

## AN-XFP-LR-OC192

10GBASE, XFP, LR, (SM)  
1310 NM, 10 KM REACH, LC

## AN-XFP-LR-OC192

10GBASE, XFP, LR Transceiver

### Features

- Supports 8.0Gb/s to 11.1Gb/s bit rates
- Hot-pluggable XFP footprint, Built-in digital diagnos
- Maximum link length of 10 KM with SMF
- 1310nm DFB laser and PIN photodiode
- XFP MSA package with duplex LC connector
- No reference clock required
- Single +3.3V power supply
- Power dissipation <1.5W
- Compatible with RoHS
- Commercial Temperature range: 0 to +70°C

### 1. Description

The XFP module is compliant with the 10G Small Form-Factor Pluggable (XFP) Multi-Source Agreement (MSA), supporting data-rate of 8.0~11.1Gbps, and transmission distance up to 10 KM on SMF.

The transceiver module comprises a transmitter with 1310nm DFB laser and a receiver with a PIN photodiode. Transmitter and receiver are separate within a wide temperature range and offers optimum heat dissipation and excellent electromagnetic shielding thus enabling high port densities for 10 GbE systems.



### Applications

- SONET OC-192&SDH STM-64 at 9.953Gbps
- 10GBASE-LR/LW 10G Ethernet
- 1200-SM-LL-L 10G Fibre Channel
- 10GE over G.709 at 11.09Gbps
- OC192 over FEC at 10.709Gbps
- Other optical links, up to 11.1Gbps

## 2. Absolute Maximum Ratings

Any stress beyond the maximum ratings can result in permanent damage. The device specifications are guaranteed only under the recommended operating conditions.

| Parameter           | Symbol          | Min  | Max | Unit |
|---------------------|-----------------|------|-----|------|
| Supply Voltage      | V <sub>cc</sub> | -0.5 | 4.5 | V    |
| Storage Temperature | T <sub>s</sub>  | -40  | +85 | °C   |
| Operating Humidity  | -               | 5    | 85  | %    |

## 3. Recommended Operating Conditions

| Parameter                               | Symbol          | Min   | Typical | Max   | Unit |
|---|-----------------|-------|---------|-------|------|
| Operating Case Temperature (Commercial) | T <sub>c</sub>  | 0     |         | +70   | °C   |
| Power Supply Voltage @3.3V              | V <sub>cc</sub> | 3.135 | 3.30    | 3.465 | V    |
| Power Supply Current                    | I <sub>cc</sub> |       |         | 500   | mA   |
| Data Rate                               |                 | 8.0   |         | 11.1  | Gbps |

## 4. Optical and Electrical Characteristics

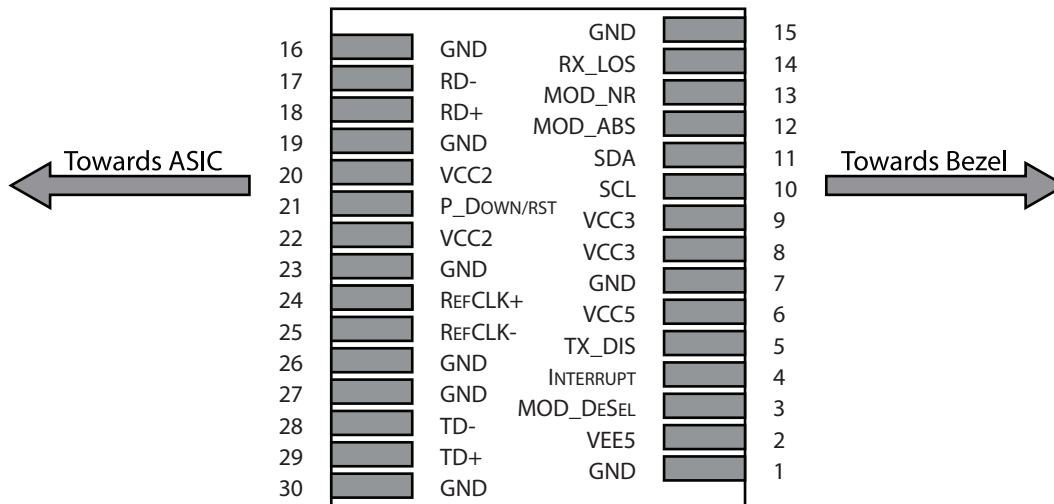
| Transmitter                   |                  |      |      |      |                 |       |
|-------------------------------|------------------|------|------|------|-----------------|-------|
| Parameter                     | Symbol           | Min  | Typ  | Max  | Unit            | Notes |
| Centre Wavelength             | $\lambda_c$      | 127- | 1330 | 1350 | nm              |       |
| Spectral Width (-20dB)        | $\Delta\lambda$  |      |      | 1    | nm              |       |
| Side-Mode Suppression Ratio   | SMSR             | 30   |      |      | dB              |       |
| Average Output Power          | P <sub>out</sub> | -3   |      | +2   | dBm             | 1     |
| Extinction Ratio              | ER               | 6.0  |      |      | dB              | 3     |
| Data Input Swing Differential | V <sub>IN</sub>  | 180  |      | 950  | mV              | 2     |
| Input Differential Impedance  | Z <sub>IN</sub>  | 90   | 100  | 110  | $\Omega$        |       |
| TX Disable                    | Disable          |      | 2.0  |      | V <sub>cc</sub> | V     |
|                               | Enable           |      | 0    |      | 0.8             | V     |
| Receiver                      |                  |      |      |      |                 |       |
| Parameter                     | Symbol           | Min  | Typ  | Max  | Unit            | Notes |
| Centre Wavelength             | $\lambda_c$      | 1260 |      | 1600 | nm              |       |
| Receiver Sensitivity          |                  |      |      | -15  | dBm             | 3     |
| Receiver Overload             |                  | 0.5  |      |      | dBm             | 3     |
| LOS De-Assert                 | LOSD             |      |      | -16  | dBm             |       |
| LOS Assert                    | LOSA             | -26  |      |      | dBm             |       |

