

10G DWDM XFP 80km Optical Transceivers

NXD-xx192-08C

Features

- Hot-pluggable XFP form factor
- Full-duplex transceiver modules
- Cooled EML transmitter and APD receiver
- No Reference Clock required
- Compliant with XFP MSA
- Data rate from 9.95Gbps to 11.3Gbps
- 1528-1563nm DWDM wavelengths (100GHz spacing)
- Reach up to 80km over SMF
- Power consumption < 2.5W
- Dual LC receptacles
- Built-in digital diagnostic functions
- Operating case temperature range from 0°C to 70°C
- 3.3V power supply voltage
- RoHS compliant (lead free)

Applications

- SONET OC-192 / SDH STM-64
- 10GBASE-ZR/ZW Ethernet
- 10G Fibre Channel
- OTN OTU2e

Description

10G DWDM XFP 80km optical transceivers (NXD-xx192-08C) are designed for 10G SDH/SONET, 10GBASE-ZR Ethernet, OTN OTU2e and 10G Fibre Channel applications. Each transceiver consists of two sections: the transmitter section incorporates a cooled EML laser; the receiver section consists of a APD photo-diode integrated with a TIA. All modules satisfy class I laser safety requirements. The 10G DWDM XFP 80km transceivers provide an enhanced monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage.



