SFP Dual Rate Bidirectional Transceivers

SFP-DR-45LR2 and SFP-DR-54LR2



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): 1490 nm or 1570 nm
- 96 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[a]	PSR	100	-	mV_{p-p}
Operating Temperature of SFP Case[b]	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 Time[c]	t_r	-	500	ps
Optical Fall Time[c]	t_f	-	500	ps
Mean Tx Wavelength SFP-DR-45LR2: 1490	λ	1480	1500	nm
Mean Tx Wavelength SFP-DR-54LR2: 1570	λ	1560	1580	nm
Spectral Width (20 dB)	Δλ	-	1	nm
Dispersion Penalty (at 80 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

Transmitter Specifications (Electical)				
Parameter	**Symbol**	**Min**	**Max**	**Unit**
Input Differential Impedence	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 (Optical)				
Parameter	**Symbol**	**Min**	**Max**	**Unit**
Receive Power[d]	$R_{sens,low/high}$	-28 (sensitivity)	-8 (saturation)	dBm
Damage Threshold for Receiver	$P_{in,damage}$	-	0	dBm
Mean Rx Wavelength SFP-DR-45LR2: 1570	λ	1560	1580	nm
Mean Rx Wavelength SFP-DR-54LR2: 1490	λ	1480	1500	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	µs
Time to Initialize, Including Reset of Tx Fault	t_init	-	300	ms
Tx Fault Assert Time	t_fault	-	100	µs
Tx Disable to Reset	t_reset	10	-	µs
LOS Assert Time	t_loss_on	-	100	µs
LOS De-assert Time	t_loss_off	-	100	µs
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	Tc(C)=Tad(16 bit signed twos complement)/256
Voltage	0 to V_{cc}	0.1	V	Internal	100 µV	V(Volts)=Vad(16 bit unsigned integer)*0.1
Bias Current	0 to 120	5	mA	External	0.002 mA	I(mA)=Islope*Iad(16 bit unsigned integer)+Ioffset
TX Power	-3 to 2	±2 dB	dBm	External	0.1µW	TX_PWR(µW)=TX_PWRslope*TX_PWRad(16 bit unsigned integer +TX_PWRoffset
RX Power	-28 to -8	±2 dB	dBm	External	0.1µW	RX_PWR(µW)=A0+A1*x+A2*x^2+A3*x^3+A4*x^4

Pin	Function	Notes
1	$V_{ee}T$	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	$V_{ee}R$	RX Ground
10	$V_{ee}R$	RX Ground
11	$V_{ee}R$	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	$V_{ee}R$	RX Ground
15	V_{ccR}	RX Power
16	V_{ccT}	TX Power
17	$V_{ee}T$	TX Ground
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	$V_{ee}T$	TX Ground

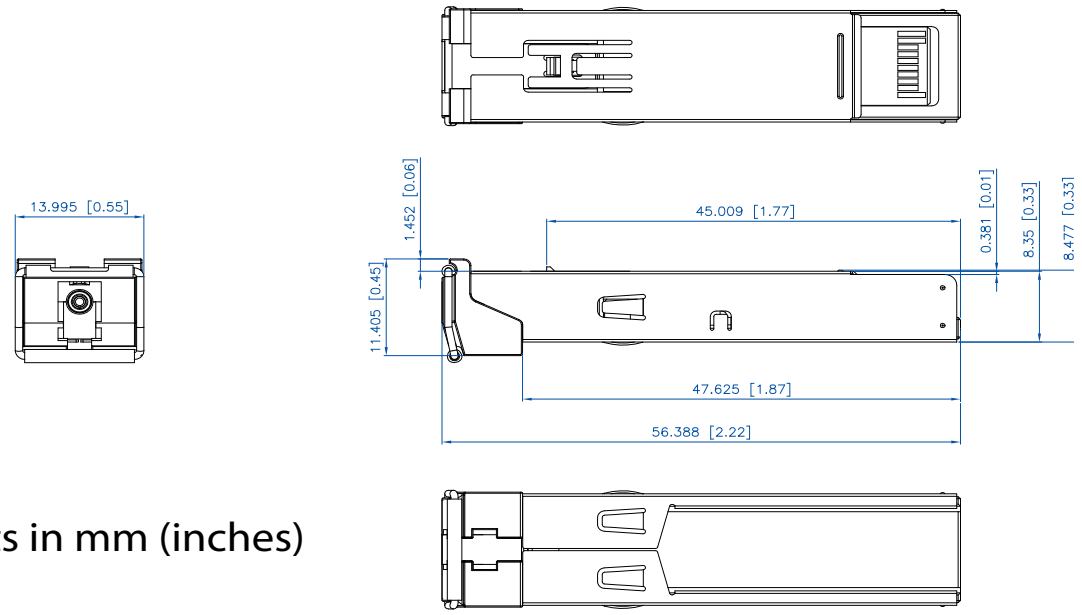
Ordering Information

Model	Description	Data Rate (Mbps)	Wavelength (nm)		Connector Type	Bail Latch Color	Distance Range (km)
			Tx	Rx			
SFP-DR-45LR2	SFP Dual Rate Bidirectional Transceiver	125 (Fast Ethernet) 155 (OC-3/STM-1) 622 (OC-12/STM-4)	1490	1570	LC	Purple	40 - 96
SFP-DR-54LR2	SFP Dual Rate Bidirectional Transceiver	125 (Fast Ethernet) 155 (OC-3/STM-1) 622 (OC-12/STM-4)	1570	1490	LC	Orange	40 - 96

Connectivity Unlimited™

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 descharge (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 indeirect radiation.

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 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

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