



## PRELIMINARY

## 10 Gbps Multirate XFP Transceivers



### Features

- 120 km with Electronic Dispersion Compensation (EDC), 80 km, and 40 km reach models
- 9.95 Gbps, 10.31 Gbps, 10.52 Gbps, 10.7 Gbps, 11.1 Gbps, and 11.3 Gbps support
- Digital Diagnostics
- XFI high-speed electrical interface
- Cooled EML with isolator
- APD receiver (120 km and 80 km) and PIN receiver (40 km)
- Power consumption under 3.5 watts
- -5° to 70° C operating temperature range
- XFP MSA Rev 4.5 compliance
- RoHS and China RoHS compliance
- Class 1 Laser, 21CFR 1040.10/1040.11 compliance
- EN 60825-1/A1:2002 compliance
- USA and Canada UL listing

### Absolute Maximum Rating

Parameter	Symbol	Min.	Typical	Max.	Unit
Maximum Supply Voltage (3.3V)	V <sub>cc3</sub>	-0.3	-	3.6	V
Maximum Supply Voltage (5.0V)	V <sub>cc5</sub>	-0.3	-	5.5	V
Maximum Supply Voltage (1.8V)	V <sub>cc2</sub>	-0.3	-	2	V
Storage Temperature	T <sub>st</sub>	-40	-	85	°C

### General Operations

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage (1.8V)	V <sub>cc2</sub>	1.71	1.8	1.89	V
Supply Voltage (3.3V)	V <sub>cc3</sub>	3.14	3.3	3.47	V
Supply Voltage (5V)	V <sub>cc5</sub>	4.75	5	5.25	V
Total Current on Any Pin	I <sub>cc</sub>	-	-	500	mA
Inrush Current (1.8V)	I <sub>inrush2</sub>	-	-	1	A
Inrush Current (3.3V)	I <sub>inrush3</sub>	-	-	0.75	A
Inrush Current (5V)	I <sub>inrush5</sub>	-	-	0.5	A
Module Current Ramp Rate	-	-	-	100	mA/μS
Power on 1.8V Rail	P <sub>2rail</sub>	-	-	1.8	W
Power on 3.3V Rail	P <sub>3rail</sub>	-	-	2.5	W
Power on 5V Rail	P <sub>5rail</sub>	-	-	2.5	W
Module Total Power Consumption	P <sub>t</sub>	-	-	3.5	W
Power Consumption-P_Down Mode	P <sub>p_d</sub>	-	-	1.5	W
Power Supply Noise Rejection	PSNR	Compliant to Section 2.7.2 of XFP MSA			
Bit Rate	BR	9.95	-	11.3	Gbps
Operating Temperature (case)	T <sub>op</sub>	-5	-	70	°C
Storage Temperature	T <sub>st</sub>	-40	-	85	°C



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### Transmitter Specifications (Electrical)

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedance	$R_{in}$	-	100	-	$\Omega$
Differential Data Input Swing	$V_{in,p-p}$	120	-	820	mV
TxDisable_Disable	$V_d$	2	-	$V_{cc3}$	V
TxDisable_Enable	$V_{en}$	GND	-	GND+0.8	V

### Transmitter Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Output Power: <b>XFP-10GD-LR12P</b>	$P_O$	-2	0	2	dBm
<b>XFP-10GD-LR08P</b>	$P_O$	0	2	4	dBm
<b>XFP-10GD-IR04P</b>	$P_O$	-1	0.5	2	dBm
Average Launch Power Tx_Off	$P_{off}$	-	-	-30	nm
Extinction Ratio: <b>XFP-10GD-LR12P</b>	ER	8.2	-	-	dB
<b>XFP-10GD-LR08P</b>	ER	9	-	-	dB
<b>XFP-10GD-IR04P</b>	ER	8.2	-	-	dB
Eye Mask	ITU-T G.691, Telecordia GR-253-CORE, IEEE802.3 10GBASE-ZR Compliant				
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Wavelength	$\lambda$	1530	-	1565	nm
Spectral Width	$\Delta\lambda_{20}$	-	-	1	nm
Jitter Generation (peak-to-peak)	$J_{gen(pk-pk)}$	-	-	0.1	UI
Jitter Generation (RMS)	$J_{gen(RMS)}$	-	-	0.01	UI
Dispersion Penalty at 2400 ps/nm <sup>a</sup>	DP	-	-	2	dB
Relative Intensity Noise	RIN	-	-	-130	dB/Hz
Reflectance Tolerance	$ref_T$	-	-	-27	dB

