

# SO-XFP-LR

XFP, 10GBase-LR, Multirate 9.95-11.1 Gbps, 1310nm, SM, DDM, 8.5dB, 10km

## OVERVIEW

The SO-XFP-LR series single mode transceiver is small form factor pluggable module for serial optical data communications such as IEEE 802.3ae 10GBASE-LR/LW. This module is designed for single mode fiber and operates at a nominal wavelength of 1310 nm. The transmitter section uses a 1310nm multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

## PRODUCT FEATURES

- Operating data rate up to 11.1Gbps
- 1310nm DFB-LD transmitter
- Distance up to 10km
- Single 3.3V power supply and TTL logic interface
- Duplex LC connector interface
- Hot-Pluggable
- Power dissipation < 1.0W
- Compliant with MSA XFP specification SFF-8472
- Compliant with IEEE 802.3ae 10GBASE-LR/LW
- Operating case temperature
  - Standard: -5 ~+70 °C
  - Extended: -20 ~+85 °C

## APPLICATIONS

- 10GBASE-LR at 10.31Gbps
- 10GBASE-LW at 9.95Gbps
- OBSAI rates 6.144 Gb/s, 3.072 Gb/s, 1.536 Gb/s, 0.768Gb/s
- CPRI rates 9.830 Gb/s, 7.373Gb/s, 6.144 Gb/s, 4.915 Gb/s, 2.458 Gb/s, 1.229 Gb/s, 0.614Gb/s
- Other optical links

## ORDERING INFORMATION

Part Number	Description
SO-XFP-LR	XFP, 10GBase-LR, Multirate 9.95-11.1 Gbps, 1310nm, SM, DDM, 8.5dB, 10km
SO-XFP-LR-E	XFP, 10GBase-LR, Multirate 9.95-11.1 Gbps, 1310nm, SM, DDM, 8.5dB, 10km, extended

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For more information, visit [smaroptics.com](http://smaroptics.com).

## GENERAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR			8.5	Gbps	
Bit Error Rate	BER			$10^{-12}$		
Operating Temperature	T <sub>OP</sub>	0		70	°C	Case temperature
Storage Temperature	T <sub>STO</sub>	-40		85	°C	Ambient temperature
Supply Current	I <sub>S</sub>		330	450	mA	For electrical power interface
Input Voltage	V <sub>CC</sub>	3.13	3.3	3.47	V	
Maximum Voltage	V <sub>MAX</sub>	-0.5		3.6	V	For electrical power interface
Total Power Dissipation			1.2	1.5	W/1	

## OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P <sub>TX</sub>	-0.5		+4	dBm	Average, coupled into 9/125um SMF
Extinction ratio	Er	8.2			dB	
Optical Center Wavelength	λ <sub>C</sub>	ITU-6.5	ITU	ITU+6.5	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			3	dB	1400ps/nm, 8.5Gbps
Relative Intensity noise	RIN			-128	dB/Hz	Peak-to-Peak
Launch Power OFF	P <sub>off</sub>			-30	dBm	Average

## OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Receiver Power	P <sub>RX</sub>			-7	dBm	Average
Optical Center Wavelength	λ <sub>C</sub>	1260		1620	nm	
Receiver Sensitivity @ 10.3GBps	R <sub>X_SENS</sub>			-23.5	dBm	BER<10 <sup>-12</sup> , PRBS 2 <sup>31</sup> -1
Loss of Signal-Asserted	P <sub>LOS_A</sub>	-32			dBm	
Loss of Signal-Deasserted	P <sub>LOS_D</sub>			-24	dBm	

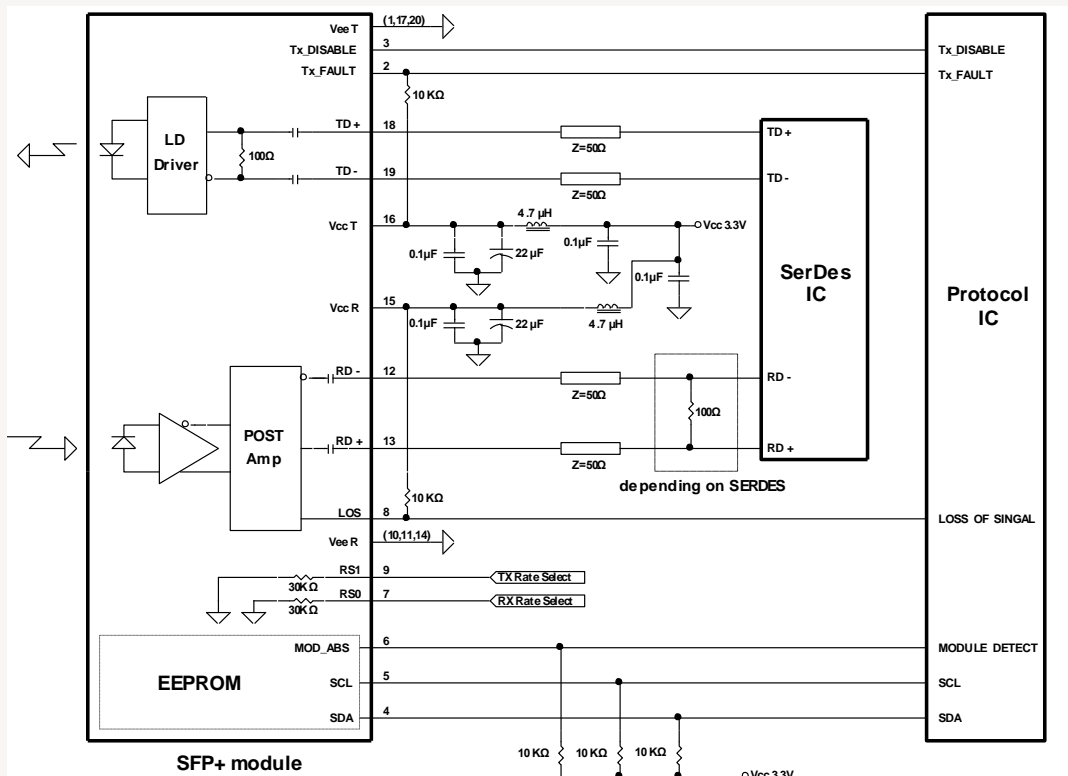
**ELECTRICAL CHARACTERISTICS – HIGH-SPEED SIGNAL INTERFACE (CML)**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential Input Impedance	$R_{IN}$		100		$\Omega$	
Differential data input swing	$V_{IN\_PP}$	150		1200	mVpp	Internally AC coupled
Differential Output Impedance	$R_{OUT}$		100		$\Omega$	
Differential data output swing	$V_{OUT\_PP}$	350		700	mVpp	Internally AC coupled

