


## EMPOWERFIBER 40km XFP Optical Transceiver EX-55192-ERC

### Features

- ◆ XFP MSA Rev 4.5 Compliant
- ◆ Data rate from 9.95Gbps to 11.3Gbps
- ◆ No Reference Clock required
- ◆ Cooled 1550nm EML and PIN receiver
- ◆ link length up to 40km
- ◆ +1.8V,+3.3V,+5V Supply Voltage
- ◆ Low Power Dissipation 3.5W Maximum
- ◆ XFI and lineside loopback Mode Supported
- ◆ -5°C to 70°C Operating Case Temperature
- ◆ Diagnostic Performance Monitoring of module temperature, Supply Voltages, laser bias current, transmit optical power, and receive optical power
- ◆ RoHS6 compliant (lead free) 



### Applications

- ◆ SONET OC-192&SDH STM 64 (with/with out FEC)
- ◆ 10GBASE ER/EW (with/with out FEC)
- ◆ 10G Fiber Channel

### Description

Empowerfiber 40km XFP GX-55192-ER transceiver comply with XFP 4.5MSA, and can support diverse applications for SDH/SONET equipment including FEC (9.95Gb/s to 10.7Gb/s),as well as Ethernet LAN(10.325Gb/s) and WAN(9.95Gb/s) applications. The high performance cooled 1550nm cooled EML transmitter and high sensitivity PIN receiver. Empowerfiber XFP transceiver provides 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.

