

Product Features

- Compliant with FC-PI-4 800-SM-LC-L
- Digital Diagnostic Monitoring available
- SFP+ MSA package with duplex LC connector
- DWDM-rated EML Transmitter
- Dual 8.5Gb/s CDR bi-directional data links
- Single +3.3V DC power supply
- Class 1 laser safety certified
- Hot-pluggable SFP footprint
- Operating temperature: 0°C to +70°C
- Up to 40km on 9/125µm SMF
- RoHS Compliant



Applications

- 8.5G Fiber channel

Descriptions

LX46xxCDH SFP+ transceivers, according to Enhanced Small Form Factor Pluggable “SFP+” Multi-Sourcing Agreement (MSA) SFF-8431 and SFF-8472, revision 10.4, are designed for use in DWDM 8x Fibre channel application of links up to 40km over single mode fiber.

The product is RoHS compliant.

Ordering Information

Table 1. Ordering Information

| Part Number | Transmitter | Output Power | Receiver | Sensitivity | Reach | Temp | DDM | RoHS |
|-------------|-------------|--------------|----------|-------------|-------|-----------|-----------|-----------|
| LX46xxCDH | DWDM EML | -1~ +2dBm | PIN | < -15.8dBm | 40km | 0 ~ 70 °C | Available | Compliant |

Notes: See Table 2 – Wavelength Guide for “xx” value.

Table 2. Wavelength Guide for “xx” value (100GHz ITU-T channel)

| Channel # | Product Part Number | Frequency (THz) | Center Wavelength (nm) |
|-----------|---------------------|-----------------|------------------------|
| 17 | LX4617CDH | 191.7 | 1563.86 |
| 18 | LX4618CDH | 191.8 | 1563.05 |
| 19 | LX4619CDH | 191.9 | 1562.23 |
| 20 | LX4620CDH | 192.0 | 1561.42 |
| 21 | LX4621CDH | 192.1 | 1560.61 |
| 22 | LX4622CDH | 192.2 | 1559.79 |
| 23 | LX4623CDH | 192.3 | 1558.98 |

| | | | |
|----|-----------|-------|---------|
| 24 | LX4624CDH | 192.4 | 1558.17 |
| 25 | LX4625CDH | 192.5 | 1557.36 |
| 26 | LX4626CDH | 192.6 | 1556.55 |
| 27 | LX4627CDH | 192.7 | 1555.75 |
| 28 | LX4628CDH | 192.8 | 1554.94 |
| 29 | LX4629CDH | 192.9 | 1554.13 |
| 30 | LX4630CDH | 193.0 | 1553.33 |
| 31 | LX4631CDH | 193.1 | 1552.52 |
| 32 | LX4632CDH | 193.2 | 1551.72 |
| 33 | LX4633CDH | 193.3 | 1550.92 |
| 34 | LX4634CDH | 193.4 | 1550.12 |
| 35 | LX4635CDH | 193.5 | 1549.32 |
| 36 | LX4636CDH | 193.6 | 1548.51 |
| 37 | LX4637CDH | 193.7 | 1547.72 |
| 38 | LX4638CDH | 193.8 | 1546.92 |
| 39 | LX4639CDH | 193.9 | 1546.12 |
| 40 | LX4640CDH | 194.0 | 1545.32 |
| 41 | LX4641CDH | 194.1 | 1544.53 |
| 42 | LX4642CDH | 194.2 | 1543.73 |
| 43 | LX4643CDH | 194.3 | 1542.94 |
| 44 | LX4644CDH | 194.4 | 1542.14 |
| 45 | LX4645CDH | 194.5 | 1541.35 |
| 46 | LX4646CDH | 194.6 | 1540.56 |
| 47 | LX4647CDH | 194.7 | 1539.77 |
| 48 | LX4648CDH | 194.8 | 1538.98 |
| 49 | LX4649CDH | 194.9 | 1538.19 |
| 50 | LX4650CDH | 195.0 | 1537.40 |
| 51 | LX4651CDH | 195.1 | 1536.61 |
| 52 | LX4652CDH | 195.2 | 1535.82 |
| 53 | LX4653CDH | 195.3 | 1535.04 |
| 54 | LX4654CDH | 195.4 | 1534.25 |
| 55 | LX4655CDH | 195.5 | 1533.47 |
| 56 | LX4656CDH | 195.6 | 1532.68 |
| 57 | LX4657CDH | 195.7 | 1531.90 |
| 58 | LX4658CDH | 195.8 | 1531.12 |
| 59 | LX4659CDH | 195.9 | 1530.33 |
| 60 | LX4660CDH | 196.0 | 1529.55 |

Pin Description

Table 3. 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.