**ELECTRICAL CHARACTERISTICS – LOW-SPEED SIGNAL INTERFACE (LVTTTL)**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input High Voltage		2.0		$V_{CC}+0.3$	V	TX-DIS, TX-FAULT
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		$V_{CC}$	V	RX-LOS
Output Low Voltage		GND		0.5	V	

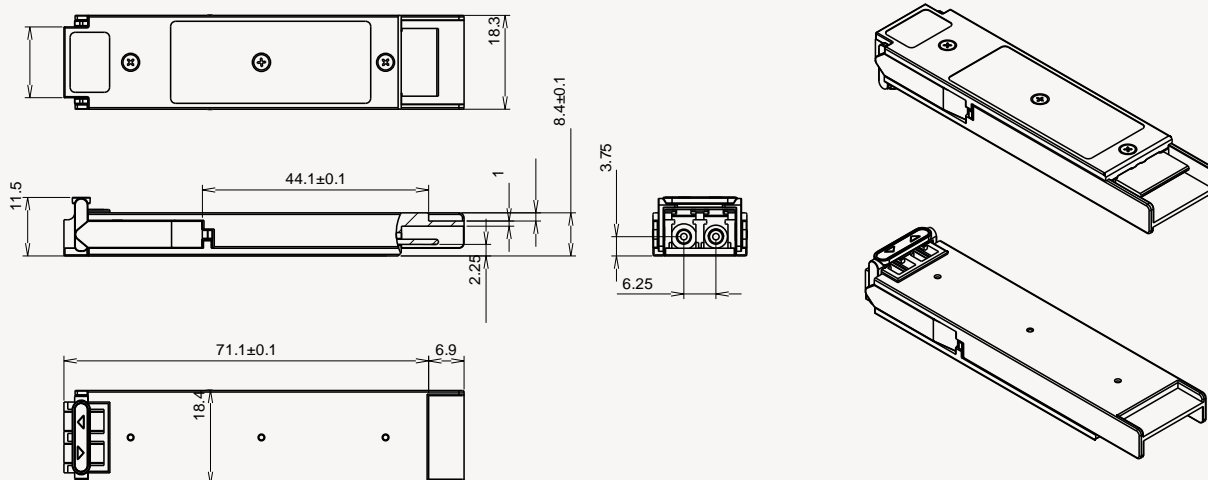
**FUNCTIONAL DIAGRAM OF TRANSCEIVER AND RECOMMENDED CIRCUIT SCHEMATIC**



### PIN ASSIGNMENT ACCORDING TO MSA

PIN	Signal Name	Description	PIN	Signal Name	Description
1	V <sub>EE</sub> T	Transmitter Signal Ground	11	V <sub>EE</sub> R	Receiver Signal Ground
2	TX_Fault	Transmitter Fault Indication. Logic "1" Output = Laser Fault. Logic "0" Output = Normal Operation	12	RD-	Inverse Receiver Data Out
3	TX_Disable	Logic "1" Input (or no connection) = Laser off, Logic "0" = Laser on.	13	RD+	Receiver Data Out
4	SDA	Modulation Definition 2 – Two wires serial ID Interface	14	V <sub>EE</sub> R	Receiver Signal Ground
5	SDL	Modulation Definition 1 – Two wires serial ID Interface	15	V <sub>CC</sub> R	Receiver Power – 3.3V±5%
6	MOD-ABS	Modulation Definition 0 – Ground in Module	16	V <sub>CC</sub> T	Transmitter Power – 3.3V±5%
7	RS0	RX Rate Select (LVTTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	17	V <sub>EE</sub> T	Transmitter Signal Ground
8	RX_LOS	Loss of Signal Out (OC).	18	TD+	Transmitter Data In
9	RS1	TX Rate Select (LVTTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	19	TD-	Inverse Transmitter Data In
10	V <sub>EE</sub> R	Receiver Signal Ground	20	V <sub>EE</sub> T	Transmitter Signal Ground

### MECHANICAL DIMENSIONS



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