

MULTI-RATE 10-GIGABIT XFP 80KM TRANSCEIVERS WITH DIGITAL DIAGNOSTICS

TXP1XGHL2x



Product Description

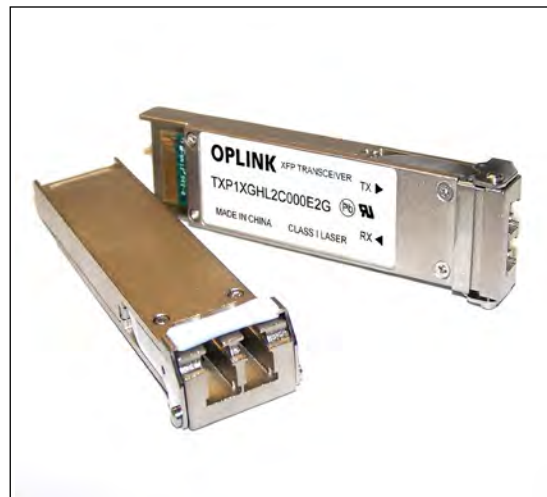
The TXP1XGHL2x XFP multi-rate fiber optic transceivers with digital diagnostics monitoring functionality provide a quick and reliable interface for 10Gbps applications. The diagnostic functions, alarm and warning features as described in the XFP Multi-Source Agreement (MSA) are provided via standard I²C serial interface. The transceivers are compliant with the XFP Multi-Source Agreement and are designed to support SONET/SDH, 10G Ethernet, and 10G Fiber Channel data rates from 9.95Gb/s to 11.09Gb/s.

Each transceiver utilizes an 1550nm electro-absorption modulated laser with an APD receiver to support up to 80km 10G applications. The transceivers satisfy Class I Laser Safety requirements in accordance with the U.S. FDA/CDRH and international IEC-60825 standards.

The transceivers connect to standard 30-pad XFP connectors for hot plug capability. This allows the system designer to make configuration changes or maintenance by simply plugging in different types of transceivers without removing the power supply from the host system.

The transmitter and receiver DATA interfaces are AC-coupled Current Mode Logic (CML). LV-TTL Transmitter Disable control input and Loss of Signal output interfaces are also provided.

The transceivers operate from +1.8V, +3.3V and +5.0V power supplies over a operating case temperature range of -5°C to +70°C (Commercial), -5°C to +85°C (Extended), or -40°C to +85°C (Industrial).



Features

- ☑ Lead Free Design & Fully RoHS Compliant
- ☑ Compliant with XFP MSA
- ☑ Compliant with OC-192/STM-64
- ☑ Compliant with IEEE802.3ae
- ☑ Compliant with ITU-T G.709
- ☑ Support 10G Fiber Channel Applications
- ☑ Digital Diagnostics Monitoring
- ☑ Temperature-stabilized EML Transmitter
- ☑ Low Power Consumption
- ☑ Wide Case Operating Temperature Range
- ☑ Transmission Distance up to 80km

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	T_{ST}	- 40	+ 85	°C
Operating Case Temperature ¹	Commercial	- 5	+ 70	°C
	Extended	- 5	+ 85	
	Industrial	- 40	+ 85	
Supply Voltage	V_{CC2}	0	+ 2.0	V
	V_{CC3}	- 0.2	+ 3.6	
	V_{CC5}	- 0.2	+ 6.0	
Operating Relative Humidity ²	RH	0	85	%
Input Voltage	V_{in}	0	Vcc	V

¹ Case temperature is measured on top side of XFP module.

² Non condensing

Transmitter Performance Characteristics (Over Operating Case Temperature Range and V_{CC})

Parameter	Symbol	Minimum	Typical	Maximum	Units
Operating Data Rate	B	9.95	-	11.09	Gb/s
Average Optical Output Power (50% duty cycle)	P_O	- 1.0	-	+ 4.0	dBm
Transmitter OFF Power	P_{OFF}	-	-	- 45.0	dBm
Extinction Ratio	ER	8.2	-	-	dB
Center Wavelength	λ_C	1530	1550	1565	nm
Spectral Width (-20dB) ¹	$\Delta\lambda_{20}$	-	-	1.0	nm
Side Mode Suppression Ratio	$SMSR$	30	-	-	dB
Relative Intensity Noise	RIN	-	-	- 130	dB/Hz
Reflectance Tolerance	ref_T	-	-	- 27	dB
Tx Jitter Generation (peak-to-peak) ²	$JG_{p,p}$	-	-	0.1	UI
Jitter Generation (RMS)	JG_{RMS}	-	-	0.01	UI
Dispersion Penalty ³ @ 9.95Gb/s (BER= 10^{-12})	DP	-	-	2.5	dB
Optical Output Eye	Compliant with GR253-CORE, IEEE 803.3ae, and ITU-T G.693				

¹ Measured with OSA and 0.1nm resolution bandwidth.
² Jitter generation is compliant with SONET OC-192 per GR-253 and OTU-2 per G.709.
³ Specified as the difference between the maximum receiver sensitivity and the worst case receiver sensitivity with 80km fiber.

