## Features

- Transceiver unit with independent
  - 1310nm MQW FP Laser diode transmitter
  - InGaAs PIN photodiode receiver
- Meet SFF MSA with duplex LC receptacle
- Metal enclosure for lower EMI
- +3.3V Single power supply
- Qualified to meet the intent of Bellcore reliability practices
- LVPECL logic interface simplifiers interface to external circuitry
- LVTTL logic signal detect output
- Links of 2km with 9/125 $\mu m$ signal mode fiber (SMF)

## Application

- SONET/SDH
- ATM

## General

The optical transceiver is a high performance, cost effective module for serial optical data communication application.

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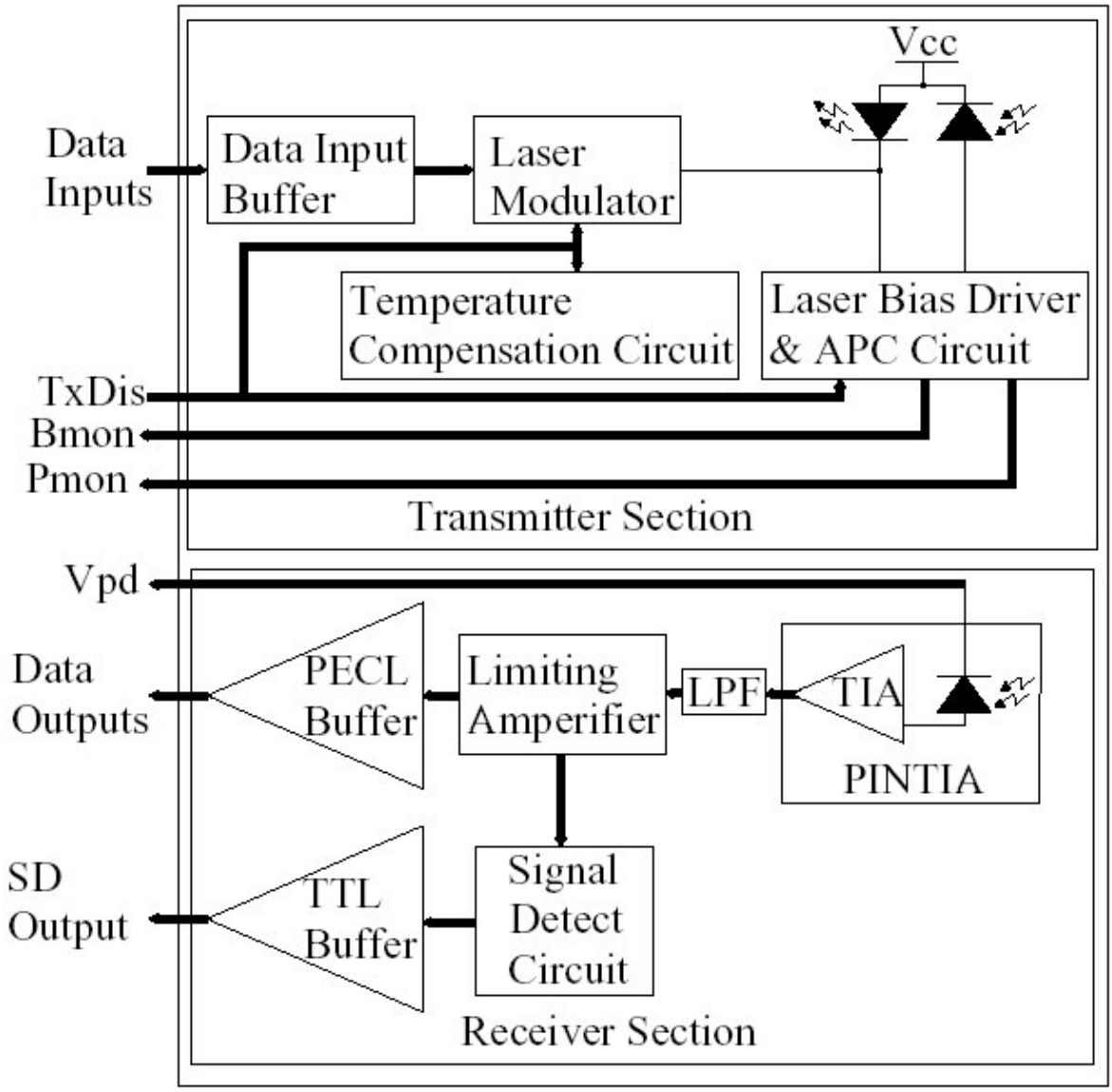



