# LTB3418 1250 Mb/s PX-10 P2MP OLT Burst Mode 2x5 SFF E-PON Transceiver, 10 km

The LTB3418 E-PON OLT transceiver module has been designed for low cost point to multi point (P2MP) Fiber to the Home, Business or Curb (FTTX) systems employing high-speed burst mode TDM receivers/transmitters in 1250 Mb/sec symmetrical duplex data links. The device is based on the IEEE 802.3ah, Revision D3.3, 1000BASE PX-10 specification for bi-directional communications over a single fiber and incorporates a high performance 1310 nm Burst Mode InGaAs P-I-N/TIA Receiver and 1490 nm CW mode DFB transmitter. It is designed to serve up to 16 subscribers in advanced TDM P2MP FTTH equipment over distances of up to 10 km. It incorporates the SFF MSA LVTTL Signal Detect (Rx_SD) and Tx Disable (Tx_DIS) monitor and control functions. The industry standard 2x15 small form factor (SFF) package incorporates a pigtail fiber interface with SC/APC or SC/UPC optical connector. It is fabricated with a rugged die cast metal housing and cage assembly and operates over the temperature range from 0 to +70 degrees Centigrade.

### Applications

- Gigabit Ethernet Access Networks
- Fiber to the Home, Curb, Office (FTTx)
- Point to Multi Point Service (P2MP)
  - Up to 10 km Reach (16:1 Split)
  - Up to 20 km Reach (8:1 Split)

### Features

- Dual Wavelength Bi-Directional Tx/Rx
- 1250 Mb/s Symmetrical Tx/Rx Data Rate
- 1310 nm P-I-N/TIA Burst Mode Receiver
- 1490 nm CW Mode DFB Laser
- IEEE 802.3ah, Revision D3.3 Compliant
- Single 3.3 Volt DC supply
- Low Power Consumption
- 2x5 SFF Package Outline
- Single Fiber, Full Duplex Operation
- Pigtail Optical Interface with Optional Connector
- Operating Temperature Range:
  - 0 to +70 ºC
- Tx DATA Signal Interface
  - LVPECL Differential
  - Internally AC-Coupled and Terminated
- Rx DATA Signal Interface
  - LVPECL Differential
  - Externally DC-Coupled and Terminated
- Tx DISABLE Input Control Function
  - LVTTL Interface
  - "LOW" = Transmitted Enabled
  - "HIGH" = Transmitter Disabled
- Rx SIGNAL DETECT Output Monitor Function
  - LVTTL Interface
  - "LOW" = Loss of Signal
  - "HIGH" = Normal Operation
- BER $<10^{-10}$ (PRBS = $2^7$-1)