Receiver Performance Characteristics (Over Operating Case Temperature Range and V_{CC})

Parameter	Symbol	Minimum	Typical	Maximum	Units
Operating Data Rate	B	9.95	-	11.09	Gb/s
Wavelength of Operation	λ	1260	-	1570	nm
Receiver Sensitivity ¹ @ 9.95Gb/s	P_{min_BB}	-	-	- 24.0	dBm
Maximum Input Optical Power (10^{-12} BER)	P_{max}	- 7.0	-	-	dBm
LOS Thresholds	Increasing Light Input	-	-	- 27.0	dBm
	Decreasing Light Input	- 35.0	-	-	
LOS Hysteresis	-	0.5	-	-	dB
Receiver Reflectance	-	-	-	- 27	dB

¹ Specified at BER $<10^{-12}$

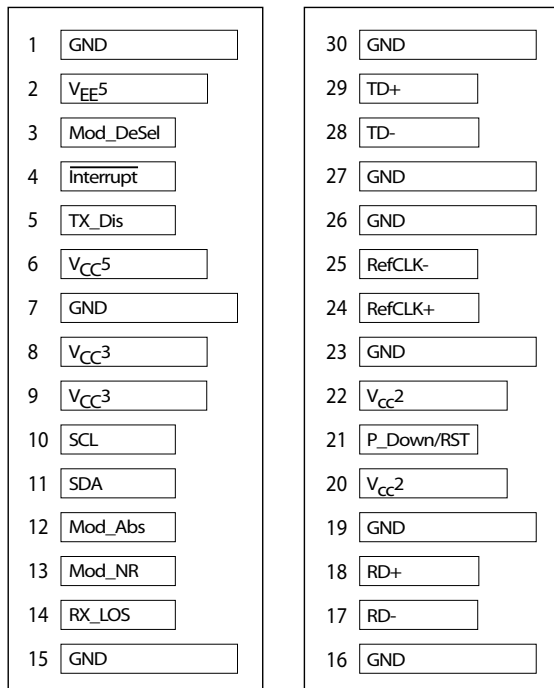
Electrical Interface (Over Operating Case Temperature Range and V_{CC})

Parameter	Symbol	Minimum	Typical	Maximum	Units
Differential Impedance	Z_d	-	100	-	Ω
Differential Input Voltage Swing	$V_{p-p, diff}$	120	-	820	mV
Differential Output Voltage Swing	$V_{p-p, D/I}$	340	550	850	mV
Output Rise/Fall Time (20 to 80%)	T_r/T_f	24	-	-	ps
TX_Dis, P_Down/RST	V_{IL}	-0.3	-	0.8	V
	V_{IH}	2.0	-	$V_{CC} + 0.3$	
XFP Interrupt, Mod_NR, RX_LOS	V_{OL}	0	-	0.4	V
	V_{OH}	$host_V_{CC} - 0.5$	-	$host_V_{CC} + 0.3$	

Electrical Power Supply Characteristics (Over Operating Case Temperature Range and V_{CC})

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Voltage	V_{CC2}	1.71	1.8	1.89	V
	V_{CC3}	3.13	3.3	3.47	
	V_{CC5}	4.75	5.0	5.25	
Supply Current	I_{CC2}	-	310	350	mA
	I_{CC3}	-	350	750	
	I_{CC5}	-	40	100	
Power Dissipation	PW	-	2	3.5	W
P_Down Power Dissipation	PDW	-	-	1.5	W

