

EX31X-10D (I)

10Gb/s XFP 1310nm 10km DDM Transceiver

PRODUCT FEATURES

- Hot-pluggable XFP footprint
- Supports 9.95Gb/s to 11.3Gb/s bit rates
- XFI Loopback Mode
- RoHS-6 Compliant (lead-free)
- Power dissipation <1.5W
- Temperature Range:
 - Commercial: 0°C ~70°C
 - Extended: -10°C ~80°C
 - Industrial: -40°C ~85°C
- Maximum link length of 10km
- Uncooled 1310nm DFB laser
- Full Duplex LC connector
- No Reference Clock required
- Built-in digital diagnostic functions
- Standard bail release mechanism

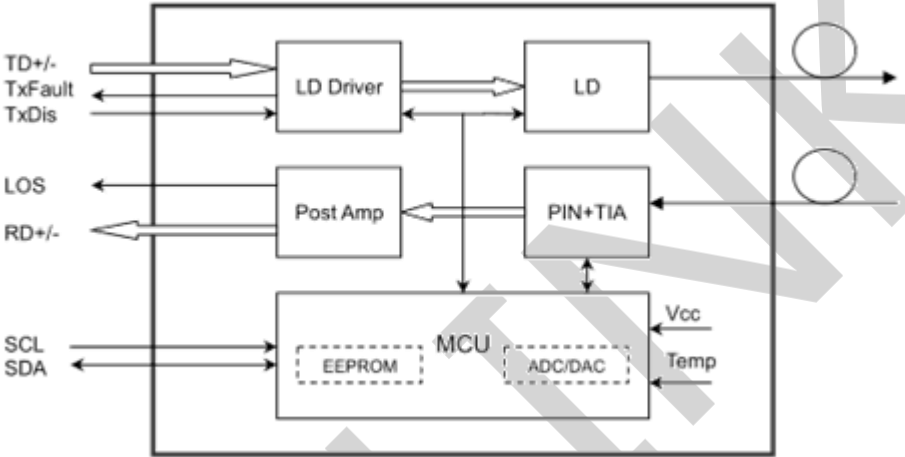
APPLICATIONS

- 10GBASE-LR/LW 10G Ethernet
- 10G Fiber Channel

DESCRIPTIONS

ETU-Link’s EX31X-10D Small Form Factor 10 G (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification¹. They comply with 10-Gigabit Ethernet 10GBASE-LR/LW per IEEE 802.3ae and 10G Fiber Channel. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA. The transceiver is RoHS compliant and lead-free per Directive 2002/95/EC³

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
EX31X-10D	10.3125Gbps	DFB	SMF	10KM	LC	0~70°C	Y	Blue
EX31X-10DE	10.3125Gbps	DFB	SMF	10KM	LC	-10~80°C	Y	Blue
EX31X-10DI	10.3125Gbps	DFB	SMF	10KM	LC	-40~85°C	Y	Blue

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T _{stg}	-40		+85	°C	
Case Operating Temperature	T _{case}	-5		70	°C	
DC Supply Voltage	V _{cc}	-0.5		4	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Case Operating Temperature	Top	0	-	70	°C	Commercial
		-40		85		Industrial
Power Supply Voltage	V _{cc}	3.13	3.3	3.47	V	
Transmission Distance	TD	-	-	10	km	Over SMF

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (Module Input)						
Differential Input Resistance	R _{Rdin}	80	100	120	Ω	
Input Differential Voltage	R _{Vdiff}	110	-	1050	mVpp	
Tx_Disable	Normal Operation	V _{IL}	-0.3	-	0.8	V
	Laser Disable	V _{IH}	2.0	-	V _{CC} +0.3	V
Receiver (Module Output)						
Differential Resistance	T _{Rd}	80	100	120	Ohm	
Output Differential Voltage	T _{Vdiff}	360	-	770	mVpp	
Differential Termination Resistance Mismatch	T _{Rdm}	-	-	5	%	
Rx los	Normal Operation	V _{OL}	-0.3	-	0.4	V
	Loss Signal	V _{OH}	2	-	V _{CC} HOST	V

Notes:

- Maximum total power value is specified across the full temperature and voltage range.
- After internal AC coupling.
- Or open circuit.
- Into 100 ohms differential termination.
- These are unfiltered 20-80% values
- Loss of Signal is open collector to be pulled up with a 4.7k – 10kohm resistor to 3.15 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
- Per Section 2.7.1. in the XFP MSA Specification¹.

