

**E-CW-SFP+-ZR-XX****CWDM SFP+ 1470~1610nm 80km DDM LC SMF Transceiver****Features**

- Supports 9.95 to 11.3Gb/s bit rates
- Duplex LC connector
- Hot pluggable SFP+ footprint
- Cooled 1470nm~1610nm DFB transmitter, APD Receiver
- Applicable for 80km SMF connection
- Low power consumption, < 1.5W
- Digital Diagnostic Monitor Interface
- Optical interface compliant to IEEE 802.3ae 10GBASE-ZR
- Electrical interface compliant to SFF-8431
- Operating case temperature: Commerical:0 to 70 °C Industrial: -40 to 85 °C

**Applications**

- 10GBASE-ZR at 10.3125Gbps
- 10G Ethernet
- Other optical links

**1. Absolute Maximum Ratings**

| Parameter           | Symbol | Min. | Max. | Unit | Note |
|---------------------|--------|------|------|------|------|
| Supply Voltage      | Vcc    | -0.5 | 4.0  | V    |      |
| Storage Temperature | TS     | -40  | 85   | °C   |      |
| Relative Humidity   | RH     | 0    | 85   | %    |      |

*Note:*

*Stress in excess of the maximum absolute ratings can cause permanent damage to the transceiver.*

**2. General Operating Characteristics**

| Parameter            | Symbol | Min. | Typ     | Max. | Unit | Note |
|----------------------|--------|------|---------|------|------|------|
| Data Rate            | DR     | 9.95 | 10.3125 | 11.3 | Gb/s |      |
| Supply Voltage       | Vcc    | 3.13 | 3.3     | 3.47 | V    |      |
| Supply Current       | Icc5   |      |         | 455  | mA   |      |
| Operating Case Temp. | Tc     | 0    |         | 70   | °C   |      |
|                      | Tl     | -40  |         | 85   |      |      |

### 3. Electrical Characteristics

| Parameter                      | Symbol  | Min.    | Typ | Max.    | Unit | Note |
|--------------------------------|---------|---------|-----|---------|------|------|
| Transmitter                    |         |         |     |         |      |      |
| Differential data input swing  | VIN,PP  | 120     |     | 820     | mVpp | 1    |
| Transmit Disable Voltage       | VD      | VCC-0.8 |     | Vcc     | V    |      |
| Transmit Enable Voltage        | VEN     | Vee     |     | Vee+0.8 |      |      |
| Input differential impedance   | Rin     |         | 100 |         | Ω    |      |
| Receiver                       |         |         |     |         |      |      |
| Differential data output swing | Vout,pp | 340     | 650 | 800     | mVpp | 2    |
| Output rise time and fall time | Tr, Tf  | 28      |     |         | Ps   | 3    |
| LOS asserted                   | VLOS_F  | VCC-0.8 |     | Vcc     | V    | 4    |
| LOS de-asserted                | VLOS_N  | Vee     |     | Vee+0.8 | V    | 4    |

**Notes:**

Connected directly to TX data input pins. AC coupling from pins into laser driver IC.

Into 100Ω differential termination.

20 – 80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's sequence in the PRBS 9 is an acceptable alternative.

LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.

### 4. Optical Characteristics

| Parameter                   | Symbol                       | Min.             | Typ       | Max.             | Unit  | Note |
|-----------------------------|------------------------------|------------------|-----------|------------------|-------|------|
| Transmitter                 |                              |                  |           |                  |       |      |
| Operating Wavelength        | $\lambda$                    | $\lambda$ -6.5nm | $\lambda$ | $\lambda$ +6.5nm | nm    | 1    |
| Ave. output power (Enabled) | PAVE                         | 0                |           | 4                | dBm   | 2    |
| Side-Mode Suppression Ratio | SMSR                         | 30               |           |                  | dB    |      |
| Extinction Ratio            | ER                           | 3.5              |           |                  | dB    |      |
| RMS spectral width          | $\Delta\lambda$              |                  |           | 1                | nm    |      |
| Rise/Fall time (20%~80%)    | Tr/Tf                        |                  |           | 50               | ps    |      |
| Dispersion penalty          | TDP                          |                  |           | 3                | dB    |      |
| Relative Intensity Noise    | RIN                          |                  |           | -128             | dB/Hz |      |
| Output Optical Eye          | Compliant with IEEE 0802.3ae |                  |           |                  |       |      |
| Receiver                    |                              |                  |           |                  |       |      |
| Operating Wavelength        | $\lambda$                    | 1260             |           | 1620             | nm    |      |
| Receiver Sensitivity        | PSEN1                        |                  |           | -23              | dBm   | 3    |
| Overload                    | PAVE                         |                  |           | -7               | dBm   |      |
| LOS Assert                  | Pa                           | -37              |           |                  | dBm   |      |
| LOS De-assert               | Pd                           |                  |           | -24              | dBm   |      |
| LOS Hysteresis              | Pd-Pa                        | 0.5              |           |                  | dB    |      |

