

## C-1xx-1250(C)-FDFB-SLCx



## Features

- Duplex LC Single Mode Transceiver
- Small Form Factor Multi-sourced 2x5 Pin Package
- Complies with IEEE 802.3 Gigabit Ethernet
- 1270 nm to 1610 nm Wavelength, CWDM DFB Laser
- Single +3.3V Power Supply
- LVPECL Differential Inputs and Outputs
- LVTTTL Signal Detection Output (C-1xx-1250C-FDFB-SLCx)
- LVPECL Signal Detection Output (C-1xx-1250-FDFB-SLCx)
- Temperature Range: 0 to 70 °C
- Class 1 Laser International Safety Standard IEC 825 compliant
- Solderability to MIL-STD-883, Method 2003
- Pin Coating is Sn/Pb with minimum 2% Pb content
- Flammability to UL94V0
- Humidity RH 5-85% (5-90% short term) to IEC 68-2-3
- Complies with Bellcore GR-468-CORE
- Uncooled laser diode with MQW structure
- 1.25 Gbps Ethernet Links application
- 1.06 Gbps Fiber Channel application
- RoHS compliance available

## Absolute Maximum Rating

| Parameter             | Symbol    | Min. | Max. | Unit | Note                     |
|-----------------------|-----------|------|------|------|--------------------------|
| Power Supply Voltage  | $V_{CC}$  | 0    | 3.6  | V    |                          |
| Output Current        | $I_{out}$ | 0    | 30   | mA   |                          |
| Soldering Temperature | -         | -    | 260  | °C   | 10 seconds on leads only |
| Operating Temperature | $T_{opr}$ | 0    | 70   | °C   |                          |
| Storage Temperature   | $T_{stg}$ | -40  | 85   | °C   |                          |

## Recommended Operating Condition

| Parameter                    | Symbol    | Min. | Typ. | Max. | Unit |
|------------------------------|-----------|------|------|------|------|
| Power Supply Voltage         | $V_{CC}$  | 3.1  | 3.3  | 3.5  | V    |
| Operating Temperature (Case) | $T_{opr}$ | 0    | -    | 70   | °C   |
| Data rate                    |           | -    | 1250 | -    | Mbps |

## Transmitter Specifications

| Parameter                   | Symbol          | Min                       | Typical     | Max               | Unit  | Notes                                          |
|-----------------------------|-----------------|---------------------------|-------------|-------------------|-------|------------------------------------------------|
| <b>Optical</b>              |                 |                           |             |                   |       |                                                |
| Optical Transmit Power      | $P_o$           | -5                        | -           | 0                 | dBm   | C-1xx-1250(C)-FDFB-SLC2                        |
| Optical Transmit Power      | $P_o$           | -3                        | -           | +2                | dBm   | C-1xx-1250(C)-FDFB-SLC3                        |
| Optical Transmit Power      | $P_o$           | 0                         | -           | +5                | dBm   | C-1xx-1250(C)-FDFB-SLC4                        |
| Output center Wavelength    | $\lambda$       | $\lambda_p - 5.5$         | $\lambda_p$ | $\lambda_p + 7.5$ | nm    | $\lambda_p = 1550$ nm, C-1xx-1250(C)-FDFB-SLCx |
| Output Spectrum Width       | $\Delta\lambda$ | -                         | -           | 1                 | nm    | -20 dB width                                   |
| Side Mode Suppression Ratio | Sr              | 30                        | 35          | -                 | dBm   | CW, $P_o = 5$ mW                               |
| Extinction Ratio            | ER              | 9                         | -           | -                 | dB    |                                                |
| Output Eye                  |                 | Compliant with IEEE 802.3 |             |                   |       |                                                |
| Optical Rise Time           | $t_r$           | -                         | -           | 0.26              | ns    | 20% to 80% Values                              |
| Optical Fall Time           | $t_f$           | -                         | -           | 0.26              | ns    | 20% to 80% Values                              |
| Relative Intensity Noise    | RIN             | -                         | -           | -120              | dB/Hz |                                                |
| Total Jitter                | TJ              | -                         | -           | 0.27              | ns    | Measured with 27-1 PRBS                        |

