

EOLF-BI1624-X Series

Single-Mode 2.5Gbps
 SC/LC/Pigtail Single-Fiber SFF
 Transceiver
 RoHS6 Compliant



Features

- ◆ Single-Mode Transceiver
- ◆ Support 2.5Gbps Data Links
- ◆ 26dB Power Budget at least
- ◆ Single 3.3V Power Supply and TTL Logic Interface
- ◆ SC/LC/Pigtail Connector Interface
- ◆ Class 1 FDA and IEC60825-1 Laser Safety Compliant
- ◆ Operating Case Temperature
 Standard: 0°C~+70°C
 Industrial: -40°C~+85°C
- ◆ Compliant with SFF MSA Specification
- ◆ Compliant with SFF 8472 MSA

Applications

- ◆ SONET/SDH Links
- ◆ Gigabit Ethernet Links
- ◆ Fiber Channel Links
- ◆ Other Optical Link

Ordering information

| Part No. | Data Rate | λ (nm) | Interface | Power Budget | Form | Temp. | DDMI |
|-------------------|--------------|----------------|-----------|--------------|------|----------|------|
| EOLF-BI1624-26-MQ | 100M~2.5Gbps | 1510 | SC | ≥ 26 dB | 2x5 | Standard | NO |
| EOLF-BI1624-26-QM | 100M~2.5Gbps | 1590 | SC | ≥ 26 dB | 2x5 | Standard | NO |

Note1: The above table lists the standard version only. For other order information, please refer the following nomenclature and consult EOPTOLINK.

Nomenclature

EOLF- □□□-□□□□□□□□
 A B C D E F G H I J K L

| Code | Parameter | Detailed description |
|------|-----------|----------------------|
| A | F | |
| B | Blank | BI |

| | | | | | | |
|---|-------------------|---|--|--|------------|---------|
| C | λ | 13=1310nm | 15=1550nm | 16=CWDM | | |
| D | Data Rate | 03=155M, 06=2.5G, 10=100M~1000M, 12=2.5G, 24=2.5G, 26=2.67G, 30=3.125G, 48=4.25G, R=request | | | | |
| E | Distance | 02=850nm, MMF | XM=Blank~9Km, FP, MM F, (Blank=1Km, X=2~9) | XX=XX Km (SMF, X=0~9) | A=100Km | B=120Km |
| F | DDM | Blank=Without DDM | | | D=With DDM | |
| G | CWDM TX λ | A=1270, B=1290,, R=1610 | | | | |
| H | CWDM RX λ | A=1270, B=1290,, R=1610 | | | | |
| I | Form | Blank=2x5 | A=2x10 | 6=2x6 | 7=2x7 | |
| J | Temperature | Blank=0~70 | | | I=-40~85 | |
| K | Connector | Blank=SC | L=LC | P=Pigtail/SC | | |
| L | Input/output & SD | Blank=Input: DC; Output: DC; SD-TTL (FC/GBE/2FC/OC48) | | Blank=Input: DC; Output: DC; SD-PECL(OC-3/STM-4) | | |
| | | 1=Input: AC; Output: AC; SD-TTL (FC/GBE/2FC/OC48) | | 1=Input: AC; Output: AC; SD-PECL (OC-3/STM-4) | | |
| | | 2=Input: AC; Output: DC; SD-TTL (FC/GBE/2FC/OC48) | | 2=Input: AC; Output: DC; SD-PECL (OC-3/STM-4) | | |
| | | 3=Input: DC; Output: AC; SD-TTL (FC/GBE/2FC/OC48) | | 3=Input: DC; Output: AC; SD-PECL (OC-3/STM-4) | | |

Regulatory Compliance

| Feature | Standard | Performance |
|--|--|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883G Method 3015.7 | Class 1C (>1000 V) |
| Electrostatic Discharge to the enclosure | EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE | Compliant with standards |
| Electromagnetic Interference (EMI) | FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B | Compliant with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design. |
| Immunity | EN 55024:1998+A1+A2 IEC 61000-4-3 | Compliant with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver |

| | | |
|-----------------------|--|---|
| | | performance is detectable between these limits. |
| Laser Eye Safety | FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1 | CDRH compliant and Class I laser product. TüV Certificate No. 50135086 |
| Component Recognition | UL and CUL EN60950-1:2006 | UL File E317337 TüV Certificate No. 50135086 (CB scheme) |
| RoHS6 | 2002/95/EC 4.1&4.2 2005/747/EC 5&7&13 | Compliant with standards ^{*note3} |

