

## **ZX-SFP-CWDM-1610-NC**

1.25 Gbs CWDM SFP Transceiver

### **Features**

- Up to 1.25Gb/s data links
- Duplex LC connector
- Hot-pluggable SFP footprint
- Uncooled DFB laser transmitter in 18 possible CWDM wavelengths
- RoHS compliant and Lead Free
- Up to 80km on 9/125µm SMF
- Metal enclosure for lower EMI
- Digital diagnostic compatible with SFF-847 Rev11.0
- Single +3.3V power supply
- Low power dissipation <800mW
- Commercial operating temperature
- SFP MSA SFF-8074i Compliant

### **Applications**

- Gigabit Ethernet
- 1x Fiber Channel

### **Product Description**

ZX-SFP-CWDM-1610-NC Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The SFP transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.063Gbps and 80km transmission distance with SMF.

SFP transceivers are RoHS compliant and lead-free.

### **Regulatory Compliance**

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2.
- Immunity compatible with IEC 61000-4-3.
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B.
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2.
- RoHS compliant with 2002/95/EC 4.1&4.2 2005/747/EC.

### CWDM Available Wavelengths

| Wavelengths | Min. | Typ. | Max. |
|-------------|------|------|------|
| 1270        | 1266 | 1270 | 1277 |
| 1290        | 1286 | 1290 | 1297 |
| 1310        | 1306 | 1310 | 1317 |
| 1330        | 1326 | 1330 | 1337 |
| 1350        | 1346 | 1350 | 1357 |
| 1370        | 1366 | 1370 | 1377 |
| 1390        | 1386 | 1390 | 1397 |
| 1410        | 1406 | 1410 | 1417 |
| 1430        | 1426 | 1430 | 1437 |
| 1450        | 1446 | 1450 | 1457 |
| 1470        | 1466 | 1470 | 1477 |
| 1490        | 1486 | 1490 | 1497 |
| 1510        | 1506 | 1510 | 1517 |
| 1530        | 1526 | 1530 | 1537 |
| 1550        | 1546 | 1550 | 1557 |
| 1570        | 1566 | 1570 | 1577 |
| 1590        | 1586 | 1590 | 1597 |
| 1610        | 1606 | 1610 | 1617 |

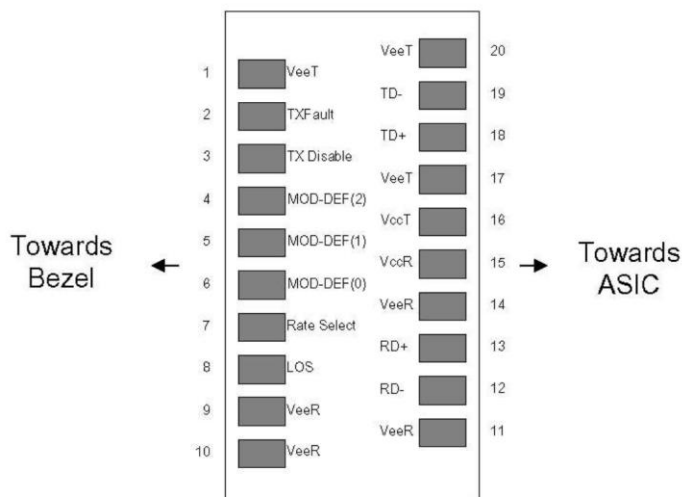
### Pin Descriptions

| Pin | Symbol      | Name/Descriptions                                                   | Ref. |
|-----|-------------|---------------------------------------------------------------------|------|
| 1   | VeeT        | Transmitter Ground (Common with Receiver Ground).                   | 1    |
| 2   | TX Fault    | Transmitter Fault.                                                  |      |
| 3   | TX Disable  | Transmitter Disable. Laser output disabled on high or open. LVTT-I. | 2    |
| 4   | MOD_DEF (2) | Module Definition 2. Data line for Serial ID.                       | 3    |
| 5   | MOD_DEF (1) | Module Definition 1. Clock line for Serial ID.                      | 3    |
| 6   | MOD_DEF (0) | Module Definition 0. Grounded within the module.                    | 3    |
| 7   | Rate Select | No connection required.                                             |      |
| 8   | LOS         | Loss of Signal indication. Logic 0 indicates normal operation.      | 4    |
| 9   | VeeR        | Receiver Ground (Common with Transmitter Ground)                    | 1    |
| 10  | VeeR        | Receiver Ground (Common with Transmitter Ground).                   | 1    |
| 11  | VeeR        | Receiver Ground (Common with Transmitter Ground).                   | 1    |

