

## Product Features

- Compliant with CPRI and OBSAI
- Electrical interface specifications per SFF-8431
- Management interface specifications per SFF-8431 and SFF-8472
- SFP+ MSA package with duplex LC connector
- Uncooled DML Laser
- Up to 6.1Gb/s bi-directional data links
- Single +3.3V power supply
- Class 1 laser safety certified
- Commercial operating temperature: 0°C to +70°C
- Up to 20km on 9/125µm SMF
- RoHS Compliant



## Applications

- 6G CPRI and OBSAI
- 20km 6G CWDM Network

## Descriptions

LX430xCWR 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 20km over single mode fiber. They are compliant with IEEE Std 802.3-2005 10Gb Ethernet 10GBase-LR/LW.

LX430xCWR are compliant with RoHS.

## Ordering Information

**Table 1. Ordering Information**

| Part Number | Transmitter | Output Power | Receiver | Sensitivity | Reach | Temp      | DDM       | RoHS      |
|-------------|-------------|--------------|----------|-------------|-------|-----------|-----------|-----------|
| LX4301CWR   | 1271nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4302CWR   | 1291nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4303CWR   | 1311nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4304CWR   | 1331nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4305CWR   | 1351nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4306CWR   | 1371nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4307CWR   | 1391nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4308CWR   | 1411nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4309CWR   | 1431nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °C | Available | Compliant |
| LX4310CWR   | 1451nm DML  | 0 ~ +5dBm    | PIN      | < -14.4dBm  | 20km  | 0 ~ 70 °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 4.7KΩ to 10KΩ pull-up resistor to VccHost.
3. This input is internally biased high with a 4.7KΩ to 10KΩ 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 4.7KΩ to 10KΩ pull-up resistor to VccHost.

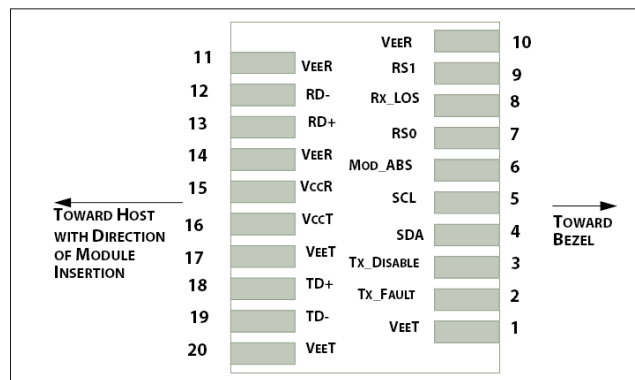


Figure 1. Host PCB SFP+ pad assignment top view

## 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 | Ts              | -40     | 85      | °C   |
| Relative Humidity   | RH              | 5       | 95      | %    |
| Supply Voltage      | V <sub>CC</sub> | -0.5    | 4.0     | V    |

## Recommended Operating Conditions

**Table 4. Recommended Operating Conditions**

| Parameter                  | Symbol          | Min   | Typ   | Max   | Unit |
|----------------------------|-----------------|-------|-------|-------|------|
| Operating Case Temperature | T <sub>C</sub>  | 0     | 25    | 70    | °C   |
| Supply Voltage             | V <sub>CC</sub> | 3.135 | 3.3   | 3.465 | V    |
| Data Rate                  | -               | -     | 6.144 | -     | Gb/s |

