

# 10GBASE-ZR XFP 1550nm 80km DOM Duplex LC Transceiver

XFP-LH80-SM1550-LL



## Application

- 10GBASE-ZR/ZW&10G Ethernet
- 10G Fiber Channel
- Other Optical Links

## Standards

- XFP MSA Compliant
- CPRI
- eCPRI

## Features

- Hot-Pluggable XFP Footprint
- Supports 9.95Gb/s to 11.3Gb/s Bit Rates
- Up to 80km on 9/125 $\mu$ m SMF
- Duplex LC/UPC Type
- 1550nm EML Transmitter and APD Receiver
- Low Power Consumption < 3.5W
- Single 3.3V Power Supply
- Support Digital Diagnostic Monitoring Interface
- No Reference Clock Required
- Operating Case Temperature Range: 0 ~ 70°C
- Metal Enclosure, for Lower EMI
- Meet ESD Requirements, Resist 8KV Direct Contact Voltage

## Description

The 10G XFP Optical Transceiver Module supports up to 80km link lengths over SMF via an LC duplex connector. The transceiver is compliant with CPRI, eCPRI. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA. With these features, this 10G SFP+ transceiver is ideal for data centers, 10G fibre channel, legacy FDDI multimode links, etc.

## Product Specifications

### I. 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.	Unit
<b>Storage Temperature</b>	$T_S$	-40	85	°C
<b>Maximum Supply Voltage 1</b>	$V_{CC3}$	-0.5	4.0	V
<b>Maximum Supply Voltage 2</b>	$V_{CC5}$	-0.5	6.0	V
<b>Relative Humidity (Non-condensation)</b>	RH	5	95	%
<b>Damage Threshold</b>	$TH_d$	0		dBm

### II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
<b>Operating Case Temperature</b>	$T_{OP}$	0		70	°C	
<b>Power Supply Voltage</b>	$V_{CC}$	3.135	3.3	3.465	V	
<b>Data Rate</b>			10.3125		Gb/s	
<b>Control Input Voltage High</b>		2		$V_{CC}$	V	
<b>Control Input Voltage Low</b>		0		0.8	V	
<b>Link Distance (SMF)</b>	D			80	km	9/125um

### III. Optical Characteristics

The following optical characteristics are defined over the recommended operating environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
<b>Center Wavelength</b>	$\lambda_C$	1530	1550	1570	nm	1
<b>Optical Spectral Width</b>	$\Delta\lambda$			1	nm	
<b>Side Mode Suppression Ratio</b>	SMSR	30			dB	
<b>Average Optical Power</b>	$P_{AVG}$	0		5	dBm	
<b>Optical Extinction Ratio</b>	ER	8.2			dB	
<b>Transmitter and Dispersion Penalty</b>	TDP			3.0	dB	
<b>Average Launch Power of OFF Transmitter</b>	$P_{OFF}$			-30	dBm	
<b>Transmitter Eye Mask</b>	Compliant with IEEE802.3ae					
<b>Receiver</b>						
<b>Center Wavelength</b>	$\lambda_C$	1270		1610	nm	
<b>Receiver Sensitivity (Average Power)</b>	$S_{en}$			-24	dBm	2
<b>Input Saturation Power (Overload)</b>	$P_{sat}$	-8			dBm	
<b>LOS Assert</b>	$LOS_A$	-37			dBm	
<b>LOS De-assert</b>	$LOS_D$			-27	dBm	
<b>Receiver Reflectance</b>	$R_{rx}$			-27	dBm	
<b>LOS Hysteresis</b>	$LOS_H$	0.5			dB	

**Notes:**

1. Average power figures are informative only, per IEEE 802.3ae.
2. Measured with Light Source 1550nm, ER=8.2dB; BER=<math>10^{-12}</math>@10.3125Gbps, PRBS=2<sup>31</sup>-1 NRZ.

## IV. Electrical Characteristics

The following electrical characteristics are defined over the recommended operating environment unless otherwise specified.