## Transmitter Section

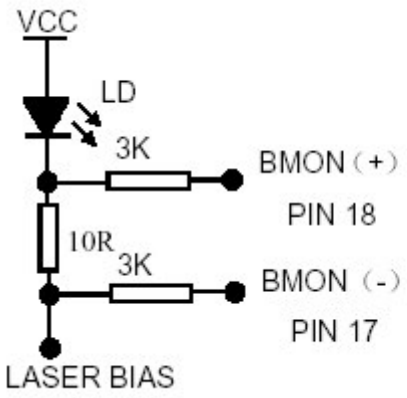



**Figure2 LD Bias Current Monitor Circuit**

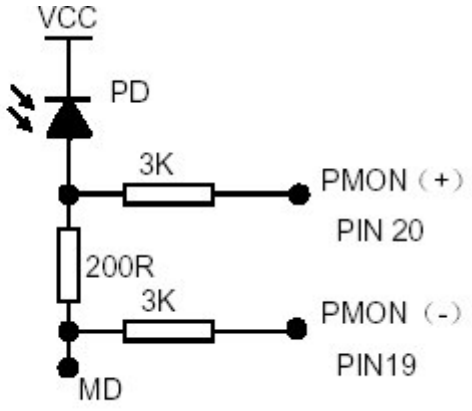



**Figure 3 Power Monitor Circuit**

Transmitter is designed for single mode fiber and operates at a nominal wavelength of 1310nm. The

transmitter module uses a MQW FP laser diode and full IEC 825 and CDRH class 1 eye safety. The output optical power can be disabled via the single TxDis pin. Logic LVTTL HIGH level disables the transmitter. It contains APC function, temperature compensation circuit, PECL data TxDis input interface, LD bias current monitor circuit, power monitor circuit.

**Receiver Section**

The receiver section uses a hermetic packaged PINTIA (InGaAs PIN and trans-impendence amplifier) and a limiting amplifier. Which transforms input optical power to optical current through PIN PD. And the optical current is transformed to voltage signal by trans-impendence amplifier. Differential DATA and /DATA LVPECL data signal is produced by limiting amplifier and voltage signal that is through limiting amplifier and filter. The receiver signal detect monitors input optical signal. When the optical power is not enough to support module operating normally, SD pin will beat LVTTL logic level 0 and signal detect appears. The PINTIA is ac coupled to limiting amplifier through a low pass filter. The LPF are enough to pass the signal from 5Mb/s to 2600Mb/s without significant distortion or performance penalty.

**Power Supply Filtering and Ground Planes**

It is important to exercise care in circuit board layout to achieve optimum performance from these transceivers. It is further recommended that a continuous ground plane be provided in the circuit board directly under the transceiver to provide a low inductance ground for signal return current.

**Electromagnetic Interference (EMI)**

One of a circuit board designer's foremost concerns is the control of electromagnetic equipment. Success in controlling generated Electromagnetic Interference (EMI) enables the designer to pass a governmental agency's EMI regulatory standard and more importantly, it reduces the possibility of interference to neighboring equipment. The optical transceiver provides excellent EMI performance. The LC transceiver use forward and backward shields, which obturates the interstice of LC module effectually, and improves EMI performance.

**Application note**

There are a few fundamental guidelines to follow when designing the transceiver circuit interface. On the board, every data connection should be an impedance match. The data inputs and outputs lines should be treaded as 50 ohm microstrip line, and vias should be avoided. The matching resistor should be placed at the end of each matched line. The optical transceiver is high frequency, high bandwidth circuits. To ensure stability, use good high frequency layout techniques, filter voltage circuit, and keep ground connections short.

**Cleaning Recommendations:** The transceivers are supplied with a process plug to prevent contamination of the optical ports during shipping, handling and storage. So it is not need to clean it. In the event of contamination of the optical ports, the recommended cleaning process is the use of forced nitrogen. If contamination is thought to have remained, the optical ports can be cleaned using cotton sticker.