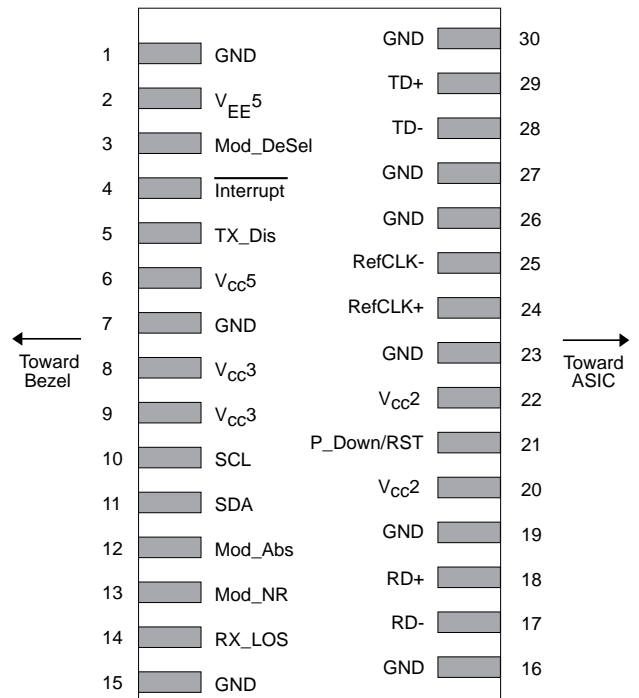
XFP Transceiver Electrical Pad Layout



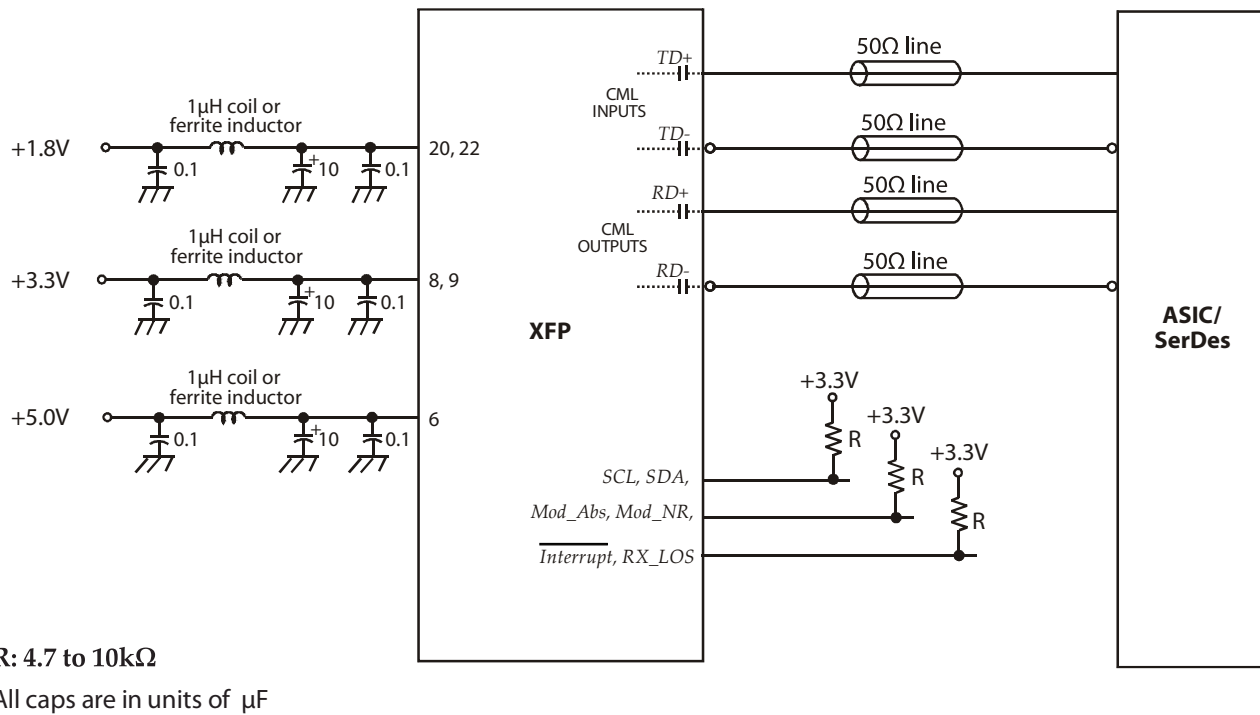
Bottom of XFP Board
(as viewed thru top of board)

Top of XFP Board

Host Board Connector Pad Layout



Host Board Termination & Coupling



Application Notes

Electrical Interface: All signal interfaces are compliant with the XFP MSA specification. The high speed DATA interface is differential AC-coupled internally and can be directly connected to a 3.3V SERDES IC.

RX_LOS: The Loss of Signal circuit monitors the level of the incoming optical signal and generates a logic HIGH when an insufficient photocurrent is produced.

TX_Dis: When the TX Disable pin is at logic HIGH, the transmitter optical output is disabled. (less than -45dBm).

P_Down: The Power Down Function pin, when held High by the host, places the module in the standby (Low Power) mode with a maximum power dissipation of 1.5W. This protects hosts which are not capable of cooling higher power modules which may be accidentally inserted. The module's 2-wire serial interface and all laser safety functions must be fully functional in this low power mode. During P_Down, the module shall still support the completion of reset Interrupt, as well as maintain functionality of the variable power supply.