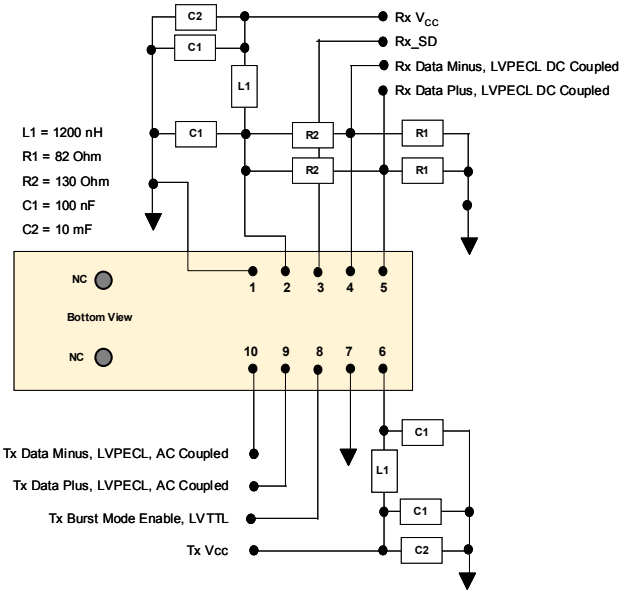
**Recommended Operating Conditions**

| Parameter | Symbol | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Ambient Operating Temperature | $T_{amb}$ | 0 | 25 | +70 | ºC |
| DC Supply Voltage | $V_{CC}$ | 3.135 | 3.3 | 3.465 | Volts |
| Module Supply Current | $I_{IN}$ | - | 150 | 200 | mA |
| Module Power Dissipation | $P_D$ | - | 500 | 700 | mW |
| Signaling Speed +/- 100 ppm | S | - | 1.25 | - | GBd |
| Useful Reach (16:1 Split) | D | - | 10 | - | km |
| Useful Reach (8:1 Split) | D | - | 20 | - | km |

**Ordering Information**

| Part Number | Package Option (X) | |
|---|---|---|
| LTB3418 X | A | SMF Pigtail Without Connector |
| | B | SMF Pigtail with SC/APC |
| | C | SMF with SC/UPC |

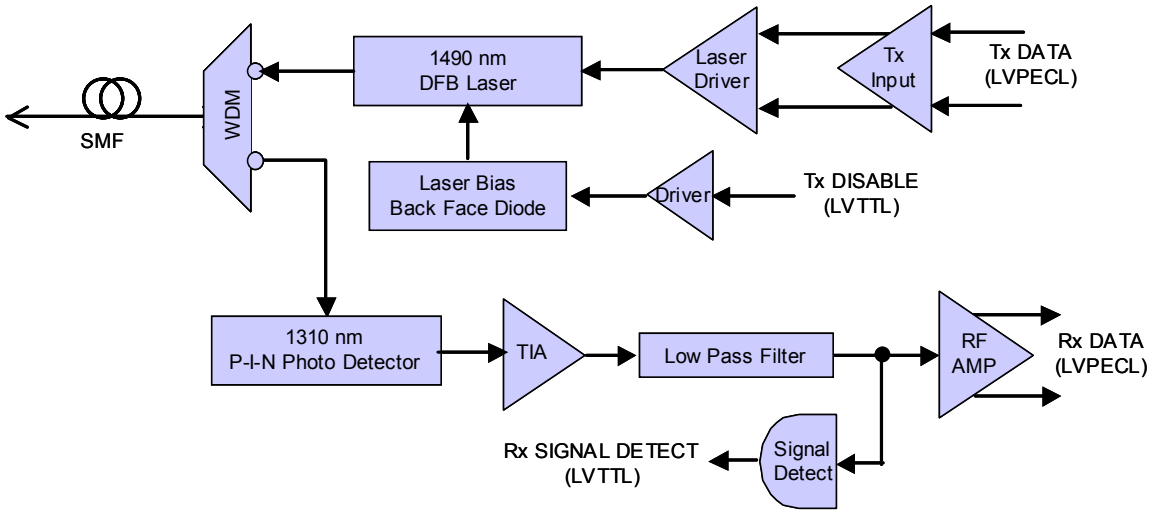
**LTB3418 2X5 SFF Interface**



| Absolute Maximum Ratings | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Max** | **Units** | **Notes** |
| Storage Temperature | $T_{stg}$ | -40 | +85 | ºC | Exceeding the Absolute Maximum Ratings may cause irreversible damage to the device.<br><br>The device is not intended to be operated under the condition of simultaneous Absolute Maximum Ratings, a condition which may cause irreversible damage to the device. |
| Case Temperature | $T_{case}$ | 0 | +70 | ºC | |
| Relative Humidity - Storage | $RH_S$ | 0 | 95 | % | |
| Relative Humidity - Operating | $RH_O$ | 0 | 85 | % | |
| DC Supply Voltage | $V_{CC}$ | 0 | 3.6 | V | |
| Soldering Temperature | $T_{sld}$ | 0 | 260 | ºC | |
| Soldering Duration | $t_{sld}$ | 0 | 10 | sec | |
| **Absolute Maximum Ratings: Optical and Electrical Signal Levels** | | | | | |
| **Parameter** | **Symbol** | **Min** | **Max** | **Units** | **Notes** |
| Transmit DISABLE Logic HIGH State | Tx_DIS | 0 | $V_{CC}$+0.5 | V | |
| Receiver SIGNAL DETECT Logic HIGH State | Rx_SD | 0 | $V_{CC}$+0.5 | V | |

