

## Product Specification

### 100GBASE-SR10 100m CXP Optical Transceiver Module FTLD10CE3C

#### PRODUCT FEATURES

- 12-channel full-duplex transceiver module
- Hot Pluggable CXP form factor
- Multirate capability: 1Gb/s to 11.3Gb/s per channel
- Maximum link length of 100m on OM3 Multimode Fiber (MMF)
- Unretimed CPPI electrical interface
- Requires 3.3V power supply only
- Low power dissipation: < 3.5W
- Reliable VCSEL array technology
- Digital Diagnostics including Tx and Rx optical power monitoring
- Commercial operating case temperature range: 0°C to 70°C
- RoHS-6 Compliant (lead-free)



#### APPLICATIONS

- Infiniband 12x SDR/DDR/QDR
- 100GBASE-SR10 100G Ethernet
- OTU4/OTU2e
- 12x 10GBASE-SR Ethernet (compatible)
- PCIe (Gen1/2/3)
- SATA3
- Proprietary protocols

Finisar's FTLD10CE3C second-generation CXP transceiver modules are designed for use in up to 136 Gigabit per second links over 12 duplex multimode fiber pairs. They are compliant with the IBTA CXP Specification<sup>1</sup>, IEEE 802.3ba 100GBASE-SR10 and CPPI electrical interfaces<sup>2</sup>. The transceiver is RoHS-6 compliant and lead-free per Directive 2002/95/EC<sup>3</sup>, and Finisar Application Note AN-2038<sup>4</sup>. They support Tx/Rx optical power monitoring functionality. For applications up to 14 Gb/s per channel please contact Finisar.

#### PRODUCT SELECTION

|                   |
|-------------------|
| <b>FTLD10CE3C</b> |
|-------------------|

E: Ethernet-compliant optical interface  
3: Second generation product  
C: Commercial temperature rate

**I. Pin Descriptions**

| Bottom side                       |               |                | Top Side       |           |       |
|-----------------------------------|---------------|----------------|----------------|-----------|-------|
| I/O #                             | Name          | Contact Length | Contact Length | Name      | I/O # |
| <b>Receiver -- Top Card</b>       |               |                |                |           |       |
| C1                                | GND           |                |                | GND       | D1    |
| C2                                | RX1p          |                |                | RX0p      | D2    |
| C3                                | RX1n          |                |                | RX0n      | D3    |
| C4                                | GND           |                |                | GND       | D4    |
| C5                                | RX3p          |                |                | RX2p      | D5    |
| C6                                | RX3n          |                |                | RX2n      | D6    |
| C7                                | GND           |                |                | GND       | D7    |
| C8                                | RX5p          |                |                | RX4p      | D8    |
| C9                                | RX5n          |                |                | RX4n      | D9    |
| C10                               | GND           |                |                | GND       | D10   |
| C11                               | RX7p          |                |                | RX6p      | D11   |
| C12                               | RX7n          |                |                | RX6n      | D12   |
| C13                               | GND           |                |                | GND       | D13   |
| C14                               | RX9p          |                |                | RX8p      | D14   |
| C15                               | RX9n          |                |                | RX8n      | D15   |
| C16                               | GND           |                |                | GND       | D16   |
| C17                               | RX11p         |                |                | RX10p     | D17   |
| C18                               | RX11n         |                |                | RX10n     | D18   |
| C19                               | GND           |                |                | GND       | D19   |
| C20                               | PRSNT_L       |                |                | Vcc3.3-RX | D20   |
| C21                               | Int_L/Reset_L |                |                | Vcc12-RX  | D21   |
| <b>Transmitter -- Bottom Card</b> |               |                |                |           |       |
| A1                                | GND           |                |                | GND       | B1    |
| A2                                | TX1p          |                |                | TX0p      | B2    |
| A3                                | TX1n          |                |                | TX0n      | B3    |
| A4                                | GND           |                |                | GND       | B4    |
| A5                                | TX3p          |                |                | TX2p      | B5    |
| A6                                | TX3n          |                |                | TX2n      | B6    |
| A7                                | GND           |                |                | GND       | B7    |
| A8                                | TX5p          |                |                | TX4p      | B8    |
| A9                                | TX5n          |                |                | TX4n      | B9    |
| A10                               | GND           |                |                | GND       | B10   |
| A11                               | TX7p          |                |                | TX6p      | B11   |
| A12                               | TX7n          |                |                | TX6n      | B12   |
| A13                               | GND           |                |                | GND       | B13   |
| A14                               | TX9p          |                |                | TX8p      | B14   |
| A15                               | TX9n          |                |                | TX8n      | B15   |
| A16                               | GND           |                |                | GND       | B16   |
| A17                               | TX11p         |                |                | TX10p     | B17   |
| A18                               | TX11n         |                |                | TX10n     | B18   |
| A19                               | GND           |                |                | GND       | B19   |
| A20                               | SCL           |                |                | VCC3.3-TX | B20   |
| A21                               | SDA           |                |                | VCC12-TX  | B21   |

