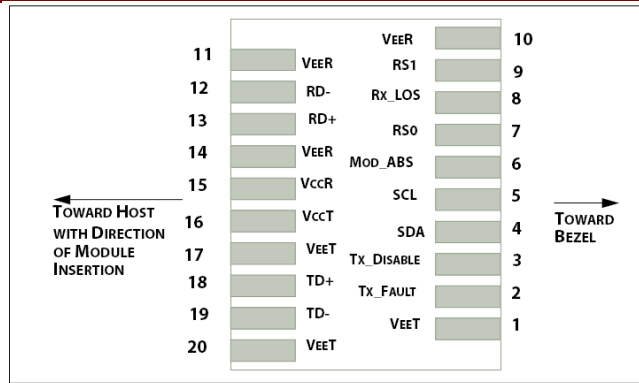


Figure 1. Host PCB SFP+ pad assignment top view

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 | T_C | -40 | 25 | 85 | °C |
| Supply Voltage | V_{CC} | 3.135 | 3.3 | 3.465 | V |
| Data Rate | - | - | 10.3125 | - | Gb/s |

Transceiver Electrical Characteristics

Table 5. Transceiver Electrical Characteristics

| Parameter | Symbol | Minimum | Typical | Maximum | Unit | Notes |
|------------------------------|----------|---------|---------|---------|----------|-------|
| Module Supply Current | I_{CC} | - | - | 550 | mA | - |
| Power Dissipation | P_D | - | - | 1800 | mW | - |
| Transmitter | | | | | | |
| Input Differential Impedance | Z_{IN} | - | 100 | - | Ω | - |

| | | | | | | | |
|----------------------------------|----------------------|---------------|-----|-----|--------------|-------------------|---|
| Differential Data Input Swing | | $V_{IN,P-P}$ | 180 | - | 700 | mV _{P-P} | - |
| TX_FAULT | Transmitter Fault | V_{OH} | 2.0 | - | V_{CCHOST} | V | - |
| | Normal Operation | V_{OL} | 0 | - | 0.8 | V | - |
| TX_DISABLE | Transmitter Disable | V_{IH} | 2.0 | - | V_{CCHOST} | V | - |
| | Transmitter Enable | V_{IL} | 0 | - | 0.8 | V | - |
| Receiver | | | | | | | |
| Output Differential Impedance | | Z_O | - | 100 | - | Ω | - |
| Differential Data Output Swing | | $V_{OUT,P-P}$ | 300 | - | 850 | mV _{P-P} | 1 |
| Data Output Rise Time, Fall Time | | t_r, t_f | 28 | - | - | ps | 2 |
| RX_LOS | Loss of signal (LOS) | V_{OH} | 2.0 | - | V_{CCHOST} | V | 3 |
| | Normal Operation | V_{OL} | 0 | - | 0.8 | V | 3 |

Notes:

- Internally AC coupled, but requires a external 100 Ω differential load termination.
- 20–80%.
- LOS is an open collector output. Should be pulled up with 4.7k Ω on the host board.

Transmitter Optical Characteristics

Table 6. Transmitter Optical Characteristics

| Parameter | Symbol | Minimum | Typical | Maximum | Unit | Notes |
|------------------------------------|---|---------|---------|---------|-------|-------|
| Launch Optical Power | P_o | 0 | - | +4.0 | dBm | 1 |
| Center Wavelength Range | λ_c | 1464.5 | - | 1617.5 | nm | - |
| Center Wavelength Tolerance | $\Delta\lambda_c$ | -6.5 | - | 6.5 | nm | - |
| Extinction Ratio | EX | 9 | - | - | dB | 2 |
| Side Mode Suppression Ratio | SMSR | 30 | - | - | dB | - |
| Transmitter and Dispersion Penalty | TDP | - | - | 3.0 | dB | - |
| Relative Intensity Noise | RIN | - | - | -128 | dB/Hz | - |
| Optical Return Loss Tolerance | ORLT | - | - | 21 | dB | - |
| Pout @TX-Disable Asserted | P_{off} | - | - | -30 | dBm | 1 |
| Eye Diagram | IEEE Std 802.3-2005 10Gb Ethernet 10GBASE-ZR compatible | | | | | |

Notes:

- The optical power is launched into 9/125 μ m SMF.
- Measured with a PRBS 2³¹-1 test pattern @10.3125Gbps.