Note2: For update of the equipments and strict control of raw materials, EOPTOLINK has the ability to supply the customized products since Jan 1st, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item 13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for Eoptolink's transceivers, because Eoptolink's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

Product Description

The EOLF-BI1624-X series is small form factor pluggable module for SONET/SDH application, single fiber applications by using 1310nm/1550nm transmitter and 1550nm/1310nm receiver. It is with the SFF 20-pin connector to allow hot plug capability.

The transmitter section uses a multiple quantum well laser and is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings^{*Note3}

| Parameter | Symbol | Min. | Max. | Unit |
|-----------------------------|--------|------|------|------|
| Storage Temperature | Ts | -40 | +85 | °C |
| Supply Voltage | Vcc | -0.5 | 3.6 | V |
| Operating Relative Humidity | | - | 95 | % |

*Note3: Exceeding any one of these values may destroy the device permanently.

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|----------------------------|----------------|----------------|---------|------|------|
| Operating Case Temperature | T _A | EOLF-BI1624-X | 0 | +70 | °C |
| | | EOLF-BI1624-XI | -40 | +85 | |
| Power Supply Voltage | Vcc | 3.15 | 3.3 | 3.45 | V |
| Power Supply Current | Icc | | | 300 | mA |

| | | | | | | |
|-----------|--------------|--|--|-------|--|------|
| Date Rate | OC-48/STM-16 | | | 2.5 | | Gbps |
| | GBE | | | 1.25 | | Gbps |
| | FC | | | 1.063 | | Gbps |

Performance Specifications - Electrical

| Parameter | Symbol | Min. | Typ. | Max | Unit | Notes |
|---------------------------------|---------|------|------|---------|------|--|
| Transmitter | | | | | | |
| LVPECL Inputs(Differential) | Vin | 400 | | 2000 | mVpp | AC coupled inputs ^{*(note5)} |
| Input Impedance (Differential) | Zin | 85 | 100 | 115 | ohms | Rin > 100 kohms @ DC |
| TX_Dis | Disable | 2 | | Vcc+0.3 | V | |
| | Enable | 0 | | 0.8 | | |
| TX_FAULT | Fault | 2 | | Vcc+0.3 | V | |
| | Normal | 0 | | 0.5 | | |
| Receiver | | | | | | |
| LVPECL Outputs (Differential) | Vout | 400 | | 2000 | mVpp | AC coupled outputs ^{*(note5)} |
| Output Impedance (Differential) | Zout | 85 | 100 | 115 | ohms | |
| RX_LOS | LOS | 2 | | Vcc+0.3 | V | |
| | Normal | 0 | | 0.8 | V | |
| MOD_DEF (0:2) | VoH | 2.5 | | | V | With Serial ID |
| | VoL | 0 | | 0.5 | V | |

Optical and Electrical Characteristics
(EOLF-BI1624-26-MQ/QM, 1510nm DFB / APD & 1590nm DFB / APD)

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|--|---|------|---------|------|------|
| Power Budget | | 26 | | | dB |
| Data Rate | | | 2.5 | | Gbps |
| Transmitter | | | | | |
| Center Wavelength, EOLF-BI1624-26-MQ | λ_c | 1490 | 1510 | 1530 | nm |
| Center Wavelength, EOLF-BI1624-26-QM | | 1570 | 1590 | 1610 | |
| Spectral Width (-20dB) | $\Delta\lambda$ | | | 1 | nm |
| Average Output Power ^{*(note3)} | | -2 | | 3 | |
| Extinction Ratio ^{*(note4)} | ER | 8.2 | | | dB |
| Rise/Fall Time(20%~80%) | tr/tf | | | 2 | ns |
| Output Optical Eye ^{*(note4)} | IUT-T G.957 Compliant ^{*(note7)} | | | | |
| TX_Disable Assert Time | t_off | | | 10 | us |
| P _{out} @TX Disable Asserted | P _{out} | | | -45 | dBm |
| Receiver | | | | | |
| Center Wavelength, EOLF-BI1624-26-MQ | λ_c | 1560 | 1590 | 1620 | nm |

