

## Fiber Optic SFP DFB 1550nm OC-48 Lightwave Transceiver with APD Photodiode

Data Sheet

**OFP3478**



The OFP3478 transceiver module operates at a wavelength of 1550 nm and at 2.5 Gb/s for OC-48/STM-16 long reach applications.

### Features

- Hot-pluggable
- Single +3.3 V supply
- Duplex LC connector interface
- Distributed Feedback 1550 type LD
- Low power dissipation
- OC-48/STM-16 Long Reach
- Multi data rates from 622Mbps to 2.7Gbps
- APD receiver
- Power Output: 0 to +5 dBm
- 80 km link distance
- Multi-Source Agreement (MSA) for Small Form Factor Pluggable (SFP) Compliant

### Applications

- Telecommunications and Data Communications system networks
- SONET OC-12, OC-48 LR-2/STM L16.2
- Gigabit Ethernet
- Point-to-Point networking
- Metro Access Rings
- 1x/ 2x Fiber Channel

### Description

The OFP3478 transceiver provides signal conversion and processing for serial optical data communication applications. It operates over single mode fiber by converting 1550 nm wavelength lightwave information into an electrical signal and vice versa at a data rate of 2.5 Gb/s.

Housed in a compact metal package, the transceiver module consists of a transmitter and receiver optical subassembly coupled with a duplex LC receptacle. A high-speed uncooled DFB laser diode operates as light source while an APD photodiode subsequently acts as a detector.

This dual-fiber connector transceiver is designed for use in telecom and datacom network system applications at 2.5 Gb/s for SONET OC-12, OC-48 LR-2/SDH STM-16 L16.2, Gigabit Ethernet and 1x/2x Fiber Channel applications.

**Serial Identification (EEPROM)**

An SFP having module definition 4 provides access to sophisticated identification information that describes the SFP transceiver’s capabilities, standard interface, manufacturer and other information. An EEPROM containing the detailed product information for the host equipment is accessed by the 2-wire serial CMOS EEPROM protocol. See SFP MSA for detailed description.

**Safety**

**Laser Compliance Statement**

The OFFP3478 is classified as a Class I Laser Product. It complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated under recommended operating conditions. Because the transceiver is designed to be inherently eye safe, it does not require open fiber control thus eliminating complex electronics or mechanics.

Caution - use of device other than those specified herein may result in hazardous laser radiation exposure or other damage. Please embrace all customary precautions and discretion while handling this device.

**Performance Specifications**

**Absolute Maximum Ratings**

Stresses in excess of the absolute maximum ratings can cause damage to the optical device. Operations of the optical device are suggested to remain within the recommended operating conditions. Exposure to the absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter           | Symbol          | Minimum | Maximum | Unit |
|---------------------|-----------------|---------|---------|------|
| Storage Temperature | T <sub>S</sub>  | -40     | +85     | °C   |
| Supply Voltage      | V <sub>CC</sub> | 0       | 4.0     | V    |
| Relative Humidity   | RH              | 5       | 85      | %    |

**Recommended Operating Conditions**

| Parameter             | Symbol                            | Minimum | Typical | Maximum | Unit |
|-----------------------|-----------------------------------|---------|---------|---------|------|
| Operating Temperature | T <sub>OP</sub>                   | 0       |         | 70      | °C   |
| Supply Voltage        | V <sub>CC</sub>                   | 3.1     | 3.3     | 3.5     | V    |
| Supply Current        | I <sub>TX</sub> + I <sub>RX</sub> |         | 200     | 300     | mA   |

