



Datasheet

SFP Multi Rate Bidirectional Transceivers

SFP-MR-45LR2 and SFP-MR-54LR2



Features

- 100 Mbps-2.7 Gbps data rates
- OC-48/STM-16 standard compliances
- IEEE 802.3ah, 1000Base-BX10 compatibility
- Simplex LC connector
- 26 dB minimum power budget
- 80 km minimum reach
- Single 3.3 V supply
- 1490 nm or 1570 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: Purple or Orange

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 _{p-p} |
| 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} | -2 | 0.5 | 3 | 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: SFP-MR-45LR2 | λ | 1480 | 1490 | 1500 | nm |
| SFP-MR-54LR2 | λ | 1560 | 1570 | 1580 | nm |
| Spectral Width (20 dB) | $\Delta\lambda$ | - | - | 1 | nm |
| Relative Intensity Noise | RIN | - | - | -120 | dB/Hz |
| Transmitter Reflectance | - | - | - | -12 | dB |
| Dispersion Penalty (at 40 km) ¹ | dp | - | 0.5 | 1 | dB |
| Side Mode Suppression Ration | SMSR | 30 | - | - | 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 Impedence | R_{in} | 80 | 100 | 120 | Ω |
| 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 ² | $R_{sens,low}$ | - | -30 | -28 | dBm |
| Receive Power High ² | $R_{sens,high}$ | -10 | - | - | dBm |
| Damage Threshold for Receiver | $P_{in,damage}$ | - | - | 0 | dBm |
| Wavelength: SFP-MR-45LR2 | λ | 1560 | - | 1580 | nm |
| SFP-MR-54LR2 | λ | 1480 | - | 1500 | nm |
| LOS Assert | - | -38 | - | - | dBm |
| LOS De-assert | - | - | - | -28 | 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 |

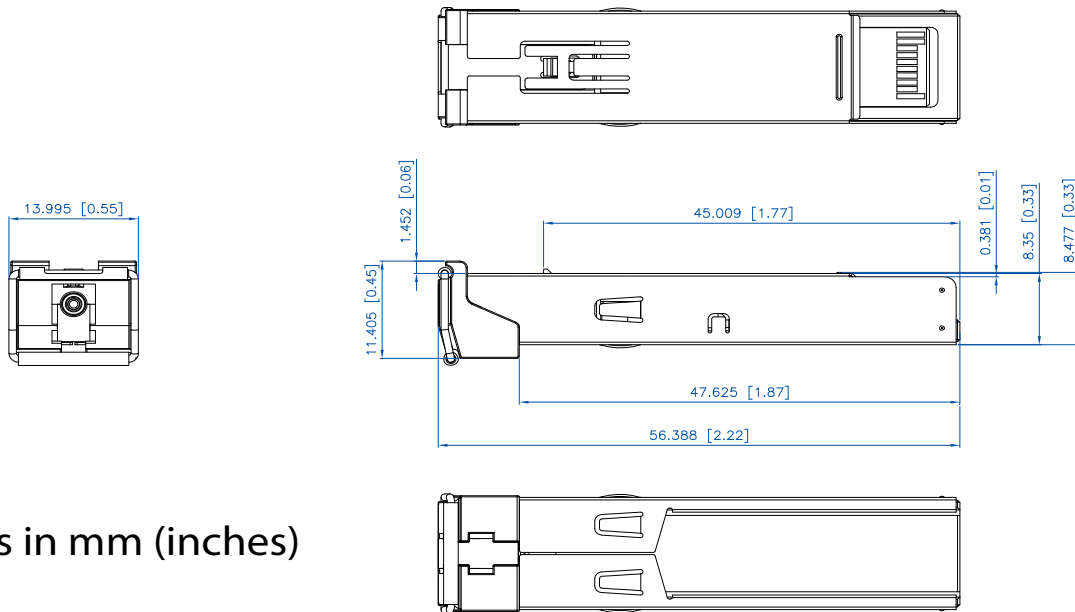
Timing and Electrical

| Parameter | Symbol | Min | Typical | Max | Unit |
|-------------------------------------------------|---------------------|----------|---------|--------------|---------|
| Tx Disable Negate Time | t_{on} | - | - | 1 | ms |
| Tx Disable Assert Time | t_{off} | - | - | 10 | μ s |
| Time to Initialize, Including Reset of Tx Fault | t_{init} | - | - | 300 | ms |
| Tx Fault Assert Time | t_{fault} | - | - | 100 | μ s |
| Tx Disable to Reset | t_{reset} | 10 | - | - | μ s |
| LOS Assert Time | $t_{loss_{on}}$ | - | - | 100 | μ s |
| LOS De-assert Time | $t_{loss_{off}}$ | - | - | 100 | μ 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 μ 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 | -2 to 3 | ±2 dB | dBm | External | 0.1 μ W | $TX_PWR(\mu W) = TX_PWR_{slope} * TX_PWR_{ad}(16 \text{ bit unsigned})$ |
| RX Power | -18 to 0 | ±2 dB | dBm | External | 0.1 μ 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-45LR2 | SFP Multi Rate Bidirectional Transceiver | 100 - 2700 Mbps | 1490/1570 | Purple | 0 - 80 |
| SFP-MR-54LR2 | SFP Multi Rate Bidirectional Transceiver | 100 - 2700 Mbps | 1570/1490 | Orange | 0 - 80 |

MRV has more than 50 offices throughout the world. Addresses, phone numbers, and fax numbers are listed at www.mrv.com. Please e-mail us at 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.