**Figure 1 – CXP-compliant 84-pin connector**

| Pin | Symbol    | Name/Description                                        | Notes |
|-----|-----------|---------------------------------------------------------|-------|
| A1  | GND       | Ground                                                  | 1     |
| A2  | Tx1p      | Transmitter Non-Inverted Data Input                     |       |
| A3  | Tx1n      | Transmitter Inverted Data Input                         |       |
| A4  | GND       | Ground                                                  | 1     |
| A5  | Tx3p      | Transmitter Non-Inverted Data Input                     |       |
| A6  | Tx3n      | Transmitter Inverted Data Input                         |       |
| A7  | GND       | Ground                                                  | 1     |
| A8  | Tx5p      | Transmitter Non-Inverted Data Input                     |       |
| A9  | Tx5n      | Transmitter Inverted Data Input                         |       |
| A10 | GND       | Ground                                                  | 1     |
| A11 | Tx7p      | Transmitter Non-Inverted Data Input                     |       |
| A12 | Tx7n      | Transmitter Inverted Data Input                         |       |
| A13 | GND       | Ground                                                  | 1     |
| A14 | Tx9p      | Transmitter Non-Inverted Data Input                     |       |
| A15 | Tx9n      | Transmitter Inverted Data Input                         |       |
| A16 | GND       | Ground                                                  | 1     |
| A17 | Tx11p     | Transmitter Non-Inverted Data Input                     |       |
| A18 | Tx11n     | Transmitter Inverted Data Input                         |       |
| A19 | GND       | Ground                                                  | 1     |
| A20 | SCL       | 2-wire serial interface clock                           |       |
| A21 | SDA       | 2-wire serial interface data                            |       |
| B1  | GND       | Ground                                                  | 1     |
| B2  | Tx0p      | Transmitter Non-Inverted Data Input                     |       |
| B3  | Tx0n      | Transmitter Inverted Data Input                         |       |
| B4  | GND       | Ground                                                  | 1     |
| B5  | Tx2p      | Transmitter Non-Inverted Data Input                     |       |
| B6  | Tx2n      | Transmitter Inverted Data Input                         |       |
| B7  | GND       | Ground                                                  | 1     |
| B8  | Tx4p      | Transmitter Non-Inverted Data Input                     |       |
| B9  | Tx4n      | Transmitter Inverted Data Input                         |       |
| B10 | GND       | Ground                                                  | 1     |
| B11 | Tx6p      | Transmitter Non-Inverted Data Input                     |       |
| B12 | Tx6n      | Transmitter Inverted Data Input                         |       |
| B13 | GND       | Ground                                                  | 1     |
| B14 | Tx8p      | Transmitter Non-Inverted Data Input                     |       |
| B15 | Tx8n      | Transmitter Inverted Data Input                         |       |
| B16 | GND       | Ground                                                  | 1     |
| B17 | Tx10p     | Transmitter Non-Inverted Data Input                     |       |
| B18 | Tx10n     | Transmitter Inverted Data Input                         |       |
| B19 | GND       | Ground                                                  | 1     |
| B20 | VCC3.3-TX | +3.3 V Power supply transmitter                         |       |
| B21 | VCC12-TX  | +12.0 V Power supply transmitter - <b>NOT CONNECTED</b> | 2     |
| C1  | GND       | Ground                                                  | 1     |
| C2  | Rx1p      | Receiver Non-Inverted Data Output                       |       |
| C3  | Rx1n      | Receiver Inverted Data Output                           |       |
| C4  | GND       | Ground                                                  | 1     |
| C5  | Rx3p      | Receiver Non-Inverted Data Output                       |       |
| C6  | Rx3n      | Receiver Inverted Data Output                           |       |
| C7  | GND       | Ground                                                  | 1     |
| C8  | Rx5p      | Receiver Non-Inverted Data Output                       |       |
| C9  | Rx5n      | Receiver Inverted Data Output                           |       |
| C10 | GND       | Ground                                                  | 1     |