**Transmitter Electro-Optical Interface (T<sub>C</sub> = 0~70°C; V<sub>CC,T,R</sub> = 3.1V < V<sub>CC</sub> < 3.5V)**

| Parameter                                | Symbol                          | Minimum         | Maximum               | Unit  |
|--|---------------------------------|-----------------|-----------------------|-------|
| Transmitter Differential Input Voltage   | TD +/-                          | 400             | 2000                  | mVp-p |
| Optical Output Power <sup>1</sup>        | P <sub>O</sub>                  | 0               | +5                    | dBm   |
| Optical Extinction Ratio <sup>1</sup>    | E <sub>R</sub>                  | 8.2             |                       | dB    |
| Center Wavelength <sup>1</sup>           | λ <sub>C</sub>                  | 1280            | 1340                  | nm    |
| Spectral Width <sup>1</sup>              | Δλ                              |                 | < 1                   | nm    |
| Side Mode Suppression Ratio <sup>1</sup> | SMSR                            | 30              |                       | dB    |
| Optical Rise/ Fall Time <sup>2</sup>     | t <sub>r</sub> / t <sub>f</sub> |                 | 0.15                  | nsec  |
| Tx_Fault - HIGH                          | V <sub>Fault_H</sub>            | 2               | V <sub>CC</sub>       | V     |
| Tx_Fault - LOW                           | V <sub>Fault_L</sub>            | V <sub>ee</sub> | V <sub>ee</sub> + 0.5 | V     |

**OFFP3478 SFP TRANSCEIVER DATA SHEET**

|                   |                  |          |                |   |
|-------------------|------------------|----------|----------------|---|
| Tx_Disable - High | $V_{Disable\_H}$ | 2        | $V_{CC}$       | V |
| Tx_Disable - LOW  | $V_{Disable\_L}$ | $V_{ee}$ | $V_{ee} + 0.8$ | V |

**Note:**

1. Measured at 2488.32 Mbps, PRBS 2<sup>23</sup>-1, NRZ.
2. 20%-80%

**Receiver Electro-Optical Specifications ( $T_C = 0\sim 70^\circ C$ ;  $V_{CC,T,R} = 3.1V < V_{CC} < 3.5V$ )**

| Parameter                                       | Symbol           | Minimum | Typical | Maximum | Unit              |
|---|------------------|---------|---------|---------|-------------------|
| Receiver Differential Output Voltage            | RD +/-           | 600     | 800     |         | mV <sub>p-p</sub> |
| Receiver Overload <sup>1,2</sup>                | $P_{INMAX}$      | -8      |         |         | dBm               |
| Receiver Sensitivity <sup>1,2</sup>             | $P_{INMAX}$      |         |         | -28     | dBm               |
| Operating Center Wavelength                     | $\lambda_C$      | 1270    |         | 1620    | nm                |
| Receiver LOS Assert Level <sup>2</sup>          | $P_{RX\_LOS\ A}$ | -45     |         |         | dBm               |
| Receiver LOS Deassert Level <sup>2</sup>        | $P_{RX\_LOS\ D}$ |         |         | -28.5   | dBm               |
| Receiver Loss of Signal Hysteresis <sup>2</sup> |                  | 0.5     | 2       |         | dB                |

**Note:**

1. With BER better than or equal to  $1 \times 10^{-12}$ .
2. Measured in center of eye opening with 2<sup>23</sup>-1 PRBS, NRZ.

