Applications

- 10G ZR Ethernet
- 10G Fiber Channel
- Switch to Switch interface
- Switch backplane applications
- Router/Server interface
- Other Optical Links

Product Features

- Compliant with SFF-8431,SFF-8432 and IEE802.3ae
- Cooled EML transmitter and PIN receiver
- Digital Diagnostic Monitor Interface
- Hot pluggable
- Dual CDR with 9.95-11.3Gb/s
- link length up to 80km
- 10GBASE-ER, and 2G/4G/ 8G/10G Fiber Channel applications.
- Low power consumption
- Operating case temperature: 0 to 70 °C

General

SFP+10G-ZR - designed to transmit and receive optical data over single mode optical fiber for link length 40km. The transceiver consists of two sections: Transmitter section incorporates a colded EML laser. Receiver section consists of a PIN photodiode integrated with a TIA. All modules satisfy class I laser safety requirements. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage.

Ordering information

Part number	Output power	Rec. Sens.	Data Rate	Wavelength	Distance
SFP+-10G-ER	0 ~ +4 db	-24db	10G	1550nm	80KM

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Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature	Ts	-40	85	°C	
Relative Humidity	RH	0	85	%	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the module

General Operating Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Data Rate	DR		10.3125		Gb/s	
Supply Voltage	Vcc	3.13	3.3	3.47	V	
Supply Current	Icc5			450	mA	
Operating Case Temp.	Tc	0		70	°C	
Operating Case Temp.	Tl	-40		85	°C	

Electrical Input/Output Characteristics

Parameter		Symbol	Min.	Typ	Max.	Unit	Note
Transmitter							
Diff. input voltage swing			120		820	mVpp	1
Tx Disable input	H	VIH	2.0		Vcc+0.3	V	
	L	VIL	0		0.8		
Tx Fault output	H	VOH	2.0		Vcc+0.3	V	2
	L	VOL	0		0.8		
Input Diff. Impedance		Zin		100		Ω	
Receiver							
Diff. output voltage swing			340	650	800	mVpp	3
Rx LOS Output	H	VOH	2.0		Vcc+0.3	V	2
	L	VOL	0		0.8		

Notes:
1. TD+/- are internally AC coupled with 100Ω differential termination inside the module.
2. Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.
3. RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Operating Wavelength	λ	1530		1565	nm	3
Ave. output power (Enabled)	PAVE	0		+4	dBm	1
Extinction Ratio	ER	10			dB	1
Side-Mode Suppression Ratio	SMSR			>30	dB	
RMS spectral width	Δλ			1	nm	
Rise/Fall time (20%~80%)	Tr/Tf			50	ns	2
Tx jitter(4m-80MHz)				0.1	uipp	
Tx jitter(20k-80MHz)				0.3	uipp	
Optical modulation amplitude	OMA	-6.2			dBm	
Dispersion penalty				1	dB	
Output Optical Eye	Compliant with IEEE802.3ae					
Receiver						
Operating Wavelength	λ	1260		1600	nm	
Receiver Sensitivity	Pisen			-24	dBm	3
Min. Overload	Pmax	-7			dBm	
LOS Assert	Pd	-32			dBm	
LOS De-assert	Pd-Pa			-26	dBm	
LOS Hysteresis	Pimax	0.5		4	dB	

Notes:
1. Measure at 2^7-1 NRZ PRBS pattern
2. Transmitter eye mask definition
3. "XX" is: 45,47,49,51,53,55,57,59 and 61; "Δλ" is 7.5
4. Measured with Light source 1XX0 nm, ER=9dB; BER =<10^-12 @PRBS=2^7-1 NRZ
5. When LOS de-asserted, the RX data+/- output is High-level (fixed)

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Pin Definitions and Functions
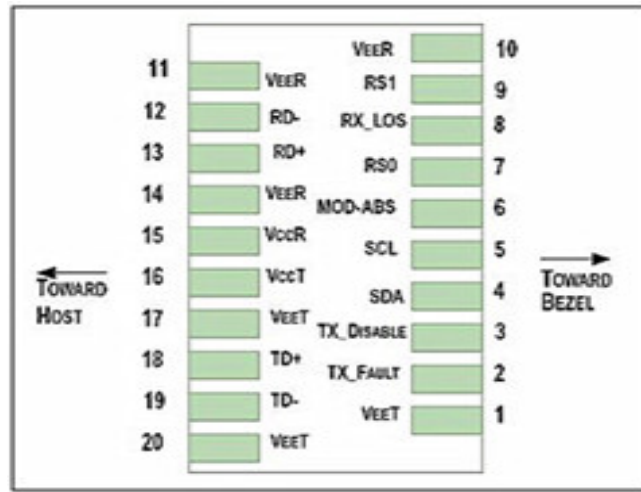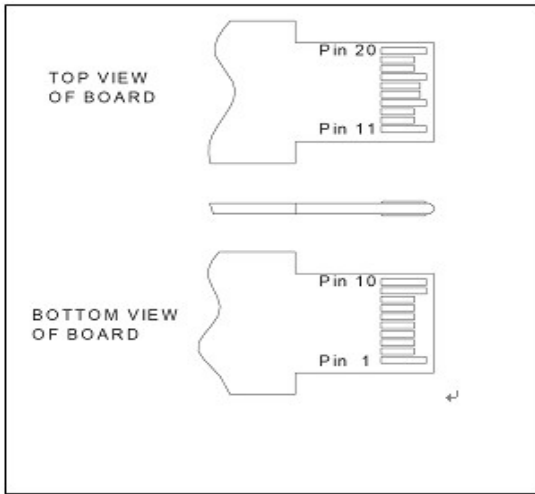
| Pin	Symbol	Name/Description	Notes
1	VeeT	Tx ground	
2	Tx Fault	Tx fault indication, Open Collector Output, active "H"	1
3	Tx Disable	LVTTL Input, internal pull-up, Tx disabled on "H"	2
4	MOD-DEF2	2 wire serial interface data input/output (SDA)	3
5	MOD-DEF1	2 wire serial interface clock input (SCL)	3
6	MOD-DEF0	Model present indication	3
7	Rate select	No connection	
8	LOS	Rx loss of signal, Open Collector Output, active "H"	4
9	VeeR	Rx ground	
10	VeeR	Rx ground	
11	VeeR	Rx ground	
12	RD-	Inverse received data out	5
13	RD+	Received data out	5
14	VeeR	Rx ground	
15	VccR	Rx power supply	
16	VccT	Tx power supply	
17	VeeT	Tx ground	
18	TD+	Transmit data in	6
19	TD-	Inverse transmit data in	6
20	VeeT	Tx ground	

