

Datasheet

Multi-Rate (10 Gbps) 80 km Single-Mode XFP Transceivers

XFP-10GD-LR2



Highlights

- XFP transceiver
- Data Rates: 9.95 - 10.7 Gbps
- Compliant protocols:
 - Ethernet (10GBase-ZR/ZW [LAN/WAN])
 - Fibre Channel (10 Gbps)
 - SDH (STM-64, STM-64 with FEC)
 - SONET (OC-192, OC-192 with FEC)
- Single-mode fiber
- 1550 nm
- 40 to 80 km
- Duplex LC connector
- Digital Diagnostics (SFF-8472)
- XFI Loopback
- Hot-swap

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.

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

Specifications Overview	
Data Rate	9.95 - 10.7 Gbps
Tx Wavelength	1550 nm
Tx Power (Minimum)	0 dBm
Tx Disable	Yes
Rx Wavelength Range	1270 - 1600 nm
Rx Sensitivity @ 9.95 Gbps	-24 dBm
Rx Sensitivity @ 10.7 Gbps	-23 dBm
Rx Saturation	-7 dBm
Dispersion Penalty @ 9.95 Gbps	2 dBm
Dispersion Penalty @ 10.7 Gbps	3 dBm
Operating Temperature Range	-5 to 75°C
Power Consumption	3.5 Watt

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Optical Specifications

Parameter	Symbol	Minimum	Maximum	Unit	Notes
Transmitter					
Output Optical Power @ 9/125 SMF	P_{OUT}	0	4	dBm	-
Center Wavelength	λ_C	1530	1565	nm	-
Extinction Ratio	ER	9	-	dB	-
Sidemode Suppression Ratio	SSR_{min}	30	-	dB	-
Tx Jitter Generation (peak-to-peak)	Tx_j	-	0.1	UI	1
Tx Jitter Generation (RMS)	Tx_{jRMS}	-	0.01	UI	2
Relative Intensity Noise	RIN	-	-130	dB/Hz	-
Receiver					
Receiver Sensitivity @ 9.95 Gbps	R_{SENS1}	-	-24	dBm	3, 4
Receiver Sensitivity @ 10.7 Gbps	R_{SENS2}	-	-23	dBm	3
Maximum Input Power	P_{MAX}	-7	-	dBm	-
Center Wavelength	λ_C	1270	1600	nm	-
Path Penalty at 1600 ps/nm @ 9.95 Gbps	DP_1	-	2	dB	5
Path Penalty at 1600 ps/nm @ 10.7 Gbps	DP_2	-	3	dB	5
LOS Assert	LOS_A	-37	-	dBm	-
LOS De-Assert	LOS_D	-	-30	dBm	-
LOS Hysteresis	-	0.5	-	dB	-
Receiver Reflectance	R_{rx}	-	-27	dB	-

- Notes:**
1. Measured with a host jitter of 50 mUI peak-to-peak.
 2. Measured with a host jitter of 7 mUI RMS.
 3. Measured at 1528-1600nm with worst ER; BER<10⁻¹²; PRBS31.
 4. Equivalent to -22.1 dBm OMA at ER = 9 dB.
 5. Dispersion penalty is measured in loopback using 18 ps/(nm*km) fiber (SMF-28).

Absolute Maximum Rating

Parameter	Symbol	Min.	Max.	Unit	Notes
Maximum Supply Voltage (1.8 V)	V_{CC2}	-0.5	2.0	V	-
Maximum Supply Voltage (3.3 V)	V_{CC3}	-0.5	4.0	V	-
Maximum Supply Voltage (5.0 V)	V_{CC5}	-0.5	6.0	V	-
Storage Temperature	T_S	-40	85	°C	-
Case Operating Temperature	T_{OP}	-5	70	°C	-

General Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Bit Rate	BR	9.95	10.7	Gbps	1
Bit Error Ratio	BER	-	10 ⁻¹²	-	2
Maximum Supported Link Length	L_{MAX}	20	80	km	1

- Notes:**
1. ITU-T G.959.1 P1L1-2D2, 10GBASE-ZR/ZW 10G Ethernet, 10G Fibre Channel, SONET OC-192 with FEC, ITU-T G.709.
 2. Tested with a 2³¹ - 1 PRBS

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Electrical Specifications

Parameter	Symbol	Minimum	Maximum	Unit	Notes
Supply Voltage (1.8 V)	V_{CC2}	1.71	1.89	V	-
Supply Voltage (3.3 V)	V_{CC3}	3.13	3.46	V	-
Supply Voltage (5.0 V)	V_{CC5}	4.75	5.25	V	-
Supply Current - V_{CC2} Supply	I_{CC2}	-	750	mA	-
Supply Current - V_{CC3} Supply	I_{CC3}	-	400	mA	-
Supply Current - V_{CC5} Supply	I_{CC5}	-	350	mA	-
Module Total Power	P	-	3.5	W	1
Transmitter					
Input Differential Impedance	R_{in}	80	120	Ω	2
Differential Data Input Swing	V_{in} , pp	120	820	mV	-
Transmit Disable Voltage	V_D	2.0	V_{CC}	V	3
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	4
Data Output Rise Time	t_r	-	38	ps	5
Data Output Fall Time	t_f	-	38	ps	5
LOS Fault	$V_{LOS\ fault}$	$V_{CC} - 0.5$	$V_{CC\ HOST}$	V	6
LOS Normal	$V_{LOS\ norm}$	GND	GND + 0.5	V	6
Power Supply Rejection	PSR	See Note 6 Below			7

- Notes:**
1. Maximum total power value is specified across the full temperature and voltage range.
 2. After internal AC coupling.
 3. Or open circuit.
 4. Into 100 ohms differential termination.
 5. 20 – 80 %
 6. 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.
 - 7.