Mod_NR: The Mod_NR is an output pin that when High, indicates that the module has detected a condition that renders transmitter and or receiver data invalid, shall consist of logical OR of the following signals:

- Transmit Signal Conditioner Loss of Lock
- Transmitter Laser Fault
- Receiver Signal Conditioner Loss of Lock

Other conditions deemed valuable to the detection of fault may be added to the Mod_NR. The Mod_NR output pin is

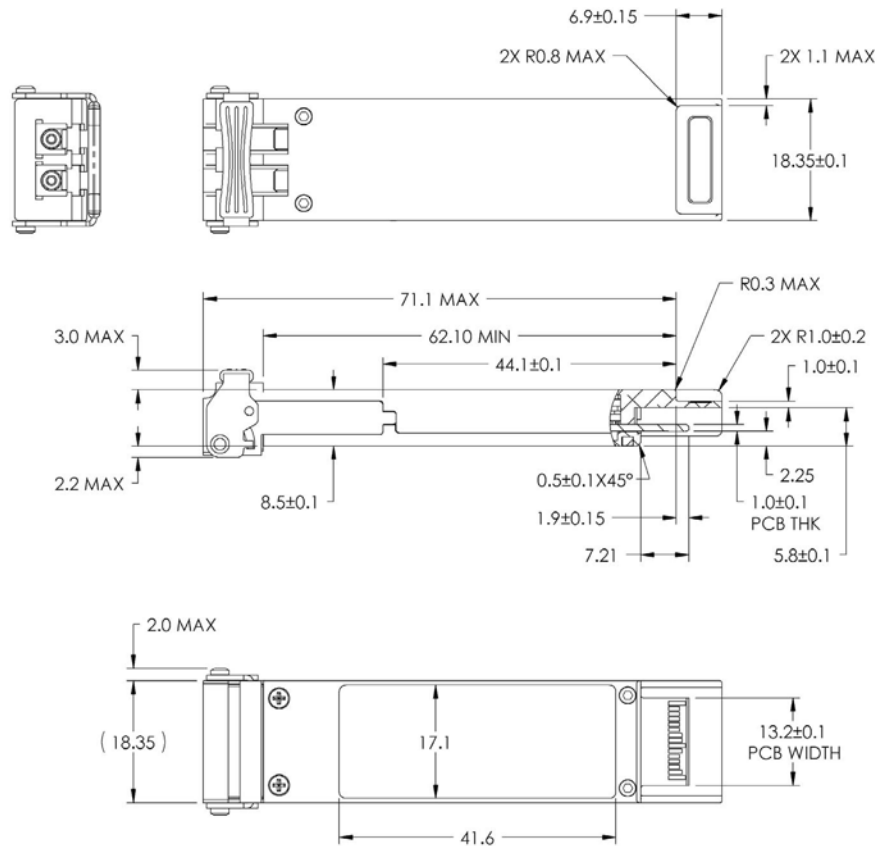
an open collector and must be pulled to Host_Vcc on the host board.

P_Down/RST: The negative edge of Reset Function signal initiates a complete module reset.

Module Behavior During P_Down and RST: During execution of a reset (t_{init}) or while held in Power Down mode, a module may be unable to determine the correct value for Mod_NR and RX_LOS. These outputs as well as all interrupt related flags, except completion of Reset flag, shall be disregarded by the host. When the module completes a Reset and is not in Power Down mode, the module must represent the correct value of both signals on its outputs before posting a completion of reset interrupt to the host.

At no time shall a module cause spurious assertion of the Interrupt pin. When a host initially applies power to a module with the P_Down/RST signal asserted, a module comes up in power down mode. The module shall only assert the Interrupt signal pin to inform the host it has completed a reset. The completion of reset flag shall be the only interrupt source flag set during power down mode. The host is expected to clear this interrupt before releasing the module from the power down mode. The transition from power down mode to normal mode will trigger a reset of the module and result in a 2nd module reset and a 2nd reset completion interrupt to the host.

Power Supply and Grounding: The power supply line should be well-filtered. All 0.1 μF power supply bypass capacitors should be as close to the transceiver module as possible.

Package Outline


DIMENSION IN MILLIMETERS
 NOTES: UNLESS OTHERWISE
 SPECIFIED

Ordering Information

Oplink can provide a remarkable range of customized optical solutions. For detail, please contact Oplink's Sales and Marketing for your requirements and ordering information (510) 933-7200 or Sales@oplink.com.

Model Name	Operating Temperature		Center Wavelength	Latch Color	Distance
Oplink Order Number					
TXP1XGHL2C000E2G	-5°C to +70°C	Commercial	1550nm	White	80km
TXP1XGHL2E000E2G	-5°C to +85°C	Extended			
TXP1XGHL2I000E2G	-40°C to +85°C	Industrial			