**Pin Assignment**

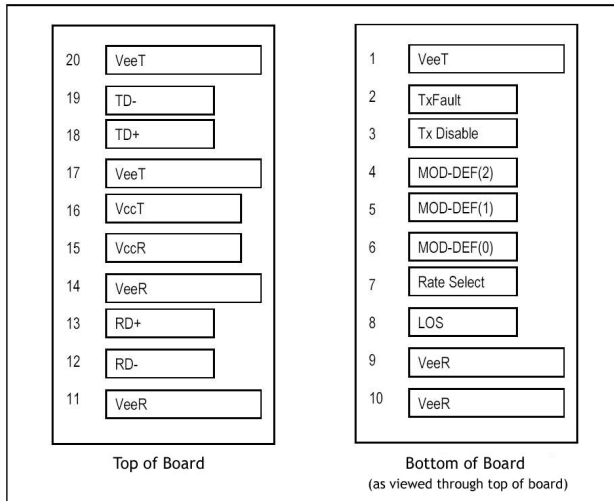


Figure 1. SFP Transceiver Electric Pad Layout

**OFP3478 SFP TRANSCEIVER DATA SHEET**

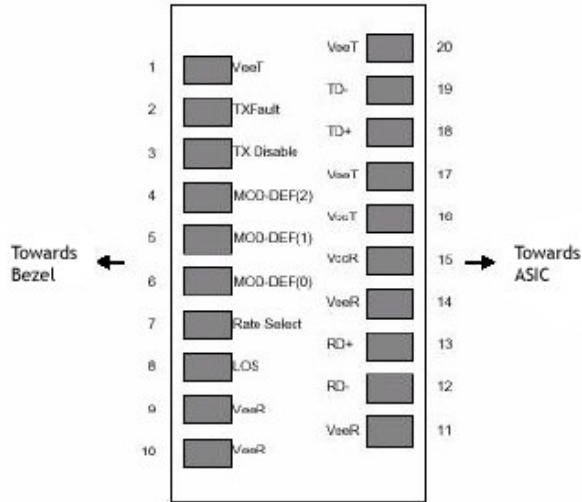


Figure 2. Diagram of Host Board Connector Block Pin

**Pin Description and Plug-in Sequence<sup>1</sup> (1-Grd, 2-Power, 3-Signal)**

| Pin No. | Name        | Description                  | Plug-in Sequence | Notes  |
|---------|-------------|------------------------------|------------------|--|
| 1       | VeeT        | Transmitter Ground           | 1                | Circuit ground is internally isolated from chassis ground.   |
| 2       | TX Fault    | Transmitter Fault Indication | 3                | Open-Collector outputs, asserted when LD and/or APC function fail.   |
| 3       | TX Disable  | Transmitter Disable          | 3                | Disable when high voltage (>2.0V or Open).   |
| 4       | MOD-DEF 2   | Module Definition 2          | 3                | Should be pulled up with 4.7k - 10 kΩ on host board to voltage between 2.0V and 5.5V. MOD-DEF (0) pulls line low to indicate module is plugged in.   |
| 5       | MOD-DEF 1   | Module Definition 1          | 3                | See notes for Pin 4.   |
| 6       | MOD-DEF 0   | Module Definition 0          | 3                | See notes for Pin 4.   |
| 7       | Rate Select | Bandwidth Selection          | 3                | No connection required.  |
| 8       | LOS         | Loss of Signal               | 3                | LOS is Open-Collector output. Should be pulled up with 4.7k - 10kΩ on host board to a voltage between 2.0V and 5.5V. Logic 0 indicates normal operation; logic 1 indicates loss of signal. |
| 9       | VeeR        | Receiver Ground              | 1                | See notes for Pin 1.   |
| 10      | VeeR        | Receiver Ground              | 1                | See notes for Pin 1.   |
| 11      | VeeR        | Receiver Ground              | 1                | See notes for Pin 1.   |
| 12      | RD-         | Inv. Received Data Out       | 3                |  |
| 13      | RD+         | Received Data Out            | 3                |  |
| 14      | VeeR        | Receiver Ground              | 1                | See notes for Pin 1.   |
| 15      | VccR        | Receiver Power               | 2                |  |
| 16      | VccT        | Transmitter Power            | 2                |  |

## OFP3478 SFP TRANSCEIVER DATA SHEET

|    |      |                       |   |                      |
|----|------|-----------------------|---|----------------------|
| 17 | VeeT | Transmitter Ground    | 1 | See notes for Pin 1. |
| 18 | TD+  | Transmit Data In      | 3 |                      |
| 19 | TD-  | Inv. Transmit Data In | 3 |                      |
| 20 | VeeT | Transmitter Ground    | 1 | See notes for Pin 1. |