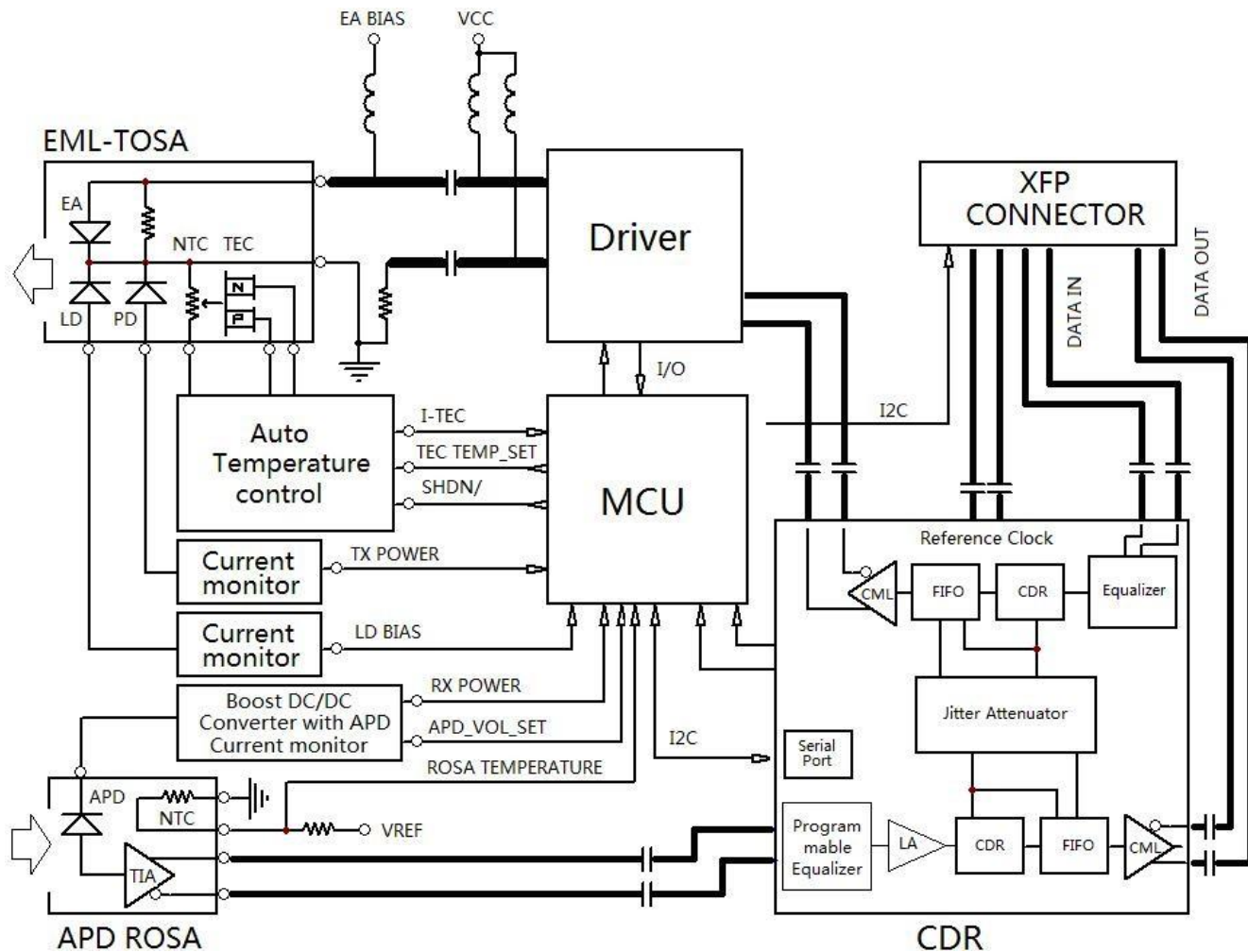


Figure 1. Module Block Diagram

Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|----------------------------|--------|------|-----|------|
| Supply Voltage | Vcc3 | -0.5 | 4.0 | V |
| Storage Temperature | Tst | -10 | 75 | °C |
| Case Operating Temperature | Top | 0 | 70 | °C |

Operating Conditions

| Parameter | Symbol | Min | Typical | Max | Unit |
|----------------------------|--------|------|---------|------|------|
| Supply Voltage | Vcc3 | 3.13 | 3.3 | 3.47 | V |
| Supply current | Icc3 | - | 500 | 720 | mA |
| Operating Case temperature | Tca | 0 | - | 70 | °C |
| Module Power Dissipation | Pm | - | 1.8 | 2.5 | W |

Transmitter Specifications – Optical

| Parameter | Symbol | Min | Typical | Max | Unit |
|-----------------------------------|--|----------------------------|---------|-------------------|-------|
| Center Wavelength-Start of Life | λ_c | $\lambda_c - 25\lambda_c$ | | $\lambda_c + 25$ | pm |
| Center Wavelength-End of life [1] | λ_c | $\lambda_c - 100\lambda_c$ | | $\lambda_c + 100$ | pm |
| Optical Transmit Power | Po | 0 | - | +4 | dBm |
| Optical Transmit Power | PTX_DIS | - | - | -30 | dBm |
| Extinction Ratio | ER | 8.2 | - | - | dB |
| Jitter Generation(P-P) | JG P-P | - | - | 0.1 | UI |
| Jitter Generation(RMS) | JG RMS | - | - | 0.01 | UI |
| Spectral Width (-20dB) | $\Delta\lambda_{20}$ | - | - | 0.3 | nm |
| Side Mode Suppression Ratio | SMSR | 30 | - | - | dB |
| Dispersion penalty (1600ps/nm) | DP | - | - | 2 | dB |
| Relative Intensity Noise | RIN | - | - | -130 | dB/Hz |
| Eye Mask | Compliant with ITU-T G.691 STM-64 eye mask | | | | |

Notes:

1. Wavelength stability is achieved within 60 seconds (max) after power up. λ_c refer to wavelength selection,
2. BER=10⁻¹²; PRBS 2³¹-1@10.3125Gbps

Transmitter Specifications – Electrical

| Parameter | Symbol | Min | Typical | Max | Unit |
|------------------------------|---------|-----|---------|----------|----------|
| Input differential impedance | Rim | - | 100 | - | Ω |
| Differential data Input | VtxDIFF | 120 | - | 850 | mV |
| Transmit Disable Voltage | VD | 2.0 | - | Vcc3+0.3 | V |
| Transmit Enable Voltage | Ven | 0 | - | +0.8 | V |
| Transmit Disable Assert Time | Vn | - | - | 10 | us |

Receiver Specifications – Optical

| Parameter | Bit Rate (Gb/s) | BER | Symbol | Min | Typical | Max | dBm |
|----------------------------|-----------------|-------------|-------------|------|---------|------|-----|
| Sensitivity (0km) | 9.95-10.7 | $<10^{-12}$ | Rsen | | - | -26 | dBm |
| | 11.1 | $<10^{-12}$ | Rsen | | | -25 | dBm |
| | | $<10^{-4}$ | Rsen | | | -28 | dBm |
| | 11.3 | $<10^{-4}$ | Rsen | | | -28 | dBm |
| Sensitivity (80km) | 9.95-10.7 | $<10^{-12}$ | Rsen | | | -22 | dBm |
| | 11.1 | $<10^{-12}$ | Rsen | | | -21 | dBm |
| Maximum Input Power | | | RX-overload | -7 | - | - | dBm |
| Input Operating Wavelength | | | λ | 1260 | - | 1600 | nm |
| Reflectance | | | Rrx | - | - | -27 | dBm |
| Loss of Signal Asserted | | | LOS_A | -37 | - | -30 | dBm |
| LOS De-Asserted | | | LOS_D | - | - | -28 | dBm |
| LOS Hysteresis | | | LOS_H | 0.5 | - | - | dB |

Notes:

1. Measured with ER=9 dB; PRBS $2^{31} - 1$.
2. For 10GEthernet application, -24dBm is equivalent to an OMA of -22.09dBm for an ER = 9 dB.

