

Datasheet

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)	$\Delta\lambda$	-	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

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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	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

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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	-3 to 2	±2 dB	dBm	External	0.1 μ W	$TX_PWR(\mu W) = TX_PWR_{slope} * TX_PWR_{ad}(16 \text{ bit unsigned integer}) + TX_PWR_{offset}$
RX Power	-28 to -8	±2 dB	dBm	External	0.1 μ W	$RX_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$

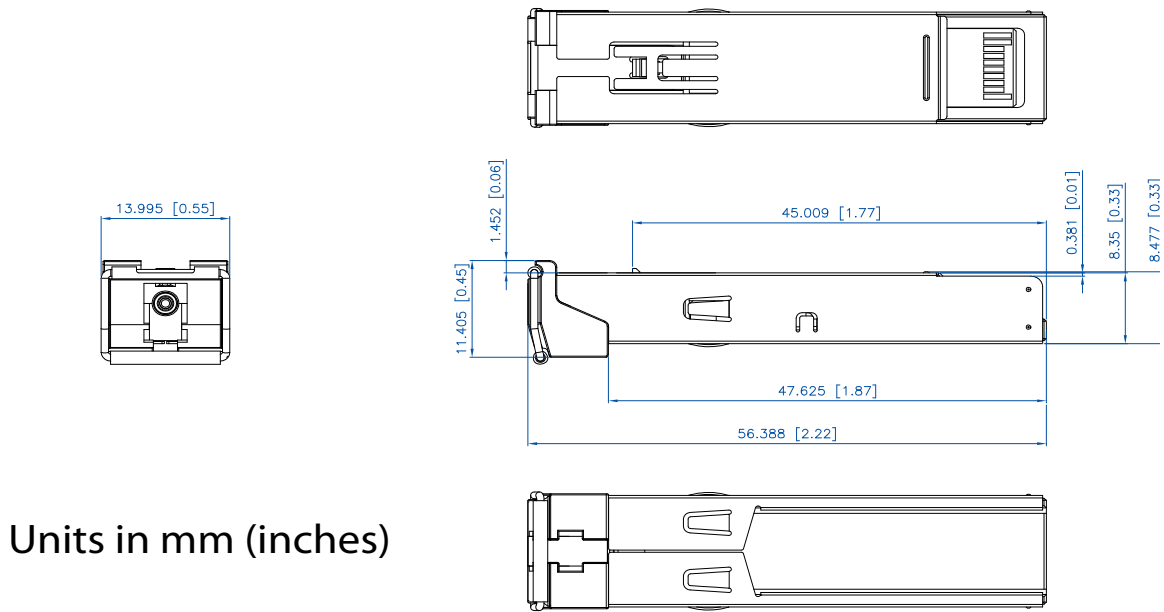
Pin	Function	Notes
1	V_{eeT}	TX Ground
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	V_{eeR}	RX Ground
10	V_{eeR}	RX Ground
11	V_{eeR}	RX Ground
12	RXD-	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

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

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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 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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