

## Datasheet

### SFP Dual Rate Bidirectional Transceivers

SFP-DR-35IR2 and SFP-DR-53IR2



#### Features

- Designed for SFF-8472 compliance (SFP)
- 100 Mbps – 622 Mbps data rates
  - OC-3/STM-1
  - OC-12/STM-4
- Single-mode optics (Simplex LC)
- Single fiber, bi-directional
- Separate Tx and Rx wavelengths
- Class 1 laser (Tx): 1310 nm or 1550 nm
- 48 km distance
- Digital Diagnostics (SFF-8724)
- Commercial temperature rating

#### General Operating

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	$V_{CC}$	3.135	3.465	V
Total Current	$I_{CC}$	-	300	mA
Power Supply Noise Rejection <sup>a</sup>	PSR	100	-	mV <sub>p-p</sub>
Operating Temperature of SFP Case <sup>b</sup>	$T_{op}$	-5	70	°C
Storage Temperature	$T_{st}$	-40	85	°C
Data Rate OC-3/STM-1	DR	-	155	Mbps
Data Rate OC-12/STM-4	DR	-	622	Mbps
Data Rate Fast Ethernet	DR	-	125	Mbps

a) 20 Hz to 155 MHz

b) Maximum Relative Humidity is 85%, non-condensing

#### Transmitter Specifications (Optical)

Parameter	Symbol	Min	Max	Unit
Optical Power	$P_{op}$	-3	2	dBm
Average Launch Power of Off Tx	$P_{off}$	-	-45	dBm
Extinction Ratio	ER	10	-	dB
Eye Mask	IEEE 802.3 and SONET/SDH compliant			
Optical Rise Tim <sup>c</sup>	$t_r$	-	500	ps
Optical Fall Tim <sup>c</sup>	$t_f$	-	500	ps
Mean Tx Wavelength SFP-DR-35IR2: 1310	$\lambda$	1296	1330	nm
Mean Tx Wavelength SFP-DR-53IR2: 1550	$\lambda$	1480	1580	nm
Spectral Width (RMS)	$\Delta\lambda$	-	1	nm
Dispersion Penalty (at 40 km)	-	-	1	dB
Relative Intensity Noise	RIN	-	-120	dB/Hz
Optical Crosstalk	XT	-	-45	dB
Side Mode Suppression Ration	SMSR	30	-	dB
Reflectance Tolerance	rp	-24	-	dB

c) 20% - 80% values

## Datasheet

### Transmitter Specifications (Electrical)

Parameter	Symbol	Min	Max	Unit
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

### Receiver Specifications (Optical)

Parameter	Symbol	Min	Max	Unit
Receive Power <sup>d</sup>	$R_{sens,low/high}$	-28 (sensitivity)	-8 (saturation)	dBm
Damage Threshold for Receiver	$P_{in,damage}$	-	0	dBm
Mean Rx Wavelength SFP-DR-35IR2: 1550	$\lambda$	1480	1600	nm
Mean Rx Wavelength SFP-DR-53IR2: 1310	$\lambda$	1260	1360	nm
LOS Assert	-	-38	-	dBm
LOS De-assert	-	-	-28	dBm
LOS Hysteresis	-	0.5	3	dB
Receiver Reflectance	-	-	-12	dB

d) at  $10^{-12}$  BER, FE unbalanced pattern, and  $10^{-10}$  BER, 155.52 Mbps and 622.08 Mbps

### Receiver Specifications (Electrical)

Parameter	Symbol	Min	Max	Unit
PECL Single Ended Data Output Swing	$V_{out,p-p}$	185	800	mV
Data Output Rise Time	$t_r$	-	500	ps
Data Output Fall Time	$t_f$	-	500	ps

### Timing and Electrical

Parameter	Symbol	Min	Max	Unit
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

## Datasheet

### Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Bit Value	Formula
Temperature	-5 to 70	± 3	° C	Internal	1/256 C	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement})/256$
Voltage	0 to $V_{CC}$	0.1	V	Internal	100 $\mu$ V	$V(\text{Volts}) = V_{ad}(16 \text{ bit unsigned integer}) * 0.1$
Bias Current	0 to 120	5	mA	External	0.002 mA	$I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$
TX Power	-3 to 2	±2 dB	dBm	External	0.1 $\mu$ W	$TX\_PWR(\mu W) = TX\_PWR_{slope} * TX\_PWR_{ad}(16 \text{ bit unsigned integer}) + TX\_PWR_{offset}$
RX Power	-28 to -8	±2 dB	dBm	External	0.1 $\mu$ W	$RX\_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$