### Receiver Specifications (Electrical)

Parameter	Symbol	Min	Typical	Max	Unit
Reference Differential Output Impedance	$Z_d$	-	100	-	$\Omega$
Differential Data Output Swing	$V_{out,p-p}$	340	-	850	mV
Output Rise Time, 20-80%	$t_r$	24	-	-	ps
Output Fall Time, 20-80%	$t_f$	24	-	-	ps
LOS Fault	$V_{LOS\_fault}$	host_Vcc3 - 0.5	-	host_Vcc3	V
LOS Normal	$V_{LOS\_normal}$	GND	-	GND + 0.4	V



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Receiver Specifications (Optical)						
Parameter	Symbol	Min	Typical	Max	Unit	
Sensitivity (9.95 Gb/s):	XFP-10GD-LR12P <sup>a</sup>	R <sub>Xsens995</sub>	-	-	-24	dBm
	XFP-10GD-LR08P <sup>b</sup>	R <sub>Xsens995</sub>	-	-	-24	dBm
	XFP-10GD-IR04P <sup>a</sup>	R <sub>Xsens995</sub>	-	-	-16	dBm
Sensitivity (10.7 Gb/s):	XFP-10GD-LR12P <sup>a</sup>	R <sub>Xsens1070</sub>	-	-	-23	dBm
	XFP-10GD-LR08P <sup>b</sup>	R <sub>Xsens1070</sub>	-	-	-23	dBm
	XFP-10GD-IR04P <sup>a</sup>	R <sub>Xsens1070</sub>	-	-	-15	dBm
Overload:	XFP-10GD-LR12P <sup>a</sup>	R <sub>X OL</sub>	-7	-	-	dBm
	XFP-10GD-LR08P <sup>b</sup>	R <sub>X OL</sub>	-7	-	-	dBm
	XFP-10GD-IR04P <sup>a</sup>	R <sub>X OL</sub>	0	-	-	dBm
Wavelength <sup>c</sup>	$\lambda$	1528	-	1561	nm	
Optical Return Loss	ORL	-	-	-27	dB	
LOS Assert:	XFP-10GD-LR12P	-	-34	-	-	dBm
	XFP-10GD-LR08P	-	-34	-	-	dBm
	XFP-10GD-IR04P	-	-24	-	-	dBm
LOS De-assert:	XFP-10GD-LR12P	-	-	-24	-	dBm
	XFP-10GD-LR08P	-	-	-24	-	dBm
	XFP-10GD-IR04P	-	-	-16	-	dBm
LOS Hysteresis	-	0.5	-	-	dB	

a) At 8.2dB ER, 1<sup>e-12</sup> BER, 2<sup>31</sup>-1 PRBS, back to back

b) At 9dB ER, 1<sup>e-12</sup> BER, 2<sup>31</sup>-1 PRBS, back to back

c) Operational over 1200 - 1625 nm range

Reference Clock					
Parameter	Symbol	Min	Typical	Max	Unit
Clock Differential Input Impedance	Z <sub>d</sub>	80	100	120	$\Omega$
Differential Input Clock Amplitude (p-p)	-	640	-	1600	mV
Reference Clock Duty Cycle	-	40	-	60	%
Reference Clock Rise/Fall Time (20%-80%)	T <sub>r</sub> /T <sub>f</sub>	200	-	1250	ps
Reference Clock Frequency	f <sub>0</sub>	-	Baud/64	-	MHz



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Pin Out Definition				
Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V power supply (not used)	
3	LVTTTL-I	Mod_DeSel	Module De-Select; when held low allows module to respond to 2-wire interface interface	
4	LVTTTL-O	Interrupt	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; turns off transmitter laser output	
6		Vcc5	+5 V Power Supply	
7		GND	Module Ground	1
8		Vcc3	+3.3 V Power Supply	
9		Vcc3	+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		Vcc2	+1.8 V Power Supply	
21	LVTTTL-I	P_Down/RST	Power Down; When high, requires the module to limit power consumption to 1.5 W or below. 2-wire serial interface must be functional in the low power mode. Reset; the falling edge initiates a complete rest of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		Vcc2	+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	
25	PECL-I	RefCLK-	Reference Clock Inverted Input, AC coupled on the host board	
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

**Note:**

1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Shall be pulled up with 4.7k-10kohms to a voltage between 3.15 V and 3.45 V on the host board.