|     |               |                                                      |   |
|-----|---------------|------------------------------------------------------|---|
| C11 | Rx7p          | Receiver Non-Inverted Data Output                    |   |
| C12 | Rx7n          | Receiver Inverted Data Output                        |   |
| C13 | GND           | Ground                                               | 1 |
| C14 | Rx9p          | Receiver Non-Inverted Data Output                    |   |
| C15 | Rx9n          | Receiver Inverted Data Output                        |   |
| C16 | GND           | Ground                                               | 1 |
| C17 | Rx11p         | Receiver Non-Inverted Data Output                    |   |
| C18 | Rx11n         | Receiver Inverted Data Output                        |   |
| C19 | GND           | Ground                                               | 1 |
| C20 | PRSNT_L       | Module Present                                       |   |
| C21 | Int_L/Reset_L | Interrupt / Reset                                    |   |
| D1  | GND           | Ground                                               | 1 |
| D2  | Rx0p          | Receiver Non-Inverted Data Output                    |   |
| D3  | Rx0n          | Receiver Inverted Data Output                        |   |
| D4  | GND           | Ground                                               | 1 |
| D5  | Rx2p          | Receiver Non-Inverted Data Output                    |   |
| D6  | Rx2n          | Receiver Inverted Data Output                        |   |
| D7  | GND           | Ground                                               | 1 |
| D8  | Rx4p          | Receiver Non-Inverted Data Output                    |   |
| D9  | Rx4n          | Receiver Inverted Data Output                        |   |
| D10 | GND           | Ground                                               | 1 |
| D11 | Rx6p          | Receiver Non-Inverted Data Output                    |   |
| D12 | Rx6n          | Receiver Inverted Data Output                        |   |
| D13 | GND           | Ground                                               | 1 |
| D14 | Rx8p          | Receiver Non-Inverted Data Output                    |   |
| D15 | Rx8n          | Receiver Inverted Data Output                        |   |
| D16 | GND           | Ground                                               | 1 |
| D17 | Rx10p         | Receiver Non-Inverted Data Output                    |   |
| D18 | Rx10n         | Receiver Inverted Data Output                        |   |
| D19 | GND           | Ground                                               | 1 |
| D20 | Vcc3.3-RX     | +3.3 V Power supply receiver                         |   |
| D21 | Vcc12-RX      | +12.0 V Power supply receiver - <b>NOT CONNECTED</b> | 2 |

Notes

1. Circuit ground is internally isolated from chassis ground.
2. 12V power supply not required.

## II. General Product Characteristics

| Parameter                         | Value                                                                                                                       | Unit  | Notes                                                      |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------|
| Module Form Factor                | CXP                                                                                                                         |       |                                                            |
| Number of Lanes                   | 12 Tx and 12 Rx                                                                                                             |       |                                                            |
| Maximum Aggregate Data Rate       | 135.816                                                                                                                     | Gb/s  |                                                            |
| Maximum Data Rate per Lane        | 11.318                                                                                                                      | Gb/s  |                                                            |
| Protocols Supported               | Typical applications include Infiniband DDR/QDR, 100GBASE-SR10 Ethernet, OTU4, OTU2e, PCIe-Gen1/2/3, 12x10GBASE-SR Ethernet |       |                                                            |
| Electrical Interface and Pin-out  | 84-pin edge connector                                                                                                       |       | Pin-out as defined by the CXP Specification                |
| Optical Cable Type Required       | Multimode ribbon 24-fiber cable assembly, MPO connector                                                                     |       |                                                            |
| Maximum Power Consumption per End | 3.5                                                                                                                         | Watts | Varies with output voltage swing and pre-emphasis settings |
| Management Interface              | Serial, I2C-based, 400 kHz maximum frequency                                                                                |       | As defined by the CXP Specification                        |

| Data Rate Specifications           | Symbol | Min  | Typ | Max        | Units  | Ref. |
|------------------------------------|--------|------|-----|------------|--------|------|
| Bit Rate per Lane                  | BR     | 1000 |     | 11318      | Mb/sec | 1    |
| Bit Error Ratio @10.3Gb/s per Lane | BER1   |      |     | $10^{-12}$ |        | 2    |
| Bit Error Ratio @11.1Gb/s per Lane | BER2   |      |     | $10^{-6}$  |        | 2    |
| Bit Error Ratio @11.2Gb/s per Lane | BER3   |      |     | $10^{-6}$  |        | 2    |
| Bit Error Ratio @11.3Gb/s per Lane | BER4   |      |     | $10^{-8}$  |        | 2    |
| Link distance on OM3 MMF           | D1     |      |     | 100        | meters |      |
| Link distance on OM4 MMF           | D2     |      |     | 150        | meters |      |

### Notes:

1. Infiniband SDR/DDR/QDR, 100GBASE-SR10 100G Ethernet, OTU2e, OTU4, PCIe Gen1/2/3, 12x10GBASE-SR 10G Ethernet.
2. Tested with a PRBS  $2^{31}-1$  test pattern.

