

DATA SHEET
UTX10L1D
10Gbps 1310nm XFP 10km Transceiver Overview

UTX10L1D 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 .

Product Features

- XFI Loopback Mode
- Supports 9.95Gbps to 11.3Gbps bit rates
- Power dissipation <2.0W
- DFB laser and PIN receiver
- Single +3.3V power supply
- Hot-pluggable XFP footprint
- Maximum link length of 10km
- No Reference Clock required
- Operating temperature range:
- Commercial: -5°C~+70°C
- RoHS Compliant
- Full Duplex LC connector
- Built-in digital diagnostic functions
- Standard bail release mechanism

Applications

- 10GBASE-LR/LW 10G Ethernet
- 10G Fiber Channel
- SONET OC-192 SR-1 SDH STM I-64.1

Ordering Information

| Part. No | Specifications | | | | | | | | |
|----------|----------------|-------------|---------|----------|-----|-----------|-----------|------------|-----|
| | Pack | Rate (Gbps) | Tx (nm) | Po (dBm) | RX | Sen (dBm) | Temp (°C) | Reach (km) | DDM |
| UTX10L1D | XFP | 10.3125 | 1310 | -6~-1 | PIN | <-15 | -5~70 | 10 | Y |

For More Information:

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General Specifications

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|-----------------------|------------------|-------|---------|-------------------|------|---------|
| Data Rate | DR | | 10.3125 | | Gbps | |
| Bit Error Rate | BER | | | 10 ⁻¹² | | |
| Operating Temperature | T _{OP} | -5 | | 70 | °C | |
| Storage Temperature | T _{STO} | - 40 | | 85 | °C | |
| Supply Current | I _S | | | 450 | mA | |
| Input Voltage | V _{CC} | 3.14 | 3.3 | 3.46 | V | |
| Maximum Voltage | V _{MAX} | - 0.5 | | 4 | V | |

Optical Characteristics – Transmitter
V_{CC}=3.14V to 3.46V, T_C=-5°C to 70°C

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|------------------------------------|--------------------|------|-----------------------------------|-------|-------|---------|
| Output Optical Power | P _{TX} | - 6 | | - 1 | dBm | 1 |
| Optical Center Wavelength | λ _C | 1290 | 1310 | 1330 | nm | |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Optical Rise/Fall Time (20% - 80%) | T _{RF_IN} | | | 30 | ps | |
| Relative Intensity Noise | RIN | | | - 130 | dB/Hz | |
| Output Eye | | | Compliant with IEEE802.3 standard | | | |

Optical Characteristics – Receiver
V_{CC}=3.14V to 3.46V, T_C=-5°C to 70°C

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|------------------------------|---------------------|------|-----|------|------|---------|
| Receiver Sensitivity | S | | | -15 | dBm | |
| Optical Center Wavelength | λ _C | 1270 | | 1610 | nm | |
| Receiver Sensitivity | R _{X_SEN} | | | - 15 | dBm | |
| Optical Power Input Overload | P _{in-max} | +0.5 | | | dbm | |
| Receiver Reflectance | R | | | -14 | dB | |
| LOS Assert | P _{LOS_A} | - 32 | | | dBm | |
| LOS De-Assert | P _{LOS_D} | | | - 18 | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |

Electrical Characteristics – Transmitter
 $V_{CC}=3.14V$ to $3.46V$, $T_C=-5^{\circ}C$ to $70^{\circ}C$

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|--------------------------------------|----------|--------------|-----|--------------|----------|---------|
| Input differential impedance | R_{IN} | | 100 | | Ω | |
| Transmit differential output Voltage | | 120 | | 820 | mV | |
| Receiver differential output Voltage | | 340 | 650 | 850 | mV | |
| Transmit disable voltage | V_D | $V_{CC}-0.5$ | | V_{CC} | V | |
| Transmit enable voltage | V_{EN} | V_{EE} | | $V_{EE}+0.8$ | V | |
| Transmit disable assert time | | | | 10 | us | |

Electrical Characteristics – Receiver
 $V_{CC}=3.14V$ to $3.46V$, $T_C=-5^{\circ}C$ to $70^{\circ}C$