## Transceiver Electrical Characteristics

**Table 5. Transceiver Electrical Characteristics**

| Parameter                        | Symbol                          | Minimum         | Typical | Maximum | Unit                | Notes |   |
|----------------------------------|---------------------------------|-----------------|---------|---------|---------------------|-------|---|
| Module Supply Current            | I <sub>CC</sub>                 | -               | -       | 300     | mA                  | -     |   |
| Power Dissipation                | P <sub>D</sub>                  | -               | -       | 1000    | mW                  | -     |   |
| <b>Transmitter</b>               |                                 |                 |         |         |                     |       |   |
| Input Differential Impedance     | Z <sub>IN</sub>                 | -               | 100     | -       | Ω                   | -     |   |
| Differential Data Input Swing    | V <sub>IN, P-P</sub>            | 180             | -       | 700     | mV <sub>P-P</sub>   | -     |   |
| TX_FAULT                         | Transmitter Fault               | V <sub>OH</sub> | 2.0     | -       | V <sub>CCHOST</sub> | V     | - |
|                                  | Normal Operation                | V <sub>OL</sub> | 0       | -       | 0.8                 | V     | - |
| TX_DISABLE                       | Transmitter Disable             | V <sub>IH</sub> | 2.0     | -       | V <sub>CCHOST</sub> | V     | - |
|                                  | Transmitter Enable              | V <sub>IL</sub> | 0       | -       | 0.8                 | V     | - |
| <b>Receiver</b>                  |                                 |                 |         |         |                     |       |   |
| Output Differential Impedance    | Z <sub>O</sub>                  | -               | 100     | -       | Ω                   | -     |   |
| Differential Data Output Swing   | V <sub>OUT, P-P</sub>           | 300             | -       | 850     | mV <sub>P-P</sub>   | 1     |   |
| Data Output Rise Time, Fall Time | t <sub>r</sub> , t <sub>f</sub> | 28              | -       | -       | ps                  | 2     |   |
| RX_LOS                           | Loss of signal (LOS)            | V <sub>OH</sub> | 2.0     | -       | V <sub>CCHOST</sub> | V     | 3 |

|                  |          |   |   |     |   |   |
|------------------|----------|---|---|-----|---|---|
| Normal Operation | $V_{OL}$ | 0 | - | 0.8 | V | 3 |
|------------------|----------|---|---|-----|---|---|

**Notes:**

1. Internally AC coupled, but requires a external 100Ω differential load termination.
2. 20–80%.
3. LOS is an open collector output. Should be pulled up with 4.7KΩ 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       | -       | +5.0    | dBm   | 1     |
| Center Wavelength Range            | $\lambda_c$   | 1264.5  | -       | 1457.5  | nm    | -     |
| Center Wavelength Tolerance        | $\Delta\lambda_c$                                       | -6.5    | -       | 6.5     | nm    | -     |
| Extinction Ratio                   | EX  | 3.5     | -       | -       | dB    | 2     |
| Optical Modulation Amplitude       | OMA   | -2.1    | -       | -       | dBm   | -     |
| 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-LR compatible |         |         |         |       |       |

**Notes:**

1. The optical power is launched into 9/125μm SMF.
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @6.144Gbps.

## Receiver Optical Characteristics

**Table 7. Receiver Optical Characteristics**

| Parameter                          | Symbol      | Minimum | Typical | Maximum | Unit | Notes |
|------------------------------------|-------------|---------|---------|---------|------|-------|
| Center Wavelength                  | $\lambda_c$ | 1260    | -       | 1620    | nm   | -     |
| Receiver Sensitivity ( $P_{avg}$ ) | S           | -       | -       | -14.4   | dBm  | 1,3   |
| Receiver Sensitivity (OMA)         | $S_{OMA}$   | -       | -       | -14.0   | dBm  | 1     |
| Receiver Overload ( $P_{avg}$ )    | $P_{OL}$    | 0.5     | -       | -       | dBm  | 1     |
| Stressed Sensitivity (OMA)         | -           | -       | -       | -11.0   | dBm  | 2     |
| Optical Return Loss                | ORL         | 26      | -       | -       | dB   | -     |
| LOS De-Assert                      | $LOS_D$     | -       | -       | -16     | dBm  | -     |
| LOS Assert                         | $LOS_A$     | -30     | -       | -       | dBm  | -     |
| LOS Hysteresis                     | -           | 0.5     | -       | -       | dB   | -     |

**Notes:**

1. Measured with PRBS 2<sup>31</sup>-1 test pattern, 6.144Gb/s, BER<10<sup>-12</sup>.
2. Comply with IEEE 802.3-2005.
3. The wavelength 1411/1431/1451nm need to use dispersion compensating fiber(DCF) can up to 20km, Else, 1411/1431/1451nm can up to 15km;