| Receiver                       |        |     |     |     |      |       |
|--------------------------------|--------|-----|-----|-----|------|-------|
| Parameter                      | Symbol | Min | Typ | Max | Unit | Notes |
| LOS Hysteresis                 |        | 0.5 |     | 4   | dB   |       |
| Data Output Swing Differential | Vout   | 400 | 600 | 800 | mV   | 2     |
| LOS                            | High   | 2.0 |     | Vcc | V    |       |
|                                | Low    |     |     | 0.8 | V    |       |

**Notes:**

1. The optical power is launched into SMF.
2. Internally AC-coupled.
3. Measured with a PRBS 2<sup>31</sup>-1 test pattern @9953Mbps, BER ≤1×10<sup>-12</sup>.

**5. Pin Descriptions**



| Pin | Logic   | Symbol    | Name/Description   | Notes |
|-----|---------|-----------|--|-------|
| 1   |         | GND       | Module Ground  | 1     |
| 2   |         | VEE5      | Optional -5.2 Power Supply – Not required  |       |
| 3   | LVTTL-I | Mod-Desel | Module De-select; When held low allows the module to, respond to 2-wire serial interface commands                |       |
| 4   | LVTTL-O | Interrupt | Interrupt (bar); 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 – Not required   |       |
| 7   |         | GND       | Module Ground  | 1     |
| 8   |         | VCC3      | +3.3V Power Supply   |       |

| Pin | Logic       | Symbol     | Name/Description  | Notes |
|-----|-------------|------------|---|-------|
| 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 – Not required   |       |
| 21  | LVTTTL-I    | P_Down/RST | 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 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 – Not required   |       |
| 23  |             | GND        | Module Ground   | 1     |
| 24  | PECL-I      | RefCLK+    | Reference Clock non-inverted input, AC coupled on the host board – Not required   | 3     |
| 25  | PECL-I      | RefCLK-    | Reference Clock inverted input, AC coupled on the host board – Not required   | 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:**