## III. Absolute Maximum Ratings

| Parameter                  | Symbol                                                         | Min  | Typ | Max | Unit | Ref. |
|----------------------------|----------------------------------------------------------------|------|-----|-----|------|------|
| Maximum Supply Voltage     | V <sub>cc1</sub> ,<br>V <sub>ccTx</sub> ,<br>V <sub>ccRx</sub> | -0.5 |     | 3.6 | V    |      |
| Storage Temperature        | T <sub>S</sub>                                                 | -40  |     | 85  | °C   |      |
| Case Operating Temperature | T <sub>OP</sub>                                                | 0    |     | 70  | °C   |      |
| Relative Humidity          | RH                                                             | 0    |     | 85  | %    | 1    |

### Notes:

1. Non-condensing.

**IV. Electrical Characteristics ( $T_{OP} = 0$  to  $70^{\circ}\text{C}$ ,  $V_{CC} = 3.3 \pm 5\%$  Volts)**

NOTE: The FTLD10CE3C requires that a CPPI-compliant CXP electrical connector be used on the host board in order to guarantee its electrical interface specification. Please check with your connector supplier.

| Parameter                                    | Symbol                   | Min                                    | Typ | Max  | Unit     | Ref. |
|----------------------------------------------|--------------------------|----------------------------------------|-----|------|----------|------|
| Supply Voltage                               | Vcc1,<br>VccTx,<br>VccRx | 3.15                                   |     | 3.45 | V        |      |
| Supply Current                               | Icc                      |                                        | 850 | 1000 | mA       |      |
| Module Total Power                           | P                        |                                        |     | 3.5  | W        | 1, 7 |
| Link Turn-On Time                            |                          |                                        |     |      |          |      |
| Transmit turn-on time                        |                          |                                        |     | 2000 | ms       | 2    |
| Transmitter (per Lane)                       |                          |                                        |     |      |          |      |
| Single ended input voltage tolerance         | VinT                     | -0.3                                   |     | 4.0  | V        |      |
| Differential data input swing                | Vin,pp                   | 120                                    |     | 1200 | mVpp     | 3    |
| Differential input threshold                 |                          |                                        | 50  |      | mV       |      |
| AC common mode input voltage tolerance (RMS) |                          | 15                                     |     |      | mV       |      |
| Differential input return loss               |                          | Per IEEE 802.3ba,<br>Section 86A.4.1.1 |     |      | dB       | 4    |
| J2 Jitter Tolerance                          | Jt2                      | 0.17                                   |     |      | UI       |      |
| J9 Jitter Tolerance                          | Jt9                      | 0.29                                   |     |      | UI       |      |
| Data Dependent Pulse Width Shrinkage         | DDPWS                    | 0.07                                   |     |      | UI       |      |
| Eye mask coordinates {X1, X2<br>Y1, Y2}      |                          | 0.11, 0.31<br>95, 350                  |     |      | UI<br>mV | 5    |
| Receiver (per Lane)                          |                          |                                        |     |      |          |      |
| Single-ended output voltage                  |                          | -0.3                                   |     | 4.0  | V        |      |
| Differential data output swing               | Vout,pp                  | 0                                      |     | 800  | mVpp     | 6,7  |
| AC common mode output voltage (RMS)          |                          |                                        |     | 7.5  | mV       |      |
| Termination mismatch at 1 MHz                |                          |                                        |     | 5    | %        |      |
| Differential output return loss              |                          | Per IEEE 802.3ba,<br>Section 86A.4.2.1 |     |      | dB       | 4    |
| Common mode output return loss               |                          | Per IEEE 802.3ba,<br>Section 86A.4.2.2 |     |      | dB       | 4    |
| Output transition time, 20% to 80%           |                          | 28                                     |     |      | ps       |      |
| J2 Jitter output                             | Jo2                      |                                        |     | 0.42 | UI       |      |
| J9 Jitter output                             | Jo9                      |                                        |     | 0.65 | UI       |      |
| Eye mask coordinates {X1, X2<br>Y1, Y2}      |                          | 0.29, 0.5<br>150, 425                  |     |      | UI<br>mV | 5    |
| Power Supply Ripple Tolerance                | PSR                      | 50                                     |     |      | mVpp     |      |

