



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 Impedance	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, 2²³-1 PRBS, and 10⁻¹² BER, 1250 Mbps, 2⁷-1 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

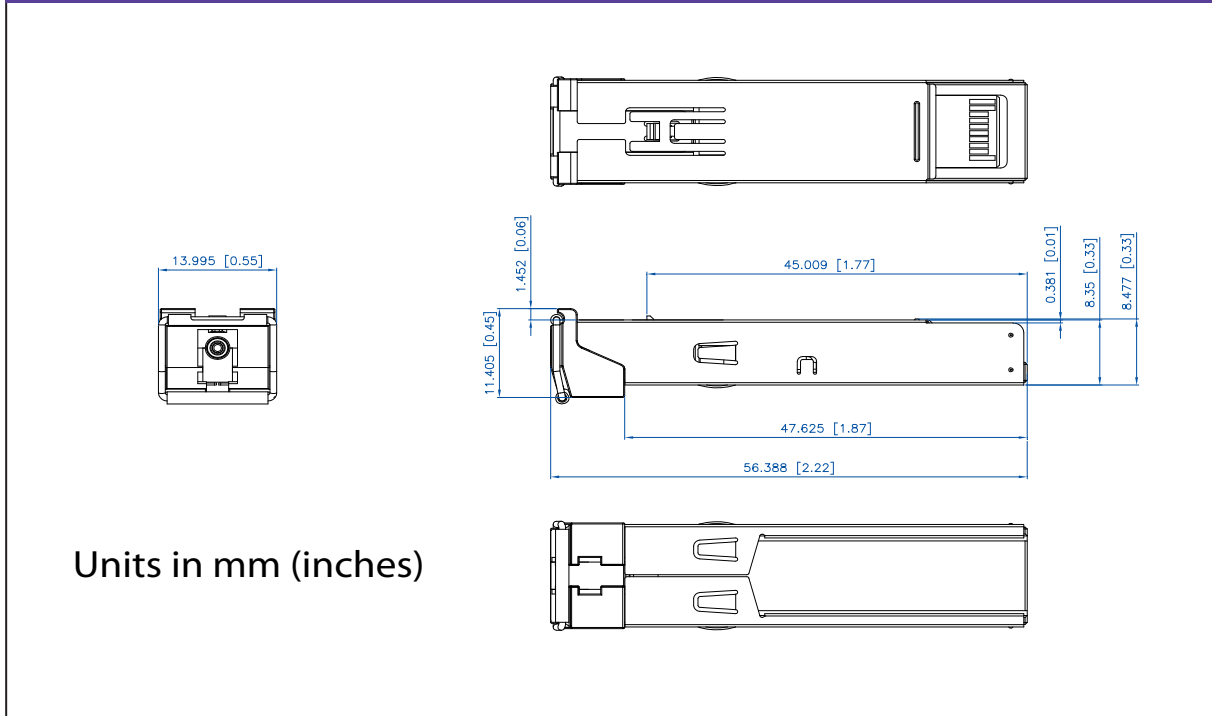
Timing and Electrical

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	$RX_PWR(\mu W) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$

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

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