## Performance Specifications

### Table1. Absolute Maximum Ratings

| Parameter | Symbol | | Min | Max | Unit |
|---|---|---|---|---|---|
| Storage Temperature | Tst | | -40 | +85 | ℃ |
| Input Voltage | - | | GND | Vcc | V |
| Power Supply Voltage | Vcc-Vee | | 0 | +3.6 | V |
| Lead Soldering Temperature/Time | - | | - | 260/10 | ℃/S |
| Operating Temperature | To | *-1 | 0 | +70 | ℃ |
| | | *-2 | -40 | +85 | ℃ |

**Note: Stress in excess of maximum absolute ratings can cause permanent damage to the module**

### Tabel 2. Operating Environment

| Parameter | Symbol | | Min | Max | Unit |
|---|---|---|---|---|---|
| Power Supply Voltage | Vcc | | +3.1 | +3.5 | V |
| Ambient Operating Temperature | Tc | *-1 | 0 | +70 | ℃ |
| | | *-2 | -40 | +85 | |

## Tabel 3. Optical and Electrical Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit | Note |
|---|---|---|---|---|---|---|
| Transmitter | | | | | | |
| Center Wavelength | $\lambda_p$ | 1266 | 1310 | 1360 | nm | |
| Spectral Width | $\Delta\lambda$ (RMS) | - | 1.8 | 4.0 | nm | |
| Average Optical Output Power | Po | -10 | - | -3 | dBm | |
| Extinction Ratio | EXT | 8.2 | - | - | dB | |
| Transmitter disable Voltage | $V_D$ | 2.0 | - | Vcc | V | |
| Transmitter Enable Voltage | $V_{EN}$ | 0 | - | 0.8 | V | |
| Power Supply Current | Icc | - | 70 | 180 | mA | 1 |
| Input Signal Amplitude | Vpp | 300 | 800 | 2000 | mV | |
| Laser Bias Monitor (Bmon(+)-Bmon(-)) | - | - | 0.05 | 0.9 | V | |
| Power Monitor (Pmon(+)-Pmon(-)) | - | 0.01 | 0.1 | 0.2 | V | |
| Output Eye | Compliant with ITU recommendation G957 | | | | | |

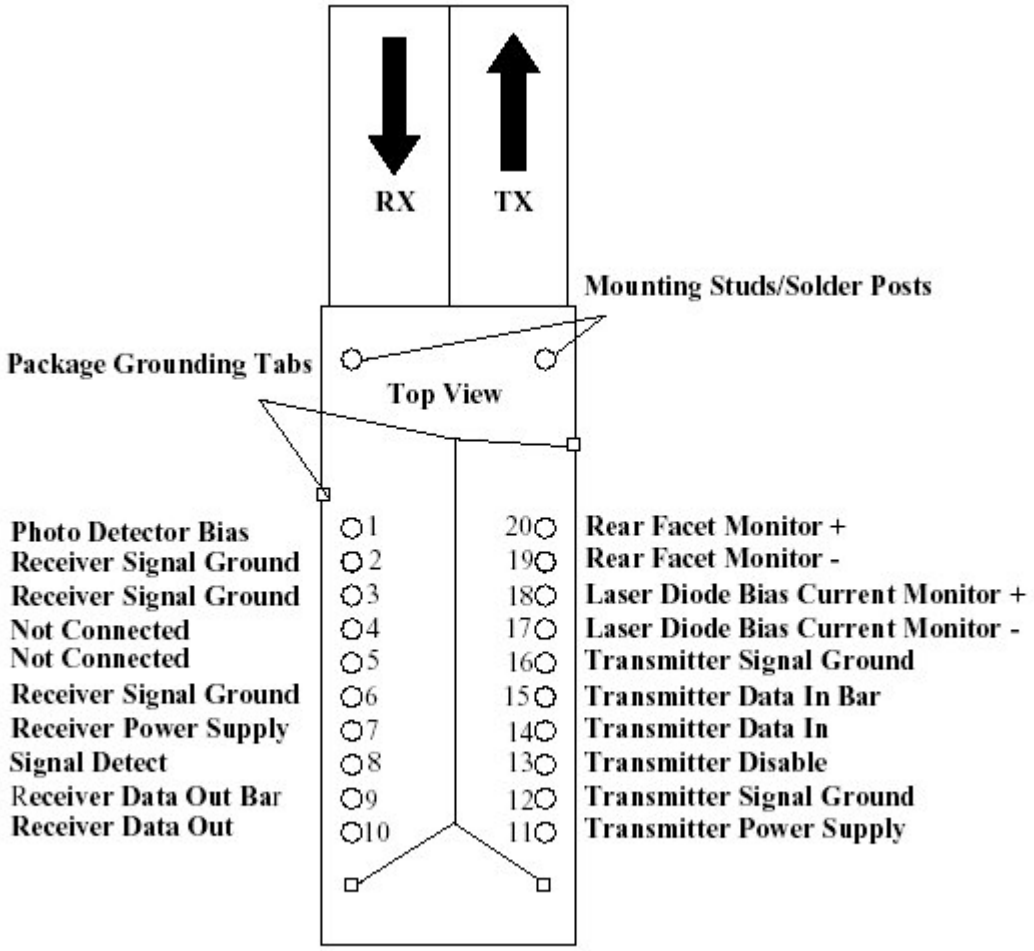
| Receiver Specifications | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Typ | Max | Unit | Note |
| Operate wavelength | $\lambda$ | 1260 | | 1580 | nm | |
| Sensitivity | Pr | - | -21 | -18 | dBm | 2 |
| Maximum input power | Ps | -3 | - | - | dBm | 2 |
| Signal Detect Assert Level | - | - | - | -18 | dBm | Low Level : Alarm |
| Signal Detect Deassert Level | - | -35 | - | - | dBm | |
| Signal Detect Hysteresis | | - | 1.5 | - | dB | |
| Power Supply Current | Icc | - | 70 | 180 | mA | 1 |
| Output Data Amplitude | Vpp | 400 | 500 | 2000 | mV | |
| Receiver Optical Return Loss | - | - | - | -27 | dB | |
| SD LOW- level voltage | VLout | - | - | 0.8 | V | |
| SD HIGH-level output voltage | VHout | 2.0 | - | - | V | |