Optical and Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Average Optical Power	P _f	-8.2		0.5	dBm	
Optical Wavelength	λ	1260	1310	1355	nm	
Sidemode Suppression ratio	SSR _{min}	30			dB	
Optical Extinction Ratio	ER	3.5			dB	
Transmitter and Dispersion Penalty	TDP			2	dB	
Average Launch power of transmitter	P _{OFF}			-30	dBm	
Relative Intensity Noise	RIN			-130	dB/Hz	
Receiver						
Receiver Sensitivity	R _{SENS}			-14.4	dBm	
Input Saturation Power (Overload)	P _{sat}	0.5			dBm	
Wavelength Range	λ _C	1270		1620	nm	
Receiver Reflectance	R _{Rx}			-12	dB	
LOS De-Assert	LOS _D			-22	dBm	

LOS Assert	LOS _A	-30			dBm	
LOS Hysteresis		0.5		4	dB	
Receiver Jitter Generation @1.25Gbps				160	ps	3

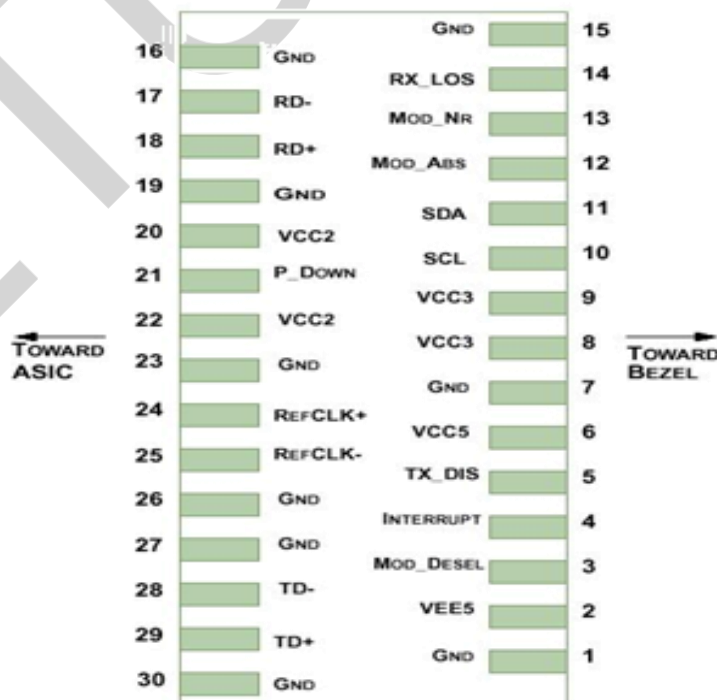
Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	°C	Internal
Voltage	0 to Vcc	±3%	V	Internal
Tx Bias Current	0 to 100	±10%	mA	Internal
Tx Output Power	-8.2 to 0.5	±3	dB	Internal
Rx Input Power	-14.4 to 0.5	±3	dB	Internal

Communication Interface Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
TX_Disable Assert Time	t _{off}			10	us	
TX_Disable Negate Time	t _{on}			2	ms	
Time to Initialize	t _{int}			300	ms	
Interrupt assert delay	Interrupt _{on}			200	Ms	
Interrupt negate delay	Interrupt _{off}			500	us	
RX_LOS assert delay	t _{loss_on}			100	us	
RX_LOS negate delay	t _{loss_off}			100	us	

Pin Diagram



Pin Definitions

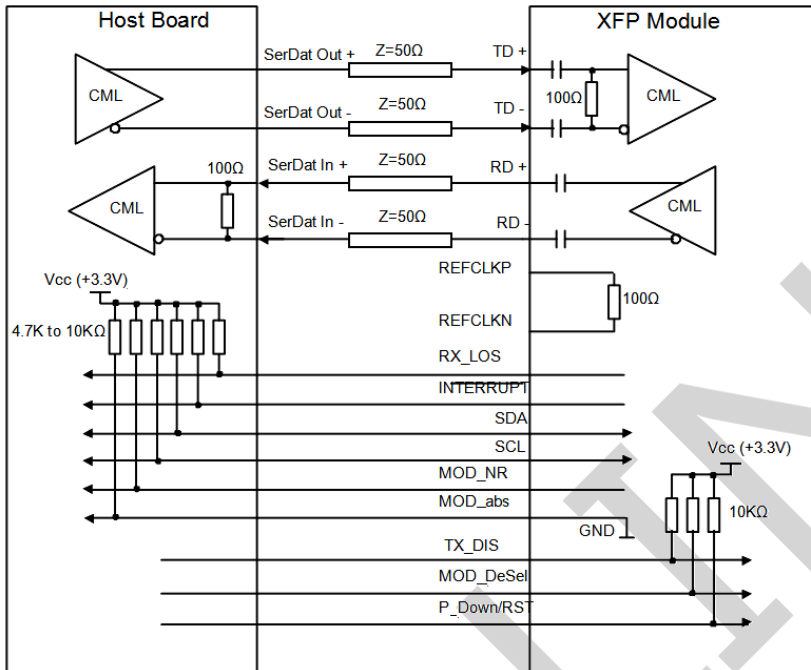
Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Module Ground	1
2		VEE5	Optional -5.2 Power Supply – Not required	
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	LVTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6		VCC5	+5 Power Supply – Not required	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTL-I	SCL	Serial 2-wire interface clock	
11	LVTTL-I/ O	SDA	Serial 2-wire interface data line	2
12	LVTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	LVTTL-O	Mod_NR	Module Not Ready; ETU-LINK's defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX.	2
14	LVTTL-O	RX_LOS	Receiver Loss of Signal indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver inverted data output	
18	CML-O	RD+	Receiver non-inverted data output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply – Not required	
21	LVTTL-I	P_Down/R ST	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		VCC2	+1.8V Power Supply – Not required	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	PECL-I	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	CML-I	TD-	Transmitter inverted data input	
29	CML-I	TD+	Transmitter non-inverted data input	
30		GND	Module Ground	1

