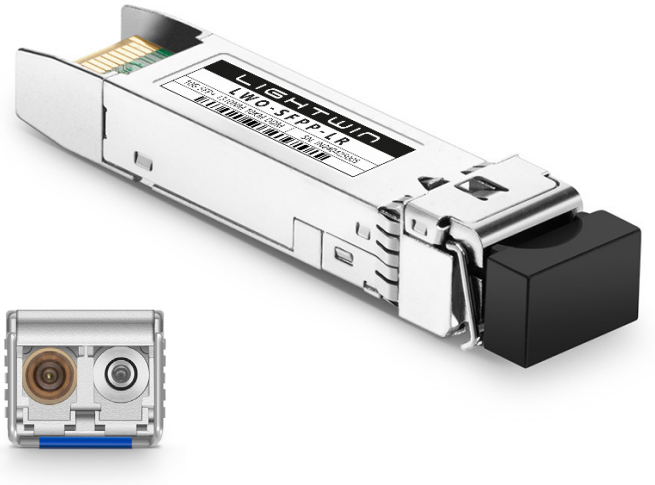
LWO-SFPP-LR

10 Gbit SFP+, 1310nm, 10km, DDM, LC-Duplex, Singlemode

Features

- Up to 11.1Gbps Data Links
- Up to 10km transmission on SMF
- DFB Laser and PIN receiver
- Metal enclosure, for lower EMI
- Hot-pluggable SFP+ footprint
- Compliant with SFP+ MSA with LC connector
- Specifications compliant with SFF 8472
- 2-wire interface with integrated Digital Diagnostic monitoring
- Single 3.3V power supply
- Power dissipation < 1.0 W
- Case operating temperature:
  - Commercial: 0°C to +70°C
  - Industrial: -40°C to +85°C



Application

- Switch to Switch Interface
- 10GBASE-LR/LW & 10G
- Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links

Functional Description

LWO-SFPP-LR Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the DFB laser and the PIN photo-detector. The module data link up to 10KM in 9/125um single mode fiber.

The optical output can be disabled by a TTL logic high-level input of Tx Disable. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner.

Transceiver Block Diagram

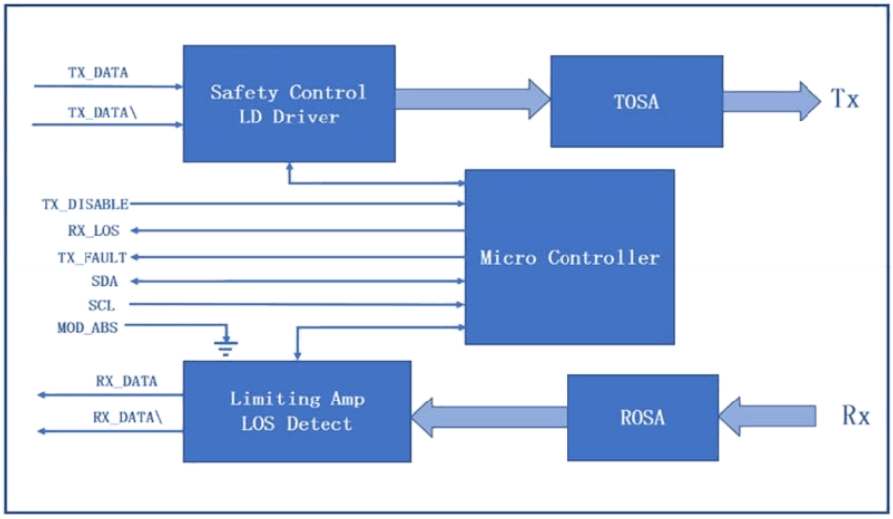


Figure 1. Transceiver Block Diagram

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Pin Assignment and Description