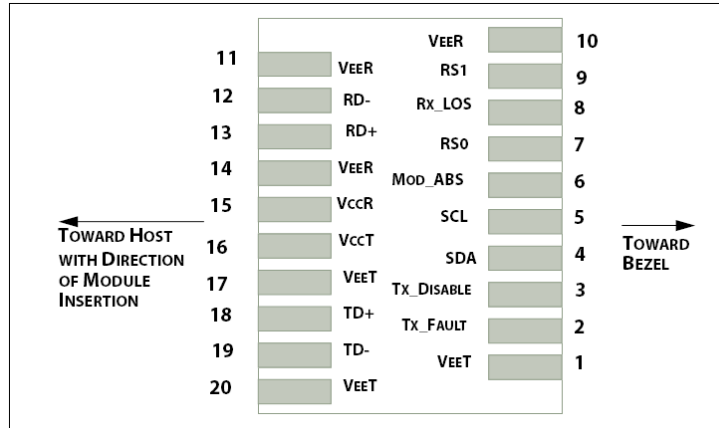


Figure 1. Host PCB SFP+ pad assignment top view

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 4. 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 5. Recommended Operating Conditions

| Parameter | Symbol | Min | Typ | Max | Unit |
|----------------------------|-----------------|-------|-----|-------|------|
| Operating Case Temperature | T _c | 0 | 25 | 70 | °C |
| Supply Voltage | V _{cc} | 3.135 | 3.3 | 3.465 | V |
| Data Rate | - | - | 8.5 | - | Gb/s |

Transceiver Electrical Characteristics

Table 6. 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 7. Transmitter Optical Characteristics

| Parameter | Symbol | Minimum | Typical | Maximum | Unit | Notes |
|------------------------------------|---|---------|---------|---------|-------|-------|
| Launch Optical Power | P_o | -1 | - | +2.0 | dBm | 1 |
| Center Wavelength Range | λ_c | 1528.77 | - | 1563.86 | nm | - |
| Center Wavelength Spacing | - | - | 100 | - | GHz | - |
| Center Wavelength Tolerance | $\Delta\lambda_c$ | -100 | - | 100 | pm | - |
| Extinction Ratio | EX | 8.2 | - | - | 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-ER compatible | | | | | |

Notes:

- The optical power is launched into 9/125 μ m SMF.
- Measured with a PRBS 2³¹-1 test pattern @8.5Gbps.

Receiver Optical Characteristics

Table 8. Receiver Optical Characteristics

| Parameter | Symbol | Minimum | Typical | Maximum | Unit | Notes |
|------------------------------------|-------------|---------|---------|---------|------|-------|
| Center Wavelength | λ_c | 1528 | - | 1565 | nm | - |
| Receiver Sensitivity (P_{avg}) | S | - | - | -15.8 | dBm | 1 |
| Receiver Overload (P_{avg}) | P_{OL} | -1.0 | - | - | 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 $2^{31}-1$ test pattern, 8.5Gb/s, BER $<10^{-12}$.
2. Comply with IEEE 802.3-2005.