## C-1xx-1250(C)-FDFB-SLCx

## Transmitter Specifications

| Parameter                | Symbol          | Min  | Typical | Max      | Unit    | Notes                                                                   |
|--------------------------|-----------------|------|---------|----------|---------|-------------------------------------------------------------------------|
| <b>Electrical</b>        |                 |      |         |          |         |                                                                         |
| Power Supply Current     | $I_{CC}$        | -    | -       | 180      | mA      | Maximum current is specified at $V_{CC}$ =Maximum @ maximum temperature |
| Transmit Enable Voltage  | $V_{EN}$        | 0    | -       | 0.8      | V       |                                                                         |
| Transmit Disable Voltage | $V_D$           | 2.0  | -       | $V_{CC}$ | V       |                                                                         |
| Data Input Current-Low   | $I_{IL}$        | -200 | -       | -        | $\mu A$ |                                                                         |
| Data Input Current-High  | $I_{IH}$        | -    | -       | 200      | $\mu A$ |                                                                         |
| Data Input Voltage-Low   | $V_{IL-V_{CC}}$ | -2.0 | -       | -1.58    | V       | These inputs are compatible with 10K, 10KH and 100K ECL and PECL inputs |
| Data Input Voltage-High  | $V_{IH-V_{CC}}$ | -1.1 | -       | -0.74    | V       |                                                                         |

## Receiver Specifications

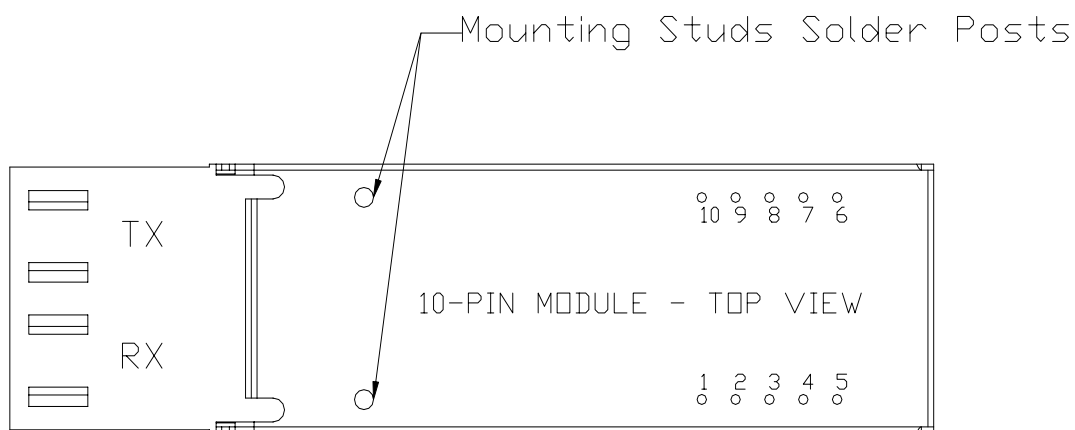
| Parameter                | Symbol   | Min  | Typical | Max  | Unit | Notes                                                         |
|--------------------------|----------|------|---------|------|------|---------------------------------------------------------------|
| <b>Optical</b>           |          |      |         |      |      |                                                               |
| Sensitivity              | -        | -    | -       | -22  | dBm  | Measured with 2 <sup>7</sup> -1 PRBS, BER = 10 <sup>-12</sup> |
| Maximum Input Power      | $P_{in}$ | -3   | -       | -    | dBm  |                                                               |
| Signal Detect-Asserted   | $P_a$    | -    | -       | -22  | dBm  | Measured on transition: low to high                           |
| Signal Detect-Deasserted | $P_d$    | -38  | -       | -    | dBm  | Measured on transition: high to low                           |
| Signal Detect-Hysteresis |          | 1.0  | -       | -    | dB   |                                                               |
| Wavelength of Operation  |          | 1100 | -       | 1620 | nm   |                                                               |