**Notes:**

1. Maximum total power value is specified across the full temperature and voltage range.
2. From power-on and end of any fault conditions.
3. After internal AC coupling. Self-biasing 100Ω differential input.
4. 10 MHz to 11.1 GHz range
5. Hit ratio =  $5 \times 10^{-5}$
6. AC coupled with 100Ω differential output impedance.
7. Settable in 4 discrete steps via the I2C interface. See Figure 2 for Vout settings.

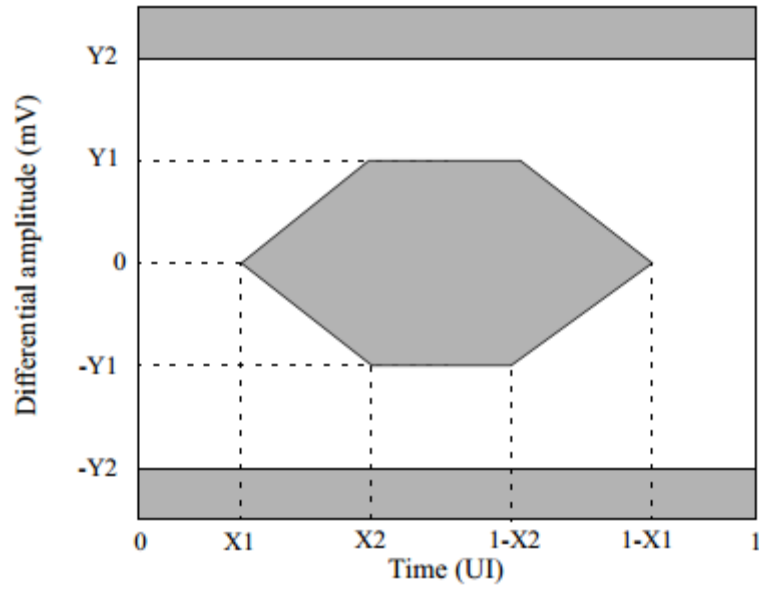


Figure 2 – Transmitter Input Differential Signal Mask

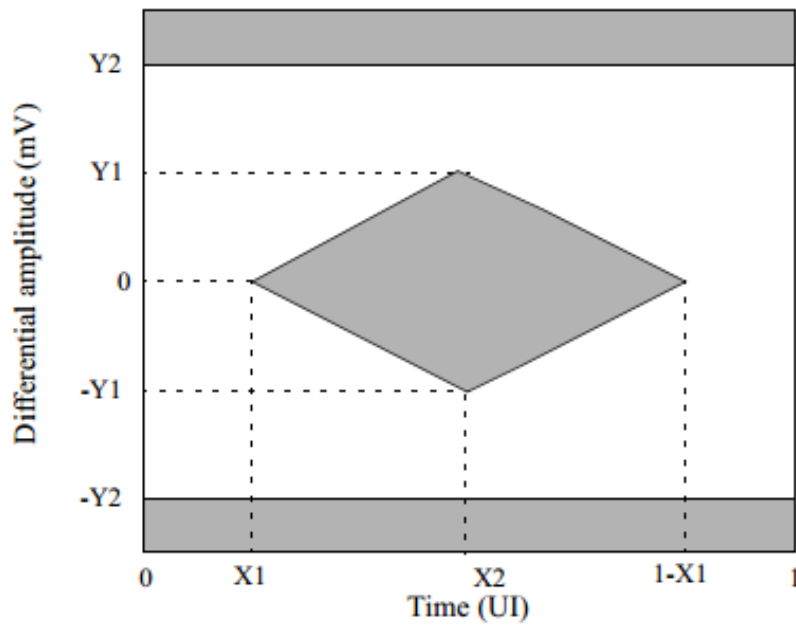


Figure 3 – Receiver Output Differential Signal Mask

## Receiver Output Amplitude Settings

| Code          | Receiver Output Amplitude (mV) |         |     | Reference       |
|---------------|--------------------------------|---------|-----|-----------------|
|               | Min                            | Nominal | Max |                 |
| 1xxx <b>b</b> |                                |         |     |                 |
| 0111 <b>b</b> | 650                            | 750     | 850 |                 |
| 0110 <b>b</b> | 550                            | 650     | 750 |                 |
| 0101 <b>b</b> | 450                            | 550     | 650 | Default Setting |
| 0100 <b>b</b> | 350                            | 450     | 550 |                 |
| 0011 <b>b</b> | 300                            | 400     | 500 |                 |
| 0010 <b>b</b> | 250                            | 350     | 450 |                 |
| 0001 <b>b</b> | 200                            | 300     | 400 |                 |
| 0000 <b>b</b> | 150                            | 250     | 350 |                 |