|    |      |                                                      |   |
|----|------|------------------------------------------------------|---|
| 12 | RD-  | Receiver Inverted DATA out. AC Coupled. CML-O.       |   |
| 13 | RD+  | Receiver Non-inverted DATA out. AC Coupled. CML-O.   |   |
| 14 | VeeR | Receiver Ground (Common with Transmitter Ground).    | 1 |
| 15 | VccR | Receiver Power Supply.                               |   |
| 16 | VccT | Transmitter Power Supply.                            |   |
| 17 | VeeT | Transmitter Ground (Common with Receiver Ground).    | 1 |
| 18 | TD+  | Transmitter Non-Inverted DATA in. AC Coupled. CML-I. |   |
| 19 | TD-  | Transmitter Inverted DATA in. AC Coupled. CML-O.     |   |
| 20 | VeeT | Transmitter Ground (Common with Receiver Ground).    | 1 |

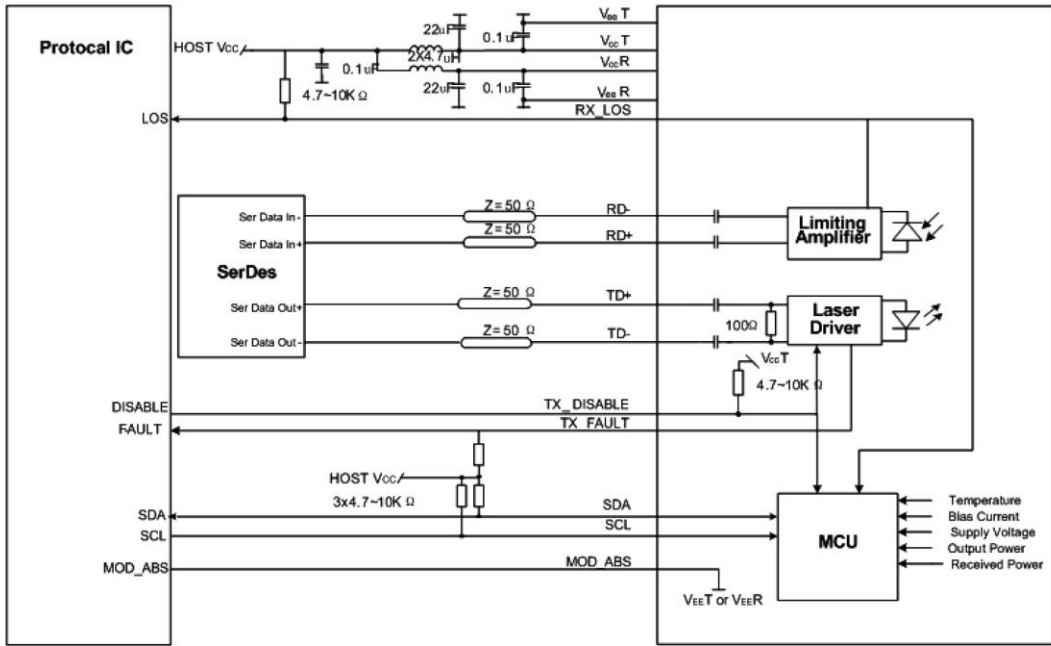
#### Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable <0.8V.
3. Should be pulled up with 4.7k-10kohms on host board to a voltage between 2.0V and 3.6V. MOD\_DEF (0) pulls line low to indicate module is plugged in.
4. LOS is open collector output. Should be pulled up with 4.7k-10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



Pin-out of connector Block on Host board

### Recommend Circuit Schematic



### Absolute Maximum Ratings

| Parameter              | Symbol | Min. | Max. | Unit |
|------------------------|--------|------|------|------|
| Maximum Supply Voltage | Vcc    | -0.5 | 4.0  | V    |
| Storage Temperature    | TS     | -40  | 85   | °C   |
| Operating Humidity     | RH     | 5    | 95   | %    |

