

**Datasheet**

## 10 Gbps Dual Rate 850 nm Multi-Mode XFP Transceivers

XFP-10GD-SX



### Highlights

- XFP transceiver
- Data Rates: 9.95 - 10.5 Gbps
- Protocols:
  - 10 Gbps Ethernet
  - 10 Gbps Fibre Channel
- Multi-mode fiber
- Dual Fiber (Tx/Rx)
- 850 nm
- 0 to 300 meters
- 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](http://www.mrv.com) or contact your nearest authorized MRV Communications dealer for more information.

### Specifications Overview

Data Rate	9.95 - 10.5 Gbps
Tx Wavelength	850 nm
Tx Power (Minimum)	-5.0 dBm
Tx Dispersion Penalty	3.9 dB
Tx Disable	Yes
Rx Wavelength Range	840 - 860 nm
Rx Sensitivity in OMA @ 10.5 Gbps	-11.1 dBm
Rx Saturation	0.5 dBm
Optical Extinction Ratio	3.0 dB
Operating Temperature Range	0 to 70°C
Power Consumption	< 1.5 Watts

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### Optical Specifications

Parameter	Symbol	Minimum	Maximum	Unit	Notes
<b>Transmitter</b>					
Optical Modulation Amplitude (OMA)	$P_{OMA}$	-2.8	-	dBm	-
Average Optical Power	$P_{AVE}$	-5	-1	dBm	1
Optical Wavelength	$\lambda$	840	860	nm	-
RMS Spectral Width	$\Delta\lambda_{rms}$	-	0.45	nm	-
Optical Extinction Ratio	ER	3.0	-	dB	-
Transmitter and Dispersion Penalty	TDP	-	3.9	dB	-
Average Launch power of OFF transmitter	$P_{OFF}$	-	-30	dBm	-
Tx Jitter	$T_xj$	Per 802.3ae Requirements			-
Encircled Flux	$< 4.5 \mu m$	-	30	%	2
Encircled Flux	$< 19 \mu m$	86	-	%	2
Relative Intensity Noise	$RIN_{12}OMA$	-	-128	dB/Hz	-
<b>Receiver</b>					
Receiver Sensitivity (OMA) @ 10.5 Gbps	$R_{SENS1}$	-	-11.1	dBm	3
Stressed Receiver Sensitivity (OMA) @ 10.3 Gbps	$R_{SENS2}$	-	-7.5	dBm	4
Maximum Input Power	$P_{MAX}$	0.5	-	dBm	-
Wavelength Range	$\lambda_C$	840	860	nm	-
Receiver Reflectance	$R_{rx}$	-	-12	dB	-
LOS Assert	$LOS_A$	-	-12	dBm	-
LOS De-Assert	$LOS_D$	30	-	dBm	-
LOS Hysteresis	-	0.5	-	dB	-

- Notes:**
1. Average power figures are informative only, per IEEE 802.3ae.
  2. Measured into Type A1a (50/125  $\mu m$  multi-mode) fiber per ANSI/TIA/EIA-455-203-2.
  3. Measured with worst ER; BER <  $10^{-12}$ ;  $2^{31} - 1$  PRBS.
  4. Per IEEE 802.3ae.

### Absolute Maximum Rating

Parameter	Symbol	Min.	Max.	Unit	Notes
Maximum Supply Voltage (3.3V)	$V_{CC3}$	-0.5	4.0	V	-
Storage Temperature	$T_S$	-40	85	°C	-
Case Operating Temperature	$T_{OP}$	0	70	°C	-

### General Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Bit Rate	BR	9.95	10.5	Gbps	1
Bit Error Ratio	BER	-	$10^{-12}$	-	2

- Notes:**
1. 10GBASE-SR/SW, 1200-Mx-SN-I
  2. Tested with a  $2^{31} - 1$  PRBS

### Maximum Supported Distances

Fiber Type	850 OFL Bandwidth	Symbol	Min	Max	Unit	Notes
62.5 $\mu m$	160 MHz/km	$L_{MAX}$	-	26	m	-
62.5 $\mu m$	OM1: 200 MHz/km	$L_{MAX}$	-	33	m	-
50 $\mu m$	400 MHz/km	$L_{MAX}$	-	66	m	-
50 $\mu m$	OM2: 500 MHz/km	$L_{MAX}$	-	82	m	-
50 $\mu m$	OM3: 2000 MHz/km	$L_{MAX}$	-	300	m	-

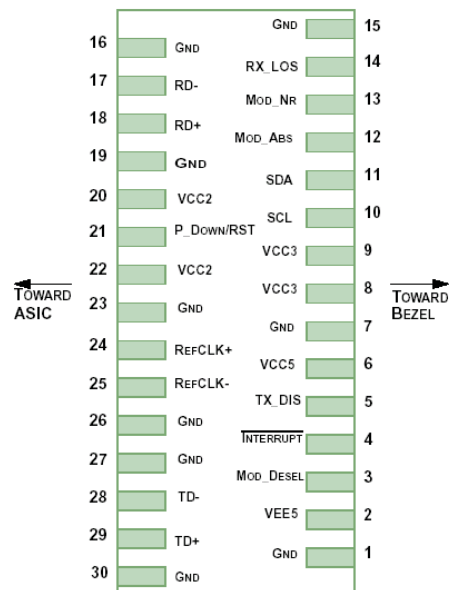
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### Electrical Specifications