## Receiver Pre-Emphasis Settings

| Code          | Pre-emphasis (dB) | Reference       |
|---------------|-------------------|-----------------|
| 0111 <b>b</b> | 4.5 +/- 0.25      |                 |
| 0110 <b>b</b> | 4.0 +/- 0.5       |                 |
| 0101 <b>b</b> | 3.5 +/- 0.5       |                 |
| 0100 <b>b</b> | 3.0 +/- 0.5       |                 |
| 0011 <b>b</b> | 2.5 +/- 0.5       | Default Setting |
| 0010 <b>b</b> | 2.0 +/- 0.5       |                 |
| 0001 <b>b</b> | 1.5 +/- 0.5       |                 |
| 0000 <b>b</b> | 0.5 +/- 0.25      |                 |

## Module-end, Typical Power Consumption

| Power (mW)       | Code          | Pre-Emphasis  |               |               |               |               |               |               |               |
|------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                  |               | 0000 <b>b</b> | 0001 <b>b</b> | 0010 <b>b</b> | 0011 <b>b</b> | 0100 <b>b</b> | 0101 <b>b</b> | 0110 <b>b</b> | 0111 <b>b</b> |
| <b>Rx Output</b> | 0000 <b>b</b> | 2006          | 2006          | 2009          | 2009          | 2009          | 2013          | 2013          | 2013          |
|                  | 0001 <b>b</b> | 2009          | 2009          | 2009          | 2013          | 2009          | 2013          | 2013          | 2016          |
|                  | 0010 <b>b</b> | 2013          | 2013          | 2013          | 2013          | 2013          | 2016          | 2016          | 2020          |
|                  | 0011 <b>b</b> | 2016          | 2013          | 2016          | 2016          | 2016          | 2020          | 2020          | 2023          |
|                  | 0100 <b>b</b> | 2020          | 2016          | 2020          | 2020          | 2020          | 2020          | 2023          | 2023          |
|                  | 0101 <b>b</b> | 2023          | 2020          | 2023          | 2023          | 2023          | 2026          | 2026          | 2026          |
|                  | 0110 <b>b</b> | 2026          | 2026          | 2026          | 2026          | 2026          | 2026          | 2030          | 2030          |
|                  | 0111 <b>b</b> | 2026          | 2026          | 2030          | 2030          | 2030          | 2030          | 2033          | 2033          |



