



## Datasheet

## SFP Multi Rate Bidirectional Transceivers

### SFP-MR-35IR1 and SFP-MR-53IR1



#### Features

- 100 Mbps-2.7 Gbps data rates
- OC-48/STM-16 standard compliances
- IEEE 802.3ah, 1000Base-BX10 compatibility
- Simplex LC connector
- 13 dB minimum power budget
- 15 km minimum reach
- Single 3.3 V supply
- 1310 nm or 1550 nm DFB laser
- Digital Diagnostic SFF-8472 compliance
- Telcordia GR-468 compliance
- GR 253/STM G.957 compliance
- RoHS and China RoHS compliance
- SFP MSA SFF-8074i compliance
- 21CFR 1040.10 and 1040.11 compliance
- TÜV compliance
- Commercial temperature rating
- Class 1 Laser
- Color coded bail latch: Blue or Yellow

#### General Operating

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	$V_{cc}$	3.135	3.3	3.465	V
Total Current	$I_{cc}$	-	-	300	mA
Power Supply Noise Rejection	PSR	100	-	-	mV <sub>p-p</sub>
Operating Temperature	$T_{op}$	-5	-	70	°C
Storage Temperature	$T_{st}$	-40	-	85	°C
Data Rate	DR	100	-	2700	Mbps

#### Transmitter Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power	$P_{op}$	-5	-2.5	0	dBm
Optical Crosstalk	XT	-	-	-45	dB
Average Launch Power (Tx:Off)	$P_{off}$	-	-	-45	dBm
Extinction Ratio	ER	8.2	-	-	dB
Eye Mask	IEEE 802.3 and SONET/SDH compliant				
Optical Rise Time (20% - 80% values)	$t_r$	-	-	160	ps
Optical Fall Time (20% - 80% values)	$t_f$	-	-	160	ps
Mean Wavelength: <b>SFP-MR-35IR1</b>	$\lambda$	1280	1310	1335	nm
<b>SFP-MR-53IR1</b>	$\lambda$	1480	1550	1580	nm
Spectral Width (20 dB)	$\Delta\lambda$	-	-	1	nm
Side Mode Suppression Ration	SMSR	30	-	-	dB
Dispersion Penalty (at 15 km) <sup>1</sup>	dp	-	0.5	1	dB
Relative Intensity Noise	RIN	-	-	-120	dB/Hz
Transmitter Reflectance	-	-	-	-12	dB
Reflectance Tolerance	rp	-24	-	-	dB

1) Measured at 2.7 Gbps, BER of  $10^{-12}$ , PRBS of  $2^{23}-1$ , at eye center


**Transmitter Specifications (Electrical)**

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedance	$R_{in}$	80	100	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	Typical	Max	Unit
Receive Power Low <sup>2</sup>	$R_{sens,low}$	-	-20	-18	dBm
Receive Power High <sup>2</sup>	$R_{sens,high}$	0	-	-	dBm
Damage Threshold for Receiver	$P_{in,damage}$	-	-	0	dBm
Wavelength: <b>SFP-MR-35IR1</b>	$\lambda$	1480	-	1600	nm
<b>SFP-MR-53IR1</b>	$\lambda$	1260	-	1360	nm
LOS Assert	-	-28	-	-	dBm
LOS De-assert	-	-	-	-18	dBm
LOS Hysteresis	-	0.5	-	-	dB
Receiver Reflectance	-	-	-	-12	dB

2) Measured at  $10^{-10}$  BER, 2.7 Gbps,  $2^{23}$ -1 PRBS, and  $10^{-12}$  BER, 1250 Mbps,  $2^7$ -1 PRBS

**Receiver Specifications (Electrical)**

Parameter	Symbol	Min	Typical	Max	Unit
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

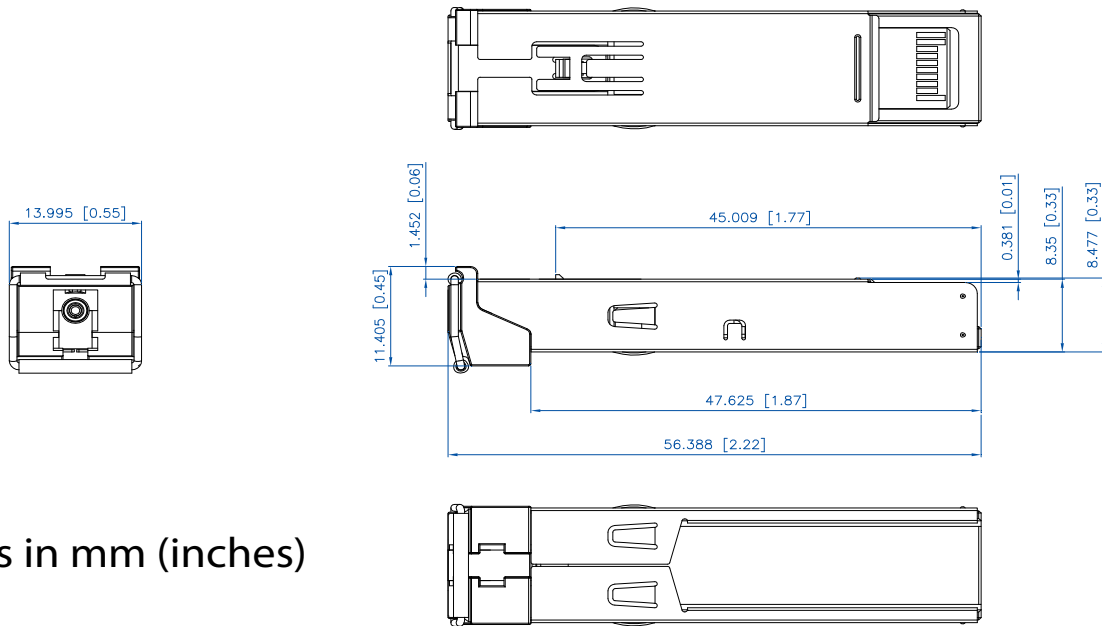
**Timing and Electrical**

Parameter	Symbol	Min	Typical	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


**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	-5 to 0	±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	-18 to 0	±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


**Outline Drawing**


Units in mm (inches)

**Ordering Information**

Model	Description	Data Rate	Wavelength (nm)	Bail Latch Color	Distance Range (km)
SFP-MR-35IR1	SFP Multi Rate Bidirectional Transceiver	100 - 2700 Mbps	1310/1550	Blue	0 - 15
SFP-MR-53IR1	SFP Multi Rate Bidirectional Transceiver	100 - 2700 Mbps	1550/1310	Yellow	0 - 15

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

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.