

# SO-SFP-8GFC-L10D

SFP+, 8/4/2/1 Gbps FC/FICON, 1310nm, SM, DDM, 6.8dB, 10km

## OVERVIEW

The SO-SFP-8GFC-L10D series single mode transceiver is small form factor pluggable module for serial optical data communications such as X1/X2/X4/X8 Fiber Channel. It is with the SFP+ 20-pin connector to allow hot plug capability. 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 8.5Gbps
- 1310nm DFB-LD transmitter
- Distance up to 20km
- Single 3.3V power supply and TTL logic interface
- Duplex LC connector interface
- Hot-Pluggable
- Compliant with MSA SFP+ specification SFF-8431
- Compliant with 8.5G FC-PI-4 800-SM-LC-L FC standard
- Compliant with 4.25G FC-PI-4 400-SM-LC-L FC standard
- Compliant with 2.125G FC-PI-4 200-SM-LC-L FC standard
- Compliant with 1.0625G FC-PI-4 100-SM-LC-L FC standard
- Operating case temperature, extended: -5°C to +70°C

## APPLICATIONS

- 1000 Base-LX Ethernet
- 8XFC at 8.5Gbps
- 4XFC at 4.25Gbps
- 2XFC at 2.125Gbps
- 1xFC at 1.0625Gbps
- Other optical links

## ORDERING INFORMATION

Part Number	Description
SO-SFP-8GFC-L10D	SFP+, 8/4/2/1 Gbps FC/FICON, 1310nm, SM, DDM, 6.8dB, 10km

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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	-5		+70	°C
Power Supply Voltage	Vcc	3.15	3.3	3.45	V
Power Supply Current	Icc			300	mA
Surge Current	ISurge			+30	mA
Baud Rate	8XFC		8.5		Gbps
	4XFC		4.25		
	2XFC		2.125		
	1XFC		0.0625		

## PERFORMANCE SPECIFICATIONS – ELECTRICAL TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
CML Inputs(Differential)	V <sub>IN</sub>	150		1200	mVpp	AC coupled inputs
Input AC Common Mode Voltage		0		25	mV	RMS
Input Impedance (Differential)	Z <sub>IN</sub>	85	100	115	ohms	R <sub>in</sub> > 100 kohms @ DC
Differential Input S-parameter	S <sub>DD11</sub>			-10	dB	
Differential to Common Mode Conversion	S <sub>CD11</sub>			-10	dB	
TX Disable	Disable	2.0		Vcc	V	
	Enable	0		0.8		
TX FAULT	Fault	2.0		Vcc	V	Io=400µA; Host Vcc
	Normal	0		0.5		Io = -4.0mA

## PERFORMANCE SPECIFICATIONS – ELECTRICAL RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
CML Outputs (Differential)	V <sub>out</sub>	350		700	mVpp	AC coupled outputs
Output AC Common Mode Voltage		0		15	mV	RMS
Output Impedance (Differential)	Z <sub>out</sub>	90	100	110	ohm	
Differential Output S-parameter	S <sub>D22</sub>			-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 ( 2:0 )	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 Supported Distance				10	km
Data Rate				8.5	Gbps

## PERFORMANCE SPECIFICATIONS – OPTICAL TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit
Centre Wavelength	$\lambda_c$	1270	1310	1355	nm
Spectral Width (RMS)	$\Delta\lambda$			1	nm
Average Output Power	$P_{out}$	-8.2		+0.5	dBm
Extinction Ratio	$ER$	3.5			dB
Average Power of OFF Transmitter	$P_{off}$			-30	dBm
Side Mode Suppression Ratio	$SMSR$	30			dB
Input Differential Impedance	$Z_{IN}$	90	100	110	$\Omega$
TX Disable	Disable	2.0		$V_{cc}+0.3$	V
	Enable	0		0.8	
TX_Fault	Fault	2.0		$V_{cc}+0.3$	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

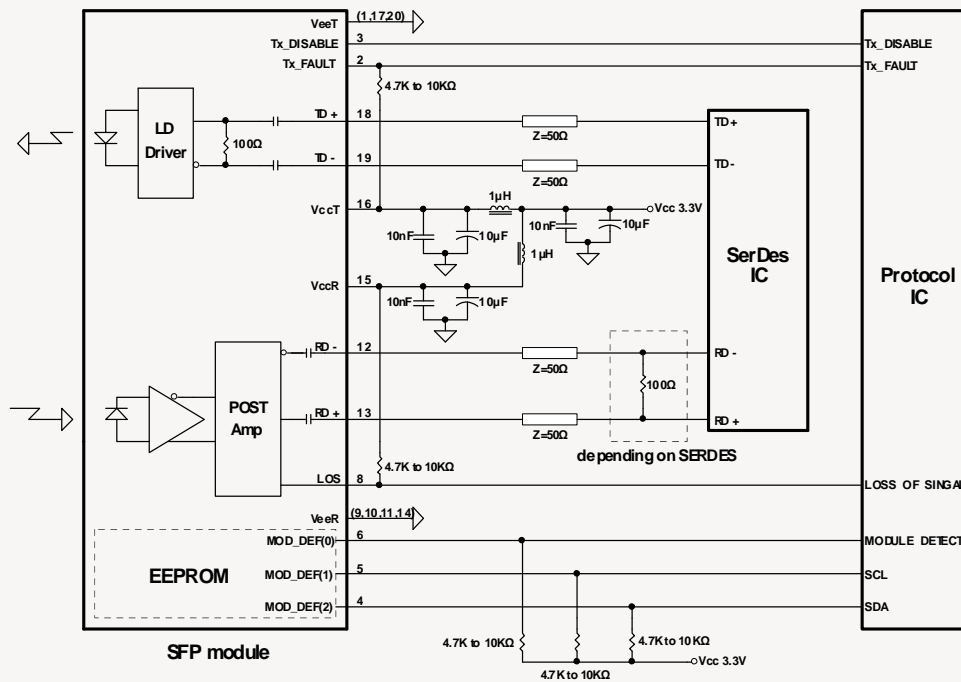
## PERFORMANCE SPECIFICATIONS – OPTICAL RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit
Centre Wavelength	$\lambda$	1260		1565	nm
Sensitivity	$P_{min}$			-15	dBm
Receiver Overload	$P_{max}$	0.5			dBm
Optical Return Loss	$ORL$			-12	dB
LOS De-Assert	$LOSD$			-17	dBm
LOS Assert	$LOSA$	-29			dBm
LOS	High	2.0		$V_{cc}+0.3$	V
	Low	0		0.8	

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RECOMMENDED CIRCUIT SCHEMATIC



PIN FUNCTION DEFINITIONS

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

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MECHANICAL DRAWING