Receiver Optical Characteristics

Table 7. Receiver Optical Characteristics

| Parameter | Symbol | Minimum | Typical | Maximum | Unit | Notes |
|------------------------------------|-------------|---------|---------|---------|------|-------|
| Center Wavelength | λ_c | 1464.5 | - | 1617.5 | nm | - |
| Receiver Sensitivity (P_{avg}) | S | - | - | -24 | dBm | 1 |
| Receiver Overload (P_{avg}) | P_{OL} | -7.0 | - | - | dBm | 1 |

| | | | | | | |
|---------------------|------------------|-----|---|-----|-----|---|
| Optical Return Loss | ORL | 26 | - | - | dB | - |
| LOS De-Assert | LOS _D | - | - | -25 | dBm | - |
| LOS Assert | LOS _A | -35 | - | - | dBm | - |
| LOS Hysteresis | - | 0.5 | - | - | dB | - |

Notes:

1. Measured with PRBS 2³¹-1 test pattern, 10.3125Gb/s, BER<10⁻¹².
2. Comply with IEEE 802.3-2005.

Recommended Host Board Power Supply Filter Network

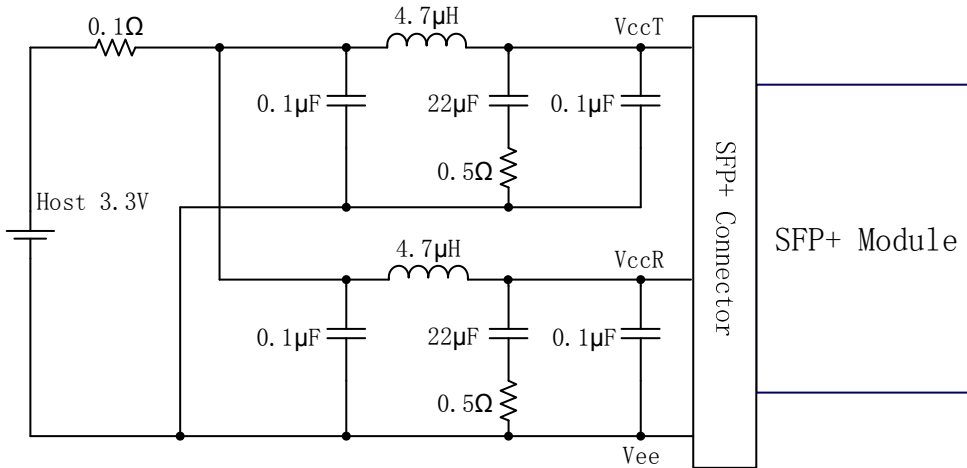