### Recommended Operating Conditions

| Parameter                               | Symbol | Min. | Typ.  | Max. | Unit |
|-----------------------------------------|--------|------|-------|------|------|
| Power Supply Voltage                    | Vcc    | 3.13 | 3.30  | 3.47 | V    |
| Power Supply Current                    | Icc    |      |       | 300  | mA   |
| Case Operating Temperature – Commercial | Tc     | 0    |       | 70   | °C   |
| Case Operating Temperature – Industrial | Ti     | -40  |       | 85   | °C   |
| Data Rate (Gigabit Ethernet)            |        |      | 1.25  |      | Gbps |
| Data Rate (Fiber Channel)               |        |      | 1.063 |      | Gbps |
| 9/125μm G.652 SMF                       | Lmax   |      |       | 80   | km   |

### Electrical Characteristics (TOP=25°C, Vcc=3.3V)

| Parameter                      | Symbol   | Min.    | Typ. | Max.    | Unit | Notes |
|--------------------------------|----------|---------|------|---------|------|-------|
| <b>Transmitter</b>             |          |         |      |         |      |       |
| Input differential impedance   | Rin      |         | 100  |         | Ω    | 1     |
| Differential data input swing  | Vin, pp  | 250     |      | 1200    | mV   |       |
| TX Disable-High                |          | Vcc-1.3 |      | Vcc     | V    |       |
| TX Disable-Low                 |          | Vee     |      | Vee+0.8 | V    |       |
| TX Fault-High                  |          | Vcc-0.5 |      | Vcc     | V    |       |
| TX Fault-Low                   |          | Vee     |      | Vee+0.5 | V    |       |
| <b>Receiver</b>                |          |         |      |         |      |       |
| Single ended data output swing | Vout, pp | 300     | 400  | 800     | mV   | 2     |
| Data output rise time          | tr       |         |      | 175     | ps   | 3     |
| Data output fall time          | tf       |         |      | 175     | ps   | 3     |
| LOS-High                       |          | Vcc-0.5 |      | Vcc     | V    |       |
| LOS-Low                        |          | Vee     |      | Vee+0.5 | V    |       |

#### Notes:

1. AC coupled.
2. Into 100-ohm differential termination.
3. 20% - 80%

### Optical and Electrical Characteristics

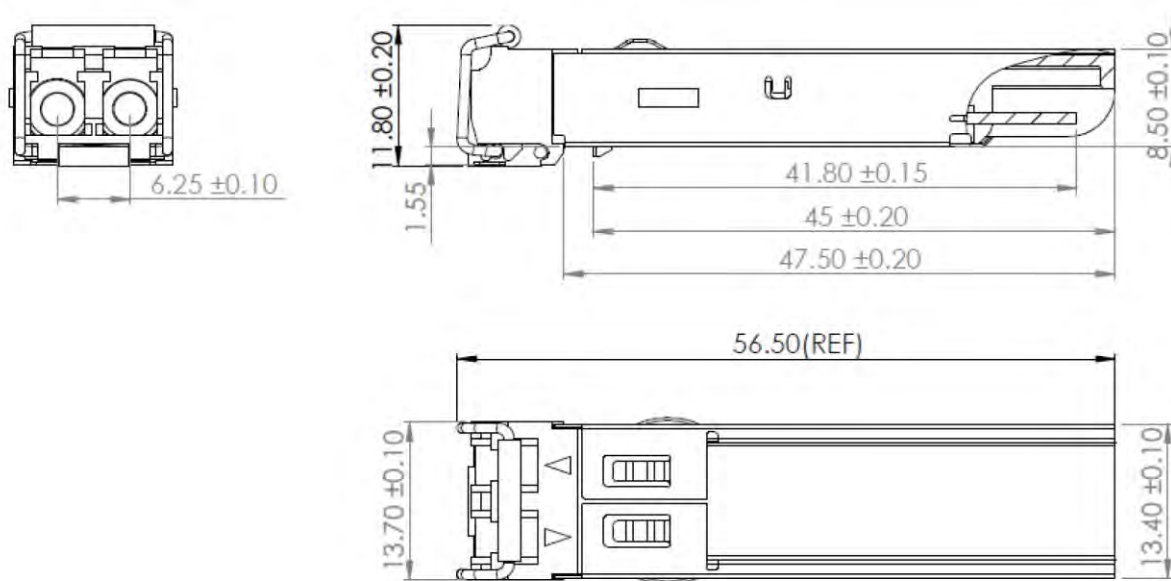
| Parameter                   | Symbol | Min. | Typ. | Max. | Unit | Notes |
|-----------------------------|--------|------|------|------|------|-------|
| <b>Transmitter</b>          |        |      |      |      |      |       |
| Output Opt. Power           | PO     | 0    |      | 5    | dBm  | 1     |
| Optical Wavelength          | λ      | X-4  | X    | X+7  | nm   | 2     |
| Spectral Width              | σ      |      |      | 1    | nm   |       |
| Side Mode Suppression Ratio | SMSR   | 30   |      |      | dB   |       |
| Optical Rise/Fall Time      | tr/tf  |      |      | 260  | ps   | 3     |
| Total Jitter                | TJ     |      |      | 200  | ps   |       |
| Optical Extinction Ratio    | ER     | 9    |      |      | dB   |       |