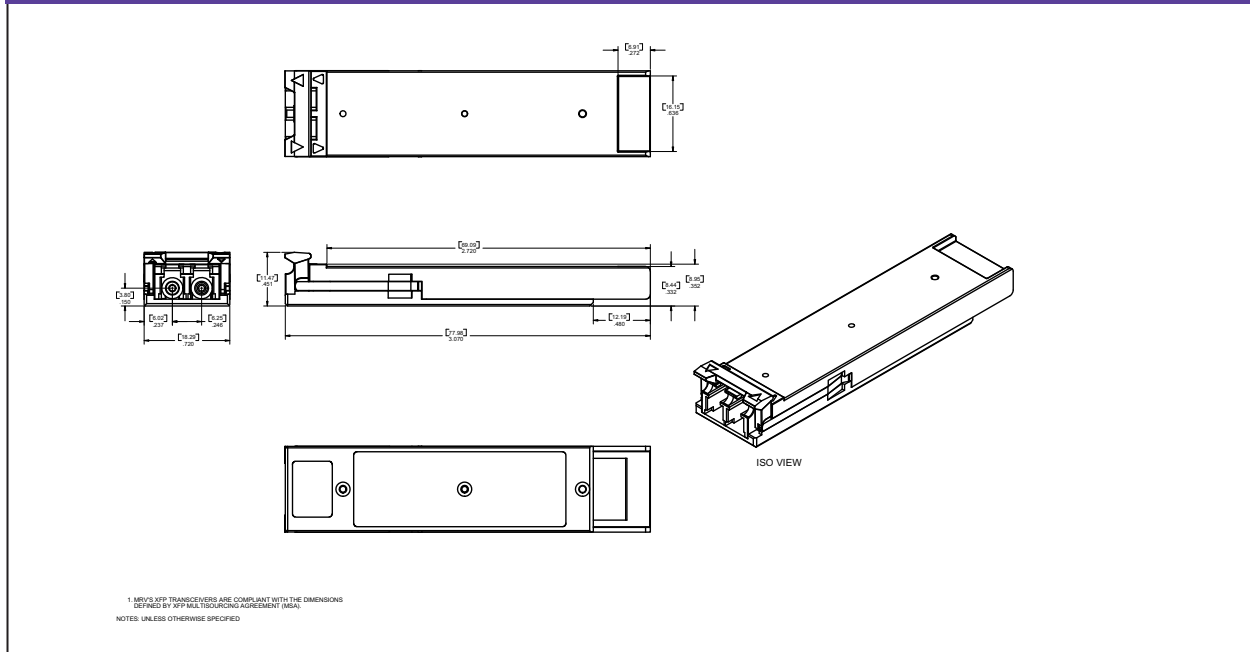


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## Ordering Information

Model	Description	Data Rate	Wavelength (nm)	Bail Latch Color	Distance (km)
XFP-10GD-LR12P	10 Gbps Multirate XFP Transceiver	9.95 - 11.3 Gbps	1550	White	120
XFP-10GD-LR08P	10 Gbps Multirate XFP Transceiver	9.95 - 11.3 Gbps	1550	White	80
XFP-10GD-LR04P	10 Gbps Multirate XFP Transceiver	9.95 - 11.3 Gbps	1550	White	40

## Mechanical Drawing



## 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.

MRV has more than 50 offices throughout the world. Addresses, phone numbers, and fax numbers are listed at [www.mrv.com](http://www.mrv.com). Please e-mail us at [sales@mrv.com](mailto:sales@mrv.com) or call us for assistance.

**MRV (West Coast USA)**  
20415 Nordhoff St.  
Chatsworth, CA 91311  
800-338-5316  
818-773-0900

**MRV (East Coast USA)**  
295 Foster St.  
Littleton, MA 01460  
800-338-5316  
978-952-4700

**MRV (International)**  
Business Park Moerfelden  
Waldeckerstrasse 13  
64546 Moerfelden-Walldorf  
Germany  
Tel. (49) 6105/2070  
Fax. (49) 6105/207-100

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