

# SO-XFP-LR20

XFP, 10GBase-LR, Multirate 9.95-11.1 Gbps, 1310nm, SM, DDM, 12dB, 20km

## OVERVIEW

The SO-XFP-LR20 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 10.3Gbps
- 1310nm DFB-LD transmitter
- Distance up to 20km
- Single 3.3V power supply and TTL logic interface
- Duplex LC connector interface
- Hot-Pluggable
- Power dissipation < 1.5W
- Compliant with MSA SFP+ specification SFF-8431
- Compliant with IEEE 802.3ae 10GBASE-LR/LW
- Operating case temperature
  - Standard: -5°C~+70°C
  - Industrial: -40°C~+85°C

## APPLICATIONS

- 10GBASE-LR at 10.31Gbps
- 10GBASE-LW at 9.95Gbps
- Other optical links

## ORDERING INFORMATION

Part Number	Description
SO-XFP-LR20	XFP, 10GBase-LR, Multirate 9.95-11.1 Gbps, 1310nm, SM, DDM, 12dB, 20km
SO-XFP-LR20-I	XFP, 10GBase-LR, Multirate 9.95-11.1 Gbps, 1310nm, SM, DDM, 12dB, 20km ind. temp

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## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	+85	°C
Supply Voltage	VCC	-0.5	3.6	V
Input Voltage	Vin	-0.5	Vcc	V
Output Current	Io	-	50	mA

## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min.	Typ	Max.	Unit	
Operating Case Temperature	TC	SO-XFP-	-5		+70	°C
		LR20				
		SO-XFP-	-40		+85	
		LR20 -1				
Power Supply Voltage	VCC	3.15	3.3	3.45	V	
Power Supply Current	ICC			430	mA	
Surge Current	ISurge			+30	mA	
Baud Rate	10GBASE-LR		10.31		Gbit/s	
	10GBASE-LW		9.95			

## PERFORMANCE SPECIFICATIONS – ELECTRICAL TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
CML Inputs(Differential)	Vin	150		1200	mVpp	AC coupled inputs
Input AC Common Mode Voltage		0		25	mV	RMS
Input Impedance (Differential)	Zin	85	100	115	ohm	Rin > 100 kohms @ DC
Differential Input S-parameter	SDD11	-	-	-10	dB	
Differential to Common Mode Conversion	SCD11	-	-	-10	dB	
Tx_DISABLE Input Voltage – High		2		3.45	V	
Tx_DISABLE Input Voltage – Low		0		0.8	V	
Tx_FAULT Output Voltage – High		2		Vcc+0.3	V	Io = 400µA; Host Vcc
Tx_FAULT Output Voltage – Low		0		0.5	V	Io = -4.0mA

## PERFORMANCE SPECIFICATIONS – ELECTRICAL RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
CML Outputs (Differential)	Vout	350		700	mVpp	AC coupled outputs
Output AC Common Mode Voltage		0		15	mV	RMS
Output Impedance (Differential)	Zout	90	100	110	ohm	
Differential Output S-parameter	SD22	-	-	-10	dB	
Rx_LOS Output Voltage – High		2		Vcc+0.3	V	Io = 400µA; Host Vcc
Rx_LOS Output Voltage – Low		0		0.8	V	Io = -4.0mA
MOD_DEF ( 0:2 )	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

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## PERFORMANCE SPECIFICATIONS – OPTICAL

Parameter	Symbol	Min.	Typ	Max.	Unit
9µm Core Diameter SMF			20		Km
Data Rate				10.3	Gbps

## PERFORMANCE SPECIFICATIONS – OPTICAL TRANSMITTER

Parameter	Symbol	Min.	Typ	Max.	Unit
Centre Wavelength	$\lambda_c$	1290		1330	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Average Output Power	$P_{out}$	-3	-1	+1	dBm
Extinction Ratio	$ER$	3.5			dB
Average Power of OFF Transmitter	$P_{off}$			-30	dBm
Side Mode Suppression Ratio	$SMSR$	30			dB
Transmitter Dispersion Penalty	$TDP$			2	dB
Input Differential Impedance	$Z_{IN}$	90	100	110	$\Omega$
TX Disable	Disable	2.0		V <sub>CC</sub> +0.3	V
	Enable	0		0.8	
TX Fault	Fault	2.0		V <sub>CC</sub> +0.3	V
	Normal	0		0.8	
TX Disable Assert Time	$t_{off}$	-	-	10	us
TX_DISABLE Negate Time	$t_{on}$	-	-	1	ms
TX_BISABLE time to start reset	$t_{reset}$	10	-	-	us
Time to initialize, include reset of TX_FAULT	$t_{init}$	-	-	300	ms
TX_FAULT from fault to assertion	$t_{fault}$	-	-	100	us
Total Jitter	$TJ$	-	-	0.28	UI(p-p)
Data Dependant Jitter	$DDJ$	-	-	0.1	UI(p-p)
Uncorrelated Jitter	$UJ$	-	-	0.023	RMS