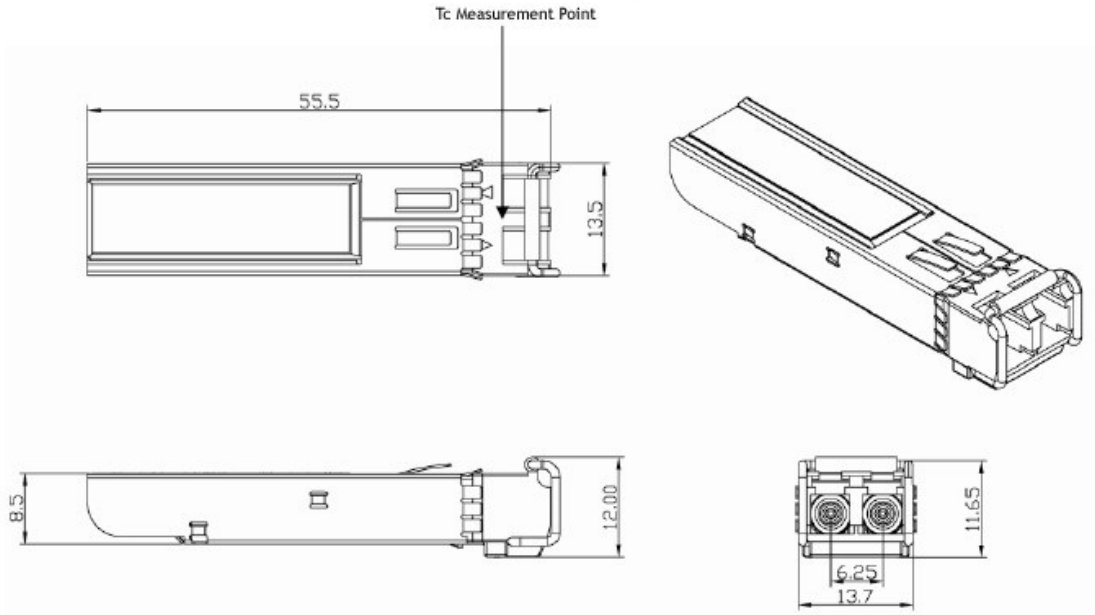
**Note:**

1. Pin engagement sequence during hot plugging.

### Physical Characteristics

#### Outline Diagram

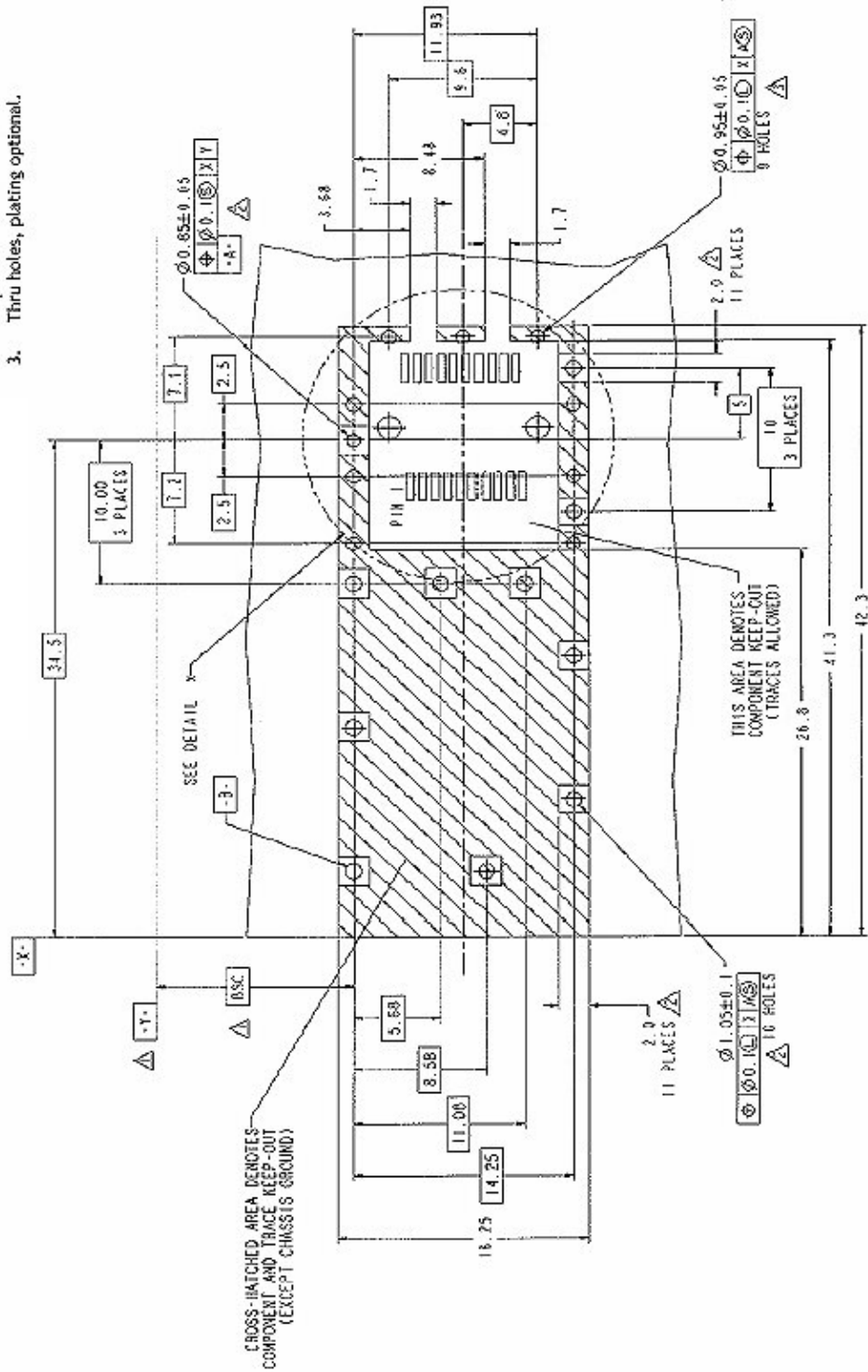
Dimensions for the device package are given in millimeters.



