

## Datasheet

# Multi-Rate (2 Gbps) Single-Mode 112 km SFP Transceivers

SFP-MR27D-LR2



### Features

- SFP transceiver
- Data Rates: 100 - 2700 Mbps
- Protocols:
  - Fast Ethernet
  - Gigabit Ethernet
  - 1 Gbps Fibre Channel
  - 2 Gbps Fibre Channel
  - Digital Video
  - OC-3/STM-1 to OC-48/STM-16 and OC-48 with FEC
- Single-mode fiber
- 1550 nm
- 40 to 112 km
- Duplex LC connector
- Digital Diagnostics (SFF-8472)
- Hot-swap
- Compliances (see last page for details)

### Overview

Small Form-Factor Pluggable (SFP) interfaces from MRV Communications provide flexible high speed links in a small industry-standard package. They deliver the deployment options and inventory control that network administrators demand for growing networks.

SFPs are designed to Multi-Source Agreement (MSA) standards to ensure network equipment compatibility. They are a perfect addition to MRV's extensive lines of networking equipment.

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	100 - 2700 Mbps
Tx Wavelength	1550 nm
Tx Power (Minimum)	-2 dBm
Tx Dispersion Penalty	2 dB
Tx Disable	Yes
Rx Wavelength Range	1200 - 1625 nm
Rx Sensitivity	-28 dBm
Rx Saturation	-9 dBm
Damage Threshold	4 dBm
Operating Temperature Range	-5 to 70 °C
Power Consumption	1 Watt

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### Transmitter Specifications, Optical

Parameter	Symbol	Min	Max	Unit	Notes
Optical Power	P <sub>op</sub>	-2	3	dBm	-
Average Launch Power (Tx: Off)	P <sub>off</sub>	-	-30	dBm	-
Extinction Ratio	ER	8.2	-	dB	-
Eye Mask	-	IEEE 802.3ah and SONET/SDH compliant			-
Optical Jitter Generation	J <sub>gen</sub>	-	0.007	UI	-
Optical Rise Time	t <sub>r</sub>	-	160	ps	1
Optical Fall Time	t <sub>f</sub>	-	160	ps	1
Mean Wavelength	λ	1500	1580	nm	-
Spectral Width (20 dB)	Δλ	-	1	nm	-
Dispersion Penalty (112 km SMF)	dp	-	2	dB	2
Relative Intensity Noise	RIN	-	-120	dB/Hz	-
Reflectance Tolerance	rp	-24	-	dB	3

- Notes:**
- 20% - 80% values
  - Measured at BER e<sup>-10</sup>, PRBS 2<sup>23</sup> -1, at eye center
  - 1 dB degradation of receiver sensitivity

### Receiver Specifications, Optical

Parameter	Symbol	Min	Max	Unit	Notes
Receive Power Low	R <sub>sens,low</sub>	-	-28	dBm	1
Receive Power High	R <sub>sens,high</sub>	-9	-	dBm	1
Damage Threshold	P <sub>in,damage</sub>	4	-	dBm	-
Wavelength	λ	1200	1625	nm	-
Maximum Reflectance	RX <sub>r</sub>	-	-27	dB	-
LOS Assert	-	-42	-	dBm	-
LOS De-assert	-	-	-28	dBm	-
LOS Hysteresis	-	0.5	-	dB	-

- Notes:**
- Measured at 10<sup>-10</sup> BER, PRBS 2<sup>23</sup> -1 for SONET; 10<sup>-12</sup> BER, PRBS 2<sup>7</sup> -1 for Gigabit Ethernet

### Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature	-5 to 70	± 3	°C	External	T <sub>c</sub> (C) = T <sub>ad</sub> (16 bit signed twos complement)/256
Voltage	0 to V <sub>CC</sub>	± 0.1	V	External	V(Volts) = V <sub>ad</sub> (16 bit unsigned integer)*0.1
Bias Current	0 to 120	± 5	mA	External	I(mA) = I <sub>slope</sub> *I <sub>ad</sub> (16 bit unsigned integer) + I <sub>offset</sub>
Tx Power	-2 to 3	±3	dBm	External	Tx_PWR(μW) = Tx_PWR <sub>slope</sub> *Tx_PWR <sub>ad</sub> (16 bit unsigned integer) + Tx_PWR <sub>offset</sub>
Rx Power	-32 to -9	±3	dBm	External	Rx_PWR(μW) = A0 + A1*x + A2*x^2 + A3*x^3 + A4*x^4

### General Operating

Parameter	Symbol	Min.	Max.	Unit	Notes
Supply Voltage	V <sub>CC</sub>	3.135	3.465	V	-
Total Current	I <sub>cc</sub>	-	300	mA	-
Power Supply Noise Rejection	PSR	100	-	-	1
Operating Temperature	T <sub>op</sub>	-5	70	°C	-
Storage Temperature	T <sub>st</sub>	-40	85	°C	-
Data Rate	DR	100	2700	Mbps	-

- Notes:**
- Denotes deviation from MSA
  - 20 Hz to 155 MHz

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### Transmitter Specifications, Electrical

Parameter	Symbol	Min	Max	Unit	Notes
Input Differential Impedance	$R_{in}$	80	120	$\Omega$	-
PECL Single Ended Data Input Swing	$V_{in,p-p}$	250	1200	mV	-
TxFault_Fault	$V_{fault}$	2	$V_{CC}$	V	-
TxFault_Normal	$V_{normal}$	$V_{EE}$	$V_{EE}+0.5$	V	-
TxDisable_Disable	$V_d$	2	$V_{CC}$	V	-
TxDisable_Enable	$V_{en}$	$V_{EE}$	$V_{EE}+0.8$	V	-