Recommended Host Board Power Supply Filter Network

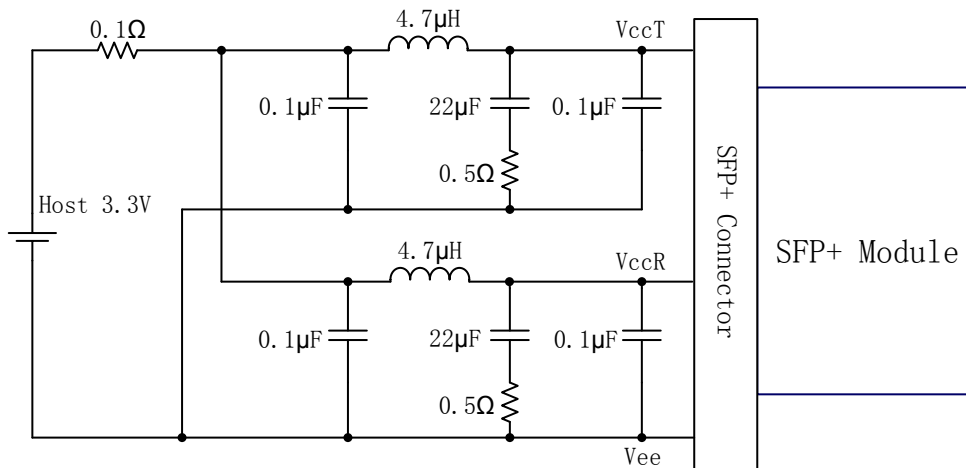


Figure 2. Recommended Host Board Power Supply Filter Network

Recommended

Application Interface Block Diagram

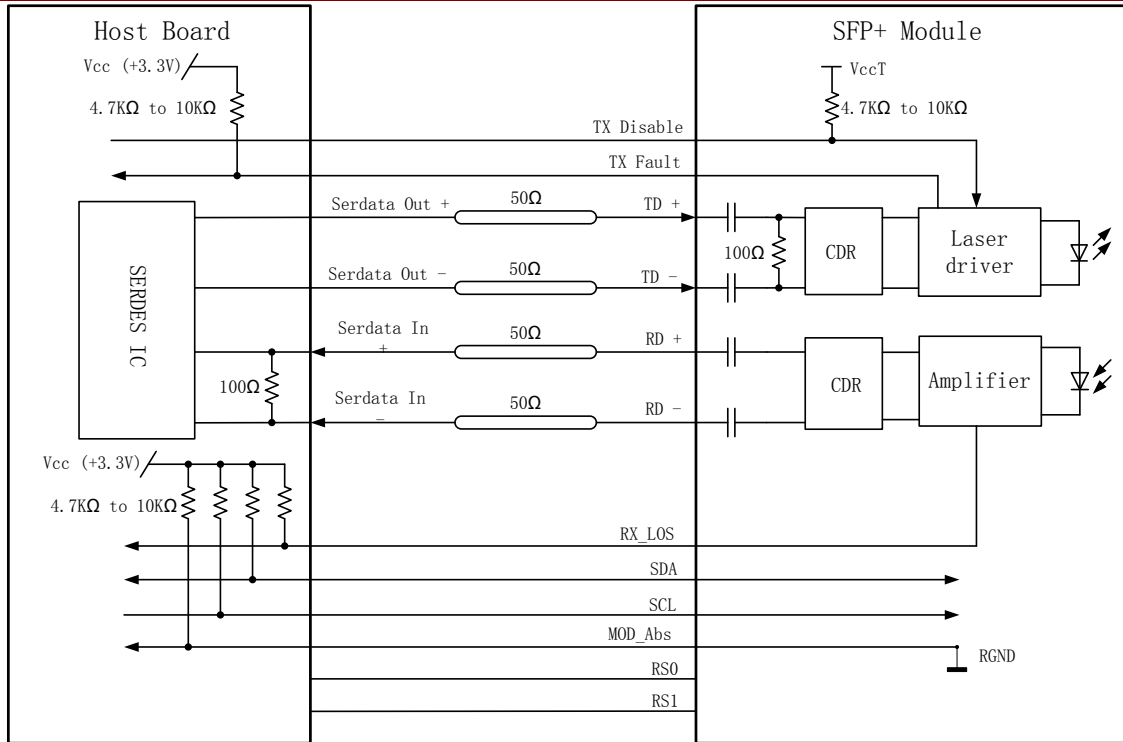


Figure 3. Recommended Application Interface Block Diagram

Mechanical specifications

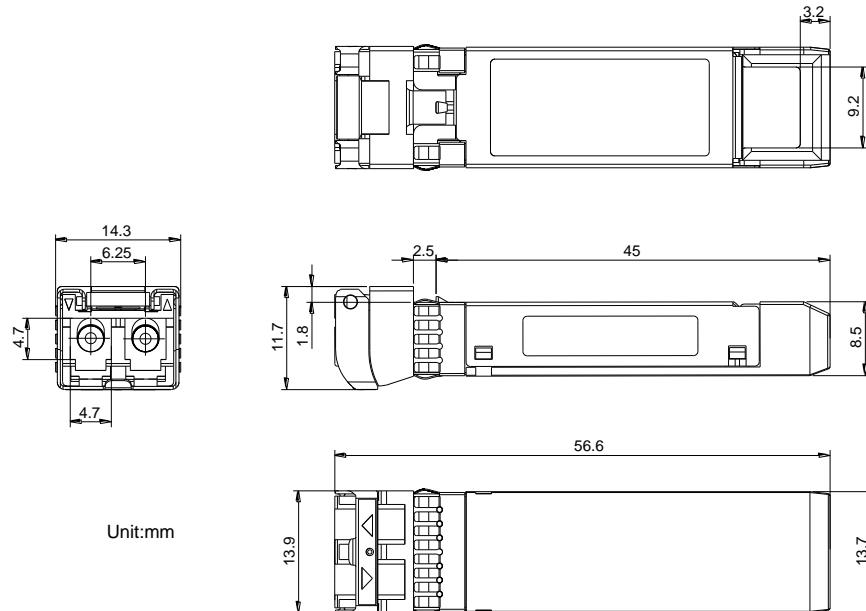