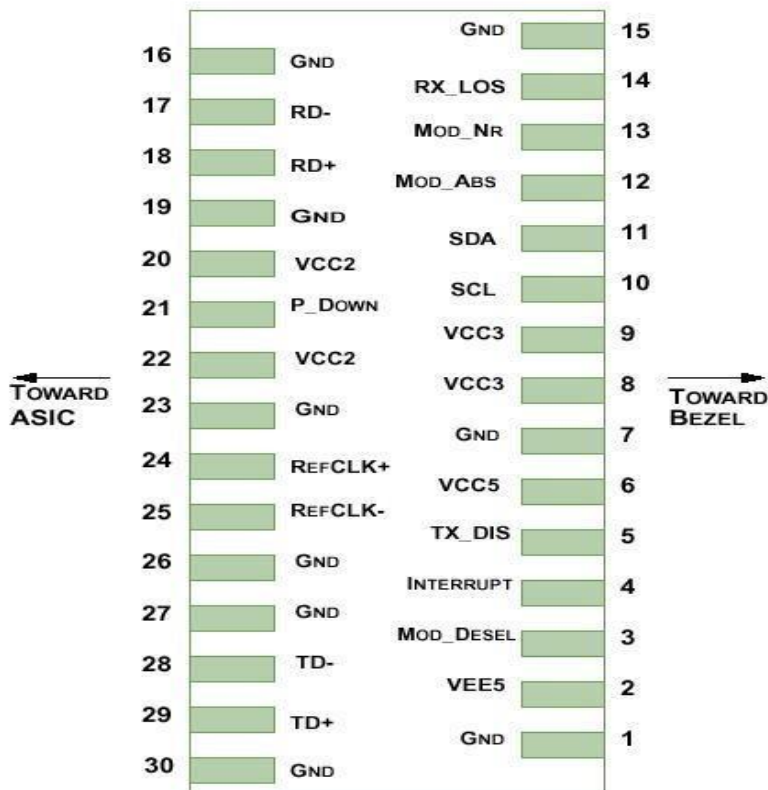
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Power Consumption</b>	P			3.5	W	1
<b>Supply Current</b>	I <sub>CC</sub>			800	mA	
<b>Transmitter</b>						
<b>Single-ended Input Voltage Tolerance</b>	V <sub>CC</sub>	-0.3		4.0	V	
<b>Differential Input Voltage Swing</b>	V <sub>IN,PP</sub>	120		820	mVpp	
<b>Differential Input Impedance</b>	Z <sub>IN</sub>	90	100	110	Ohm	2
<b>Transmit Disable Assert Time</b>				10	us	
<b>Transmit Disable Voltage</b>	V <sub>DIS</sub>	V <sub>CC</sub> -1.3		V <sub>CC</sub>	V	3
<b>Transmit Enable Voltage</b>	V <sub>EN</sub>	V <sub>EE</sub>		V <sub>EE</sub> +0.8	V	
<b>Receiver</b>						
<b>Differential Output Voltage Swing</b>	V <sub>OUT,PP</sub>	340	650	850	mVpp	
<b>Differential Output Impedance</b>	Z <sub>OUT</sub>	90	100	110	Ohm	4
<b>Data Output Rise/Fall Time</b>	T <sub>r</sub> /T <sub>f</sub>			38	ps	5
<b>LOS Assert Voltage</b>	V <sub>LOS,H</sub>	V <sub>CC</sub> -0.5		V <sub>CC</sub>	V	6

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>LOS De-assert Voltage</b>	$V_{LOS-L}$	$V_{EE}$		$V_{EE}+0.5$	V	6
<b>Power Supply Rejection</b>	PSR		See Note 7 Below			7

**Notes:**

1. Maximum total power value is specified across the full temperature and voltage range.
2. After internal AC coupling.
3. Or open circuit.
4. In to 100 ohms differential termination.
5. These are unfiltered 20-80% values.
6. Loss of signal is open collector to be pulled up with a 4.7kΩ-10kΩ resistor to 3.15-3.6V. Logic 0 indicates normal operation; Logic 1 indicates no signal detected.
7. Per section 2.7.1 in the XFP MSA specification 1.

## V. Pin Definitions



Pin	Symbol	Name/Description	Notes
1	GND	Module Ground	1
2	V <sub>EE</sub> 5	Optional-5.2 Power Supply-Not Required	
3	Mod-Desel	Module De-select; When Held Low Allows the Module to, Respond to 2-Wire Serial Interface Commands	
4	Interrupt	Interrupt (Bar); Indicates Presence of an Important Condition Which can Be read over the Serial 2-Wire Interface	2
5	Tx_DIS	Transmitter Disable; Transmitter Laser Source Turned off	
6	V <sub>CC</sub> 5	5 Power Supply	
7	GND	Module Ground	1
8	V <sub>CC</sub> 3	3.3V Power Supply	
9	V <sub>CC</sub> 3	3.3V Power Supply	
10	SCL	Serial 2-Wire Interface Clock	
11	SDA	Serial 2-Wire Interface Data Line	2
12	Mod_Abs	Module Absent; Indicates Module is Not Present. Grounded in the Module.	2
13	Mod_NR	Module Not Ready; Longline's Defines It As a Logical OR Between Rx_LOS and Loss of Lock in Tx/Rx.	2
14	Rx_LOS	Receiver Loss of Signal Indicator	2
15	GND	Module Ground	1
16	GND	Module Ground	1
17	RD-	Receiver Inverted Data Output	
18	RD+	Receiver Non-Inverted Data Output	
19	GND	Module Ground	1