| | | | | | |
|--------------------------------------|------|------|------|------|-----|
| Center Wavelength, EOLF-BI1624-26-QM | | 1480 | 1510 | 1540 | |
| Receiver Sensitivity*(note6) | Pmin | | -29 | -28 | dBm |
| Receiver Overload | Pmax | -10 | | | dBm |
| LOS De-Assert | LOSD | | | -29 | dBm |
| LOS Assert | LOSA | -42 | | | dBm |
| LOS Hysteresis*(note8) | | 0.5 | | | dB |

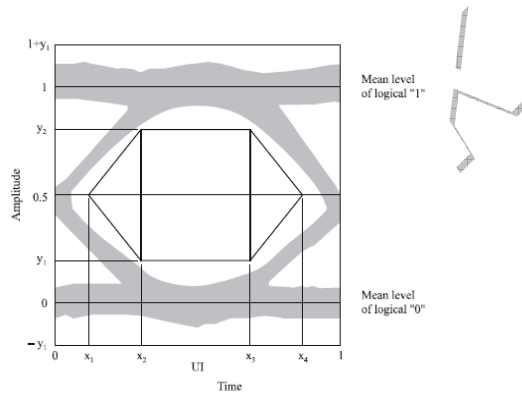
Note3: Output is coupled into a 9/125µm single-mode fiber.

Note4: Filtered, measured with a PRBS $2^{23}-1$ test pattern @2.5Gbps

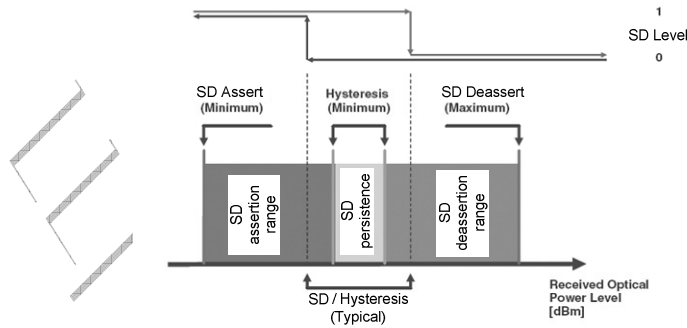
Note5: LVPECL logic, internally AC coupled.

Note6: Minimum average optical power measured at BER less than $1E-12$, with a $2^{23}-1$ PRBS and ER=9 dB.

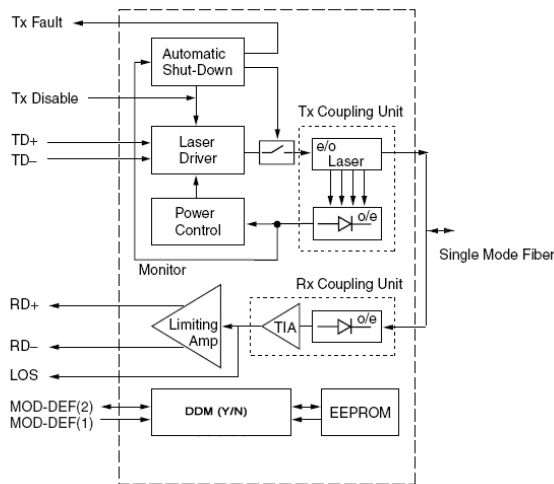
Note7: Eye Pattern Mask



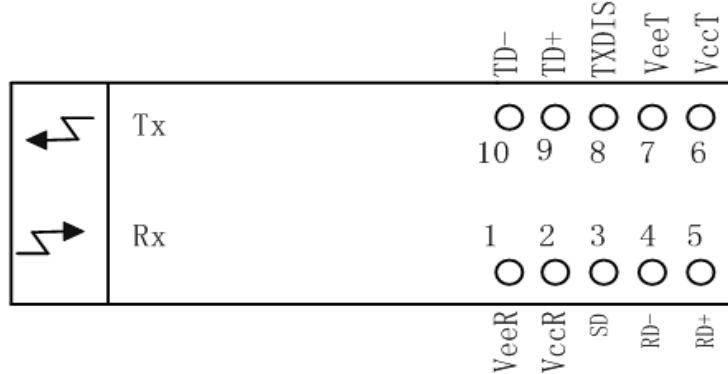
Note8: SD Hysteresis



Functional Description of Transceiver



SFF Transceiver Electrical Pad Layout



Case isolated from circuit ground.