## Receiver Specifications

| Parameter                         | Symbol           | Min  | Typical | Max   | Unit | Note                                                                        |
|-----------------------------------|------------------|------|---------|-------|------|-----------------------------------------------------------------------------|
| <b>Electrical</b>                 |                  |      |         |       |      |                                                                             |
| Power Supply Current              | $I_{CC}$         | -    | -       | 120   | mA   | The current excludes the output load current                                |
| Data Output Voltage-Low           | $V_{OL-V_{CC}}$  | -2   | -       | -1.58 | V    | These outputs are compatible with 10K, 10KH and 100K ECL and LVPECL outputs |
| Data Output Voltage-High          | $V_{OH-V_{CC}}$  | -1.1 | -       | -0.74 | V    |                                                                             |
| Signal Detect Output Voltage-Low  | $V_{SDL-V_{CC}}$ | -2   | -       | -1.58 | V    | C-1xx-1250-FDFB-SLCx                                                        |
| Signal Detect Output Voltage-High | $V_{SDH-V_{CC}}$ | -1.1 | -       | -0.74 | V    |                                                                             |
| Signal Detect Output Voltage-Low  | $V_{SDL-V_{CC}}$ | -    | -       | 0.5   | V    | C-1xx-1250C-FDFB-SLCx                                                       |
| Signal Detect Output Voltage-High | $V_{SDH-V_{CC}}$ | 2.0  | -       | -     | V    |                                                                             |

## C-1xx-1250(C)-FDFB-SLCx

## Connection Diagram



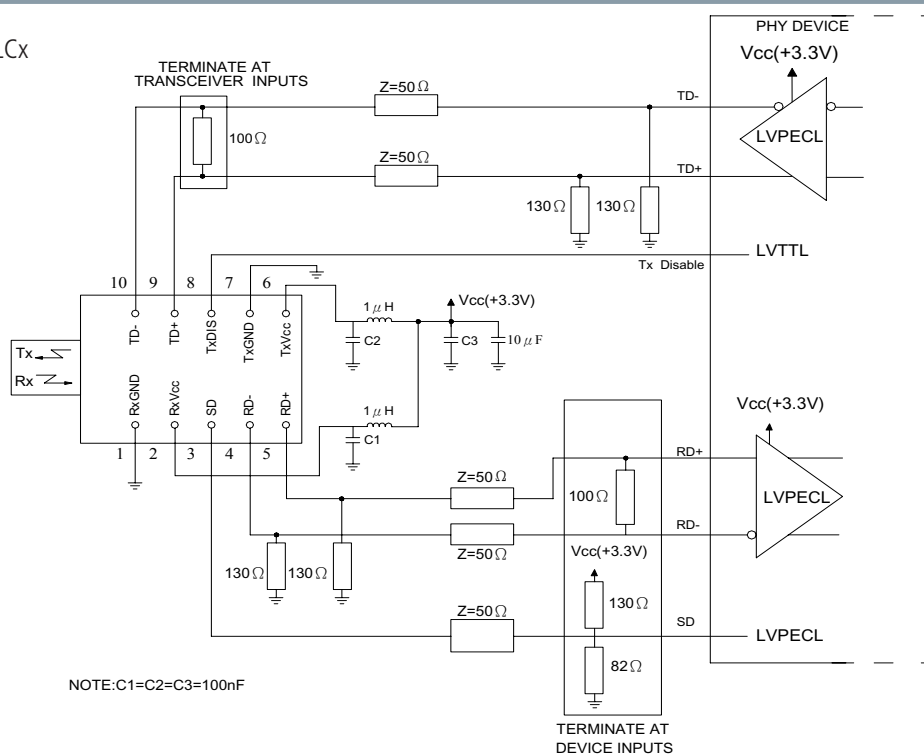
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| PIN             | Symbol | Notes                                                                                                                    |
|-----------------|--------|--------------------------------------------------------------------------------------------------------------------------|
| 1               | RxGND  | Directly connect this pin to the receiver ground plane                                                                   |
| 2               | TxVcc  | +3.3 V dc power for the receiver section                                                                                 |
| 3               | SD     | Active high on this indicates a received optical signal(LVPECL/LVTTL)                                                    |
| 4               | RD-    | Receiver Data Out Bar (LVPECL)                                                                                           |
| 5               | RD+    | Receiver Dat Out (LVPECL)                                                                                                |
| 6               | TxVcc  | +3.3 V dc power for the transmitter section                                                                              |
| 7               | TxGND  | Directly connect this pin to the transmitter ground plane                                                                |
| 8               | TxDIS  | Transmitter disable (LVTTL)                                                                                              |
| 9               | TD+    | Transmitter Data In (LVPECL)                                                                                             |
| 10              | TD-    | Transmitter Data In Bar (LVPECL)                                                                                         |
| Attaching Posts |        | The attaching posts are at case potential and may be connected to chassis ground. They are isolated from circuit ground. |

