

Datasheet

Multi-Rate (10 Gbps) Extended Multi-Mode XFP Transceivers

XFP-10GD-MMX



Overview

MRV Communications' XFP transceivers provide the high speeds and compact dimensions that today's demanding networks require while delivering the deployment flexibility and inventory control that network administrators demand. Designed to Multi-Source Agreement (MSA) standards for broadest compatibility, they perfectly match MRV's wide range of optical transport solutions.

The Fiber Driver® XFP Multi-mode Extender from MRV Communications increases the reach of 10 Gigabit Ethernet, 10 Gigabit Fibre Channel, and Sonet OC-192 data links to distances far beyond the defined standard. Pioneered by MRV Communications, this award-winning technology allows multi-mode (MM) fiber previously used for FDDI, Fast Ethernet, and other legacy protocols to support high-speed communication backbones.

Visit the MRV website at www.mrv.com or contact your nearest authorized MRV Communications dealer for more information.

Highlights

- XFP transceiver
- Data Rates: 9.953 - 11.318 Gbps
- Protocols:
 - SDH STM-64/SONET OC-192, and SONET OC-192 with FEC
 - 10GBASE Ethernet
 - 10G Fibre Channel
 - 10GBASE Ethernet with FEC
 - 10 G Fibre Channel with FEC
- Multi-mode fiber
- Dual Fiber (Tx/Rx)
- 1310 nm
- 0 to 500 m
- DSC connector
- Digital Diagnostics (SFF-8472)
- XFI Loopback
- Hot-swap

Benefits

- Protects investment in existing multi-mode fiber plant while providing a clear migration path to 10 gigabit-speed protocols
- Avoids the cost, complications, and lead times associated with the installation of new fiber
- Seamlessly integrates into existing infrastructure

Specifications Overview

| | |
|-----------------------------|---------------------|
| Data Rate | 9.953 - 11.318 Gbps |
| Tx Wavelength | 1310 nm |
| Tx Power (Minimum) | -6 dBm |
| Tx Disable | Yes |
| Rx Wavelength Range | 1270 - 1600 nm |
| Rx Sensitivity @ 10.5 Gbps | -14.4 dBm |
| Rx Sensitivity @ 11.3 Gbps | -13.4 dBm |
| Rx Saturation | 0.5 dBm |
| Extinction Ratio | 6 dB |
| Operating Temperature Range | -5 to 75°C |
| Power Consumption | < 2 Watt |

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Absolute Maximum Rating

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|----------------------------|-----------|------|------|------|-------|
| Supply Voltage (3.3V) | V_{CC3} | -0.5 | 4.0 | V | - |
| Storage Temperature | T_S | -40 | 85 | °C | - |
| Case Operating Temperature | T_{OP} | -5 | 75 | °C | - |

General Specifications

| Parameter | Symbol | Min | Max | Unit | Notes |
|-----------------------|-----------|-------|------------|------|-------|
| Bit Rate | BR | 9.953 | 11.318 | Gbps | 1 |
| Bit Error Ratio | BER | - | 10^{-12} | - | 2 |
| Transmission Distance | L_{MAX} | 0 | 500 | m | 1,3 |

- Notes:**
- SONET OC-192, SDH STM I-64.1, 10GBASE Ethernet, 10 GFC, SONET OC-192 with FEC, 10GBASE Ethernet + FEC, 10 GFC + FEC.
 - Tested with a $2^{31} - 1$ PRBS
 - Dispersion Limited

Optical Specifications

| Parameter | Symbol | Minimum | Maximum | Unit | Notes |
|-------------------------------------|-------------|---------|---------|-------|-------|
| Transmitter | | | | | |
| Output Optical Power | P_{OUT} | -6 | -1 | dBm | 1 |
| Optical Wavelength | λ | 1290 | 1330 | nm | - |
| Optical Extinction Ratio | ER | 6 | - | dB | 1 |
| Sidemode Suppression Ratio | SSR_{min} | 30 | - | dB | - |
| Tx Jitter Generation (peak-to-peak) | Tx_j | - | 0.1 | UI | - |
| Tx Jitter Generation (RMS) | Tx_{jRMS} | - | 0.01 | UI | - |
| Relative Intensity Noise | RIN | - | -130 | dB/Hz | - |
| Receiver | | | | | |
| Receiver Sensitivity @ 10.5Gbps | R_{SENS1} | - | -14.4 | dBm | 2 |
| Receiver Sensitivity @ 11.3Gbps | R_{SENS2} | - | -13.4 | dBm | 2 |
| Maximum Input Power | P_{MAX} | 0.5 | - | dBm | - |
| Optical Center Wavelength | λ_C | 1270 | 1600 | nm | - |
| LOS Assert | LOS_A | -32 | - | dBm | - |
| LOS De-Assert | LOS_D | - | -18 | dBm | - |
| LOS Hysteresis | - | 0.5 | - | dB | - |
| Receiver Reflectance | R_{rx} | - | -14 | dB | - |