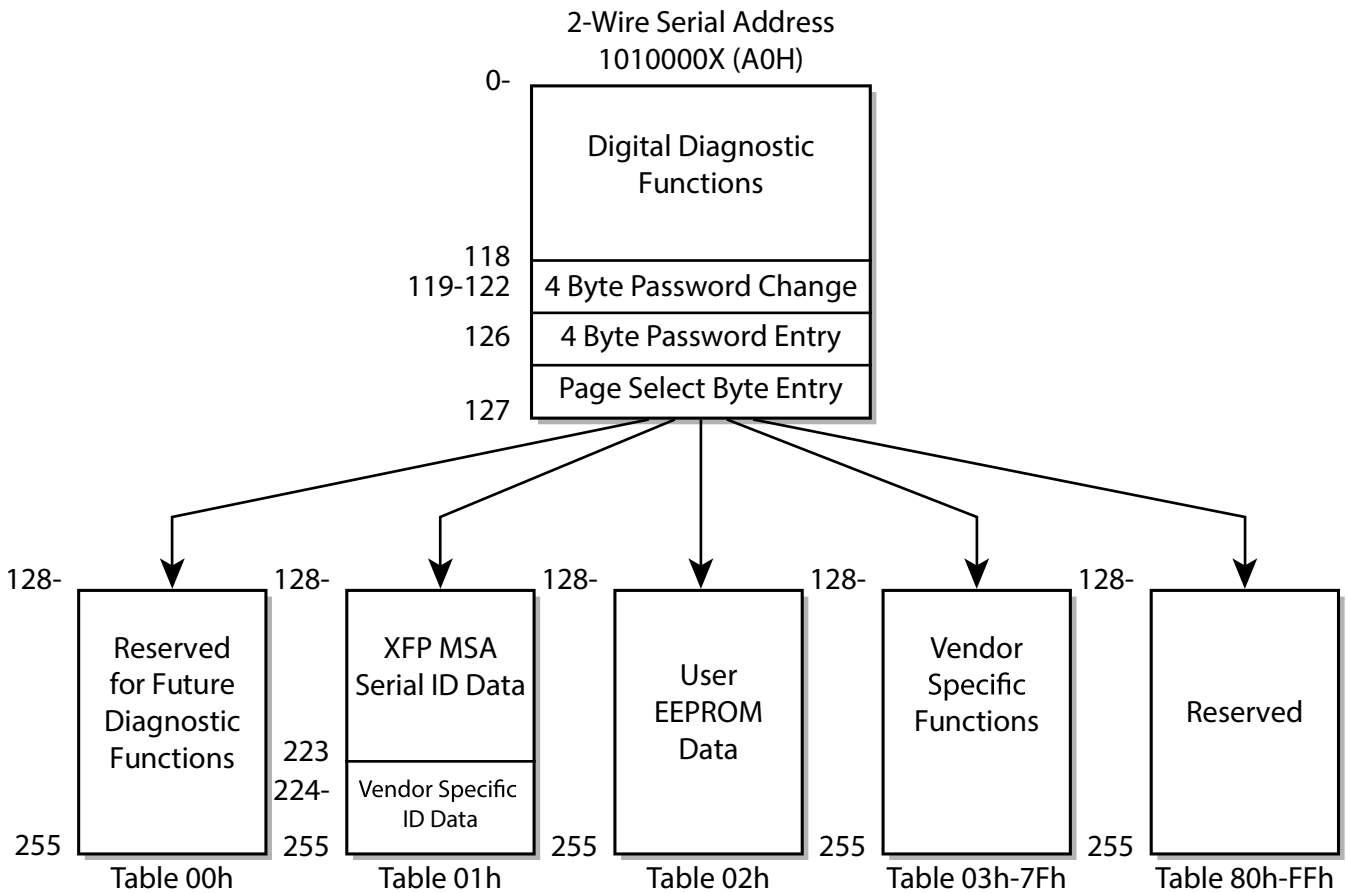
1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector, should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required.