Receiver Specifications – Electrical

| Parameter | Symbol | Min | Typical | Max | Unit |
|---------------------------|----------|-----|---------|-----------|----------|
| Output differential | Rom | - | 100 | -- | Ω |
| Differential Output Swing | Vout P-P | 350 | - | 850 | mV |
| Rise/Fall Time[1] | Tr / Tf | 24 | - | 40 | ps |
| Loss of Signal –Asserted | VOH | 2 | - | Vcc3+0.3- | V |
| Loss of Signal –Negated | VOL | GND | - | GND+0.5 | V |

Notes:

1. 20%-80%;

C-band λ c Wavelength Guide_100GHz

| ITU Channel | Product Code | Frequency (THz) | Wavelength (nm) | ITU Channel | Product Code | Frequency (THz) | Wavelength (nm) |
|-------------|--------------|-----------------|-----------------|-------------|--------------|-----------------|-----------------|
| 17 | | 191.7 | 1563.86 | 40 | | 194.0 | 1545.32 |
| 18 | | 191.8 | 1563.05 | 41 | | 194.1 | 1544.53 |
| 19 | | 191.9 | 1562.23 | 42 | | 194.2 | 1543.73 |
| 20 | | 192.0 | 1561.42 | 43 | | 194.3 | 1542.94 |
| 21 | | 192.1 | 1560.61 | 44 | | 194.4 | 1542.14 |
| 22 | | 192.2 | 1559.79 | 45 | | 194.5 | 1541.35 |
| 23 | | 192.3 | 1558.98 | 46 | | 194.6 | 1540.56 |
| 24 | | 192.4 | 1558.17 | 47 | | 194.7 | 1539.77 |
| 25 | | 192.5 | 1557.36 | 48 | | 194.8 | 1538.98 |
| 26 | | 192.6 | 1556.55 | 49 | | 194.9 | 1538.19 |
| 27 | | 192.7 | 1555.75 | 50 | | 195.0 | 1537.40 |
| 28 | | 192.8 | 1554.94 | 51 | | 195.1 | 1536.61 |
| 29 | | 192.9 | 1554.13 | 52 | | 195.2 | 1535.82 |
| 30 | | 193.0 | 1553.33 | 53 | | 195.3 | 1535.04 |
| 31 | | 193.1 | 1552.52 | 54 | | 195.4 | 1534.25 |
| 32 | | 193.2 | 1551.72 | 55 | | 195.5 | 1533.47 |
| 33 | | 193.3 | 1550.92 | 56 | | 195.6 | 1532.68 |
| 34 | | 193.4 | 1550.12 | 57 | | 195.7 | 1531.90 |
| 35 | | 193.5 | 1549.32 | 58 | | 195.8 | 1531.12 |
| 36 | | 193.6 | 1548.51 | 59 | | 195.9 | 1530.33 |
| 37 | | 193.7 | 1547.72 | 60 | | 196.0 | 1529.55 |
| 38 | | 193.8 | 1546.92 | 61 | | 196.1 | 1528.77 |
| 39 | | 193.9 | 1546.12 | | | | |