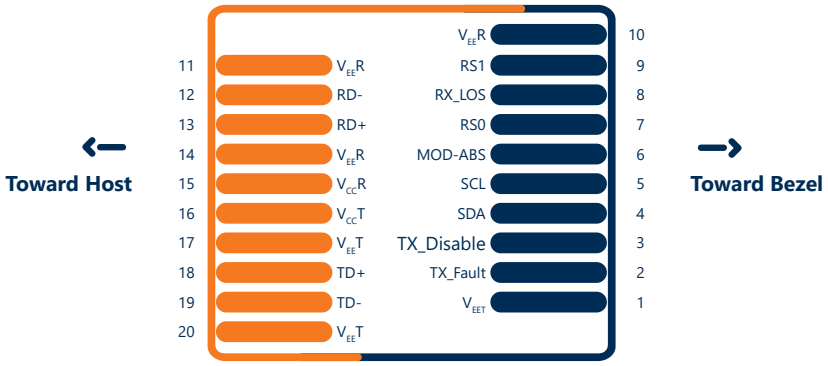

Figure 2. MSA Compliant Connector

PIN Definition

PIN	Symbol	Name/Description	Notes
1	$V_{EE}T$	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	1
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	4
13	RD+	Receiver Non-inverted DATA out. AC Coupled	4
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	4
16	V_{CCT}	Transmitter Power Supply	4
17	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled	4
19	TD-	Transmitter Inverted DATA in. AC Coupled	4
20	V_{EET}	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 4.7k – 10k Ohms 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
3. 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. Laser output disabled on TDIS>2.0V or open, enabled on TDIS<0.8V.
4. Should be pulled up with 4.7kΩ- 10kΩ 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.

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Recommended Interface Circuit

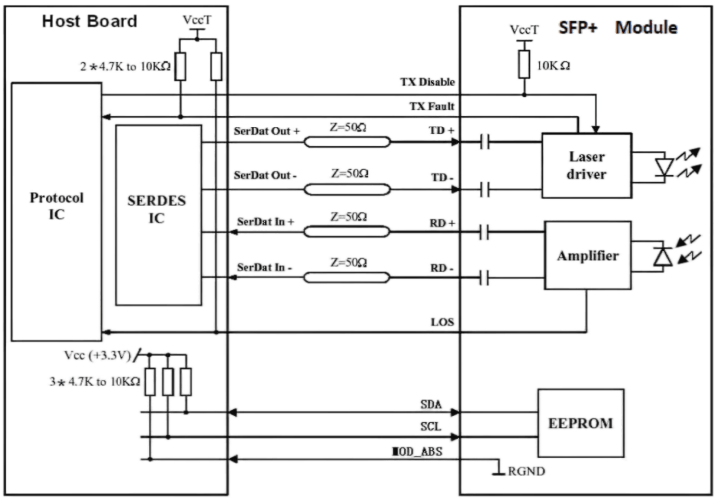

Figure 3. Recommended Interface Circuit

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Total power supply current	I_{CC}			300	mA	
Transmitter						
Differential line input Impedance	R_{IN}	85	100	115	Ohm	
Differential Data Input Voltage	V_{DT}	100	-	1000	mVp-p	
Transmitter Fault Output-High	V_{FaultH}	2	-	V_{CC}+0.3	V	
Transmitter Fault Output-Low	V_{FaultL}	0	-	0.8	V	
Transmitter Disable Voltage- High	V_{DisH}	2	-	V_{CC}+0.3	V	
Transmitter Disable Voltage- low	V_{DisL}	0	-	0.8	V	
Receiver						
Differential line Output Impedance	R_{OUT}	80	100	120	Ohm	
Differential Data Output Voltage	V_{DR}	300	-	850	mVp-p	
LOS Output Voltage-High	V_{LOSH}	2	-	VCC+0.3	V	
LOS Output Voltage-Low	V_{LOSL}	0	-	0.8	V	

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Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Average Launched Power	P_O	-6		0.5	dBm	
Average Launched Power(Laser Off)	P_{OFF}	-	-	-30	dBm	
Center Wavelength Range	λC	1260	1310	1355	nm	
Spectrum Bandwidth(-20dB)	Δλ	-	-	1	nm	
Side-Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	3.5		-	dB	1
Output Eye Mask		Compliant with IEEE 802.3ae				2
Receiver						
Input Optical Wavelength	λ_{IN}	1270	-	1610	nm	
Receiver Sensitivity	P_{SEN}	-	-	-15	dBm	3
Input Saturation Power (Overload)	P_{SAT}	0.5	-	-	dBm	4
Los Of Signal Assert	P_A	-30	-	-	dBm	
Los Of Signal De-assert	P_D	-	-	-17	dBm	
LOS -Hysteresis	P_{Hys}	0.5		6	dB	

Notes

1. Measured with a PRBS 2^{31}-1 test pattern, @10.3125Gb/s.
2. Transmitter eye mask definition, Compliant with IEEE 802.3ae.
3. Measured with BER =<10^-12 @PRBS=2^{31}-1 NRZ.