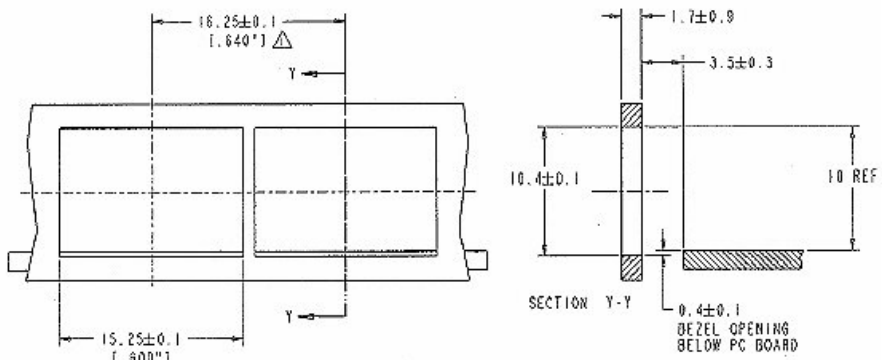
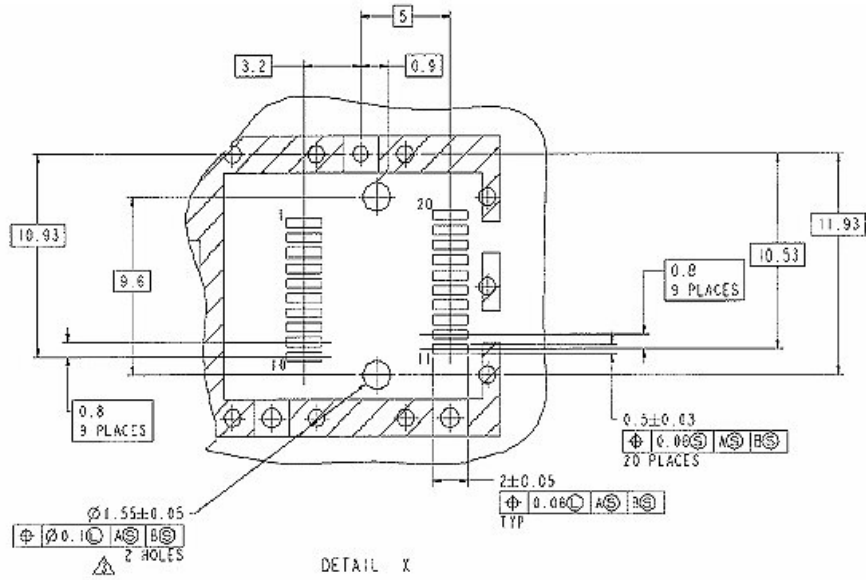
References (from SFP MSA)

SFP Host PCB Layout

- Notes:
1. Datum and basic dimensions established by customer.
  2. Pads and vias are chassis ground, 11 places.
  3. Thru holes, plating optional.