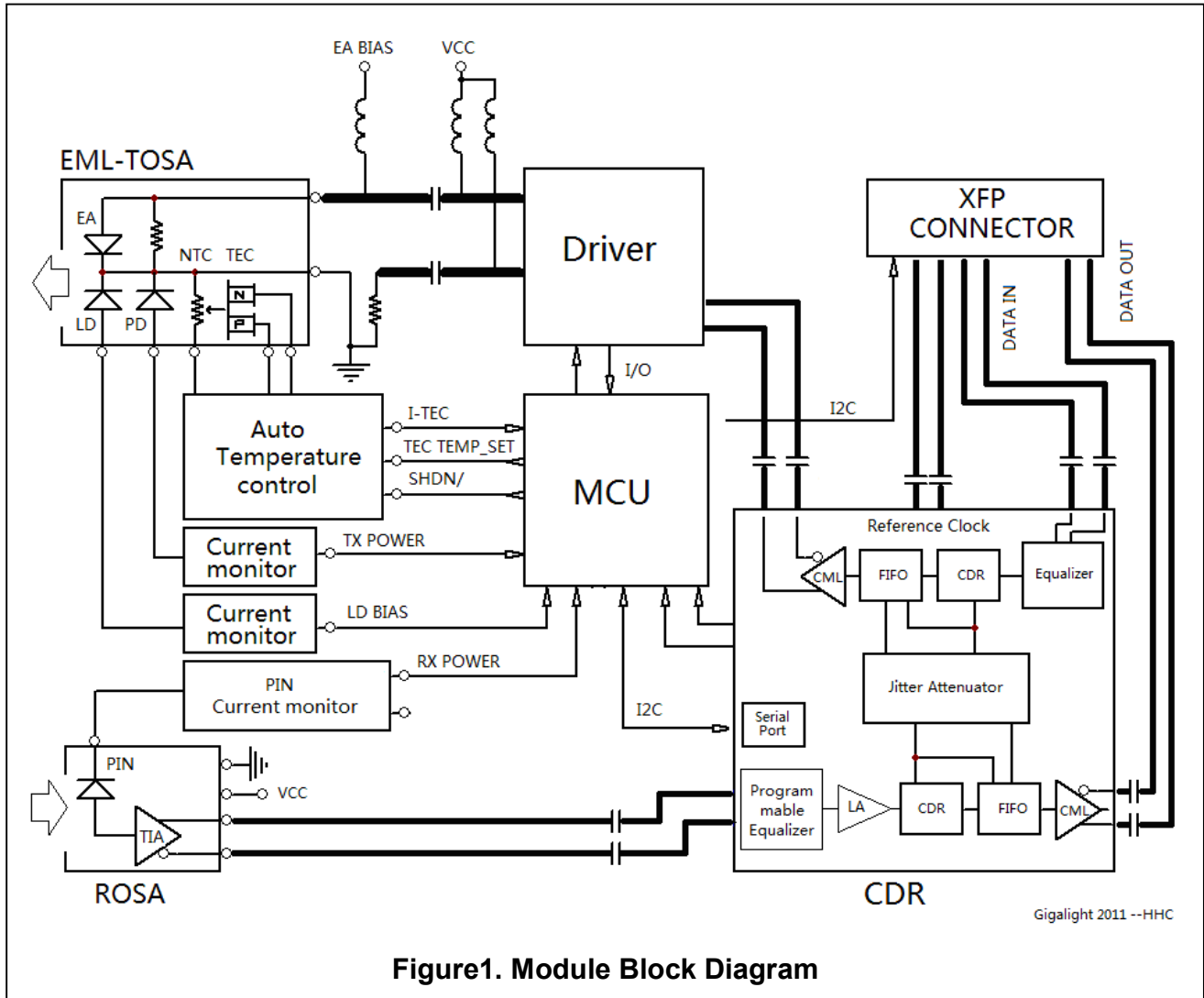


Figure1. Module Block Diagram

### Absolute Maximum Ratings

| Parameter                  | Symbol | Min  | Max | Unit |
|----------------------------|--------|------|-----|------|
| Supply Voltage 1           | Vcc3   | -0.5 | 4.0 | V    |
| Supply Voltage 2           | Vcc5   | -0.5 | 6.0 | V    |
| Supply Voltage 3           | Vcc2   | -0.5 | 2   | V    |
| Storage Temperature        | Tst    | -40  | 85  | °C   |
| Case Operating Temperature | Top    | -5   | 70  | °C   |

## Operating Conditions

| Parameter                  | Symbol | Min  | Typical | Max    | Unit |
|----------------------------|--------|------|---------|--------|------|
| Supply Voltage 1           | Vcc3   | 3.13 | 3.3     | 3.47   | V    |
| Supply current 1           | Icc3   | -    | -       | 380    | mA   |
| Supply Voltage 2           | Vcc5   | 4.75 | 5       | 5.25   | V    |
| Supply current 2 【1】       | Icc5   | -    | -       | 350    | mA   |
| Supply Voltage 3           | Vcc2   | 1.71 | 1.8     | 1.89   | V    |
| Supply current 3           | Icc2   | -    | -       | 680    | mA   |
| Operating Case temperature | Tca    | -5   | -       | 70     | °C   |
| Module Power Dissipation   | Pm     | -    | 2.5     | 3.5[1] | W    |

### Note:

1. Maximum total power value is specified across the full temperature and voltage range.

## Transmitter Specifications – Optical

| Parameter                         | Symbol                                     | Min  | Typical | Max  | Unit  |
|-----------------------------------|--|------|---------|------|-------|
| Center Wavelength                 | $\lambda_c$                                | 1530 |         | 1565 | nm    |
| Optical Transmit Power            | Po   | -1   | -       | +2   | dBm   |
| Optical Modulation Amplitude      | OMA  | -2.1 |         |      |       |
| Optical Transmit Power (disabled) | 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(800ps/nm) [2]  | DP   | -    | -       | 2    | dB    |
| Relative Intensity Noise          | RIN  | -    | -       | -130 | dB/Hz |
| Eye Mask                          | Compliant with ITU-T G.691 STM-64 eye mask |      |         |      |       |

### Note:

1. Wavelength stability is achieved within 60 seconds (max) of power up.
2. BER=10<sup>-12</sup>; PRBS 2<sup>31</sup>-1@9.95Gbps.

## Transmitter Specifications – Electrical

| Parameter                    | Symbol  | Min | Typical | Max      | Unit     |
|------------------------------|---------|-----|---------|----------|----------|
| Input differential impedance | Rim     | -   | 100     | -        | $\Omega$ |
| 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                                      | Symbol      | Min  | Typical | Max   | Unit |
|--|-------------|------|---------|-------|------|
| Input Operating Wavelength                     | $\lambda$   | 1270 | -       | 1600  | nm   |
| Receiver sensitivity 9.95~10.7Gbps[1]          | Pavg        | -    | -       | -16   | dBm  |
| Receiver sensitivity 10.1~11.3Gbps[1]          | Pavg        | -    | -       | -15   | dBm  |
| Receiver sensitivity in 10.3Gbps(OMA) [1]      | Rsen1       | -    | -       | -14.1 | dBm  |
| Stressed receiver sensitivity in 10.3Gbps(OMA) | Rsen2       | -    | -       | -11.3 | dBm  |
| Maximum Input Power                            | RX-overload | -1   | -       | -     | dBm  |
| Reflectance                                    | Rrx         | -    | -       | -27   | dB   |
| LOS Asserted                                   | Lsa         | -28  | -       | -     | dBm  |
| LOS De-Asserted                                | Lda         | -    | -       | -22   | dBm  |
| LOS Hysteresis                                 | Lh          | 0.5  | -       | -     | dB   |