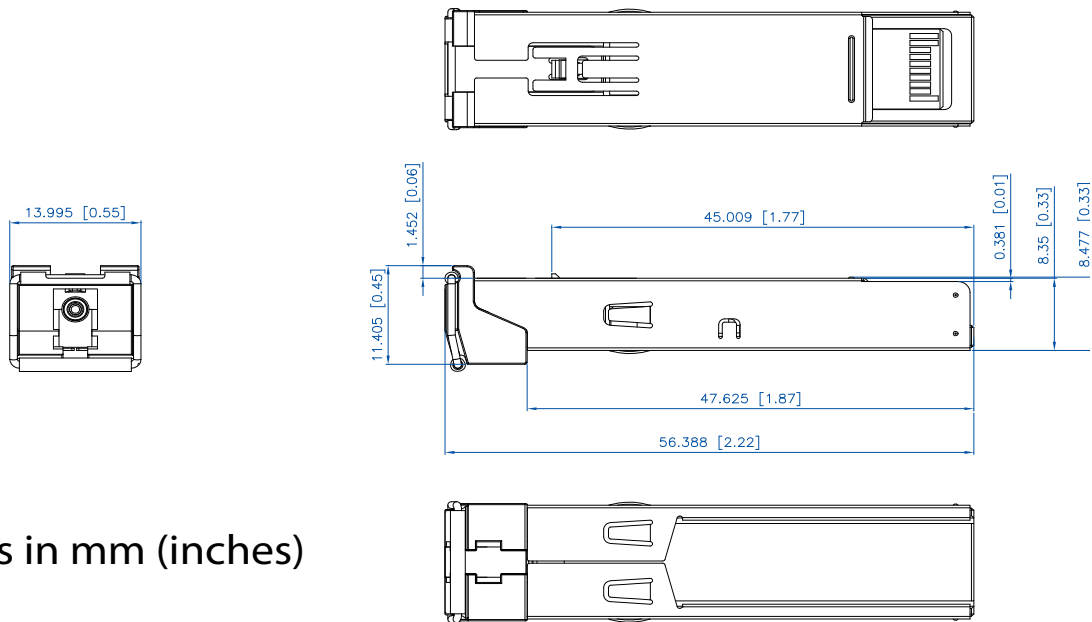
Pin	Function	Notes
1	$V_{eeT}$	TX Ground
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	$V_{eeR}$	RX Ground
10	$V_{eeR}$	RX Ground
11	$V_{eeR}$	RX Ground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

### Ordering Information

Model	Description	Data Rate (Mbps)	Wavelength (nm)		Connector Type	Bail Latch Color	Distance Range (km)
			Tx	Rx			
<b>SFP-DR-351R2</b>	SFP Dual Rate Bidirectional Transceiver	125 (Fast Ethernet) 155 (OC-3/STM-1) 622 (OC-12/STM-4)	1310	1550	LC	Blue	20 - 48
<b>SFP-DR-531R2</b>	SFP Dual Rate Bidirectional Transceiver	125 (Fast Ethernet) 155 (OC-3/STM-1) 622 (OC-12/STM-4)	1550	1310	LC	Yellow	20 - 48

Datasheet

Outline Drawing



Units in mm (inches)

Regulatory Compliances

RoHS directive; China RoHS; California RoHS Law, USA and Canada UL listing; 21CFR 1040.10 and 1040.11; SFP MSA SFF-8074i; SFF-8472; Telecordia GR-468

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 Los Angeles  
20415 Nordhoff St.  
Chatsworth, CA 91311  
800-338-5316  
818-773-0900

MRV Boston  
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

All statements, technical information and recommendations related to the products herein are based upon information believed to be reliable or accurate. However, the accuracy or completeness thereof is not guaranteed, and no responsibility is assumed for any inaccuracies. Please contact MRV Communications for more information. MRV Communications and the MRV Communications logo are trademarks of MRV Communications, Inc. Other trademarks are the property of their respective holders.