## Recommended Host Board Power Supply Filter Network

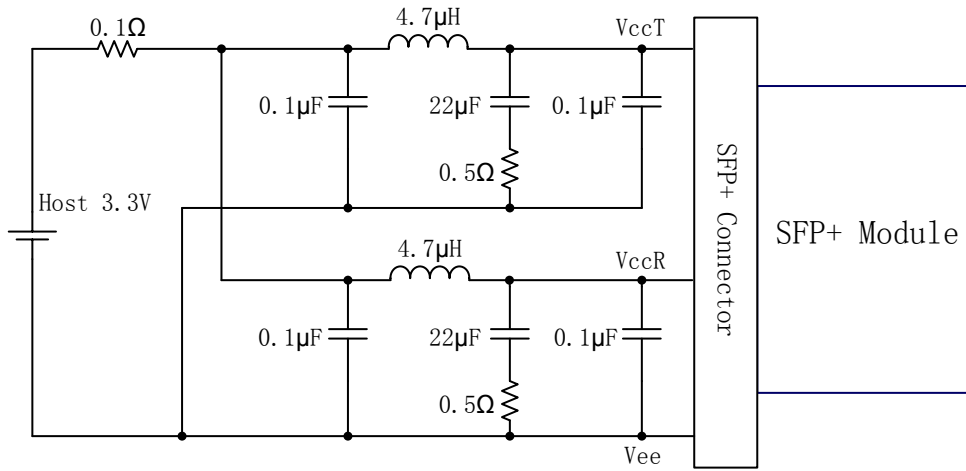


Figure 2. Recommended Host Board Power Supply Filter Network

## Recommended Application Interface Block Diagram

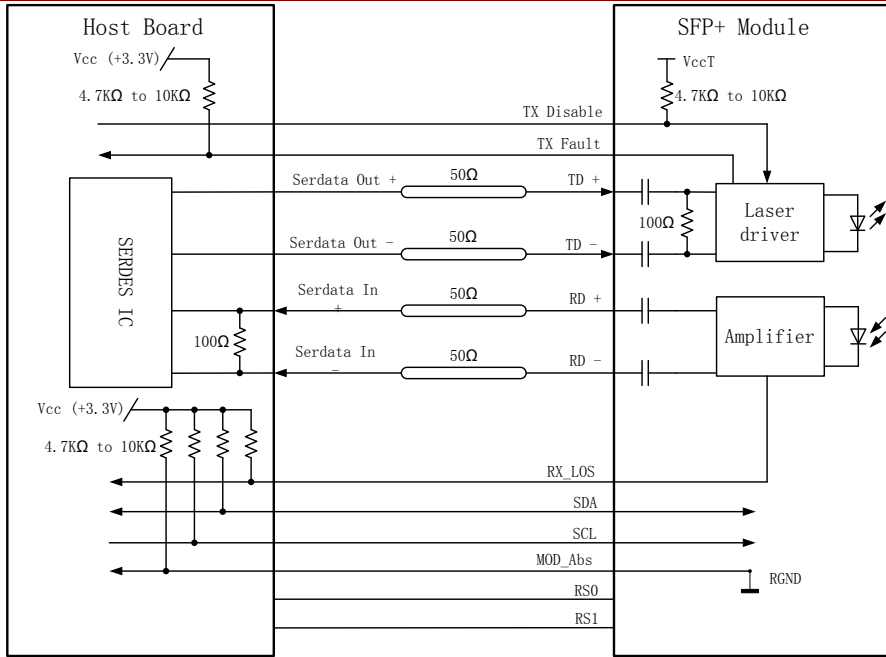


Figure 3. Recommended Application Interface Block Diagram

## Mechanical specifications

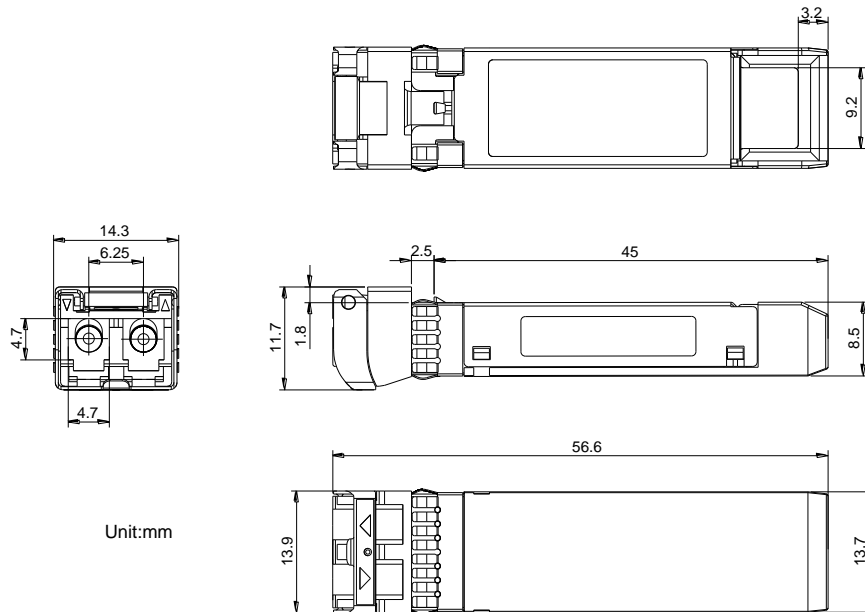