**V. Optical Characteristics ( $T_{OP} = 0$  to  $70^{\circ}\text{C}$ ,  $V_{CC} = 3.3 \pm 5\%$  Volts)**

| Parameter                                                | Symbol           | Min                               | Typ | Max   | Unit    | Ref. |
|----------------------------------------------------------|------------------|-----------------------------------|-----|-------|---------|------|
| Transmitter (per Lane)                                   |                  |                                   |     |       |         |      |
| Signaling Speed per Lane                                 |                  |                                   |     | 11.3  | GBd     | 1    |
| Center wavelength                                        |                  | 840                               |     | 860   | nm      |      |
| RMS Spectral Width                                       | SW               |                                   |     | 0.65  | nm      |      |
| Average Launch Power per Lane                            | TXP <sub>x</sub> | -7.6                              |     | 2.4   | dBm     |      |
| Transmit OMA per Lane                                    | TxOMA            | -5.6                              |     | 3.0   | dBm     | 2    |
| Difference in Power between any two lanes [OMA]          | DP <sub>x</sub>  |                                   |     | 4.0   | dB      |      |
| Peak Power per Lane                                      | PP <sub>x</sub>  |                                   |     | 4.0   | dBm     |      |
| Launch Power [OMA] minus TDP per Lane                    | P-TDP            | -6.5                              |     |       | dBm     |      |
| TDP per Lane                                             | TDP              |                                   |     | 3.5   | dBm     |      |
| Optical Extinction Ratio                                 | ER               | 3.0                               |     |       | dB      |      |
| Optical Return Loss Tolerance                            | ORL              |                                   |     | 12    | dB      |      |
| Encircled Flux                                           | FLX              | > 86% at 19 um<br>< 30% at 4.5 um |     |       | dBm     |      |
| Average launch power of OFF transmitter, per lane        |                  |                                   |     | -30   | dBm     |      |
| Relative Intensity Noise                                 | RIN              |                                   |     | -128  | dB/Hz   | 3    |
| Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} |                  | 0.23, 0.34, 0.43, 0.27, 0.35, 0.4 |     |       |         |      |
| Receiver (per Lane)                                      |                  |                                   |     |       |         |      |
| Signaling Speed per Lane                                 |                  |                                   |     | 11.3  | GBd     | 4    |
| Center wavelength                                        |                  | 840                               |     | 860   | nm      |      |
| Damage Threshold                                         | DT               | 3.4                               |     |       | dBm     |      |
| Average Receive Power per Lane                           | RXP <sub>x</sub> | -9.5                              |     | 2.4   | dBm     |      |
| Receive Power (OMA) per Lane                             | RxOMA            |                                   |     | 3.0   | dBm     |      |
| Stressed Receiver Sensitivity (OMA) per Lane             | SRS              |                                   |     | -5.4  | dBm     |      |
| Peak Power, per lane                                     | PP <sub>x</sub>  |                                   |     | 4     | dBm     |      |
| Receiver Reflectance                                     | Rfl              |                                   |     | -12   | dB      |      |
| Vertical eye closure penalty, per lane                   |                  |                                   |     | 1.9   | dB      |      |
| Stressed eye J2 jitter, per Lane                         |                  |                                   |     | 0.3   | UI      |      |
| Stressed eye J9 jitter, per Lane                         |                  |                                   |     | 0.47  | UI      |      |
| OMA of each aggressor lane                               |                  |                                   |     | -0.4  | dBm     |      |
| Receiver jitter tolerance [OMA], per Lane                |                  |                                   |     | -5.4  | dBm     |      |
| Rx jitter tolerance: Jitter frequency and p-p amplitude  |                  | (75, 5)                           |     |       | kHz, UI |      |
|                                                          |                  | (375, 1)                          |     |       | kHz, UI |      |
| LOS De-Assert                                            | LOS <sub>D</sub> |                                   |     | -12.5 | dBm     |      |
| LOS Assert                                               | LOS <sub>A</sub> | -30.0                             |     | -15.5 | dBm     |      |
| LOS Hysteresis                                           |                  | 1                                 |     |       | dB      |      |

**Notes:**

1. Transmitter consists of 12 lasers operating at a maximum rate of 11.3Gb/s each.
2. Even if TDP is <0.9dB, the OMA min must exceed this value.
3. RIN is scaled by  $10 \cdot \log(10/4)$  to maintain SNR outside of transmitter.
4. Receiver consists of 12 photodetectors operating at a maximum rate of 11.3Gb/s each.

**VI. Memory Map and Control Registers**

Compliant with the Infiniband<sup>SM</sup> Trade Association's InfiniBand<sup>TM</sup> Architectural Release 1.3, Volume 2, CXP Specification Release, November 6<sup>th</sup>, 2012.

**VII. Environmental Specifications**

Finisar FTLD10CE3C transceiver modules have an operating temperature range from 0°C to +70°C case temperature.

| Environmental Specifications | Symbol           | Min | Typ | Max | Units | Ref. |
|------------------------------|------------------|-----|-----|-----|-------|------|
| Case Operating Temperature   | T <sub>op</sub>  | 0   |     | 70  | °C    |      |
| Storage Temperature          | T <sub>sto</sub> | -5  |     | 75  | °C    |      |

**VIII. Regulatory Compliance**

Finisar FTLD10CE3C transceiver modules are RoHS-6 Compliant. Copies of certificates are available at Finisar Corporation upon request.

FTLD10CE3C transceiver modules are classified as Class 1 laser eye safety compliant per IEC 60825-1.

| Feature           | Agency   | Standard                                                                                                                          | Certificate Number |
|-------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Laser Eye Safety  | FDA/CDRH | CDRH 21 CFR 1040 and Laser Notice 50                                                                                              | 0620885-043        |
| Laser Eye Safety  | TÜV      | EN 60825-1: 2007, EN60825-2:2004+A1<br>IEC 60825-1: 2007 (2 <sup>nd</sup> Edition)<br>IEC 60825-2: 2010 (3 <sup>rd</sup> Edition) | R72120958          |
| Electrical Safety | TÜV      | EN 60950:2006+A11                                                                                                                 | R72120958          |
| Electrical Safety | UL/CSA   | CLASS 3862.07<br>CLASS 3862.87                                                                                                    | 2397145            |

Copies of the referenced certificates are available at Finisar Corporation upon request.