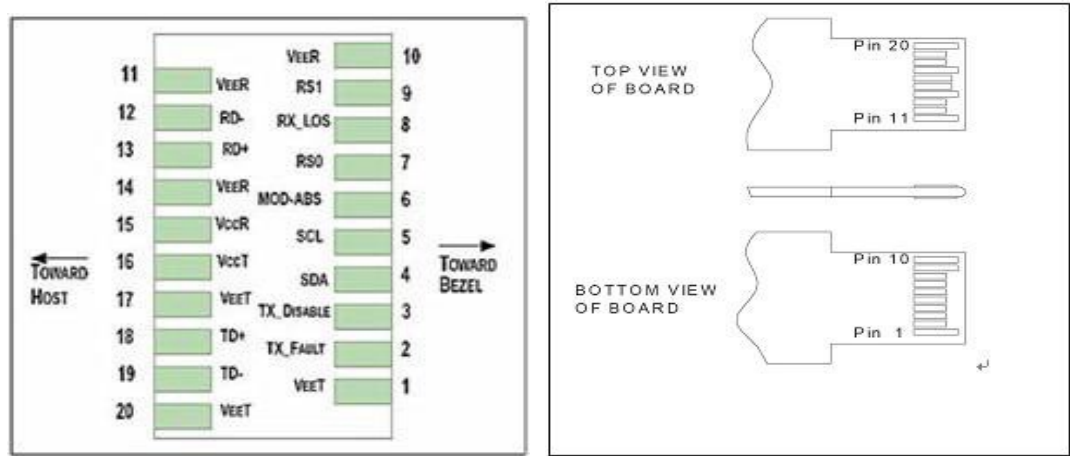
**Notes:**

The wavelength λ=1470nm~1610nm, Total 8 wavelengths,20nm spacing

Measured at 10.3125b/s with PRBS 231 – 1 NRZ test pattern.

Under the ER worst =9, measured at 10.3125 Gb/s with PRBS 231 - 1 NRZ test pattern for BER < 1x10-12

5. Pin Definition and Functions



| Pin | Symbol       | Name/Description                                              |
|-----|--------------|---------------------------------------------------------------|
| 1   | VEET [1]     | Transmitter Ground                                            |
| 2   | Tx_FAULT [2] | Transmitter Fault                                             |
| 3   | Tx_DIS [3]   | Transmitter Disable. Laser output disabled on high or open    |
| 4   | SDA [2]      | 2-wire Serial Interface Data Line                             |
| 5   | SCL [2]      | 2-wire Serial Interface Clock Line                            |
| 6   | MOD_ABS [4]  | Module Absent. Grounded within the module                     |
| 7   | RS0          | Rate Select 0                                                 |
| 8   | RX_LOS [2]   | Loss of Signal indication. Logic 0 indicates normal operation |
| 9   | RS1 [5]      | Rate Select 1                                                 |
| 10  | VEER [1]     | Receiver Ground                                               |
| 11  | VEER [1]     | Receiver Ground                                               |
| 12  | RD-          | Receiver Inverted DATA out. AC Coupled                        |
| 13  | RD+          | Receiver DATA out. AC Coupled                                 |
| 14  | VEER [1]     | Receiver Ground                                               |
| 15  | VCCR         | Receiver Power Supply                                         |
| 16  | VCCT         | Transmitter Power Supply                                      |
| 17  | VEET [1]     | Transmitter Ground                                            |
| 18  | TD+          | Transmitter DATA in. AC Coupled                               |
| 19  | TD-          | Transmitter Inverted DATA in. AC Coupled                      |
| 20  | VEET [1]     | Transmitter Ground                                            |

Notes:

- 1. Module circuit ground is isolated from module chassis ground within the module.
- 2. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
- 3. Tx\_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.
- 4. Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc\_Host with a resistor in the range 4.7 kΩ to 10 kΩ. Mod\_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.