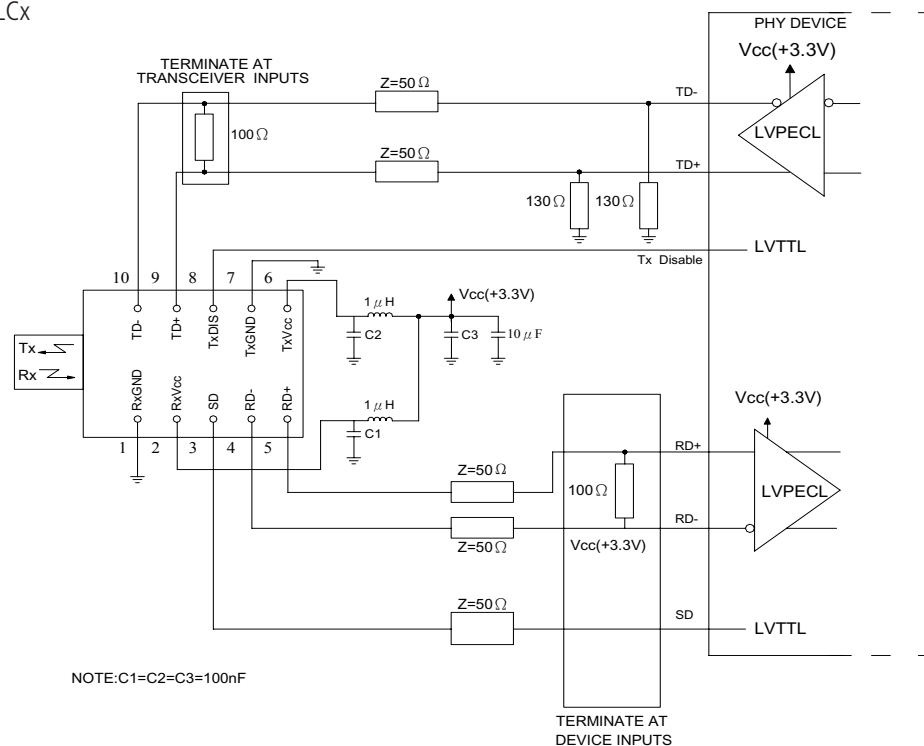
## C-1xx-1250(C)-FDFB-SLCx

## Recommended Circuit Schematic

C-1xx-1250-FDFB-SLCx



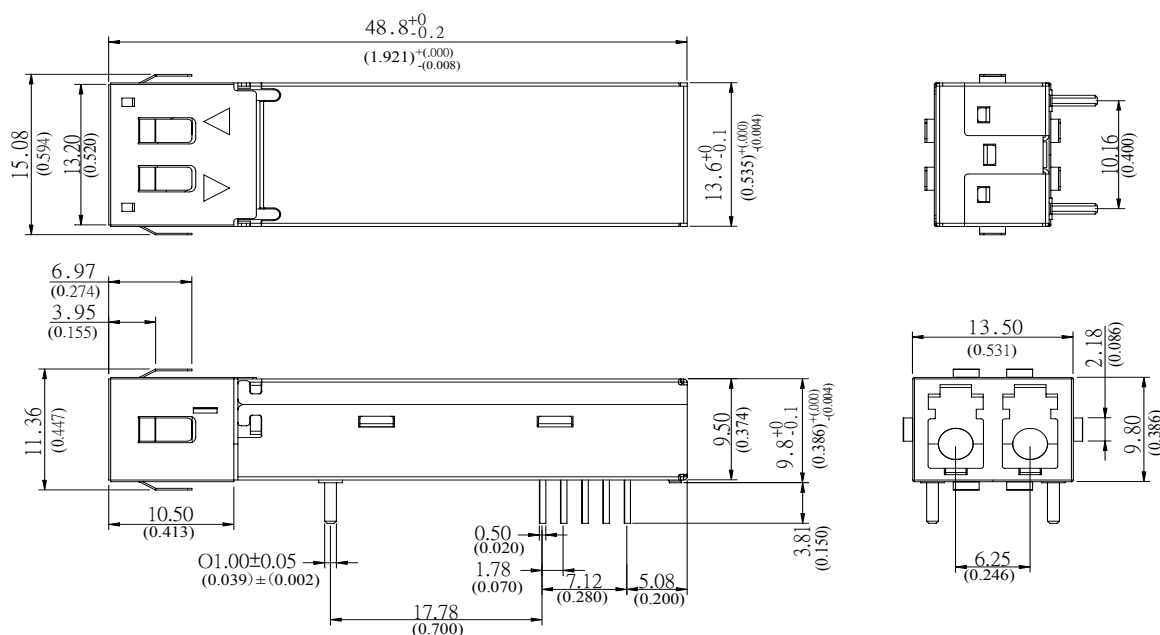
C-1xx-1250C-FDFB-SLCx



The split-loaded terminations for ECL signals need to be located at the input of devices receiving those ECL signals.  
 The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc and Tx Vcc.  
 A GND plane under the module is required for good EMI and sensitivity performance.

## C-1xx-1250(C)-FDFB-SLCx

## Package Diagram



Units in mm(inch)

## Printed Circuit Board Layout Consideration

A fiber-optic receiver employs a very high gain, wide bandwidth transimpedance amplifier. This amplifier detects and amplifies signals that are only tens of nA in amplitude when the receiver is operating near its limit. Any unwanted signal current that couples into the receiver circuitry causes a decrease in the receiver's sensitivity and can also degrade the performance of the receiver's signal detect (SD) circuit. To minimize the coupling of unwanted noise into the receiver, careful attention must be given to the printed circuit board.

At a minimum, a double-sided printed circuit board (PCB) with a large component side ground plane beneath the transceiver must be used. In applications that include many other high speed devices, a multi-layer PCB is highly recommended. This permits the placement of power and ground on separate layers, which allows them to be isolated from the signal lines. Multilayer construction also permits the routing of signal traces away from high level, high speed signal lines. To minimize the possibility of coupling noise into the receiver section, high level, high speed signals such as transmitter inputs and clock lines should be routed as far away as possible from the receiver pins.

Noise that couples into the receiver through the power supply pins can also degrade performance. It is recommended that a pi filter be used in both transmitter and receiver power supplies.