### Electrical Output

Parameter	Symbol	Min	Max	Unit	Notes
PECL Single Ended Data Output Swing	$V_{out,p-p}$	185	800	mV	-
Data Output Rise Time	$t_r$	-	175	ps	-
Data Output Fall Time	$t_f$	-	175	ps	-

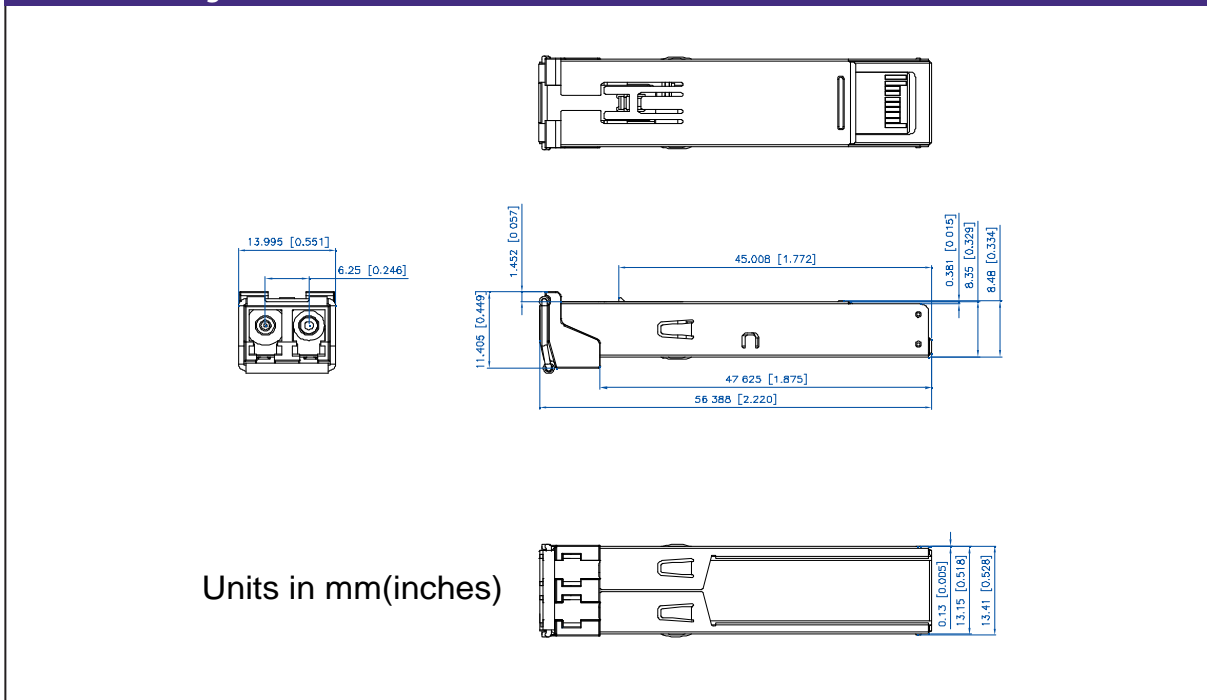
### Timing and Electrical

Parameter	Symbol	Min	Max	Unit	Notes
Tx Disable Negate Time	$t_{on}$	-	1	ms	-
Tx Disable Assert Time	$t_{off}$	-	10	$\mu s$	-
Time to Initialize, Including Reset of Tx Fault	$t_{init}$	-	300	ms	-
Tx Fault Assert Time	$t_{fault}$	-	100	$\mu s$	-
Tx Disable to Reset	$t_{reset}$	10	-	$\mu s$	-
LOS Assert Time	$t_{loss_{on}}$	-	100	$\mu s$	-
LOS De-assert Time	$t_{loss_{off}}$	-	100	$\mu s$	-
Serial ID Clock Rate	$f_{serial\_clock}$	-	100	KHz	-
RX_LOS Voltage (High)	$RX\_LOS_H$	2	-	V	-
RX_LOS Voltage (Low)	$RX\_LOS_L$	-	0.8	V	-
LOS Output Voltage-Fault	$V_{LOS\ fault}$	2	$V_{CC}$	V	-
LOS Output Voltage-Normal	$V_{LOS\ normal}$	$V_{EE}$	$V_{EE}+0.5$	V	-
MOD_DEF (0:2)-High	$V_H$	2	$V_{CC}$	V	-
MOD_DEF (0:2)-Low	$V_L$	$V_{EE}$	$V_{EE}+0.5$	V	-

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Pin	Function	Notes
1	V <sub>eeT</sub>	TX Ground
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	V <sub>eeR</sub>	RX Ground
10	V <sub>eeR</sub>	RX Ground
11	V <sub>eeR</sub>	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	V <sub>eeR</sub>	RX Ground
15	V <sub>ccR</sub>	RX Power
16	V <sub>ccT</sub>	TX Power
17	V <sub>eeT</sub>	TX Ground
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	V <sub>eeT</sub>	TX Ground

## Outline Drawing



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### Ordering Information

Model	Description	Data Rate	Wavelength (nm)	Bail Latch Color	Distance Range (km)
SFP-MR27D-LR2	Multi-Rate SFP Transceiver with Digital Diagnostics	100 - 2700 Mbps	1550	White	40 -112

### Regulatory and Industry Compliances

Class 1 Laser Product, Complies with 21CFR 1040.10, 1040.11 and EN 60825;  
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 [sales@mrv.com](mailto:sales@mrv.com) or call us for assistance.

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