**Note:**

1. BER= $10^{-12}$ ; PRBS  $2^{31}-1$ @9.95Gbps~11.3Gbps.

## Receiver Specifications – Electrical

| Parameter                     | Symbol   | Min | Typical | Max       | Unit     |
|-------------------------------|----------|-----|---------|-----------|----------|
| Output differential impedance | Rom      | -   | 100     | --        | $\Omega$ |
| 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        |

**Note:**

1. 20%-80%;

## Pin Descriptions

| Pin | Logic       | Symbol         | Name/Description   | Ref. |
|-----|-------------|----------------|--|------|
| 1   |             | GND            | Module Ground  | 1    |
| 2   |             | VEE5           | Optional -5.2 Power Supply – <b>Not required</b>   |      |
| 3   | LVTTTL-I    | Mod-Desel      | Module De-select; When held low allows the module to respond to 2-wire serial interface commands   |      |
| 4   | LVTTTL-O    | Interrupt      | Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface   | 2    |
| 5   | LVTTTL-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  | LVTTTL-I    | SCL            | Serial 2-wire interface clock  | 2    |
| 11  | LVTTTL- I/O | SDA            | Serial 2-wire interface data line  | 2    |
| 12  | LVTTTL-O    | Mod_Abs        | Module Absent; Indicates module is not present. Grounded in the module.  | 2    |
| 13  | LVTTTL-O    | Mod_NR         | Module Not Ready;  | 2    |
| 14  | LVTTTL-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  | LVTTTL-I    | P_Down/RS<br>T | Power 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<br>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. Reference Clock input is not required.