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|--------------------------------------|-------------------|----------------|-----|----------------|------|---------|
| Differential data out put swing | V_{OUT_PP} | 340 | 400 | 850 | mV | |
| Data output rise/fall time (20%-80%) | T_R | | | 20 | ps | |
| LOS Fault | V_{LOS_Fault} | $V_{CC} - 0.5$ | | V_{CC_HOST} | V | |
| LOS Normal | V_{LOS_Normal} | V_{EE} | | $V_{EE} + 0.5$ | V | |

Notes:

- 1) The supply current is XFP module's working current.
- 2) For the measurements, the device was driven with 10Gbps data pattern with $2^{31}-1$ PRBS payload.
- 3) Optical transition time is the time interval required for the rising or falling edge of an optical pulse to transition between the 20% and 80% amplitudes relative to the logical 1 and 0 levels
- 4) Measured with a PRBS $2^{31}-1$ test pattern, @10Gbps, ER=3.5dB, BER< 10^{-12}
- 5) The LOS Hysteresis minimizes 'chatter' on the output line. In principle, Hysteresis alone does not guarantee chatter-free operation.

Transmitter Section

The FP driver accepts differential input data and provide bias and modulation currents for driving a laser. An automatic power-control (APC) feedback loop is incorporated to maintain a constant average optical power. 1310 nm FP in an eye safe optical subassembly (OSA) mates to the fiber cable.

TX_DISABLE

The TX_DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on within 1ms when TX_DISABLE is low (TTL logic "0").

TX_FAULT

When the TX_FAULT signal is high, output indicates a laser fault of some kind. Low indicates normal operation.

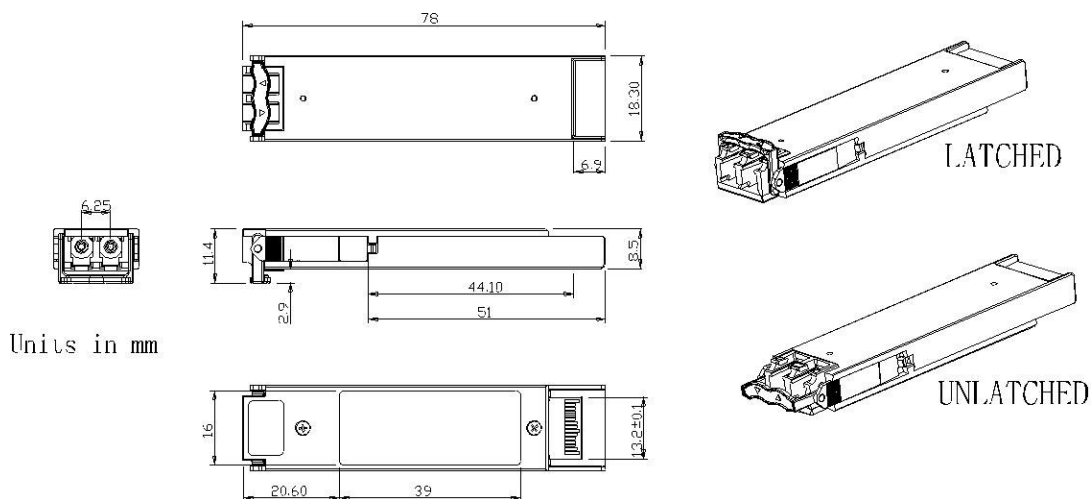
Receiver Section

The receiver utilizes a PIN detector integrated with a trans-impedance preamplifier in an OSA. This OSA is connected to a Limiting Amplifier which providing post-amplification quantization, and optical signal detection. The limiting Amplifier is AC-coupled to the transimpedance amplifier, with internal 100Ω differential termination.