- Notes:**
- Having ER = 6 dB guarantees that the -6 dBm minimum output power meets IEEE 802.3ae requirement of OMA=-5.2dBm.
 - Measured with worst ER; BER< 10^{-12} ; $2^{31}-1$ PRBS. Complies with -12.6 dBm OMA at ER = 6 dB.

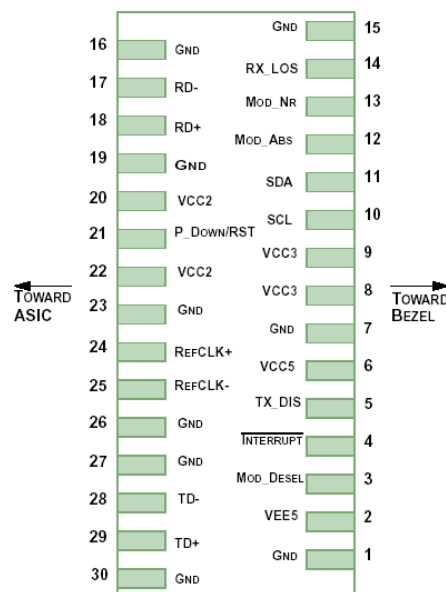
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Electrical Specifications

| Parameter | Symbol | Minimum | Maximum | Unit | Notes |
|--------------------------------|------------------|------------------|----------------|----------|-------|
| Supply Voltage | V_{CC3} | 3.13 | 3.45 | V | - |
| Supply Current | I_{CC3} | - | 600 | mA | - |
| Module Total Power | P | - | 2.0 | W | 1 |
| Transmitter | | | | | |
| Input Differential Impedance | R_{in} | 80 | 120 | Ω | 2 |
| Differential Data Input Swing | $V_{in, pp}$ | 120 | 820 | mV | 3 |
| Transmit Disable Voltage | V_D | 2.0 | V_{CC} | V | 4 |
| Transmit Enable Voltage | V_{EN} | GND | GND+0.8 | V | - |
| Transmit Disable Assert Time | - | - | 10 | us | - |
| Receiver | | | | | |
| Differential Data Output Swing | $V_{out, pp}$ | 340 | 850 | mV | 5 |
| Data Output Rise Time | t_r | - | 38 | ps | 6 |
| Data Output Fall Time | t_f | - | 38 | ps | 6 |
| LOS Fault | $V_{LOS\ fault}$ | GND | $V_{CC\ HOST}$ | V | 7 |
| LOS Normal | $V_{LOS\ norm}$ | - | GND+0.5 | V | 7 |
| Power Supply Rejection | PSR | See Note 8 Below | | | 8 |

- Notes:**
- Maximum total power value is specified across the full temperature and voltage range.
 - After internal AC coupling.
 - SONET/SDH jitter generation requirements are guaranteed with a minimum differential data input swing of 500 mV peak-to-peak.
 - Or open circuit.
 - Into 100 ohms differential termination.
 - 20 – 80 %
 - Loss Of Signal is open collector to be pulled up with a 4.7 k – 10 kohm resistor to 3.15 – 3.6 V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
 - Per Section 2.7.1. in the XFP MSA Specification (Rev 4.5 – August 2005).