Notes:

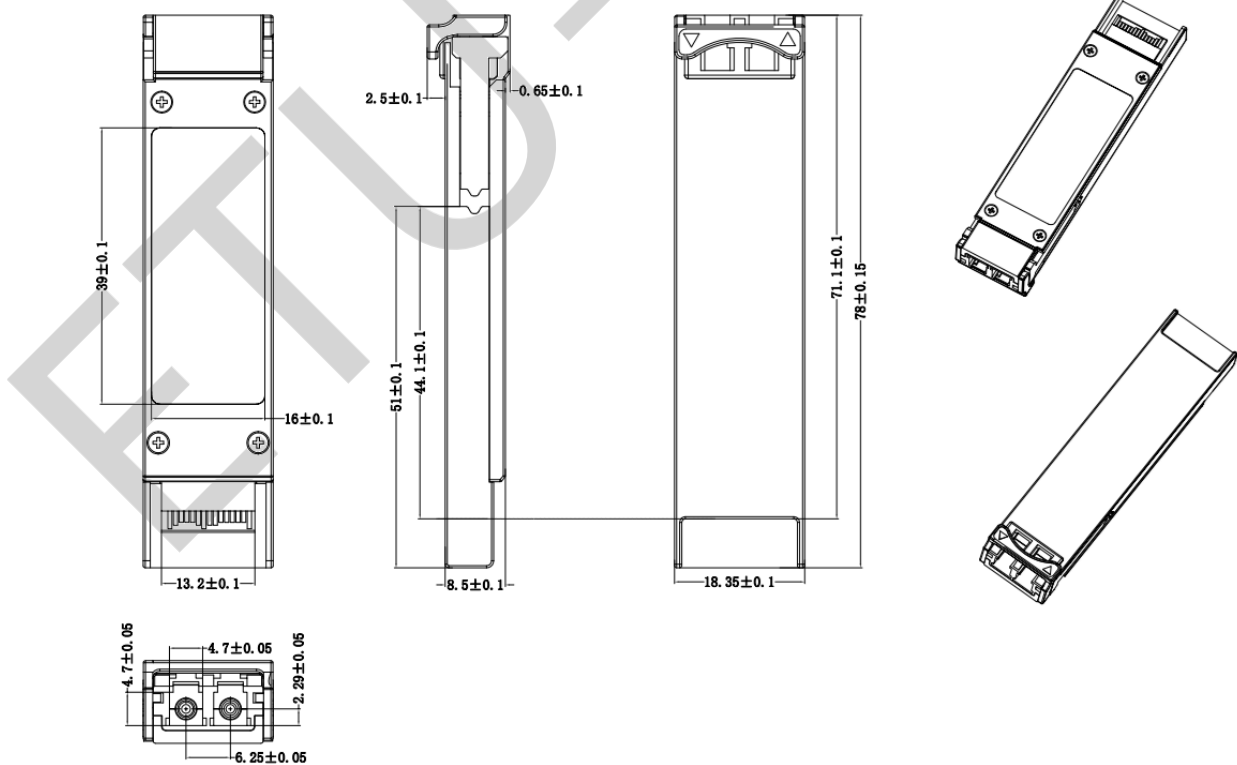
1. Module circuit ground is isolated from module chassis ground within the module.

2. Open collector; should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required by the EX31X-3LCD10. If present, it will be ignored.

Recommended Interface Circuit



Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	February 8, 2016	Preliminary datasheet
2.0	July 24, 2024	Format change

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