Pin Descriptions

| Pin | Logic | Symbol | Name/Description | Ref. |
|-----|------------|-----------|---|------|
| 1 | | GND | Module Ground | 1 |
| 2 | | VEE5 | Optional –5.2 Power Supply – Not required | |
| 3 | LVTTL-I | Mod-Desel | ect; When held low allows the module to , respond to 2-wire serial interface commands | |
| 4 | LVTTL-O | Interrupt | Indicates presence of an important condition which can be read over the serial 2-wire interface | 2 |
| 5 | LVTTL-I | TX_DIS | Transmitter Disable; Transmitter laser source turned off | |
| 6 | | VCC5 | +5 Power Supply | |
| 7 | | GND | Module Ground | 1 |
| 8 | | VCC3 | +3.3V Power Supply | |
| 9 | | VCC3 | +3.3V Power Supply | |
| 10 | LVTTL-I | SCL | Serial 2-wire interface clock | 2 |
| 11 | LVTTL- I/O | SDA | Serial 2-wire interface data line | 2 |
| 12 | LVTTL-O | Mod_Abs | Module Absent; Indicates module is not present. Grounded in the module. | 2 |
| 13 | LVTTL-O | Mod_NR | Module Not Ready; | 2 |
| 14 | LVTTL-O | RX_LOS | Receiver Loss of Signal indicator | 2 |
| 15 | | GND | Module Ground | 1 |
| 16 | | GND | Module Ground | 1 |
| 17 | CML-O | RD- | Receiver inverted data output | |
| 18 | CML-O | RD+ | Receiver non-inverted data output | |
| 19 | | GND | Module Ground | 1 |
| 20 | | VCC2 | +1.8V Power Supply | |
| 21 | LVTTL-I | Down/RS T | wer Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle. | |
| 22 | | VCC2 | +1.8V Power Supply | |
| 23 | | GND | Module Ground | 1 |
| 24 | PECL-I | RefCLK+ | Reference Clock non-inverted input, AC coupled on the host board | 3 |
| 25 | PECL-I | RefCLK- | Reference Clock inverted input, AC coupled on the host board | 3 |
| 26 | | GND | Module Ground | 1 |
| 27 | | GND | Module Ground | 1 |
| 28 | CML-I | TD- | Transmitter inverted data input | |
| 29 | CML-I | TD+ | Transmitter non-inverted data input | |
| 30 | | GND | Module Ground | 1 |