### 6. Management Interface

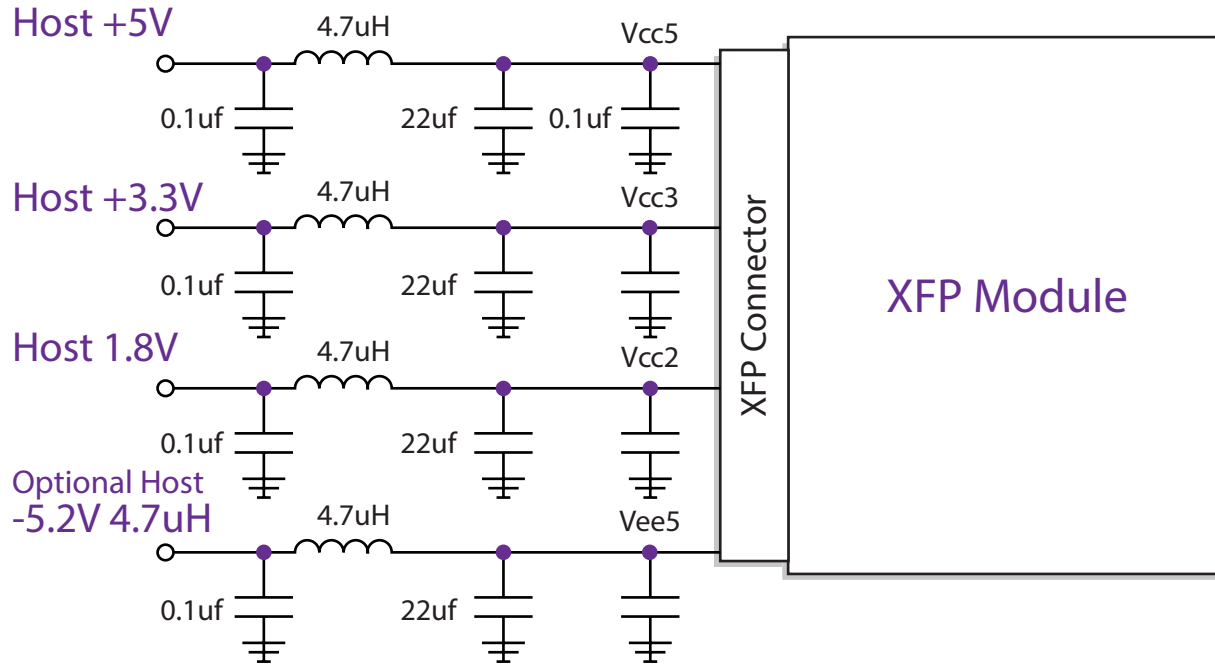
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented.

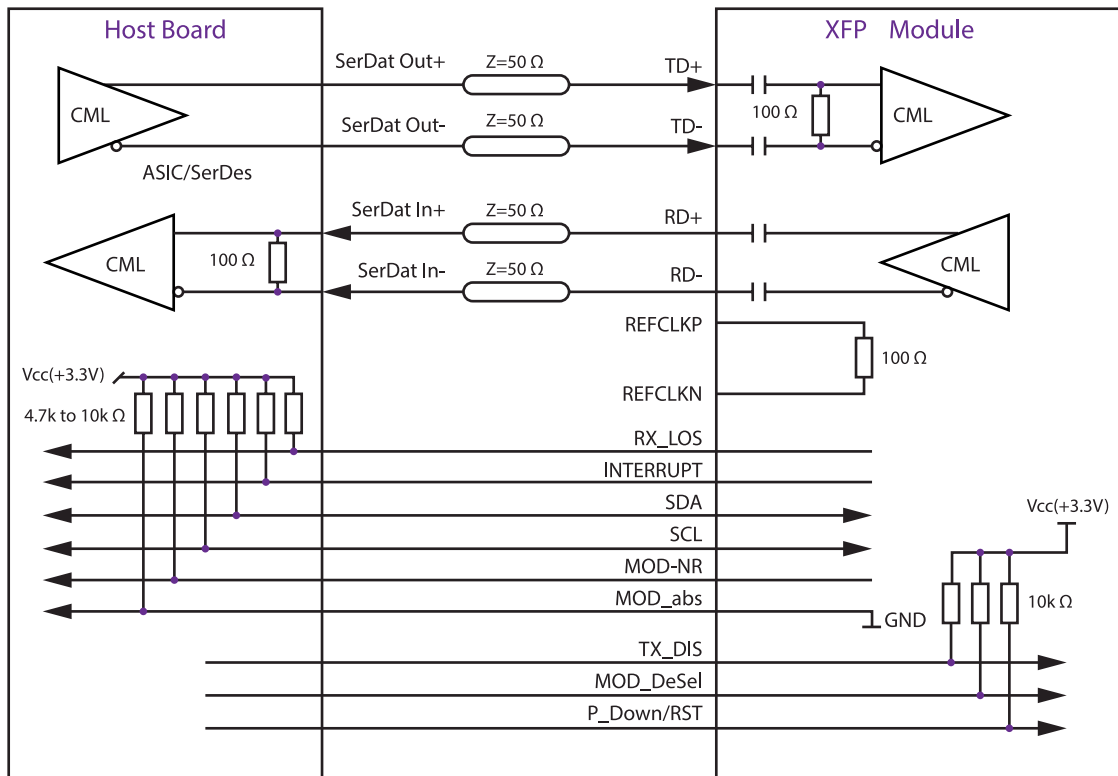
The digital diagnostic memory map specific data field defines as following:



