

# SO-SFP-4GFC-SD

SFP, 4/2/1 Gbps FC/FICON, MM, DDM, 850nm, 6dB, 150m

## OVERVIEW

The SO-SFP-4GFC-SD series multi-mode transceiver is small form factor pluggable module for duplex optical data communications such as 4X/2X/1X Fiber Channel and Gigabit Ethernet 1000BASE-SX. It is with the SFP 20-pin connector to allow hot plug capability. This module is designed for multi-mode fiber and operates at a nominal wavelength of 850 nm. The transmitter section uses a Vertical Cavity Surface Emitted Laser (VCSEL) and is a Class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated GaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. The SO-SFP-4GFC-SD series are designed to be compliant with SFF-8472 Multi-source Agreement (MSA).

## PRODUCT FEATURES

- Operating data rate up to 4.25Gbps
- 850nm VCSEL laser transmitter
- 150m with 50/125  $\mu\text{m}$  MMF, 70m on 62.5/125  $\mu\text{m}$  MMF
- Single 3.3V power supply and TTL logic interface
- Hot-Pluggable SFP footprint duplex LC connector
- Class 1 FDA and IEC60825-1 laser safety compliant
- Operating temperature
  - Standard: 0°C~+70 °C
  - Industrial:-40 °C~+85 °C
- Compliant with SFP MSA specification
- Compliant with SFF-8472 Digital Diagnostic Monitor (DDM) interface

## APPLICATIONS

- 4/2/1Gbps Fibre Channel
- 1000Base-SX Ethernet
- optical networking and equipment connectivity

## ORDERING INFORMATION

Part Number	Description
SO-SFP-4GFC-SD	SFP, 4/2/1 Gbps FC/FICON, MM, DDM, 850nm, 6dB, 150m
SO-SFP-4GFC-SD -I	SFP, 4/2/1 Gbps FC/FICON, MM, DDM, 850nm, 6dB, 150m, ind.temp.

## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Storage Temperature	TS	-40	+85	°C
Supply Voltage	VCC	-0.5	3.6	V
Operating Relative Humidity			95	%

## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	Tc	SO-SFP-4GFC-SD	0	+70	°C
		SO-SFP-4GFC-SD -I	-40	+85	°C
Power Supply Voltage	Vcc	3.15	3.3	3.45	V
Power Supply Current	Icc			300	mA
Data rate	4xFC		4.25		Gbps
	OC-48		2.5		
	2xFC		2.125		
	GBE		1.25		
	FC		1.063		

## PERFORMANCE SPECIFICATIONS – ELECTRICAL TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
CML Inputs(Differential)	V <sub>IN</sub>	400		1600	mVpp	AC coupled inputs
Input Impedance (Differential)	Z <sub>IN</sub>	85	100	115	ohms	R <sub>in</sub> > 100 kohms @ DC
TX Disable	Disable	2		Vcc	V	
	Enable	0		0.8		
TX FAULT	Fault	2		Vcc+0.3	V	
	Normal	0		0.8		

## PERFORMANCE SPECIFICATIONS – ELECTRICAL RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
CML Outputs (Differential)	V <sub>out</sub>	400	800	1200	mVpp	AC coupled outputs
Output Impedance (Differential)	Z <sub>out</sub>	85	100	115	ohms	
Rx_LOS Output Voltage – High		2		Vcc+0.3	V	
Rx_LOS Output Voltage – Low		0		0.8	V	
MOD_DEF ( 2:0 )	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

## OPTICAL AND ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
50µm Core Diameter	4xFC		150		
MMF	2xFC	L	300		m
	GBE/FC		500		
62.5µm Core Diameter	4xFC		70		
MM	2xFC	L	150		m
	GBE/FC		300		
Data Rate	4xFC		4.25		Gbps
	2xFC		2.125		
	GBE		1.25		
	FC		1.063		

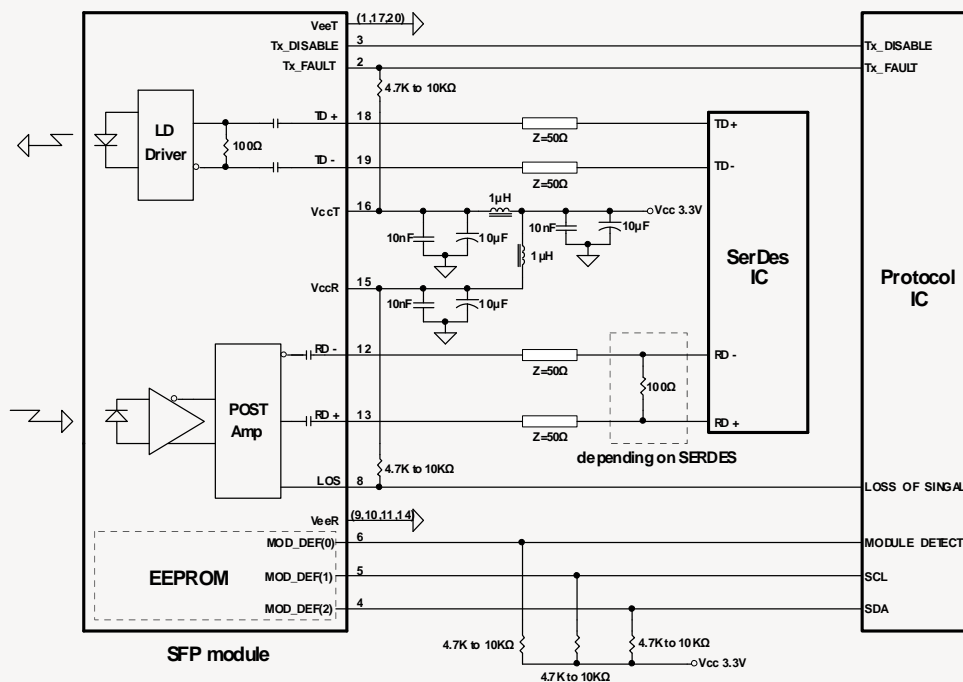
## OPTICAL AND ELECTRICAL CHARACTERISTICS TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit
Centre Wavelength	$\lambda_c$	830	850	860	nm
Spectral Width (RMS)	$\Delta\lambda$			0.85	nm
Average Output Power	$P_{out}$	-9		0	dBm
Extinction Ratio @4.25Gb/s	ER	5			dB
Rise/Fall Time(20%~80%)	$t_r/t_f$			90	ps
Output Optical Eye		Complies with ANSI FC-PI specification			
TX Disable Assert Time	$t_{off}$			10	us

## OPTICAL AND ELECTRICAL CHARACTERISTICS RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit
Centre Wavelength	$\lambda_c$	760		860	nm
Receiver Sensitivity	4xFC			-15	dBm
	2xFC	$P_{min}$		-18	
	GBE/FC			-20	
Receiver Overload	$P_{max}$	-3			dBm
Return Loss		12			dB
LOS De-Assert	LOSD			-16	dBm
LOS Assert	LOSA	-30			dBm
LOS Hysteresis		1			dB

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

MECHANICAL DRAWING