Host Board Connector Pinout

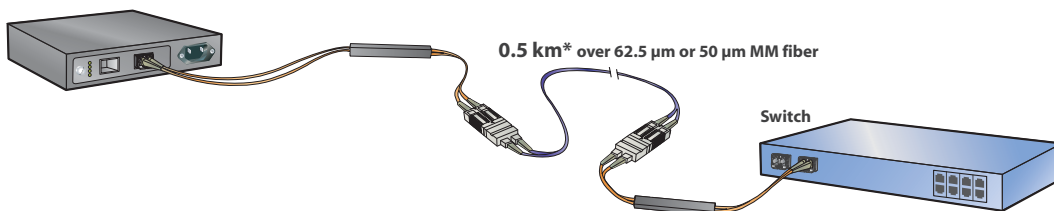


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Host Board Connector Legend

| Pin | Logic | Symbol | Name/Description | Note |
|-----|------------|-------------------------------|--|------|
| 1 | - | GND | Module Ground | 1 |
| 2 | - | V _{EE5} | Optional -5.2 V Power Supply (Not Required) | - |
| 3 | LVTTTL-I | Mod_DeSel | Module De-Select; When Held Low Allows Module to Respond to 2-Wire Serial Interface | - |
| 4 | LVTTTL-O | $\overline{\text{Interrupt}}$ | $\overline{\text{Interrupt}}$; Indicates Presence of an Important Condition Which Can Be Read Over the 2-Wire Serial Interface | 2 |
| 5 | LVTTTL-I | TX_DIS | Transmitter Disable; Transmitter Laser Source Turned Off | - |
| 6 | - | V _{CC5} | +5 V Power Supply (Not Required) | - |
| 7 | - | GND | Module Ground | 1 |
| 8 | - | V _{CC3} | +3.3 V Power Supply | - |
| 9 | - | V _{CC3} | +3.3 V Power Supply | - |
| 10 | LVTTTL-I/O | SCL | 2-Wire Serial Interface Clock | 2 |
| 11 | LVTTTL-I/O | SDA | 2-Wire Serial Interface Data Line | 2 |
| 12 | LVTTTL-O | Mod_Abs | Indicates Module is Not Present. Grounded in the Module | 2 |
| 13 | LVTTTL-O | Mod_NR | Module Not Ready; Indicating Module Operational Fault | 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 | - | V _{CC2} | +1.8 V 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 | - | V _{CC2} | +1.8 V 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 |

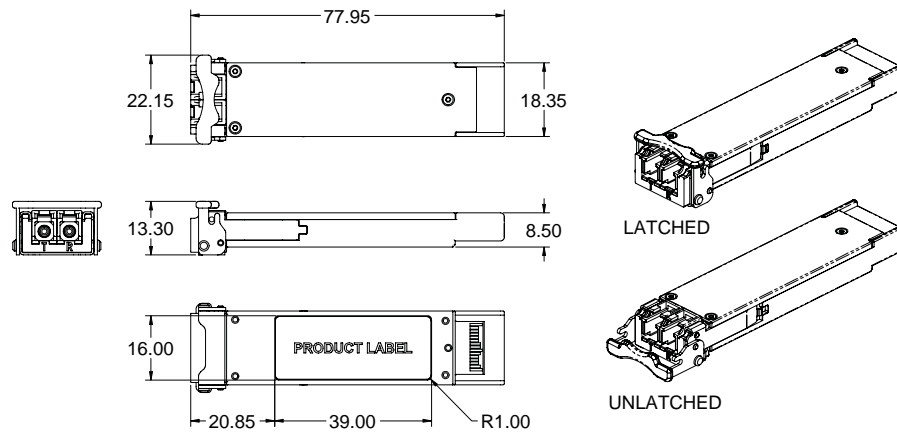
- Notes:**
1. Module circuit ground is isolated from module chassis ground within the module.
 2. Open collector; should be pulled up with 4.7 k – 10 kohms on host board to a voltage between 3.15 V and 3.6 V.
 3. A Reference Clock input is not required by the XFP-10GD-LR. If present, it will be ignored.



* 0.5 km. Maximum range depends upon grade and condition of fiber plant used.

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Mechanical Drawing



XFP Transceiver (dimensions are in mm)

Ordering Information

| Model | Description | Data Rate (Gbps) | Wavelength (nm) | Bail Latch Color | Maximum Distance Range (m) |
|--------------|---|------------------|-----------------|------------------|----------------------------|
| XFP-10GD-MMX | OC192/STM-64, 10GE or 10G FC, extended multi-mode XFP transceiver with Digital Diagnostics. | 9.953 - 11.318 | 1310 | Blue | 0 - 500 |

Regulatory and Industry Compliances

Class 1 Laser Product, complies with EN 60825-1 and 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007
MSA INF-8077i; Digital Diagnostic SFF-8472

Certified by one or more of the following agencies: TÜV, UL, CSA

RoHS Directive; China RoHS; California RoHS Law, REACH Directive SVHC; WEEE Directive

The Quality Management System is certified to ISO 9001 by QMI-SAI Global

The Environmental Management System is in compliance with ISO 14001

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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