| Receiver                  |                   |      |  |      |     |     |
|---------------------------|-------------------|------|--|------|-----|-----|
| Maximum Received Power    | RX <sub>MAX</sub> | 0    |  |      | dBm | 5   |
|                           |                   | -9   |  |      |     | 6   |
| Optical Center Wavelength | λ <sub>C</sub>    | 1270 |  | 1610 | nm  |     |
| LOS De-Assert             | LOSD              |      |  | -26  | dBm | 5   |
|                           |                   |      |  | -34  |     | 6   |
| LOS Assert                | LOSA              | -40  |  |      | dBm | 5   |
|                           |                   | -45  |  |      |     | 6   |
| LOS Hysteresis            |                   | 0.5  |  | 5    | dB  |     |
| RX Sensitivity @1.25 Gbs  | RSENS             |      |  | -25  | dBm | 4,5 |
|                           |                   |      |  | -32  |     | 4,6 |

#### Notes:

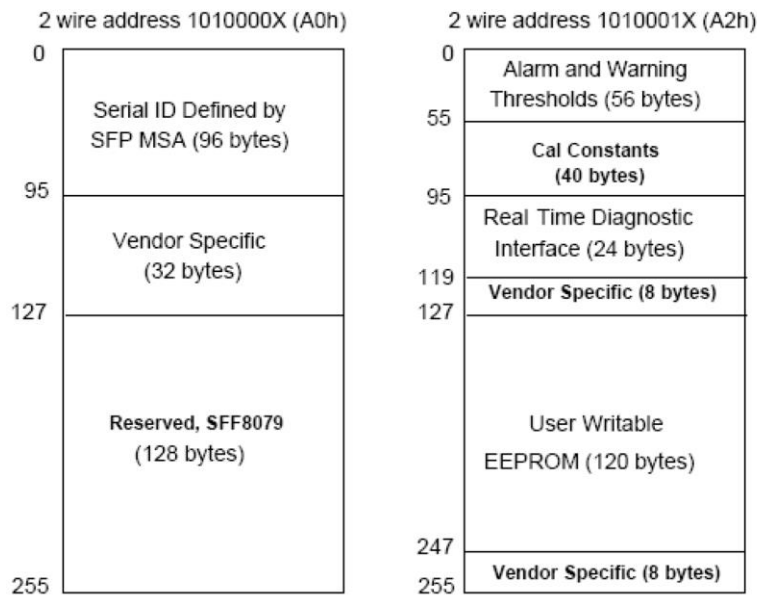
1. Class 1 Laser Safety.
2. The Transmitter Center Wavelength "X" is as specified by the customer.
3. Unfiltered, 20%-80%. Complies with Gigabit Ethernet eye masks when filtered.
4. Measured with PRBS 2<sup>7</sup>-1 at 10<sup>-10</sup> BER.
5. 5. PIN receiver.
6. APD receiver.

#### Mechanical Specifications



EEPROM Information

EEPROM memory map specific data field description is as below:



Digital Diagnostic Monitoring Interface

Five Transceiver parameter values are monitored. The following table defines the monitored parameter’s accuracy.

| Parameter    | Range                 | Accuracy | Calibration |
|--------------|-----------------------|----------|-------------|
| Temperature  | 0°C to 70°C (C)       | ±3°C     | Internal    |
| Voltage      | 2.97V to 3.63V        | ±3%      | Internal    |
| Bias Current | 0mA to 100mA          | ±10%     | Internal    |
| TX Power     | 0dBm to 5dBm          | ±3dB     | Internal    |
| RX Power     | -25dBm to 0dBm (PIN)  | ±3dB     | Internal    |
|              | -32dBm to -9dBm (APD) |          |             |