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	Notes
Storage Temperature	T_S	-40	85	degC	
Power Supply Voltage	V_{CC}	-0.3	4.0	V	
Signal Input Voltage	V_{SI}	V_{CC}-0.3	V_{CC}+0.3	V	
Relative Humidity (non-condensation)	RH	5	95	%	

Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Case Operating Temperature	T_{case}	0	-	70	°C	
Power Supply Voltage	V_{CC}	3.14	3.3	3.47	V	
Power Supply Current	ICC	-		300	mA	
Data Rate	BR		10.3125		Gbps	TX Rate/RX Rate
Transmission Distance	TD			10	km	
Coupled fiber	Single mode fiber					9/125µm SMF

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Mechanical Dimensions

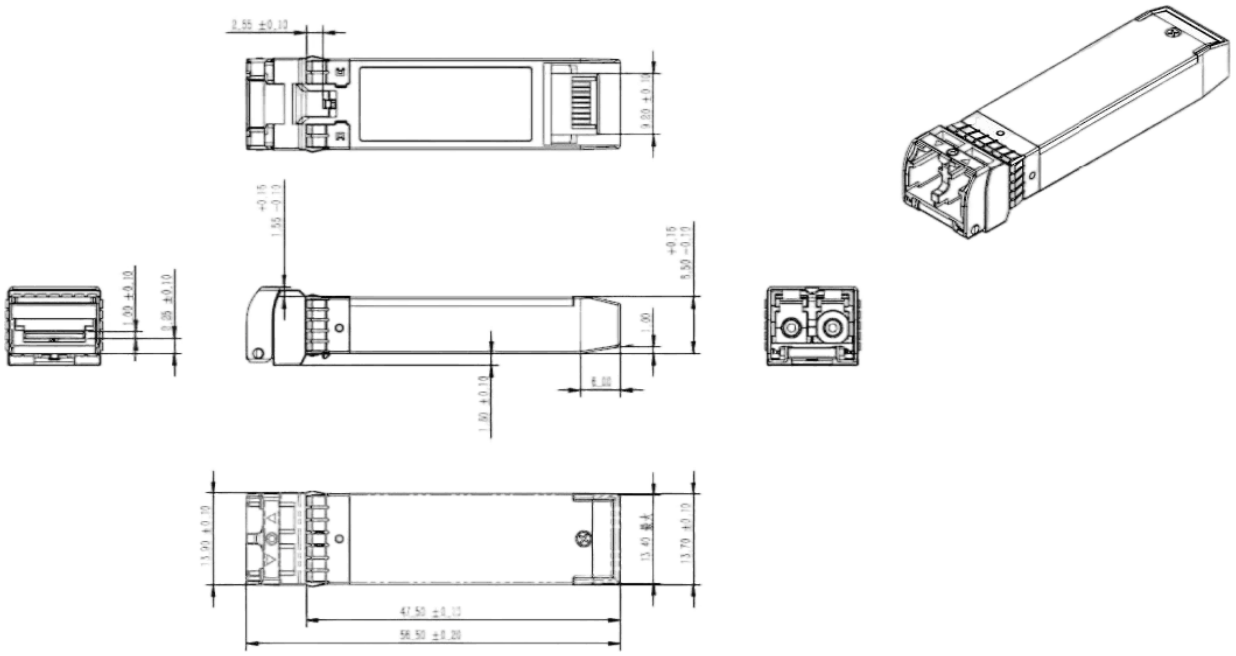

Figure 4. Mechanical Outline

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.

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