LWO-SFP-13-EX

1.25 Gbit SFP, 1310nm, 40km, DDM, LC-Duplex, Singlemode

Features

- Duplex LC Single-Mode Transceiver
- Up to 1.25Gbps data rate
- Duplex LC receptacle optical interface compliant
- Single +3.3V power supply
- Hot-pluggable
- Receiver Loss of Signal Output
- International Class 1 laser safety certified
- Transmitter disable input
- 1310nm DFB laser for 40KM
- ROHS Compliant
- Case operating temperature:
  - Commercial: 0°C - +70°C
  - Industrial: -40°C - +85°C

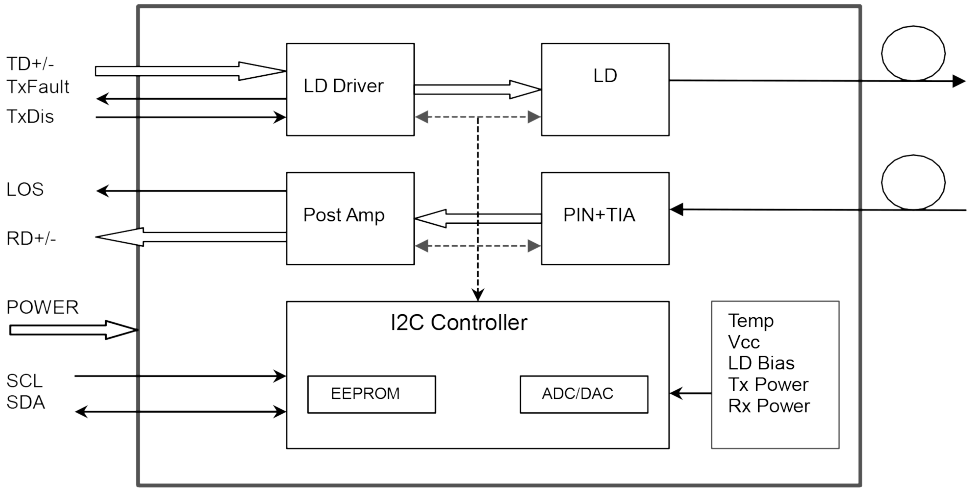
Application

- Gigabit Ethernet
- SDH
- Switched backplane applications

General Description

The SFP transceivers are high performance, cost effective modules supporting data rate of 1.25Gbps and 40km transmission distance with SMF.
The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit.
All modules satisfy class I laser safety requirements.
The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.

Transceiver Funtional Diagram



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Recommended Operating Conditions and Power Supply Requirements

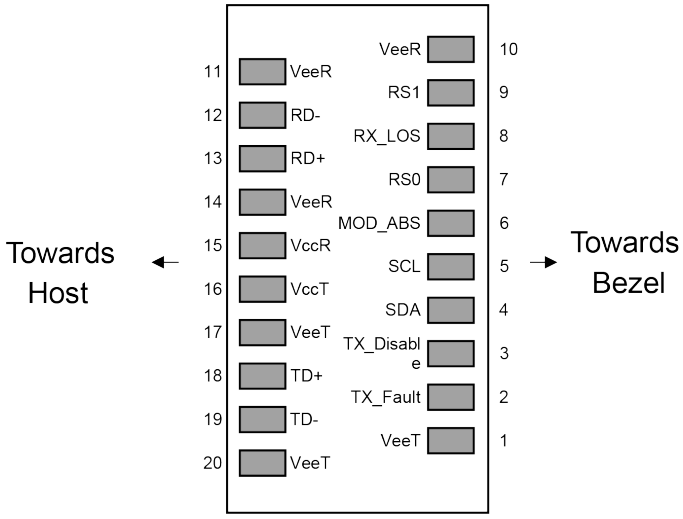
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	T_{OP}	0		70	°C	commercial
		-40		85		industrial
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Data Rate			1.25		Gb/s	
Link Distance (SMF)	D			40	km	

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Units
Storage Temperature	T_S	-40	+85	°C
Power Supply Voltage	Vcc	-0.5	3.6	V
Relative Humidity (non-condensation)	R_H	5	95	%

SFP Transceiver Electrical Connector Layout



Pin Description 1/2

Pins	Logic	Symbol	Name / Discription	Note
1		VeeT	Transmitter Ground (Common with Receiver Ground)	1
2	LVTTL-O	Tx Fault	Transmitter Fault	2
3	LVTTL-I	Tx Disable	Transmitter Disable. Laser output disabled on high or open.	3
4	LVTTL-I/O	SDA	2-wire Serial Interface Data Line	4
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock Line	4
6		MOD_ABS	Module Absent. Grounded within the module	4
7	LVTTL-I	RS0	Rate Select 0, internal pull down	5
8	LVTTL-O	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	LVTTL-I	RS1	Rate Select 1, internal pull down	5
10		VeeR	Receiver Ground (Common with Transmitter Ground)	1

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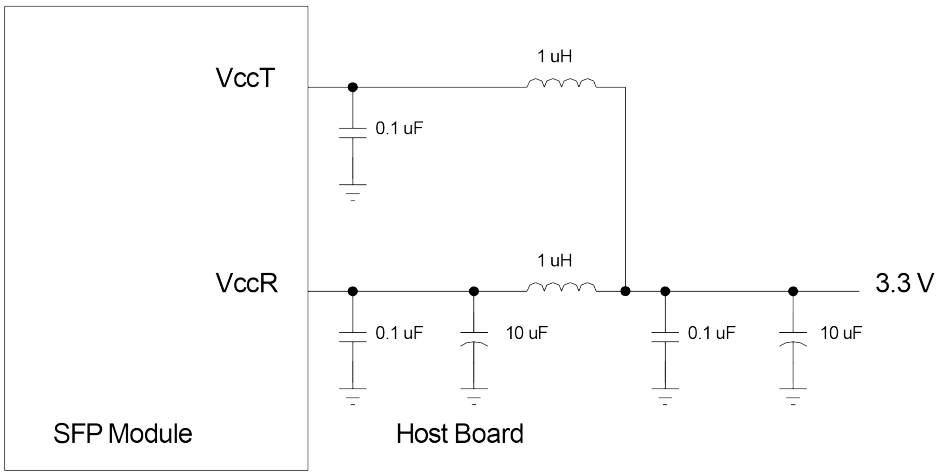
Pin Description 2/2