Figure 4. Outline Drawing

## 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

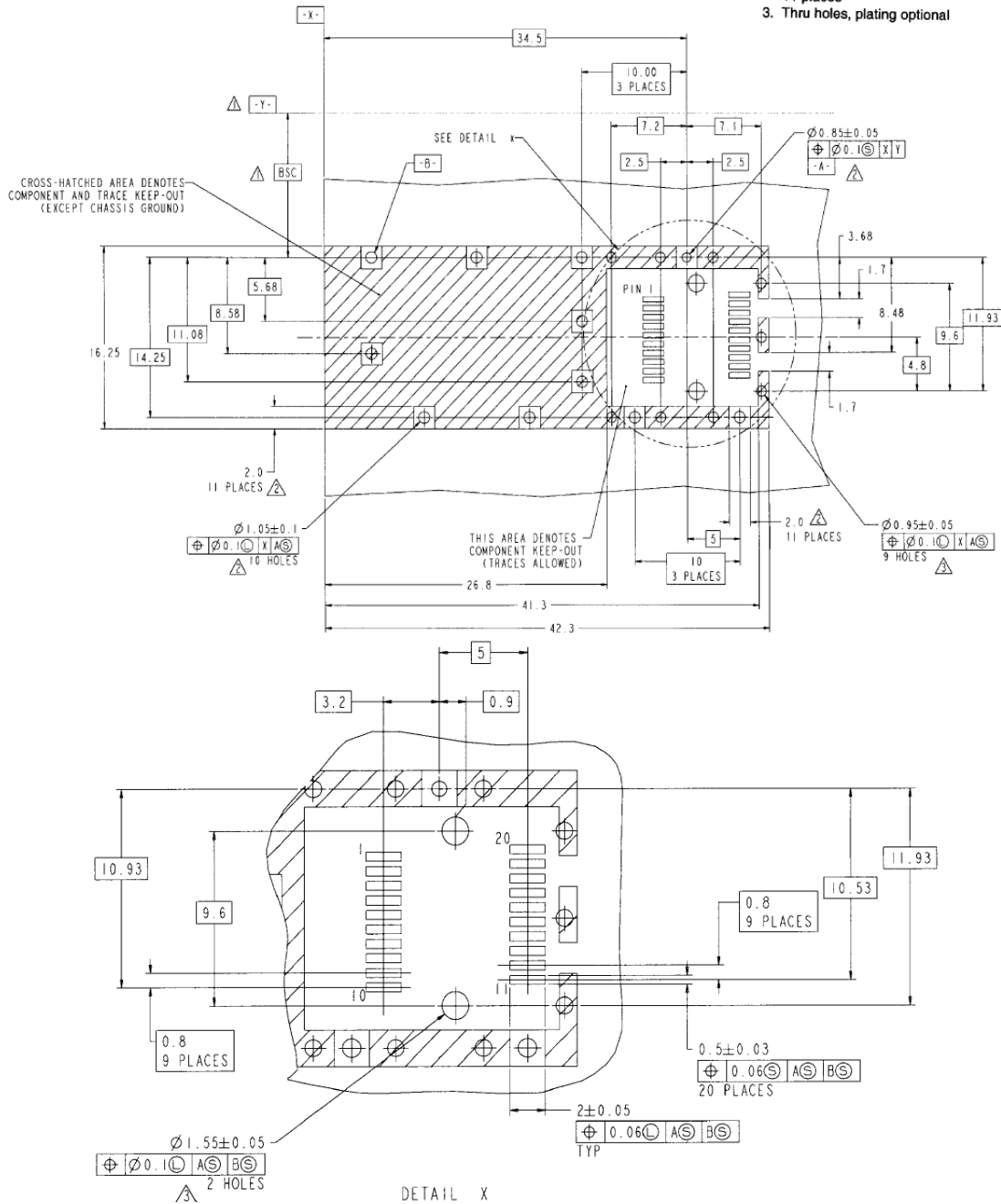


Figure 5 PCB layout recommendation

**For More Information**

**Linktel Technologies Co., Ltd**



**LX430xCWR  
6.144G Ethernet 20km CWDM SFP+ Transceiver  
6G CPRI and OBSAI application**

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