

Datasheet

2.7 Gbps Multi-Rate Single Fiber Bidirectional 80 km SFP Transceivers

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



Highlights

- SFP transceiver
- Data Rates: 100 to 2700 Mbps
- Protocols:
 - IEEE 802.3ah
 - Gigabit Ethernet
 - OC-48/STM-16
- Single-mode fiber
- Single fiber, bi-directional
- Two wavelength options:
 - Tx 1490 nm and Rx 1570 nm
 - Tx 1570 nm and Rx 1490 nm
- 40 to 96 km
- Simplex LC connector
- Digital Diagnostics (SFF-8472)
- Hot-swap
- Industrial temperature models available

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 or contact your nearest authorized MRV Communications dealer for more information.

Specifications Overview	
Data Rate	100 to 2700 Mbps
Tx Wavelength for SFP-MR-45LR2	1490 nm
Tx Wavelength for SFP-MR-54LR2	1570 nm
Tx Power (Minimum)	-2 dBm
Tx Dispersion Penalty	2 dB
Tx Extinction Ratio	8.2 dBm
Tx Disable	Yes
Rx Wavelength for SFP-MR-45LR2	1560 to 1580 nm
Rx Wavelength for SFP-MR-54LR2	1480 to 1500 nm
Rx Sensitivity	-28 dBm
Rx Saturation	-10 dBm
Rx Damage Threshold	0 dBm
Operating Temperature Range	-5 to 70 °C
Operating Temperature Range (TH Models)	-40 to 85 °C
Power Consumption	1 Watt

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Transmitter Specifications (Optical)

Parameter	Symbol	Min	Max	Unit	Notes
Optical Power	P_{op}	-2	3	dBm	-
Optical Crosstalk	XT	-	-45	dB	-
Average Launch Power of Off Tx	P_{off}	-	-45	dBm	-
Extinction Ratio	ER	8.2	-	dB	-
Eye Mask	-	IEEE 802.3 and SONET/SDH compliant			-
Optical Rise Time (20% to 80% values)	t_r	-	160	ps	-
Optical Fall Time (20% to 80% values)	t_f	-	160	ps	-
Mean Wavelength for SFP-MR-45LR2	λ	1480	1500	nm	-
Mean Wavelength for SFP-MR-54LR2	λ	1560	1580	nm	-
RMS Width (20 dB)	$\Delta\lambda$	-	1	nm	-
Side Mode Suppression Ration	SMSR	30	-	dB	-
Dispersion Penalty (at 80 km)	dp	-	2	dB	1
Relative Intensity Noise	RIN	-	-120	dB/Hz	-
Transmitter Reflectance	-	-	-12	dB	-
Reflectance Tolerance	rp	-24	-	dB	-

Notes: 1. Measured at 2.7 Gbps, 10^{-12} BER, PRBS 2²³-1, at eye center

Receiver Specifications (Optical)

Parameter	Symbol	Min	Max	Unit	Notes
Receive Power	$R_{sens,low/high}$	-28	-10	dBm	1
Damage Threshold	$P_{in,damage}$	0	-	dBm	-
Wavelength for SFP-MR-45LR2	λ	1560	1580	nm	-
Wavelength for SFP-MR-54LR2	λ	1480	1500	nm	-
LOS Assert	-	-38	-	dBm	-
LOS De-assert	-	-	-28	dBm	-
LOS Hysteresis	-	0.5	-	dB	-
Receiver Reflectance	$R_{x,r}$	-	-12	dB	-

Notes: 1. Measured at 10^{-10} BER, 2.7 Gbps, PRBS 2²³-1, and 10^{-12} BER, 1.25 Gbps, PRBS 2⁷-1

Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature	-5 to 70	± 3	°C	External	$Tc(C) = Tslope * Tad(16 \text{ bit signed twos complement value}) + Toffset$
Temperature (TH)	-40 to 85	± 3	°C	External	$Tc(C) = Tslope * Tad(16 \text{ bit signed twos complement value}) + Toffset$
Voltage	0 to V_{CC}	± 0.1	V	External	$V(\text{Volts}) = Vslope * Vad(16 \text{ bit unsigned integer}) + Voffset$
Bias Current	0 to 120	± 5	mA	External	$I(\text{mA}) = Islope * Iad(16 \text{ bit unsigned integer}) + Ioffset$
TX Power	-2 to 3	± 3	dBm	External	$TX_PWR(\mu W) = TX_PWRslope * TX_PWRad(16 \text{ bit unsigned integer}) + TX_PWRoffset$
RX Power	-28 to -10	± 3	dBm	External	$RX_PWR(\mu W) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$