**Note :**

1. **The current excludes the output load current.**
2. **Minimum sensitivity and saturation levels for a $2^{23}-1$ PRBS with 72 ones and 72 zeros inserted (ITU recommendation G958)**
3. **RL=50R connected to a level of Vcc –2V.**

## Pin Definitions

## Pin Out Diagram



## Pin Description

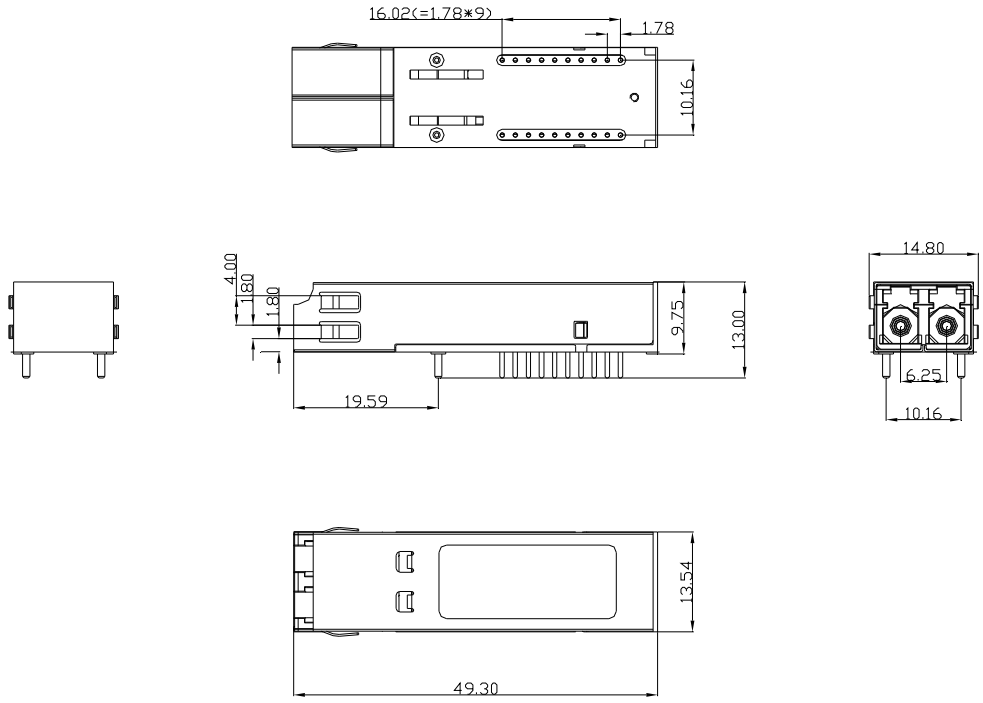
| Pin# | Name | Function | Note |
|---|---|---|---|
| | | Mounting Studs/Solder Poster | Note 1 |
| | | Package Grounding Tabs | Note 2 |
| 1 | Vpd | Photon detector Bias | Note 3 |
| 2 | VEER | Receiver Signal Grounding | Note 4 |
| 3 | VEER | Receiver Signal Grounding | Note 4 |
| 4 | NC | Not Connected | |
| 5 | NC | Not Connected | |
| 6 | VEER | Receiver Signal Grounding | Note 4 |
| 7 | VCCR | Receiver Power Supply | Note 5 |
| 8 | SD | Signal Detect | Note 6 |
| 9 | RD- | Receiver Data Out Bar | Note 7 |
| 10 | RD+ | Receiver Data Out | Note 7 |
| 11 | VCCT | Transmitter Power Supply | Note 8 |
| 12 | VEET | Transmitter Signal Ground | Note 9 |
| 13 | TxDis | Transmitter Disable | Note 10 |
| 14 | TD+ | Transmitter Data In | Note 11 |
| 15 | TD- | Transmitter Data In Bar | Note 11 |
| 16 | VEET | Transmitter Signal Ground | Note 9 |