Figure 4. Outline Drawing

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

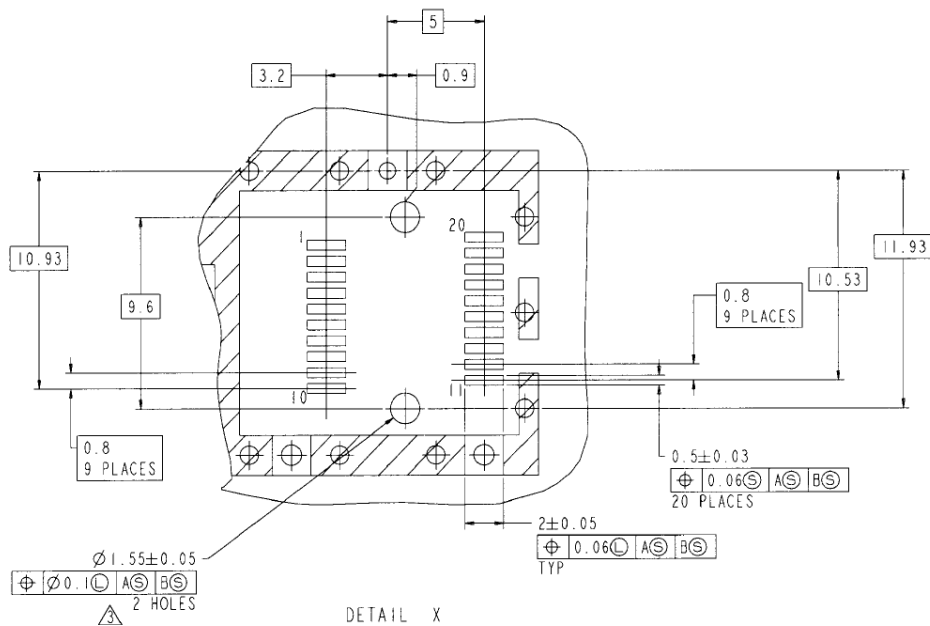
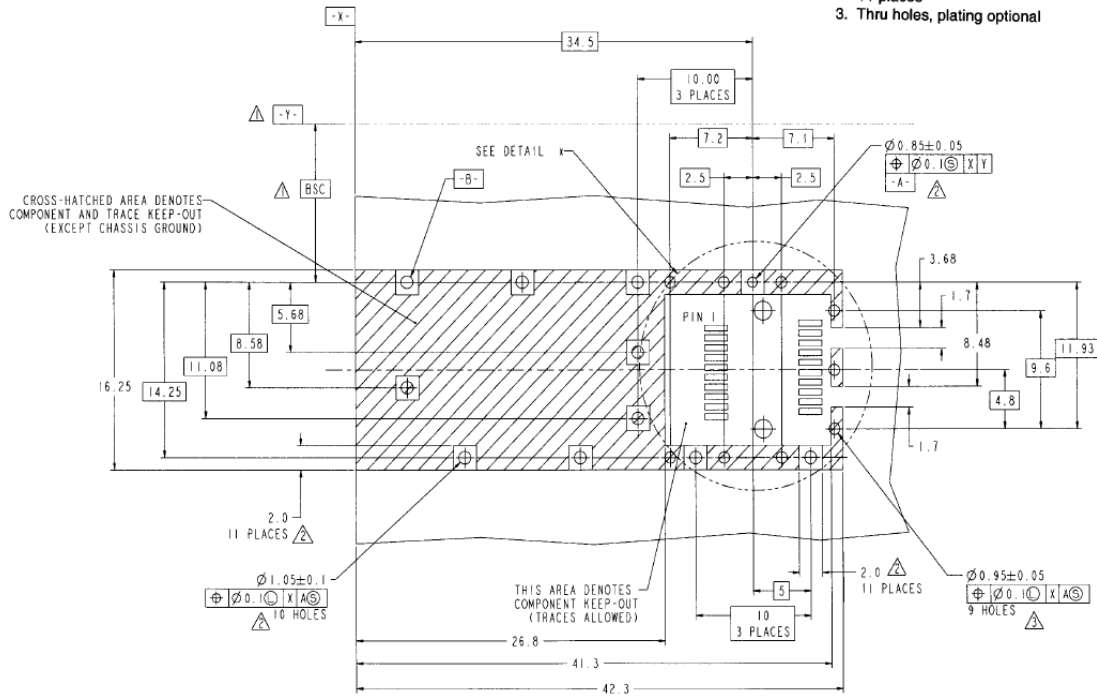


Figure 5. PCB layout recommendation

For More Information



**LX46xxCDH
8.5G DWDM SFP+ Transceiver
8G Fiber channel**

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