

SO-SFP28-LR

SFP28, 25GBASE-LR, 1310nm, SM, DDM, 10km

OVERVIEW

The SO-SFP28-LR is a 1310 nm DFB based 25Gigabit SFP28 transceiver. It is designed to transmit and receive optical data over 9/125µm single-mode optical fiber (SMF) and support up to 10km transmission. 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 60-62 according to SFF document SFF-8472 rev 11.3, "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

PRODUCT FEATURES

- Duplex LC connector
- Compliant with SFP28 MSA
- Electrical interface compliant to SFF-8431
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- Up to 10 km on 9/125um SMF G.652
- Single power supply 3.3V
- RoHS6/6 compliant
- Class 1 laser product complies with EN 60825-1
- Operating temperature range: 0°C to 70°C
- Power consumption <1.1W

APPLICATIONS

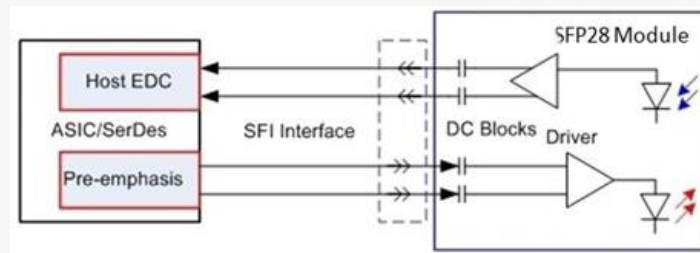
- 25GBASE-LR

ORDERING INFORMATION

Part Number	Description
SO-SFP28-LR	SFP28, 25GBASE-LR, 1310nm, SM, DDM, 10km

GENERAL DESCRIPTIONS

The SFP28 LR module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI. SFI typically operates over 200 mm of improved FR4 material or up to about 150mm of standard FR4 with one connector.



The transmitter converts 25Gbps serial PECL or CML electrical data into serial optical data compliant with the 25GBASE-LR standard. An open collector compatible Transmit Disable (Tx_Dis) is provided. Logic "1" or no connection on this pin will disable the laser from transmitting. Logic "0" on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault (Tx_Fault) is provided. TX_Fault is module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX_Fault output contact is an open drain/collector and shall be pulled up to the Vcc_Host in the host with a resistor in the range 4.7-10 kΩ. TX_Disable is a module input contact. When TX_Disable is asserted high or left open, the SFP28 module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor.

The receiver converts 25Gbps serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx_LOS contact is an open drain/collector output and shall be pulled up to Vcc_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. The Rx_LOS signal is intended as a preliminary indication to the system in which the SFP28 is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

GENERAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR			28	Gbps	
Operating Temperature	T _{OP}	0		70	°C	Case temperature
Operating Relative Humidity		5		95	%	
Storage Temperature	T _{STO}	-40		85	°C	Ambient temperature
Supply Current	I _S			300	mA	For electrical power interface
Input Voltage	V _{CC}	3.135	3.3	3.465	V	
Maximum Voltage	V _{MAX}	0		3.6	V	For electrical power interface
Maximum Optical Input Power	P _{MAX}			5	dBm	

OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_c	1290	1310	1330	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P_{AVG}	-8.4		3	dBm	
Laser Off Power	P_{Off}			-30	dBm	
Extinction ratio	E_r	3.5			dB	
Transmitter and Dispersion Penalty	TDP				dB	TBD
Relative Intensity noise	RIN			-	dB/Hz	
Optical Return Loss Tolerance	ORL				dB	TBD

OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_c	1260		1360	nm	
Receiver Sensitivity (AVG)	R_{X_SENS}			-10.4	dBm	1
Receiver Sensitivity (OMA)	R_{X_SENS}			-8.6	dBm	2
Stressed Sensitivity (OMA)				-6.8	dBm	3
Stressed eye jitter					UI _{p-p}	TBD
Receive electrical 3dB upper cut _{off} frequency					GHz	TBD
Loss of Signal-Asserted	P_{LOS_A}				dBm	TBD
Loss of Signal-Deasserted	P_{LOS_D}				dBm	TBD
Receiver Saturation	P_{SAT}			3.5	dBm	
Optical Return Loss	ORL			12	dB	

Notes:

1. Average optical power shall be measured using the methods specified in TIA/EIA455-95.
2. Receiver sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER =1x 10⁻¹².
3. Vertical eye closure penalty and stressed eye jitter are the test conditions for measuring stressed sensitivity. They are not the required characteristic of the receiver.

ELECTRICAL CHARACTERISTICS - TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Single Ended Input Voltage Tolerance		-0.3		4	V	
Common Mode Voltage Tolerance		15			mV	
Tx Input Differential Voltage	V_{In}	180		700	mV	
Tx Fault		-0.3		0.4	V	@ 0.7 mA
Data Dependent Input Jitter	DDJ			0.1	UI	
Data Input Total Jitter	TJ				UI	TBD

ELECTRICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Single Ended Output Voltage Tolerance		-0.3		4	V	

Subject to change without notice.

For more information, visit smaroptics.com.

		= Laser on.			
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 (LVTTTL). 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 DIMENSIONS

Comply with SFF-8432 rev. 5.0, the improved Pluggable form factor specification.