| 17 | BMON- | Laser Diode Bias Current Monitor- | Note 12 |
| 18 | BMON+ | Laser Diode Bias Current Monitor+ | Note 12 |
| 19 | PMON- | Rear Facet Monitor- | Note 13 |
| 20 | PMON+ | Rear Facet Monitor+ | Note 13 |

**Note:**

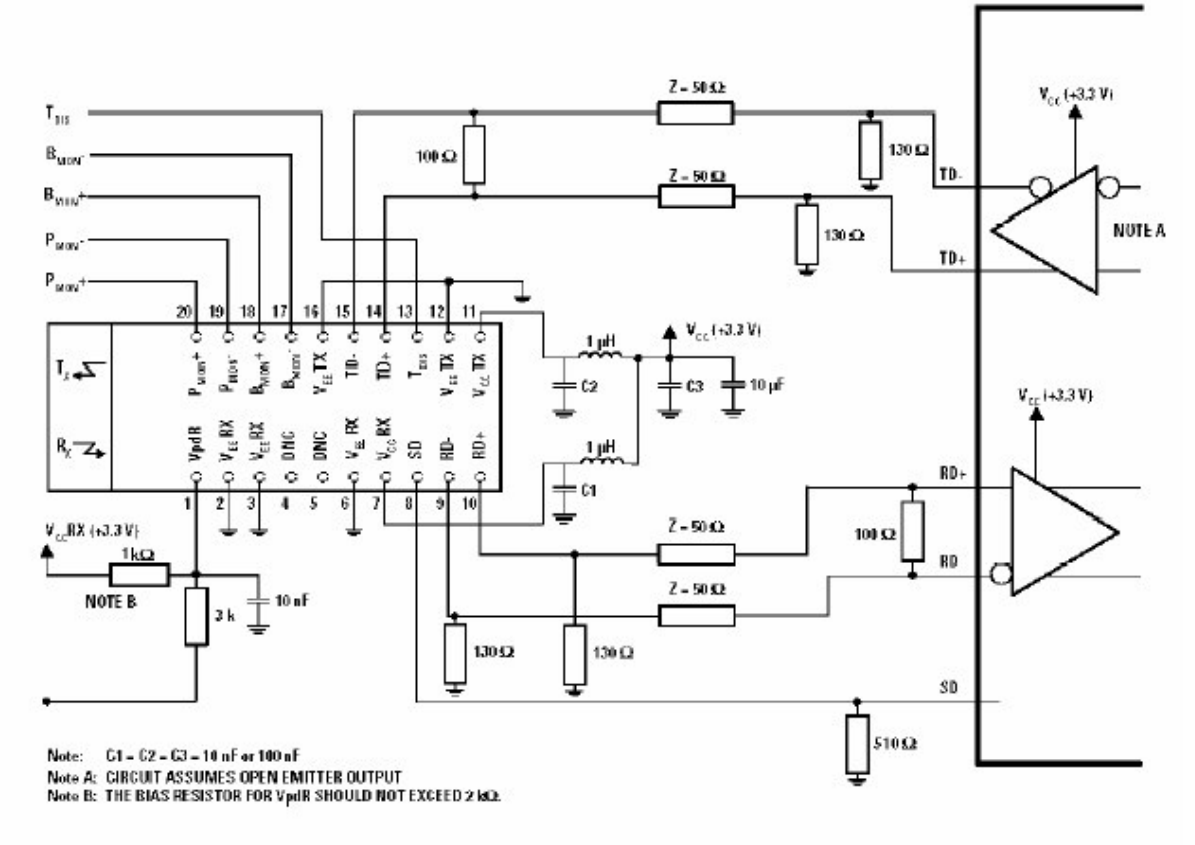
1. The two mounting studs did not be connected to the interior of ground. They are provided for transceiver mechanical attachment to the circuit board. It is recommended that the holes in the circuit board be connected to chassis ground.
2. Those Tabs did not be connected to the interior of ground. Connect four package grounding tabs to receiver signal ground.
3. This pin enables monitoring of photo detector bias current. The pin should either be connected directly to VCCRX, or to VCCRX through a resistor for monitoring photo detector bias current.
4. Directly connect these pins to the receiver ground plane.
5. Provide +3.3 V dc via the recommended receiver power supply filter circuit. Locate the power supply filter circuit as close as possible to the VCC RX pin.
6. Normal optical input levels to the receiver result in a logic "1" output. Low optical input levels to the receiver result in a logic "0" output.
7. These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