Notes:

1. When high, this output indicates a laser fault of some kind. Low indicates normal operation. And should be pulled up with a 4.7 – 10KΩ resistor on the host board.

2. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10KΩ resistor. Its states are:

    Low (0 – 0.8V): Transmitter on   (>0.8, < 2.0V): Undefined

    High (2.0V~Vcc+0.3V): Transmitter Disabled   Open: Transmitter Disabled

3. Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10KΩ resistor on the host board. The pull-up voltage shall be between 2.0V~Vcc+0.3V.
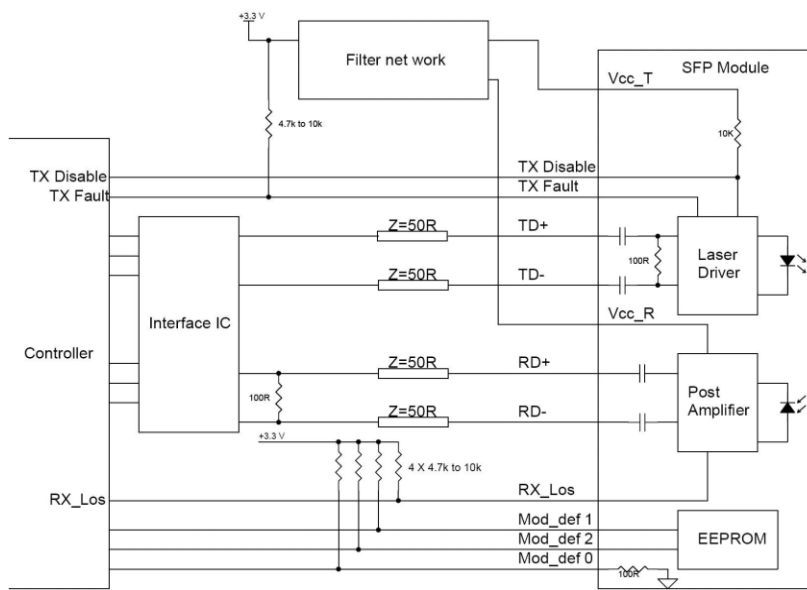
Mod-Def 0 has been grounded by the module to indicate that the module is present
Mod-Def 1 is the clock line of two wire serial interface for serial ID
Mod-Def 2 is the data line of two wire serial interface for serial ID
4. When high, this output indicates loss of signal (LOS). Low indicates normal operation.
5. RD+/-: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
6. TD+/-: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

Functional Diagram
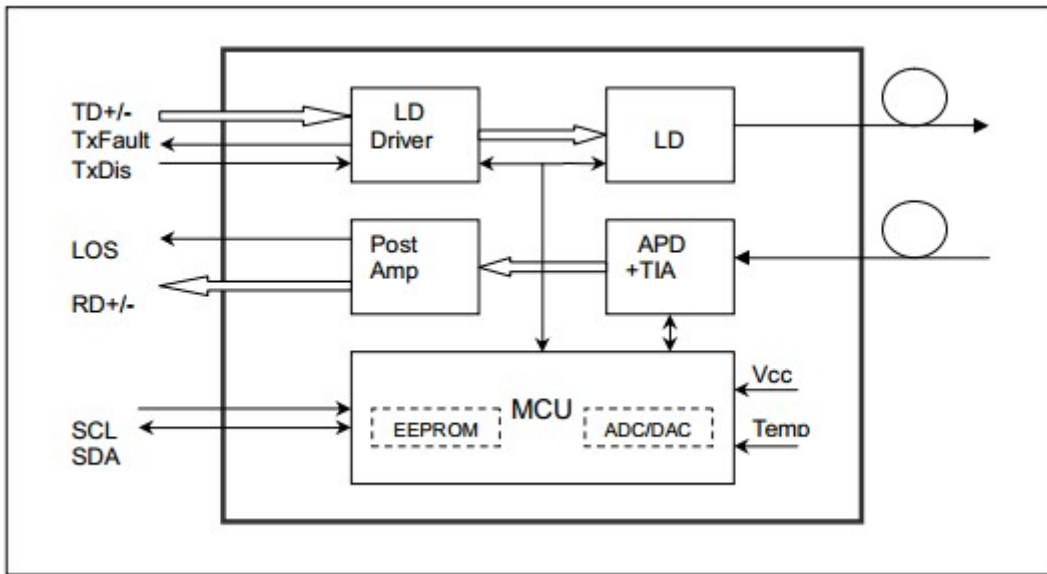
Typical Interface Circuit

Package Dimensions