SO-SFP-16GFC-SD

SFP+, 16/8/4 Gbps FC/FICON, 850nm, MM, DDM, 4dB, 35m@OM2, 100m@OM3, 125m@OM4

OVERVIEW

The SO-SFP-16GFC-SD series multi-mode transceivers are SFP+ module for bi-directional serial optical data communications such as 16x/8x/4x Fibre Channel. This module is designed for multimode 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 rate selection clock data recovery (CDR) IC. The module has a duplex LC optical interface and all mechanical characteristics are compliant with the current SFP+ specification (SFF-8431 and SFF-8432). All SFP modules fulfill the content of the serial EEPROM described in the SFP MSA, Appendix B4, table 3.1, at base data fields (defined as addresses 0 to 63) and extended data fields (defined as addresses 64 to 95). The nominal transmitter output wavelength is stated at the reserved addresses 60-61 according to SFF document SFF-8472 rev 10.5, “Digital Diagnostics Monitoring Interface”. Wavelengths stated in the specification are measured in vacuum. All requirements in this specification are valid throughout the specified lifetime and operational environmental temperature range unless otherwise stated. The transceiver modules are compliant to RoHS-6/6

ORDERING INFORMATION

Part Number	Description
SO-SFP-16GFC-SD	SFP+, 16/8/4 Gbps FC/FICON, 850nm, MM, DDM, 4dB, 35m@OM2, 100m@OM3, 125m@OM4

PRODUCT FEATURES

- Up to 14.025 Gbps data-rates
- Compliant with 16G FC 1600-SN
- Compliant with 8G, 4G fibre channel
- Up to 35m on 50/125 MMF
- Up to 100m with OM3 MMF
- Up to 125m with OM4 MMF
- Built-in CDR with shut-off Control
- Enhanced E-WRAP, O-WRAP operational features
- Duplex LC connector
- Compliant with SFP+ MSA
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- Single power supply 3.3V
- RoHS6 compliant
- Class 1 laser product complies with EN 60825-1
- Operating temperature range:

Standard: 0℃ to 70℃

Industrial: -40℃ to 85℃

- Power consumption <1.5W

APPLICATIONS

- 16G/8G/4G Fibre Channel

GENERAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Data Rate	*DR*	4.25		14.025+100ppm	Gbps	
Bit Error Rate	*BER*			10^{-12}		
Operating Temperature	*TOP*	0		70	℃	Case temperature
		-40		85	℃	Case temperature ind. Temp.
Storage Temperature	*TSTO*	-40		85	℃	Ambient temperature
Supply Current	*IS*		350	550	mA	For electrical power interface
Input Voltage	*VCC*	3.13	3.3	3.45	V	
Maximum Voltage	*VMAX*	-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	Notes
Output Optical Power	$P_{O,AVG}$	-7.8			dBm	50/125 µm MMF
Optical Center Wavelength	*λc*	840	850	860	nm	
Optical Spectrum Width				0.59	nm	RMS
Optical Modulation Amplitude @ 4.25Gbps	*OMA*	247			µW	
Optical Modulation Amplitude @ 8.5Gbps	*OMA*	302			µW	
Optical Modulation Amplitude @ 14.025Gbps	*OMA*	331			µW	
Relative Intensity noise	*RIN*			-128	dB/Hz	Peak-to-Peak

OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Optical Receiver Power	P_{MAX}			0	dBm	Average
Optical Center Wavelength	*λ*	770		860	nm	
Receiver Sensitivity @ 14.25GBps	*RX_SENS1*			-7.7	dBm	BER<10^{-12}, PRBS 2^{31}-1, stressed
Receiver Sensitivity @ 14.25GBps	*RX_SENS1*			89	µW	BER<10^{-12}, PRBS 2^{31}-1, stressed
Receiver Sensitivity @ 8.5GBps	*RX_SENS2*			76	µW	BER<10^{-12}, PRBS 2^{7}-1
Receiver Sensitivity @ 4.25GBps	*RX_SENS3*			61	µW	BER<10^{-12}, PRBS 2^{7}-1
Loss of Signal-Asserted	*PLOS_A*			-13	dBm	
Loss of Signal-Deasserted	*PLOS_D*	-24			dBm	

Loss of Signal-Hysteresis	*PLOS_H*	1		4	dB

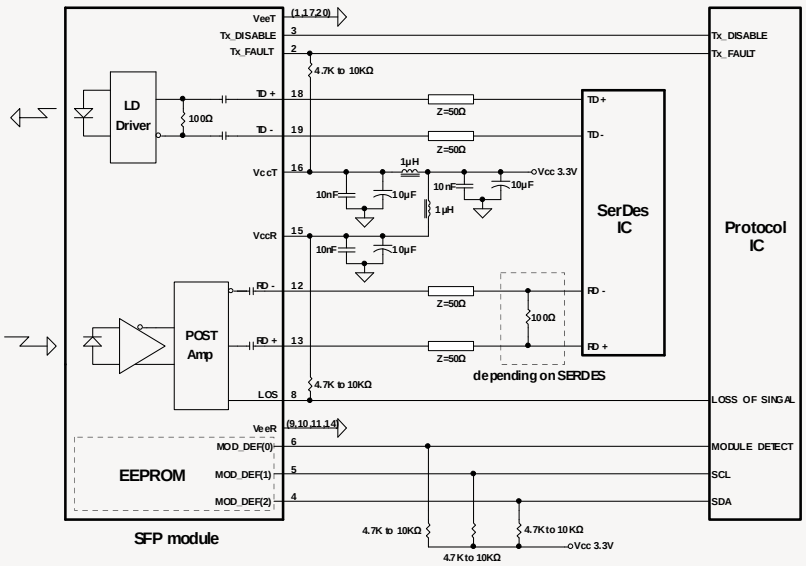
ELECTRICAL CHARACTERISTICS – HIGH-SPEED SIGNAL INTERFACE (CML)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Input Data Rate		4.25	14.025		Gb/s	
TX Clock Tolerance				±100	ppm	
Differential Input Impedance	*RIN*		100		Ω	
Differential data input amplitude		150		1200	mVpp	Internally AC coupled
Output Data Rate		4.25	14.025		Gb/s	
RX Clock Tolerance				±100	ppm	
Differential Output Impedance	*ROUT*		100		Ω	
Differential data output amplitude		350	600	700	mVpp	Internally AC coupled

ELECTRICAL CHARACTERISTICS – LOW-SPEED SIGNAL INTERFACE (LVTTL)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Input High Voltage		2.0		VCC+0.3	V	TX-DIS, TX-FAULT
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	RX-LOS
Output Low Voltage		GND		0.5	V	

RECOMMENDED CIRCUIT SCHEMATIC



PIN FUNCTION DEFINITIONS

PIN	Signal Name	Description	PIN	Signal Name	Description
1	$V_{EE}T$	Transmitter Signal Ground	11	$V_{EE}R$	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	$V_{EE}R$	Receiver Signal Ground
5	SDL	Modulation Definition 1 – Two wires serial ID Interface	15	$V_{CC}R$	Receiver Power – 3.3V±5%
6	MOD-ABS	Modulation Definition 0 – Ground in Module	16	$V_{CC}T$	Transmitter Power – 3.3V±5%
7	RS0	RX Rate Select (LVTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	17	$V_{EE}T$	Transmitter Signal Ground
8	RX_LOS	Loss of Signal Out (OC).	18	TD+	Transmitter Data In
9	RS1	TX Rate Select (LVTTL). 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	$V_{EE}R$	Receiver Signal Ground	20	$V_{EE}T$	Transmitter Signal Ground

MECHANICAL DRAWING