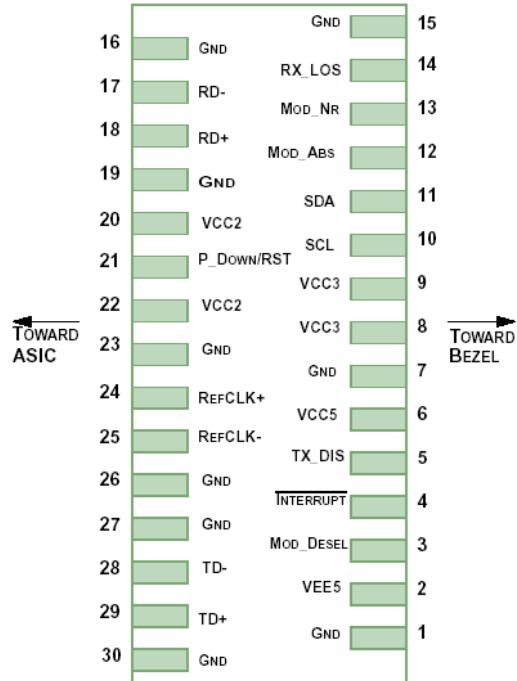
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Host Board Connector Legend				
Pin	Logic	Symbol	Name/Description	Note
1	-	GND	Module Ground	1
2	-	V _{EE5}	Optional -5.2 V Power Supply (Not Required)	-
3	LVTTL-I	Mod_DeSel	Module De-Select; When Held Low Allows Module to Respond to 2-Wire Serial Interface	-
4	LVTTL-O	$\overline{\text{Interrupt}}$	Interrupt (bar); Indicates Presence of an Important Condition Which Can Be Read Over the 2-Wire Serial Interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter Laser Source Turned Off	-
6	-	V _{CC5}	+5 V Power Supply	-
7	-	GND	Module Ground	1
8	-	V _{CC3}	+3.3 V Power Supply	-
9	-	V _{CC3}	+3.3 V Power Supply	-
10	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
11	LVTTL-I/O	SDA	2-Wire Serial 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; MRV defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX.	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	-	V _{CC2}	+1.8 V Power Supply	-
21	LVTTL-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	-
23	-	GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock Non-Inverted Input, AC Coupled on the Host Board (Not Required)	-
25	PECL-I	RefCLK-	Reference Clock Inverted Input, AC Coupled on the Host Board (Not Required)	-
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

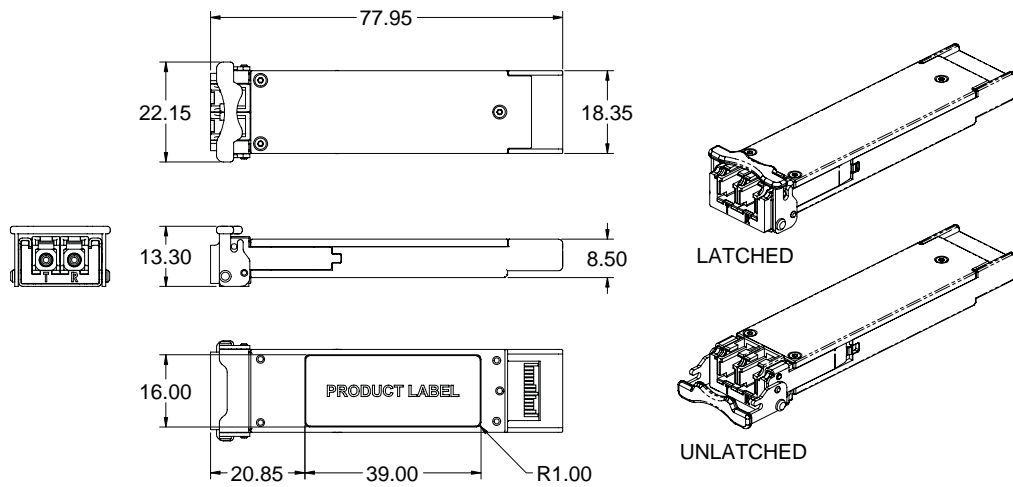
- Notes:**
1. Module circuit ground is isolated from module chassis ground within the module.
 2. Open collector; should be pulled up with 4.7 k – 10 kohms on host board to a voltage between 3.15 V and 3.6 V.

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Host Board Connector Pinout



Mechanical Drawing



XFP Transceiver (dimensions are in mm)



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Ordering Information

Model	Description	Data Rate (Gbps)	Wavelength (nm)	Bail Latch Color	Distance Range (km)
XFP-10GD-LR2	OC-192/STM-64, 10GE or 10G FC, single-mode XFP transceiver with Digital Diagnostics.	9.95 - 10.7	1550	White	40 - 80

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-8077; Digital Diagnostic SFF-8472; ITU-T G.959.1 P1L1-2D2, G.709

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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