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

3. Laser output disabled on TX_DIS >2.0V or open, enabled on TDIS <0.8V.
4. Reference Clock input is not required.

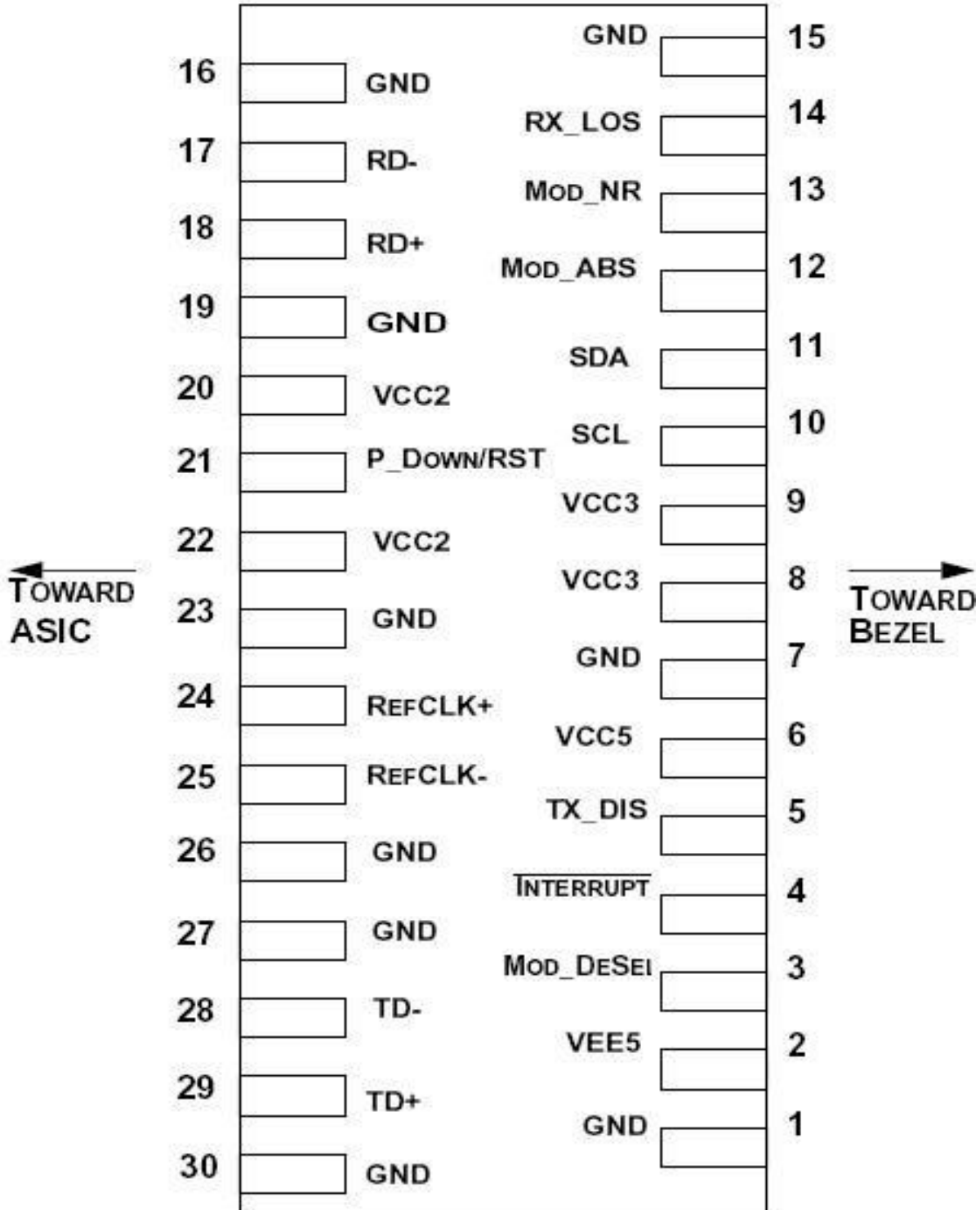


Figure 2. Electrical Pin-out Details

Mechanical Dimensions

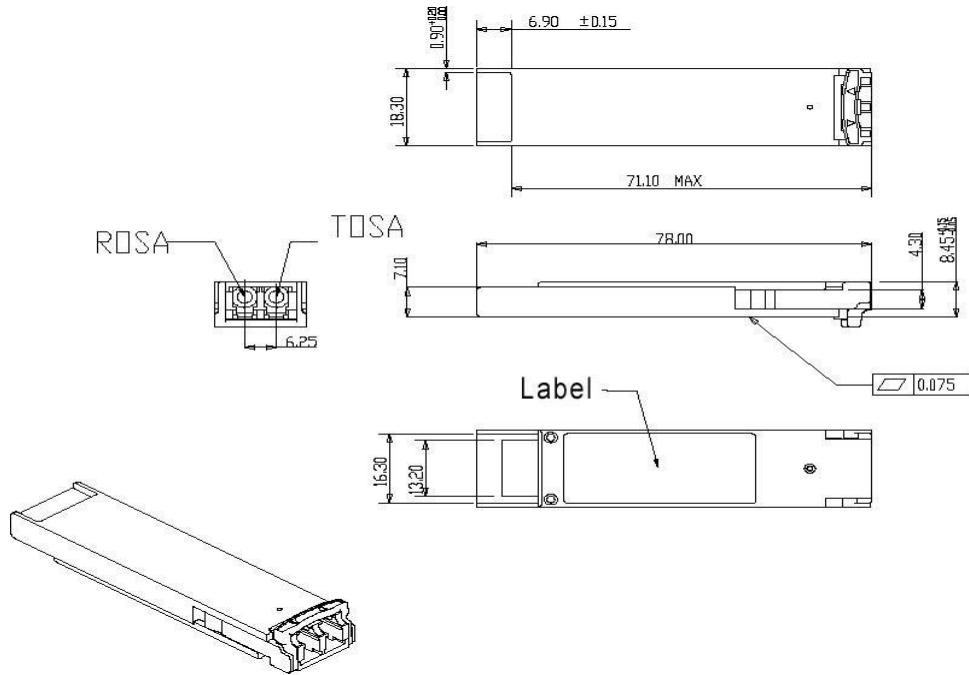


Figure 3. Mechanical Specifications

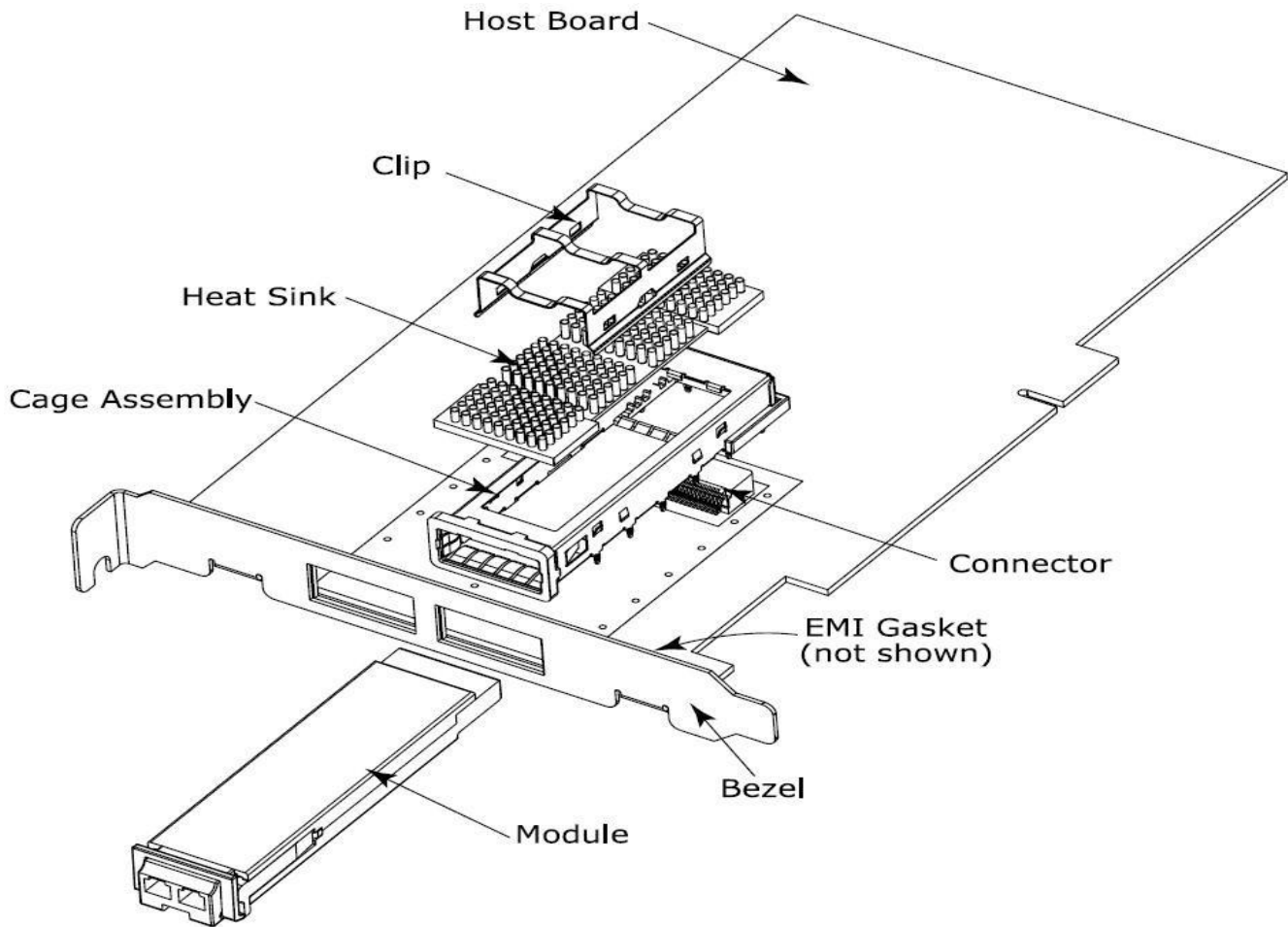


Figure 4. XFP Mechanical Components

The mechanical components defined:

1. The module, clip and connector dimensions are constant for all applications. While the bezel, cage assembly, EMI gasket and heat sink can be designed and/or adjusted for the individual application.
2. The relatively small form factor of the XFP module combined with an adaptable heatsink option allows host system design optimization of module location, heatsink shape/dimension/fins design, and airflow control. The module can be inserted and removed from the cage with the heat sink and clip attached.

Regulatory Compliance

XFP transceiver is designed to be Class I Laser safety compliant and is certified per the following standards:

| Feature | Agency | Standard | Certificate / Comments |
|--------------------------|--------|---|------------------------|
| Laser Safety | FDA | CDRH 21 CFR 1040 and Laser Notice No. 50 | 1120288-000 |
| Product Safety | UL | UL and CUL EN60950-2:2007 | E347511 |
| Environmental protection | SGS | RoHS Directive 2002/95/EC | GZ1001008706/CHEM |
| EMC | WALTEK | EN 55022:2006+A1:2007 EN 55024:1998+A1+A2:2003 - | WT10093768-D-E-E |

References

1. 10 Gigabit Small Form Factor Pluggable Module (XFP) Multi-Source Agreement (MSA), Rev 4.5 – August 2005. Documentation is currently available at <http://www.xfpmsa.org/>
2. IEEE 802.3ae – 2002
3. ITU-T G.709 / ITU-T G.959.1 <http://www.itu.int/>
4. Telcordia GR-253-CORE

ATTENTION:

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Ordering information

| Part Number | Product Description |
|---------------|--|
| NXD-xx192-08C | xx= ITU Grid 17~61, 100GHz, 10Gbps, DWDM XFP 80km, 0°C to 70°C |