## EMI and ESC Consideration

LuminentOIC transceivers offer a metalized plastic case and a special chassis grounding clip. As shown in the drawing, this clip connects the module case to chassis ground then installs flush through the panel cutout. This way, the grounding clip brushes the edge of the cutout in order to make a proper contact. The use of a grounding clip also provides increased electrostatic protection and helps reduce radiated emission from the module or the host circuit board through the chassis faceplate. The attaching posts are at case potential and may be connected to chassis ground. They should not be connected to circuit ground.

Plastic optical subassemblies are used to further reduce the possibility of radiated emission by eliminating the metal from the transmitter and receiver diode housings, which extend into connector space. By providing a non-metal receptacle for the optical cable ferrule, the gigabit speed RF electrical signal is isolated from the connector area thus preventing radiated energy leakage from these surfaces to the outside of the panel.

### Recommended Board Layout Hole Pattern



1. THIS FIGURE DESCRIBE THE RECOMMEND CIRCUIT BOARD LAYOUT FOR THE SFF TRANSCEIVER.
2. THE HATCHED AREAS ARE KEEP-OUT AREAS RESERVED FOR HOUSING STANDOFF. NO METAL TRACES OR GROUND CONNECTION IN KEEP-OUT AREAS.
3. THE MOUNTING STUDS SHOULD BE SOLDERED TO CHASSIS GROUND FOR MECHANICAL INTEGRITY.

Technical drawings of the PCB assembly. The top drawing is a plan view showing dimensions 15.24 and 14.22, and a section line A-A. The bottom drawing is a cross-section A-A showing dimensions 10.16±0.1 (0.4±0.004), 15.5 typ. (0.61), and 1 (0.039), and labels for 'SOLDER POSTS' and 'SECTION A-A'.

DIMENSION IN MILLIMETER (INCHES)

## C-1xx-1250(C)-FDFB-SLCx

## Ordering Information

## Available Options:

|                       |                          |
|-----------------------|--------------------------|
| C-1xx-1250-FDFB-SLC2  | C-1xx-1250-FDFB-SLC2-G5  |
| C-1xx-1250-FDFB-SLC3  | C-1xx-1250-FDFB-SLC3-G5  |
| C-1xx-1250-FDFB-SLC4  | C-1xx-1250-FDFB-SLC4-G5  |
| C-1xx-1250C-FDFB-SLC2 | C-1xx-1250C-FDFB-SLC2-G5 |
| C-1xx-1250C-FDFB-SLC3 | C-1xx-1250C-FDFB-SLC3-G5 |
| C-1xx-1250C-FDFB-SLC4 | C-1xx-1250C-FDFB-SLC4-G5 |

## Part numbering Definition:

|                                                                                                            | C | 1xx | 1250(C) | FDFB | S | LC | TxPower | -RoHS |
|------------------------------------------------------------------------------------------------------------|---|-----|---------|------|---|----|---------|-------|
| • 1XX = Wavelength 1XX0 nm<br>XX=27, 29, 31, 33, 35, 37, 39, 41, 43,<br>45, 47, 49, 51, 53, 55, 57, 59, 61 |   |     |         |      |   |    |         |       |
| • Communication protocol<br>1250= LVPECL SD output<br>1250C= LVTTTL SD output                              |   |     |         |      |   |    |         |       |
| • FDFB = +3.3V SFF Transceiver                                                                             |   |     |         |      |   |    |         |       |
| • Single mode fiber                                                                                        |   |     |         |      |   |    |         |       |
| • Connector options                                                                                        |   |     |         |      |   |    |         |       |
| • Tx Power range<br>2 = -5 to 0 dBm<br>3 = -3 to +2 dBm<br>4 = 0 to +5 dBm                                 |   |     |         |      |   |    |         |       |
| • RoHS<br>Blank = RoHS non-compliant product<br>G5 = RoHS 5/6-compliant product (lead exemption)           |   |     |         |      |   |    |         |       |

## Warnings:

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

## Legal Notes:

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