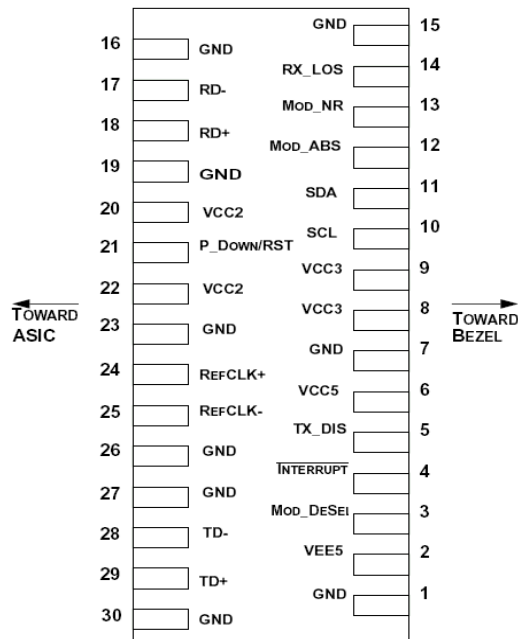


Figure2. Electrical Pin-out Details

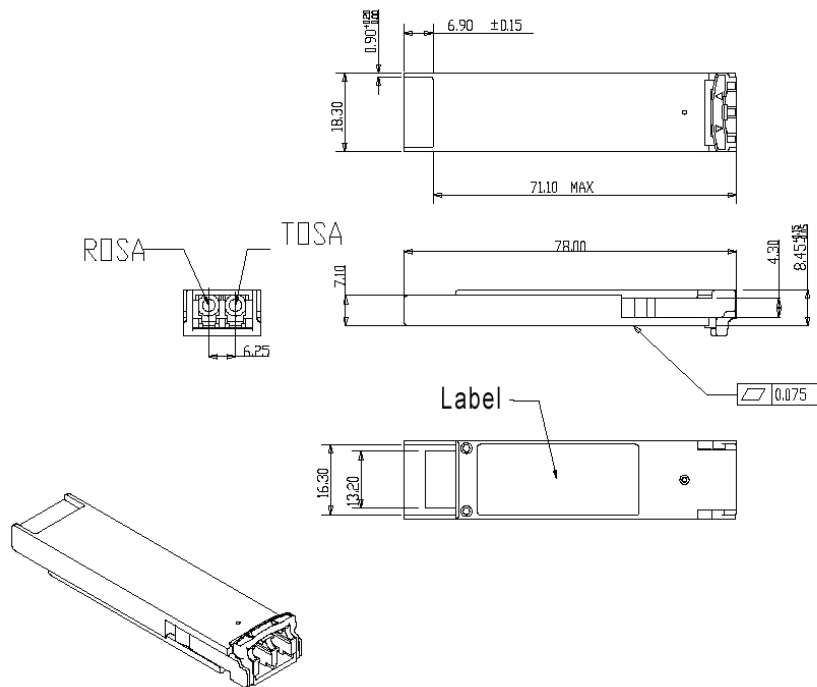
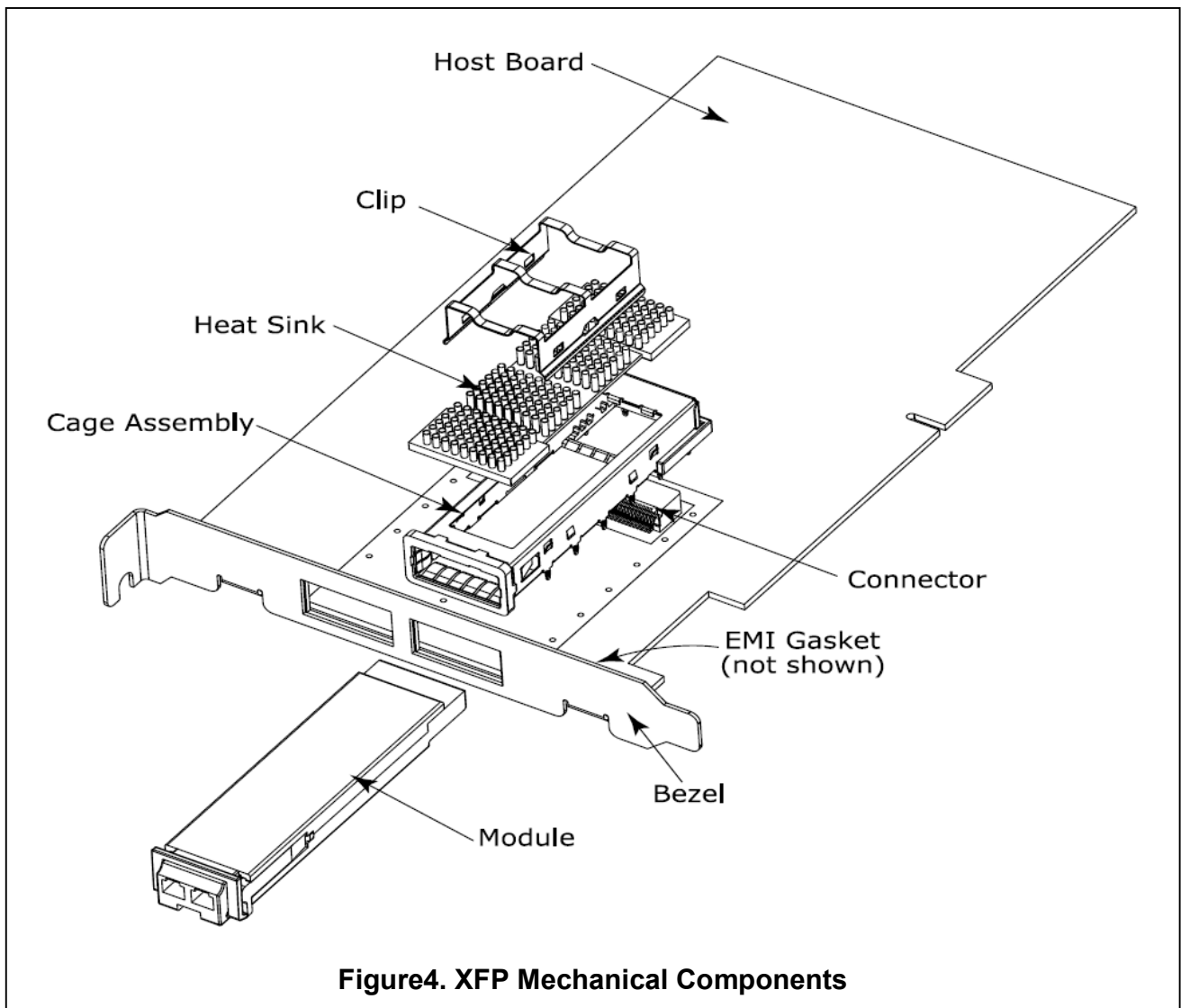


Figure3. Mechanical Specifications



**Figure4. 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

Empowerfiber 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<br>EN 55024:1998+A1+A2:2003 - | WT10093768-D-E-E       |

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