| Transmitter Electrical Specifications | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Units** | **Conditions / Notes** |
| Tx DC Supply Current | $I_{CC}$ | - | - | 150 | mA | |
| Tx_Data Differential Input Voltage | $V_{IH}$-$V_{IL}$ | 600 | - | 1900 | mV p-p | LVPECL Tx_DATA Electrical Signal |
| Tx_DIS = HIGH (Transmitter OFF / DISABLED) | $V_{OH}$ | 2.4 | - | 3.3 | V | LVTTL |
| Tx_DIS = LOW (Transmitter ON / ENABLED) | $V_{OL}$ | 0 | - | 0.8 | V | LVTTL |
| **Receiver Electrical Specifications** | | | | | | |
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Units** | **Conditions / Notes** |
| Rx DC Supply Current | $I_{RX}$ | - | - | 125 | mA | Not Including the Output Load Current |
| Rx_Data Differential Output Voltage | $V_{IH}$-$V_{IL}$ | 600 | - | 1900 | mV p-p | LVPECL Rx_DATA Electrical Signal |
| Rx_SD = HIGH (Receiver ON / NORMAL) | $V_{OH}$ | 2.4 | - | 3.3 | V | LVTTL |
| Rx_SD = LOW (Receiver OFF / LOSS OF SIGNAL) | $V_{OL}$ | 0 | - | 0.8 | V | LVTTL |

**LTB3418 Block Diagram**

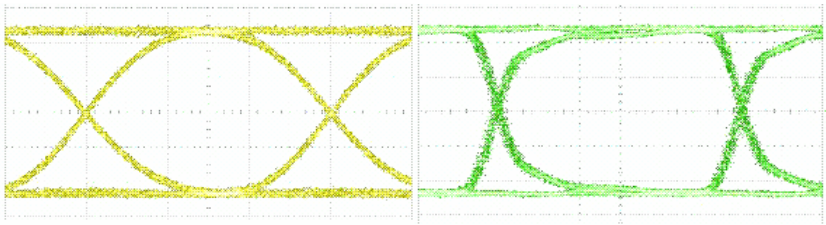


# LTB3418 1250 Mb/s PX-10 P2MP OLT Burst Mode 2x5 SFF E-PON Transceiver, 10 km

| Transmitter Optical Specifications (Tamb = 0 to 70°C, Vcc = 3.3 Volts) | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Units** | **Conditions / Notes** |
| Transmitter Type | | 1490 nm DFB CW Mode Laser | | | | |
| Average Output Power (9/125 μ SMF) | Pout | -3.0 | 0 | +2.0 | dBm | |
| Optical Output with Tx OFF | Pout | - | - | -39 | dBm | |
| Optical Rise and Fall Time | $t_r$ / $t_f$ | - | 150 | 250 | ps | 20% to 80% |
| Tx Wavelength | λ | 1480 | 1490 | 1500 | nm | |
| Spectral Line Width @ -20dB | Δλ | - | - | 0.88 | nm | IEEE 802.3ah Compliant |
| Side Mode Suppression Ratio | SMSR | 30 | - | - | dB | |
| Extinction Ratio | ER | 10 | 12 | - | dB | |
| Relative Intensity Noise | RIN | - | - | -118 | dB/Hz | |
| Optical Return Loss | RL | - | - | 15 | dB | |
| Total Jitter | Tj | - | - | 0.2 | UI | |
| Optical Cross Talk | $C_{RT}$ | - | 40 | - | dB | |
| Transmit Reflectance | RFL | - | - | -12 | dB | |
| Transmit Dispersion Penalty | DP | - | - | 2.3 | dB | |