8. Provide +3.3V DC via the recommended transmitter power supply filter circuit. Locate the power supply filter circuit as close as possible to the VCC TX pin.
9. Directly connect these pins to the transmitter signal ground plane.
10. LVTTL logic lever, to enable module connect to TTL logic low "0".
11. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host boar
12. The laser diode bias current is accessible by measuring the voltage developed across pins 17 and 18.
13. The rear facet monitor is accessible by measuring the voltage developed across pins 19 and 20.

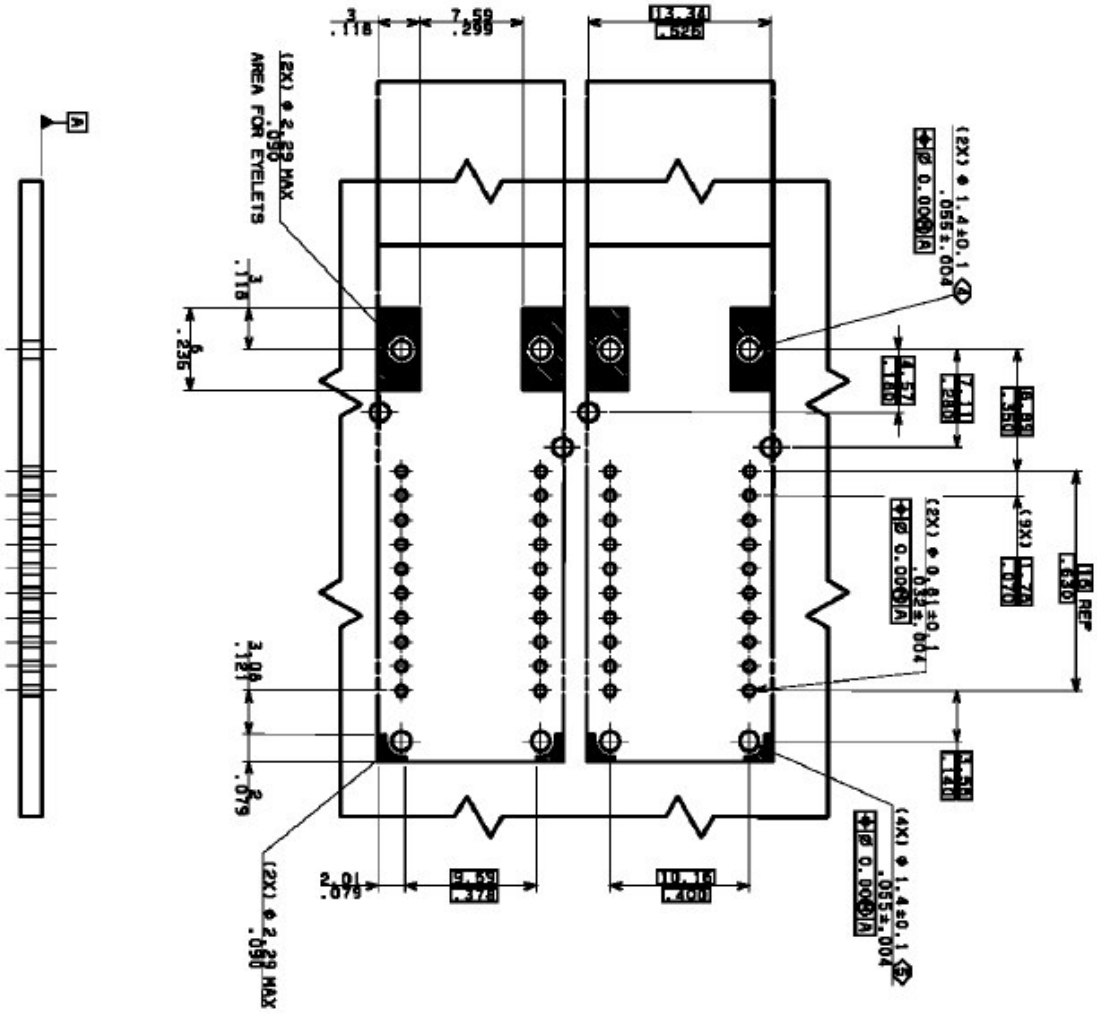
## Package Information



## Recommended Circuit



## Recommended Board Layout Hole Pattern



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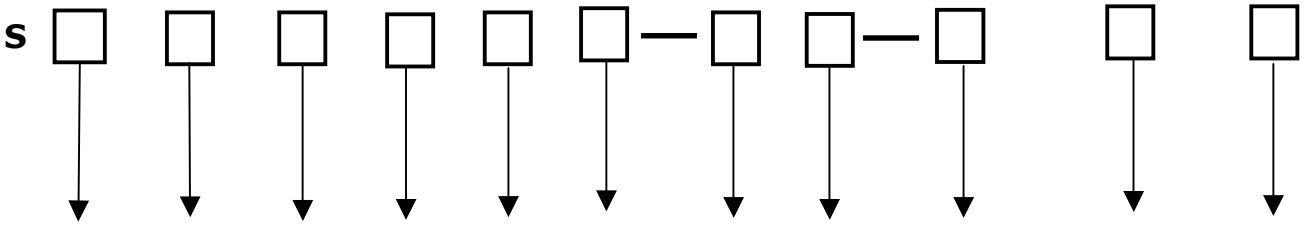
## Ordering Information




Classification:
C: CWDM
W: BIDI

Wavelength:
3:1310 nm
5:1550nm
8:850nm
…Client Especial Requirement .

LD Type:
1: FP
2:DFB
3:VCSEL
4:LED

Data rata :
1:Ulrro Low
2:52M
3:155M)
4:633M
5:1.25G
6:2.5G

Pack
1:1*9(TR)
2:2*9(TR)
1:2*5(FF)
2:2*10(FF

Output Power:
Show in the Table 7

Power:
3:3.3V
5:5V

Operate Temperature:
1: 0~70℃
2:-45~+85℃

Signal Detect:
P: PECL
T: TTL

Optical Interface type:
1:FC/PC
2:FC/APC
3:SC/PC
4:SC/APC
5:LC/PC
6:ST

| Code / Power range / Specification | 1 | 2 | 3 | 4 | Unit |
|---|---|---|---|---|---|
| ***-3*- | -15~-8 | -5~0 | - | 0~5 | dBm |
| ***-4*- | -15~-8 | -3~+2 | - | 1~5 | |
| ***-5*- | -10~-3 | -3~+2 | 0~5 | - | |
| ***-6*- | -10~-3 | -5~0 | -2~+3 | - | |