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General Operations

Parameter	Symbol	Min	Max	Unit	Notes
Supply Voltage	V_{cc}	3.135	3.465	V	-
Total Current	I_{cc}	-	300	mA	-
Power Supply Noise Rejection	PSR	100	-	mV _{p-p}	-
Operating Case Temperature	T_{opr}	-5	70	°C	1
Operating Case Temperature (TH Models)	T_{opr}	-40	85	°C	-
Storage Temperature	T_{stg}	-40	85	°C	-
Data Rate OC-48	DR	-	2488.32	Mbps	-
Data Rate FEC	DR	-	2700	Mbps	-
Data Rate Gigabit Ethernet	DR	-	1250	Mbps	-
Data Rate Fibre Channel	DR	-	1062.5	Mbps	-
Data Rate 2 Gigabit Fibre Channel	DR	-	2125	Mbps	-

Notes: 1. Maximum Relative Humidity is 85%, non-condensing

Transmitter Specifications (Electrical)

Parameter	Symbol	Min	Max	Unit	Notes
Input Differential Impedance	R_{in}	80	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 (Electrical)

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	-

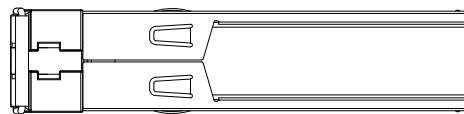
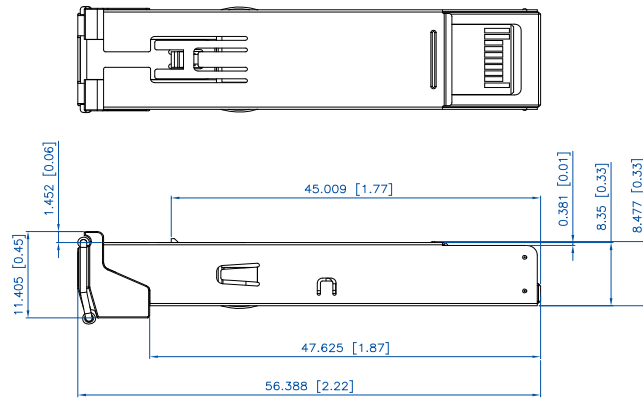
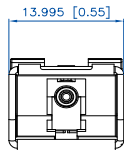
Electrical Specifications and Timing

Parameter	Symbol	Min	Max	Unit	Notes
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_{cc}	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	Name / Description	Notes
1	V _{ee} T	Module Transmitter 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 _{ee} R	Module Receiver Ground	-
10	V _{ee} R	Module Receiver Ground	-
11	V _{ee} R	Module Receiver Ground	-
12	RXD-	Receiver Data Negative	-
13	RXD+	Receiver Data Positive	-
14	V _{ee} R	Module Receiver Ground	-
15	V _{cc} R	Module Receiver Power Supply	-
16	V _{cc} T	Module Transmitter Power Supply	-
17	V _{ee} T	Module Transmitter Ground	-
18	TXD+	Transmitter Data Positive	-
19	TXD-	Transmitter Data Negative	-
20	V _{ee} T	Module Transmitter Ground	-

Outline Drawing



Units in mm (inches)



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Ordering Information

Model	Description	Data Rate (Mbps)	Wavelength (nm)		Connector Type	Digital Diagnostics	Bail Latch Color	Distance Range (km)
			Tx	Rx				
SFP-MR-45LR2	SFP Mult-Rate Bidirectional Transceiver	100 - 2700	1490	1570	LC	Yes	Purple	40 - 96
SFP-MR-54LR2	SFP Mult-Rate Bidirectional Transceiver	100 - 2700	1570	1490	LC	Yes	Orange	40 - 96
SFP-MR-45LR2TH	SFP Mult-Rate Bidirectional Transceiver <i>Temperature Hardened</i>	100 - 2700	1490	1570	LC	Yes	Purple	40 - 96
SFP-MR-54LR2TH	SFP Mult-Rate Bidirectional Transceiver <i>Temperature Hardened</i>	100 - 2700	1570	1490	LC	Yes	Orange	40 - 96

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 SFF-8074i; Telcordia GR-468, GR 253/STM G.957, Digital Diagnostic SFF-8472;
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.

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