| Receiver Optical Specifications | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Units** | **Conditions / Notes** |
| Receiver Type | | 1310 nm P-I-N/TIA Burst Mode | | | | |
| Optical Signal Indicator | | Signal Detect | | | | |
| Wavelength | λ | 1260 | 1310 | 1360 | nm | |
| Received Optical Power | Pin | -24 | - | -1 | dBm | BER<$10^{-10}$, 1250 Mb/s, PRBS $2^7$-1 |
| Maximum Input Optical Power | Pin(max) | - | - | 4 | dBm | Damage Threshold |
| Receiver Reflectance | RFL | - | - | -12 | dB | |
| Vertical Eye Closure Penalty | VEP | 1.2 | - | - | dB | |
| Receiver Settling Time | $t_{rx}$ | - | - | 400 | ns | |
| Rx_Signal Detect Assert | $P_a$ | -36.5 | - | -24 | dBm | |
| Rx_Signal Detect Deassert | $P_d$ | -37 | - | -24.5 | dBm | |
| Rx_Signal Detect Hysteresis | $P_{hy}$ | 0.5 | - | 5 | dB | |

**Eye Diagram**



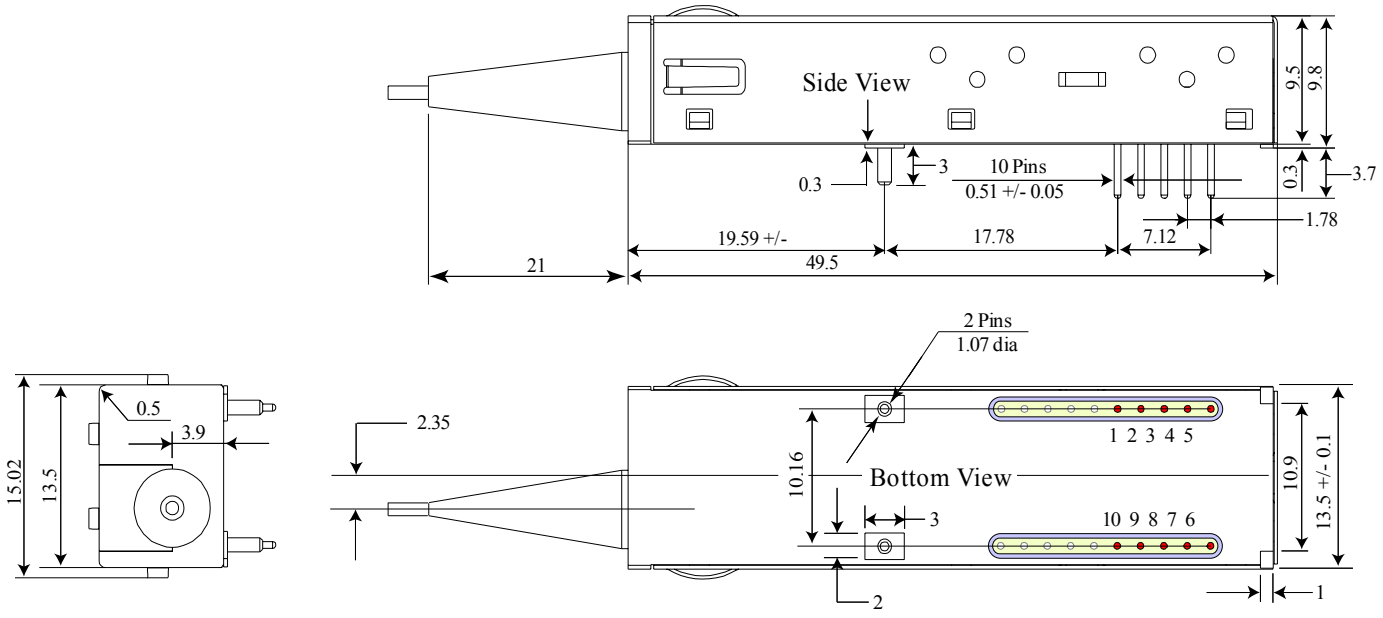
**Transmitter Test Conditions**
- Optical Output Power = 0 dBm
- Test Pattern = $2^7$-1 NRZ PRBS