Pins		Name	Discription	NOTE
11		VeeR	Receiver Ground (Common with Transmitter Ground)	1
12	CML-O	RD-	Receiver Inverted DATA out. AC Coupled	
13	CML-O	RD+	Receiver Non-inverted DATA out. AC Coupled	
14		VeeR	Receiver Ground (Common with Transmitter Ground)	1
15		VccR	Receiver Power Supply	
16		VccT	Transmitter Power Supply	
17		VeeT	Transmitter Ground (Common with Receiver Ground)	1
18	CML-I	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	CML-I	TD-	Transmitter Inverted DATA in. AC Coupled.	
20		VeeT	Transmitter Ground (Common with Receiver Ground)	1

Notes

1. Circuit ground is internally isolated from chassis ground.
2. TFAULT is an open collector/drain output, which should be pulled up with a 4.7kΩ-10kΩ resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V.A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
4. Should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 2.0V and 3.6V.
   MOD_ABS pulls line low to indicate module is plugged in.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Recommended Power Supply Filter



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Optical and Electrical Characteristics

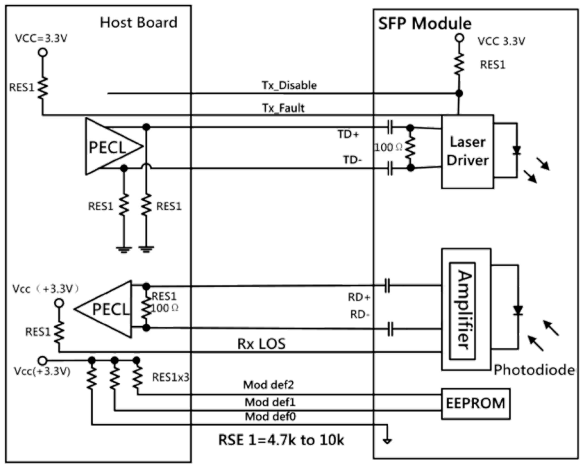
The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Electrical Characteristics						
Supply Current	I_{CC}			300	mA	
Single Ended Data Input Swing				1100	mV	
Single Ended Data Output Swing		300		600	mV	
TX_fault /LOS output (TTL)	VOH	2		V_{CC}	V	
	VOL	0		0.8		
TX_disable input (TTL)	VOH	2		V_{CC}	V	
	VOL	0		0.8		
Electrical Characteristics						
Launch Optical Power	Po	-5		0	dBm	40km
Center Wavelength	λc	1290	1310	1330	nm	DFB LD
Spectral Width(20dB)	Δλ			-	nm	DFB LD
Side Mode Suppression Ratios	SMSR	30			dB	DFB LD
Extinction Ratio	ER	9			dB	
Eye Diagram	Complies with IEEE802.3z eye masks when filtered					
Pout of OFF transmitter	Poff			-40	dBm	
Optical receiver Characteristics						
Center Wavelength Range	λc	1260		1620	nm	
Receiver Sensitivity	Sen			-24	dBm	1
Overload Input Optical Power	Psat	-3			dBm	
LOS De-assert	LosD			-30	dBm	
LOS Assert	LosA	-38				
LOS Hysteresis		0.5	3	5	dB	2

Notes

1. Measured with a PRBS 223-1 test pattern, @1.25Gb/s, EX=10dB, BER<10-12
2. The LOS Hysteresis to minimize "chatter" on the output line. In principle, hysteresis alone does not guarantee chatter-free operation

Recommended Application Circuit



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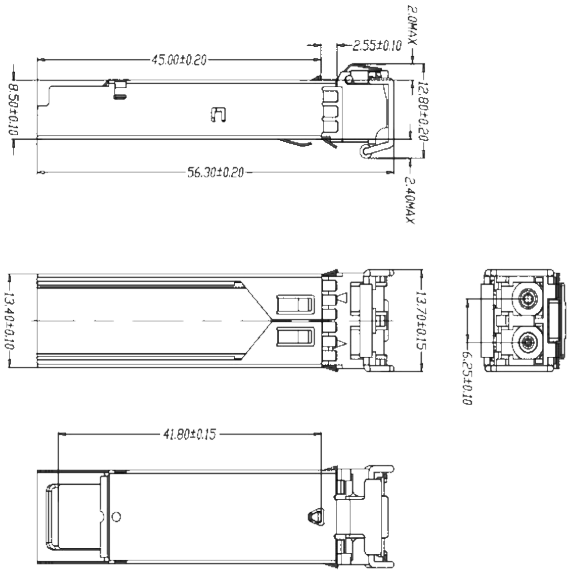
Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Min.	Max.	Unit	Notes
Temperature monitor absolute error	DMI_ Temp	-3	3	°C	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Mechanical Dimensions



ESD

This transceiver is specified as ESD threshold 1kV for high speed data pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 / JESD22- A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Laser Safety

This is a Class 1 Laser Product according to EN 60825-1:2014. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).
Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.