Figure 2. Recommended Host Board Power Supply Filter Network

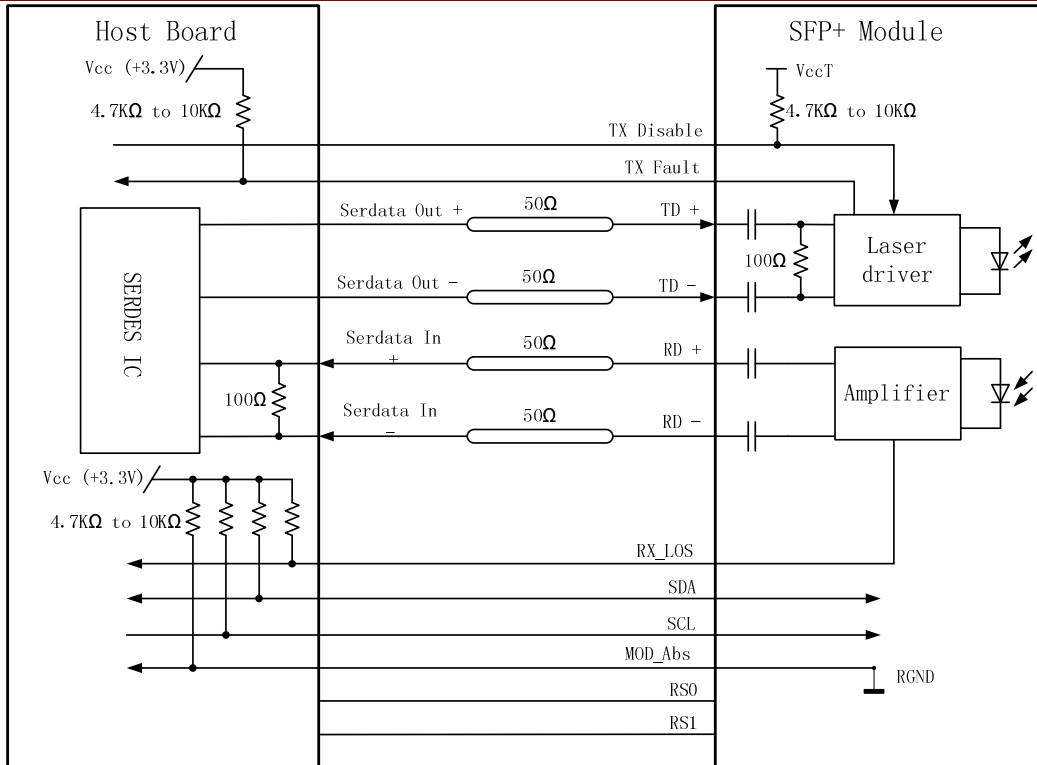


Figure 3. Recommended Application Interface Block Diagram

Mechanical specifications

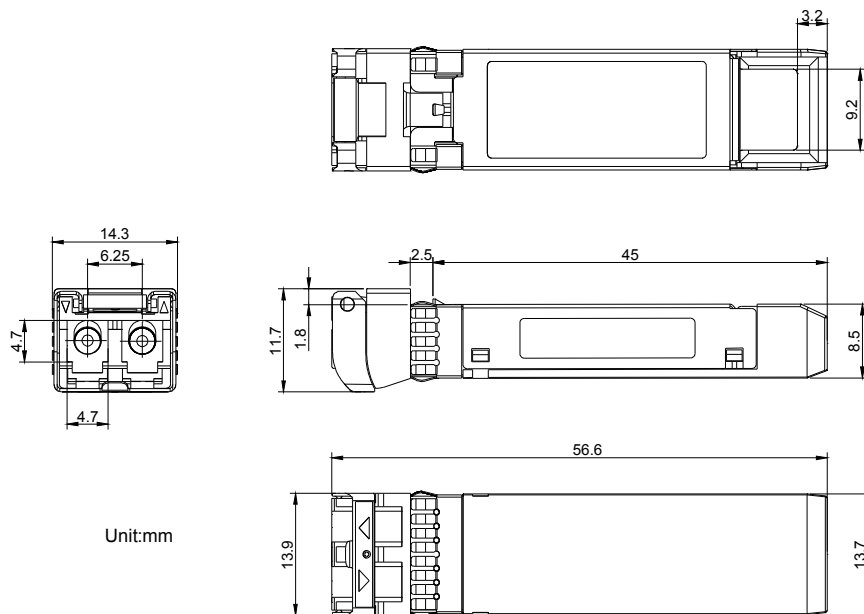


Figure 4. Outline Drawing

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

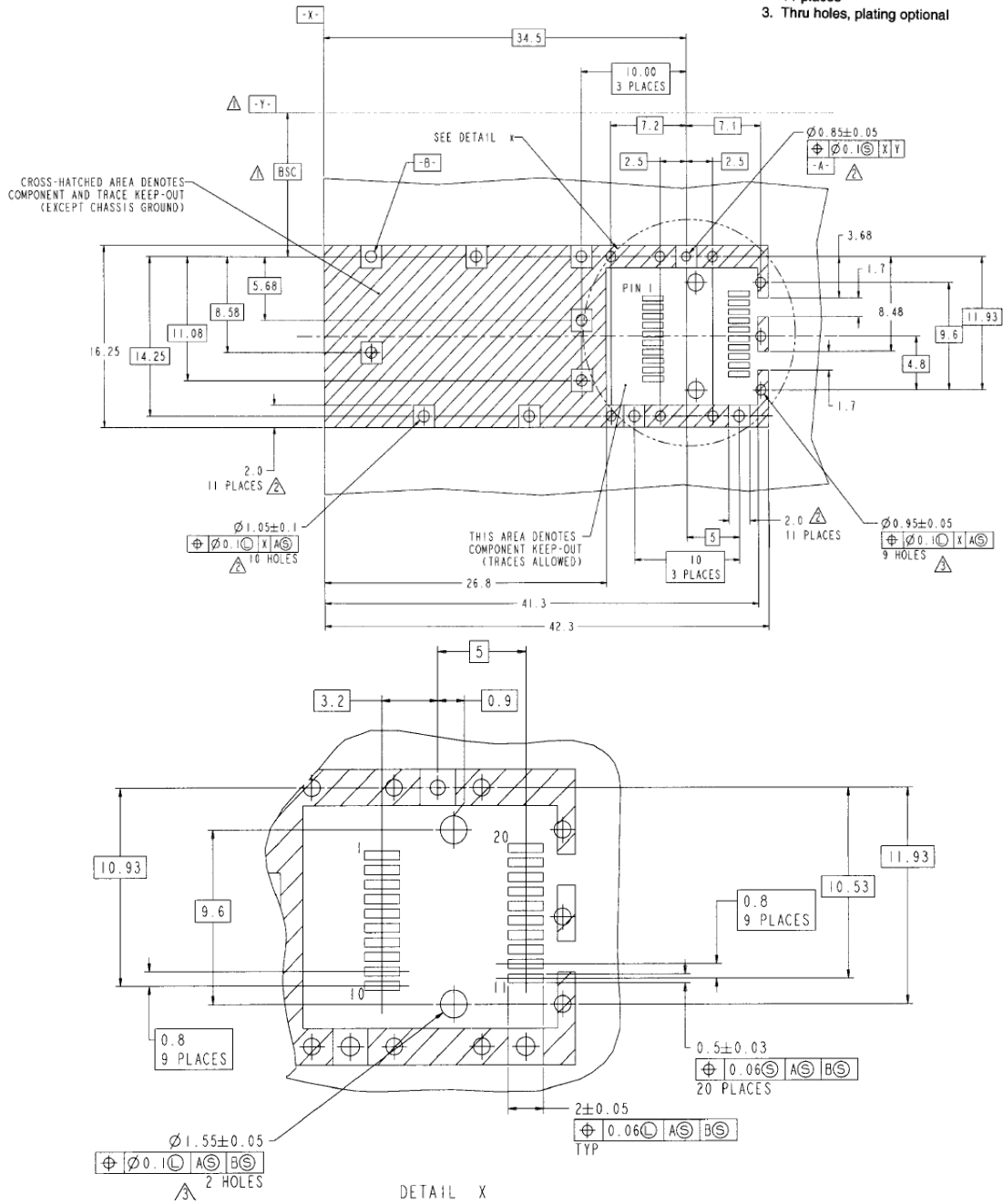


Figure 5. PCB layout recommendation

For More Information

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