**7. Recommended Host Board Power Supply Circuit**



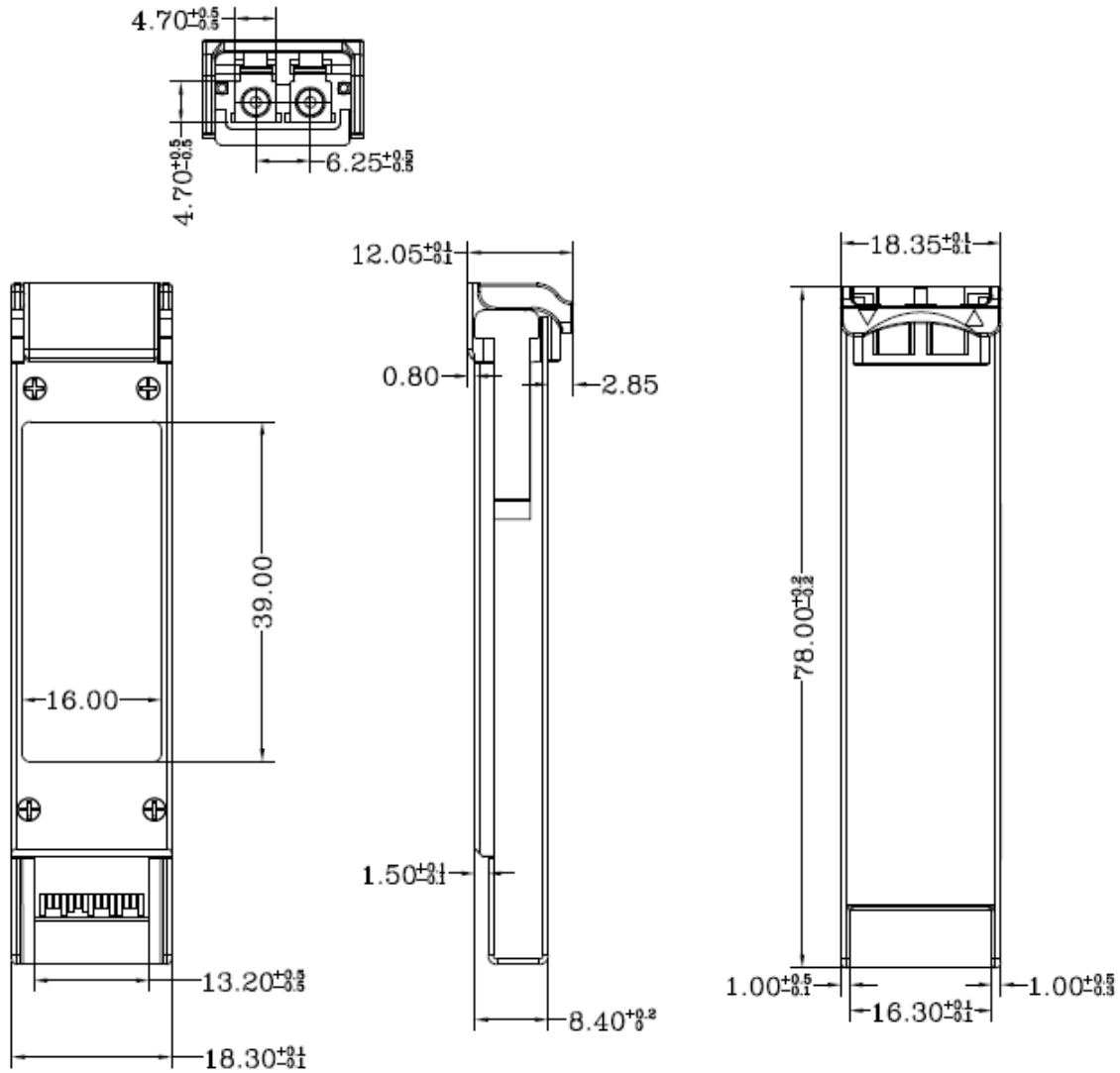
**8. Recommended High-speed Interface Circuit**



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1310 NM, 10 KM REACH, LC

## 9. Mechanical Specifications



## 10. Contact Information

Approved Networks is a leading supplier of Network Transceivers and Connectivity products to Channel Partners, Resellers, and OEMs. With more than 9 years of direct industry experience, our products are resident in the most demanding and mission critical functional networks Worldwide. We serve as a Master Distributor to the largest CMs in the world and deploy the most rigorous testing and firmware management programs to bring the highest level of functional product to the market at a cost that makes sense.

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