Parameter	Symbol	Minimum	Maximum	Unit	Notes
Supply Voltage	V <sub>cc3</sub>	3.13	3.45	V	-
Supply Current	I <sub>cc3</sub>	-	400	mA	-
Module Total Power	P	-	1.5	W	1
<b>Transmitter</b>					
Input Differential Impedance	R <sub>in</sub>	80	120	Ω	2
Differential Data Input Swing	V <sub>in</sub> , pp	120	1000	mV	-
Transmit Disable Voltage	V <sub>D</sub>	2.0	V <sub>cc</sub>	V	3
Transmit Enable Voltage	V <sub>EN</sub>	GND	GND + 0.8	V	-
Transmit Disable Assert Time	-	-	10	us	-
<b>Receiver</b>					
Differential Data Output Swing	V <sub>out</sub> , pp	600	800	mV	4
Data Output Rise Time	t <sub>r</sub>	-	40	ps	5
Data Output Fall Time	t <sub>f</sub>	-	40	ps	5
LOS Fault	V <sub>LOS fault</sub>	V <sub>cc</sub> - 0.5	V <sub>cc</sub> <sub>HOST</sub>	V	6
LOS Normal	V <sub>LOS norm</sub>	GND	GND + 0.5	V	6
Power Supply Rejection	PSR	See Note 6 Below			7

- Notes:**
- Maximum total power value is specified across the full temperature and voltage range.
  - After internal AC coupling.
  - 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.

### Host Board Connector Pinout



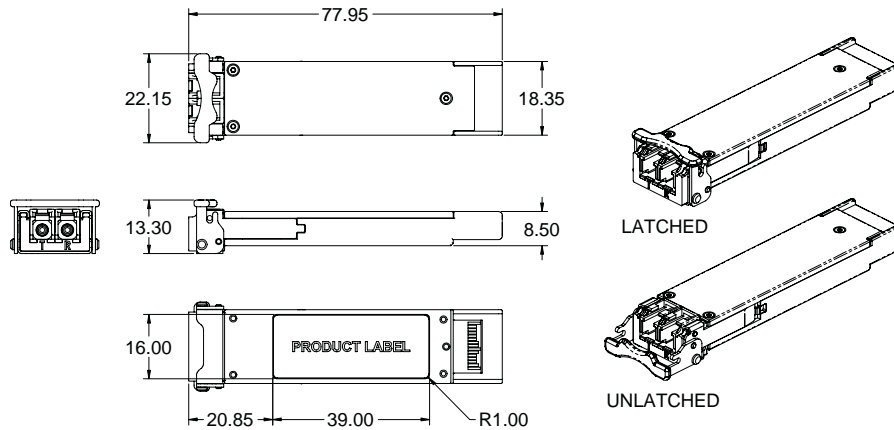
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Host Board Connector Legend				
Pin	Logic	Symbol	Name/Description	Note
1	-	GND	Module Ground	1
2	-	V <sub>EE5</sub>	Optional -5.2 V Power Supply (Not Required)	-
3	LVTTTL-I	Mod_DeSel	Module De-Select; When Held Low Allows Module to Respond to 2-Wire Serial Interface	-
4	LVTTTL-O	<u>Interrupt</u>	Interrupt (bar); 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 <sub>CC5</sub>	+5 V Power Supply (Not Required)	-
7	-	GND	Module Ground	1
8	-	V <sub>CC3</sub>	+3.3 V Power Supply	-
9	-	V <sub>CC3</sub>	+3.3 V Power Supply	-
10	LVTTTL-I	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; MRV defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX.	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 <sub>CC2</sub>	+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 <sub>CC2</sub>	+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-SX. If present, it will be ignored.

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### Mechanical Drawing



XFP Transceiver (dimensions are in mm)

### Ordering Information

Model	Description	Data Rate (Gbps)	Wavelength (nm)	Bail Latch Color	Distance Range (m)
XFP-10GD-SX	10GE or 10G FC, multi-mode XFP transceiver with Digital Diagnostics.	9.95 - 10.5	850	Beige	0 - 300

### 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; Telcordia GR-468; Digital Diagnostic SFF-8472; IEEE 802.3ae  
 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.

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 [info@mrv.com](mailto:info@mrv.com) or call us for assistance.

MRV Los Angeles  
 20415 Nordhoff Street  
 Chatsworth, CA 91311  
 800-338-5316  
 818-773-0900

MRV Boston  
 300 Apollo Drive  
 Chelmsford, MA 01824  
 800-338-5316  
 978-674-6800

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

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