## PERFORMANCE SPECIFICATIONS – OPTICAL RECEIVER

Parameter	Symbol	Min.	Typ	Max.	Unit
Centre Wavelength	$\lambda$	1270		1600	nm
Sensitivity	$P_{min}$			-14.4	dBm
Receiver Overload	$P_{MAX}$	0.5			dBm
Optical Return Loss	$ORL$			-12	dB
LOS De-Assert	$LOSD$			-15	dBm
LOS Assert	$LOSA$	-25			dBm
LOS	High	2.0		V <sub>CC</sub> +0.3	V

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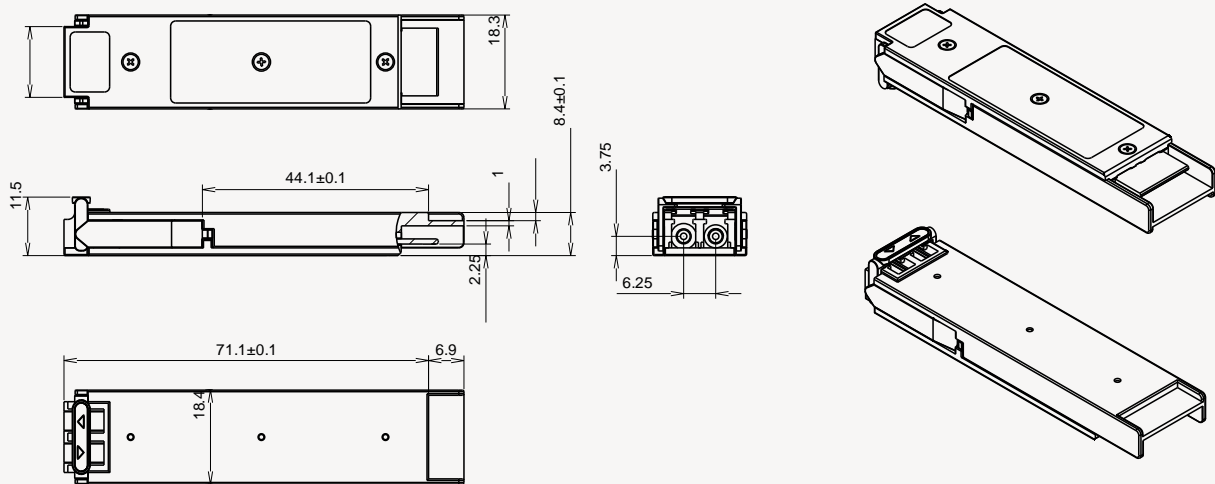
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Low	0	0.8
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### PIN FUNCTION DEFINITIONS

PIN	Signal Name	Description	PIN	Signal Name	Description
1	V <sub>EE</sub> T	Transmitter Ground	11	V <sub>EE</sub> R	Receiver Ground
2	TX_Fault	Transmitter Fault Indication	12	RD-	Inv. Received Data Out
3	TX_Disable	Transmitter Disable	13	RD+	Received Data Out
4	SDA	Module Definition 2	14	V <sub>EE</sub> R	Receiver Ground
5	SCL	Module Definition 1	15	V <sub>CC</sub> R	Receiver Power
6	MOD_ABS	Module Definition 0	16	V <sub>CC</sub> T	Transmitter Power
7	RS0	RX Rate Select (LVTTTL).	17	V <sub>EE</sub> T	Transmitter Ground
8	LOS	Loss of Signal	18	TD+	Transmit Data In
9	RS1	TX Rate Select (LVTTTL).	19	TD-	Inv. Transmit Data In
10	V <sub>EE</sub> R	Receiver Ground	20	V <sub>EE</sub> T	Transmitter Ground

### MECHANICAL SPECIFICATIONS



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