## IX. Mechanical Specifications

The FTLD10CE3C transceiver module mechanical specifications are based on the CXP Specification.

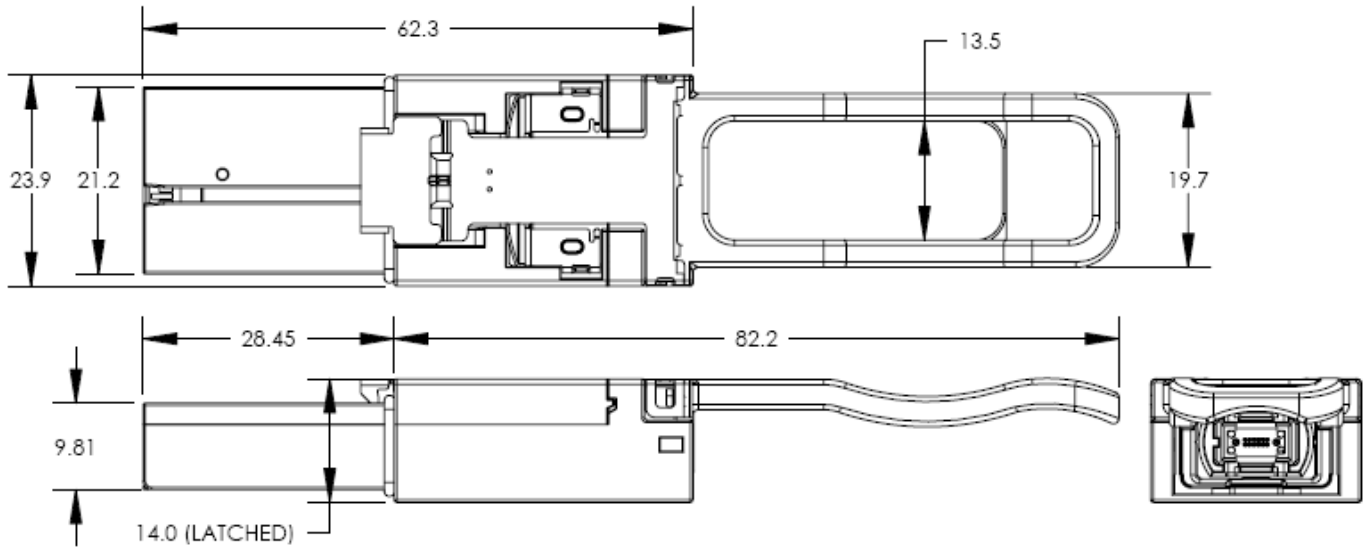


Figure 3 – FTLD10CE3C mechanical drawing

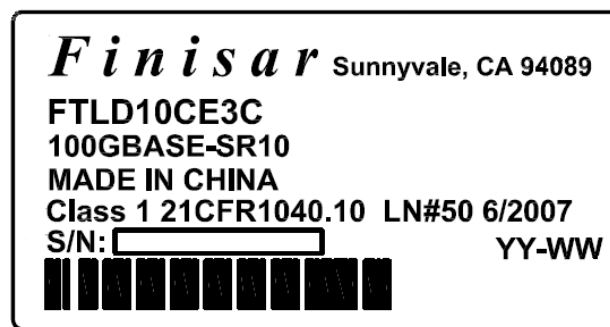


Figure 4 – FTLD10CE3C production-level product label

**X. References**

1. Supplement to Infiniband Architecture Specification, Volume 2, Release 1.3., Annex A6: " 12x Form-factor Pluggable (CXP) - Interface Specification for Cables, Active Cables, & Transceivers", November 6, 2012
2. IEEE 802.3ba, PMD Type 100GBASE-SR10
3. Directive 2002/95/EC of the European Council Parliament and of the Council, "on the restriction of the use of certain hazardous substances in electrical and electronic equipment". January 27, 2003.
4. "Application Note AN-2038: Finisar Implementation Of RoHS Compliant Transceivers", Finisar Corporation.
5. "Application Note AN-2085: CXP Transceiver EEPROM Mapping", Finisar Corporation.

**XI. For More Information**

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