**Receiver Test Conditions**
- Optical Input Power = -20 dBm
- Test Pattern = $2^7$-1 NRZ PRBS

**2x5 SFF Outline Drawing (Fiber Pigtail)**

Dimensions are in mm

Tolerances are ±0.01 mm




| 2x5 SFF PIN ASSIGNMENT | | |
|---|---|---|
| **Pin** | **Symbol** | **Description** |
| 1 | $V_{EER}$ | Receiver Signal Ground |
| 2 | $V_{CCR}$ | +3.3 Volt Receiver Power Supply |
| 3 | Rx_SD | Receiver Signal Detect |
| 4 | RD- | Rx Data - Inverted Differential Output |
| 5 | RD+ | Rx Data - Non Inverted Differential Output |
| 6 | $V_{CCT}$ | +3.3 Volt Transmitter Power Supply |
| 7 | $V_{EET}$ | Transmitter Signal Ground |
| 8 | Tx_DIS | Transmitter Disable |
| 9 | TD+ | Tx Data - Non Inverted Differential Input |
| 10 | TD- | Tx Data - Inverted Differential Input |
| Mounting Posts | | The mounting posts are provided for mechanically attaching the transceiver to the circuit board. They should not be connected to the circuit ground but can be connected to the chassis ground. |
| Housing Leads | | The housing leads should be connected to circuit |

**Eye Safety**

The transceiver is a Class 1 eye-safe device according to FDA 21CFR1040.10 and 1040.11, IEC 60825-1 and IEC 60825-2.

**Electromagnetic Interference (EMI), Immunity and Product Safety**

The transceiver is ESD safe (electrical pins) when tested according to MIL-STD-883, Method 3015.4 and ESD safe (optical connector) when tested according to IEC 61000-4-2. The device is immune to strong RF fields when tested in accordance with IEC 610004-3. The device complies with (US) FCC, Part 15, Subpart J; (Europe) CENELEC EN 55022; (Canada) Class B (CISPR22A); and (Japan) VCCI Class 1. The device has been designed to conform to product safety requirements including UL1950, CSA 22.2, and IEC 60950, and has been designed to meets the flammability requirements of UL94.

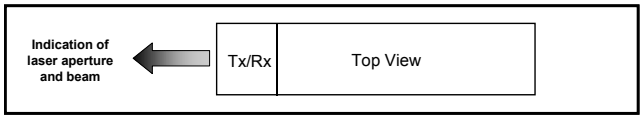
**Notice**

The factory has made all adjustments to this device prior to shipment. No adjustments or modifications to the device are required or permitted. Any adjustment, modification or tampering of the device voids the product warranty. The US Food and Drug Administration may consider that any adjustment or modification to this device is an act of manufacturing and therefore will require that the device be recertified in accordance with 21 CFR 1040.10 Subpart j.

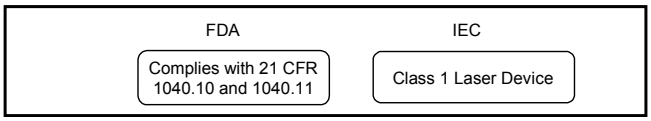
**Required Label and Laser Emission**

This device is labeled in accordance with FDA and IEC requirements for laser safety.

**Required Label**




**Laser Emission**




| Laser Radiation Information | |
|---|---|
| Wavelength | 1490 nm |
| FDA Total Optical Pout : 7 mm aperture at 20 cm distance | < 790 microwatts |
| IEC Total Optical Pout: 7 mm aperture at 14 cm distance | < 10000 microwatts |
| Beam Divergence | 17.25º |

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