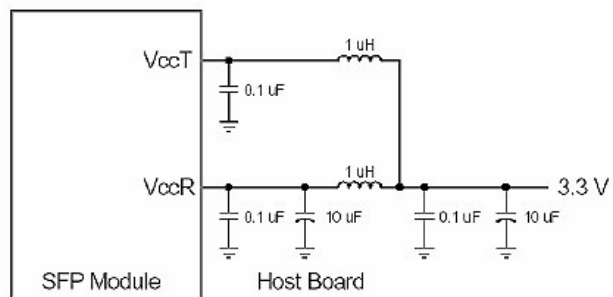
**OFFP3478 SFP TRANSCEIVER DATA SHEET**



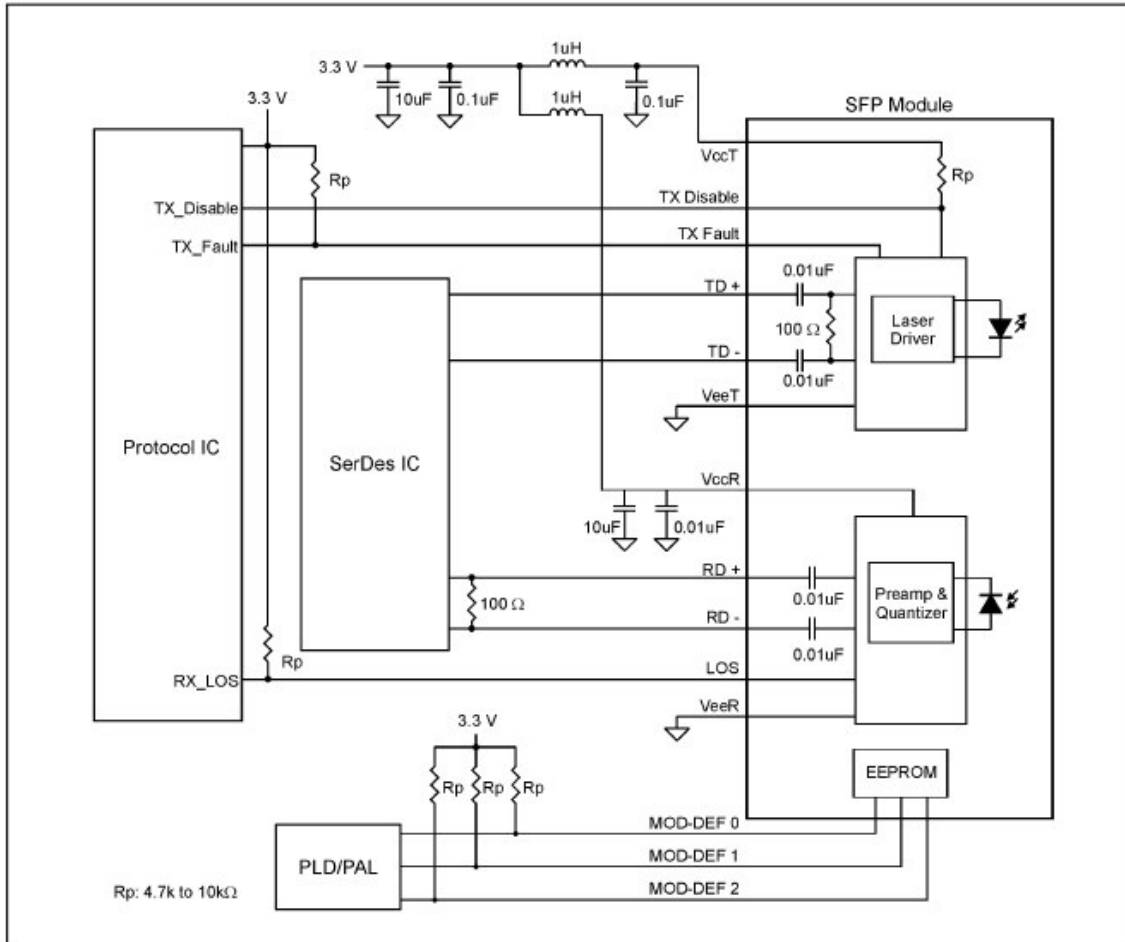
- NOTES:
- 1. MINIMUM PITCH ILLUSTRATED, ENGLISH DIMENSIONS ARE FOR REFERENCE ONLY
  - 2. NOT RECOMMENDED FOR PCI EXPANSION CARD APPLICATIONS

**Application Circuit**

**Recommended Host Board Supply Filtering Network**



Recommended Interface Diagram



Additional Information

Contact

For additional information, product specifications, or information about Optocom:

Internet: <http://www.optocom.com>

Email: [sales@optocom.com](mailto:sales@optocom.com)

Tel: +1 978 988 8711

Fax: +1 978 988 8722

©2005 Optocom Corporation. All rights reserved. Information in this document is believed to be accurate and reliable and is subject to change without notice. Optocom Corporation will not be held liable for technical or editorial errors or omissions contained herein. Reproduction in whole or in part is prohibited without prior written consent of the copyright owner and no responsibility will be assumed by Optocom Corporation for any infringements of third parties. All other brand or product names mentioned are the trademarks or registered trademarks owned by their respective companies or organizations.