Pin	Symbol	Name/Description	Notes
20	V <sub>CC2</sub>	1.8V Power Supply–Not Required	
21	P_Down/RST	Power Down; When High, Places the Module in the Low Power Stand-by Mode and on the Falling Edge of P_Down Initiates a Module Reset.	
		Reset; The Falling Edge Initiates a Complete Reset of the Module Including the 2-Wire Serial Interface, Equivalent to a Power Cycle.	
22	V <sub>CC2</sub>	1.8V Power Supply–Not Required	
23	GND	Module Ground	1
24	RefCLK+	Reference Clock Non-inverted Input, AC Coupled on the Host Board–Not Required	3
25	RefCLK-	Reference Clock Inverted Input, AC Coupled on the Host Board–Not Required	3
26	GND	Module Ground	1
27	GND	Module Ground	1
28	TD-	Transmitter Inverted Data Input	
29	TD+	Transmitter Non-inverted Data Input	
30	GND	Module Ground	1

**Notes:**

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector; Should be pulled up with 4.7k–10k ohms on host board to a voltage between 3.15V and 3.6V.
3. A reference clock input is not required.

## VI. Digital Diagnostic Functions

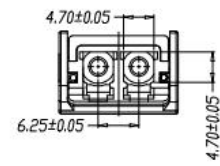
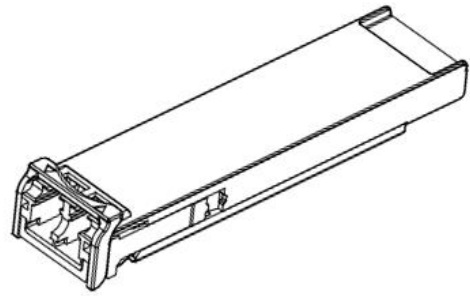
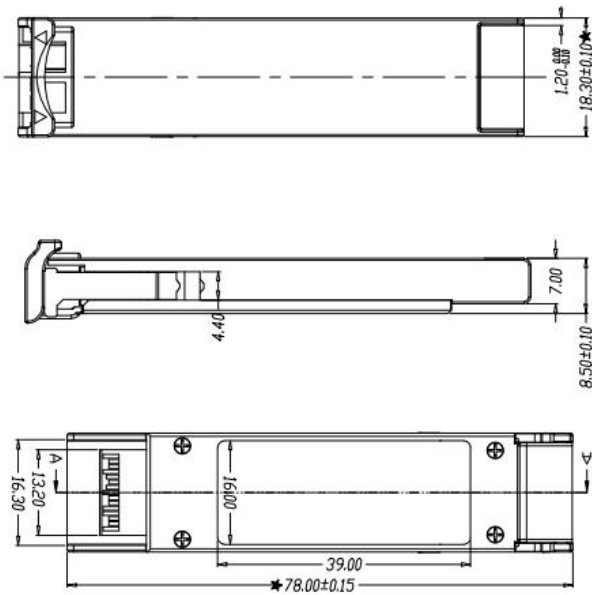
The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	Symbol	Min.	Max.	Unit	Notes
<b>Temperature Monitor Absolute Error</b>	DMI_Temp.	-3	3	degC	Over Operating Temp.

Parameter	Symbol	Min.	Max.	Unit	Notes
<b>Supply Voltage Monitor Absolute Error</b>	DMI_V <sub>CC</sub>	-0.15	0.15	V	Full Operating Range
<b>Rx Power Monitor Absolute Error</b>	DMI_Rx	-3	3	dB	
<b>Bias Current Monitor</b>	DMI_Bias	-10%	10%	mA	
<b>Tx Power Monitor Absolute Error</b>	DMI_Tx	-3	3	dB	

## VII. Mechanical Specifications

Unit: mm



Units in mm