Receive Loss (RX_LOS)

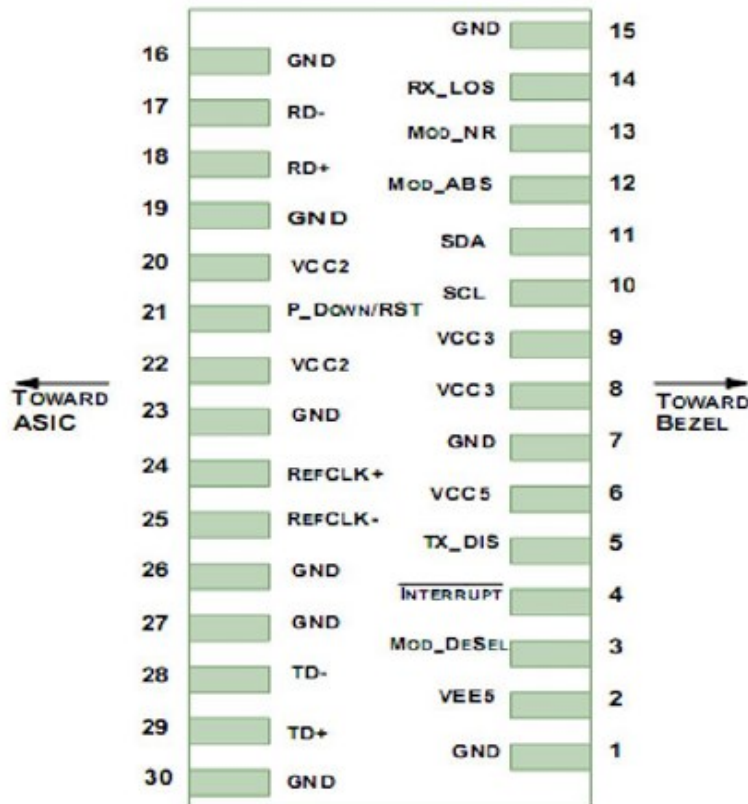
The RX_LOS is high (logic "1") when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in TTL level.

Dimensions



**ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm**

Electrical Pad Layout



| Pin | Signal Name | Description | Plug Seq. | Notes |
|-----|-------------|--|------------|-------|
| 1 | GND | Module Ground | | 1 |
| 2 | VEE5 | 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 | LVTTTL-I | |
| 4 | Interrupt | Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface | LVTTTL-O | 2 |
| 5 | TX_DIS | Transmitter Disable; Transmitter laser source turned off | LVTTTL-I | |
| 6 | VCC5 | +5 Power Supply | | |
| 7 | GND | Module Ground | | 1 |
| 8 | VCC3 | +3.3V Power Supply | | |
| 9 | VCC3 | +3.3V Power Supply | | |
| 10 | SCL | Serial 2-wire interface clock | LVTTTL-I | 2 |
| 11 | SDA | Serial 2-wire interface data line | LVTTTL-I/O | 2 |

| | | | | |
|----|------------|--|----------|---|
| 12 | Mod_Abs | Module Absent; Indicates module is not present. Grounded in the module. | LVTTTL-I | 2 |
| 13 | Mod_NR | Module Not Ready; defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX. | LVTTTL-I | 2 |
| 14 | RX_LOS | Receiver Loss of Signal indicator | LVTTTL-I | 2 |
| 15 | GND | Module Ground | | 1 |
| 16 | GND | Module Ground | | 1 |
| 17 | RD- | Receiver inverted data output | CML-O | |
| 18 | RD+ | Receiver non-inverted data output | CML-O | |
| 19 | GND | Module Ground | | 1 |
| 20 | VCC2 | +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 | LVTTTL-I | |
| 22 | VCC2 | including the 2-wire serial interface, equivalent to a power cycle. +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 | PECL-I | 3 |
| 25 | RefCLK- | Reference Clock inverted input, AC coupled on the host board – Not required | PECL-I | 3 |
| 26 | GND | Module Ground | | 1 |
| 27 | GND | Module Ground | | 1 |
| 28 | TD- | Transmitter inverted data input | CML-I | |
| 29 | TD+ | Transmitter non-inverted data input | CML-I | |
| 30 | GND | Module Ground | | 1 |

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- 1) Module circuit ground is isolated from module chassis ground within the module.
- 2) Open collector; should be pulled up with 4.7k – 10kohms on host board to a voltage between 3.15V and 3.6V.
- 3) A Reference Clock input is not required by the UTX10L1D. If present, it will be ignored.

References

1. IEEE standard 802.3. IEEE Standard Department, 2005.
2. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.