Pin Function Definitions

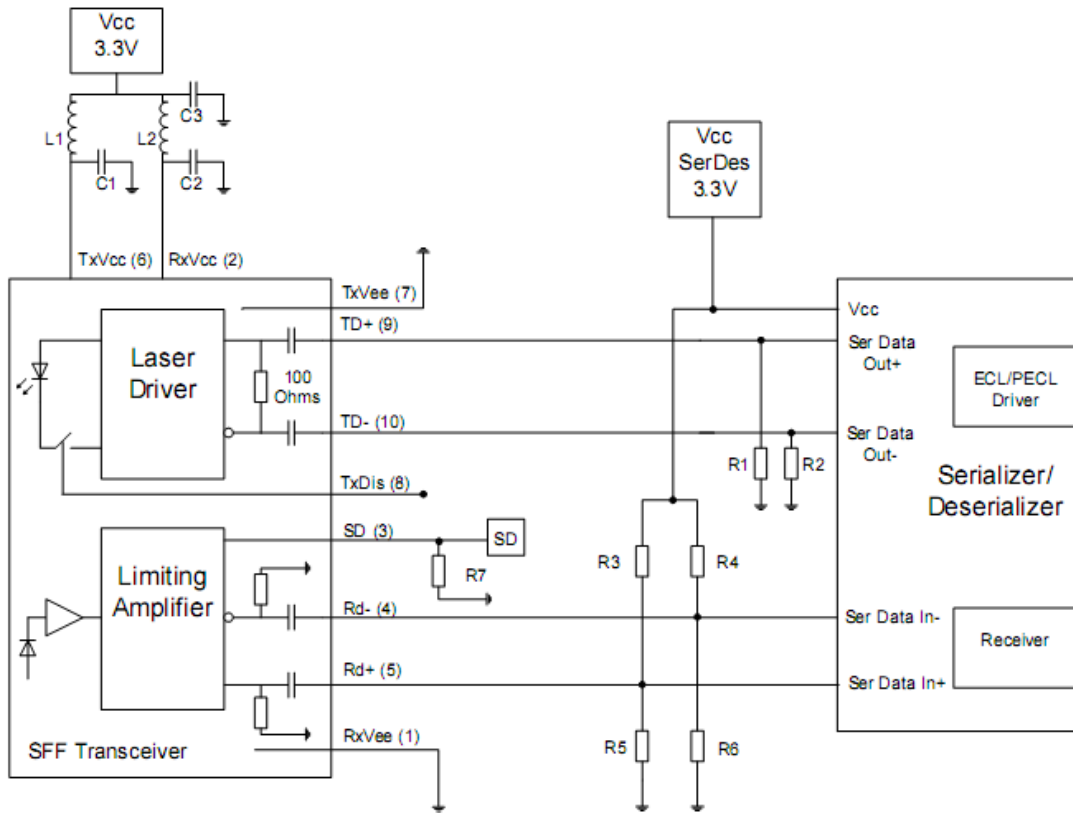
| Pin No. | Name | Function |
|---------|-------|--|
| | MS | Mounting Studs, Case isolated from circuit ground |
| 1 | VeeR | Receiver Signal Ground |
| 2 | VccR | 3.3V DC power for receiver section |
| 3 | SD | Signal Detect Output (LVPECL) "1" - "Signal valid", "0" - "Lose of signal" |
| 4 | RD- | Received Data Out Bar (LVPECL), without termination inside |
| 5 | RD+ | Received Data Out (LVPECL), without termination inside |
| 6 | VccT | 3.3V DC power for transmitter section |
| 7 | VeeT | Transmitter Signal Ground |
| 8 | TXDIS | Transmitter Disable (LVTTTL), "1" - Disable, "0" - Enable |
| 9 | TD+ | Transmitter Data In (LVPECL), without termination inside |

| | | |
|----|-----|--|
| 10 | TD- | Transmitter Data In Bar (LVPECL), without termination inside |
|----|-----|--|

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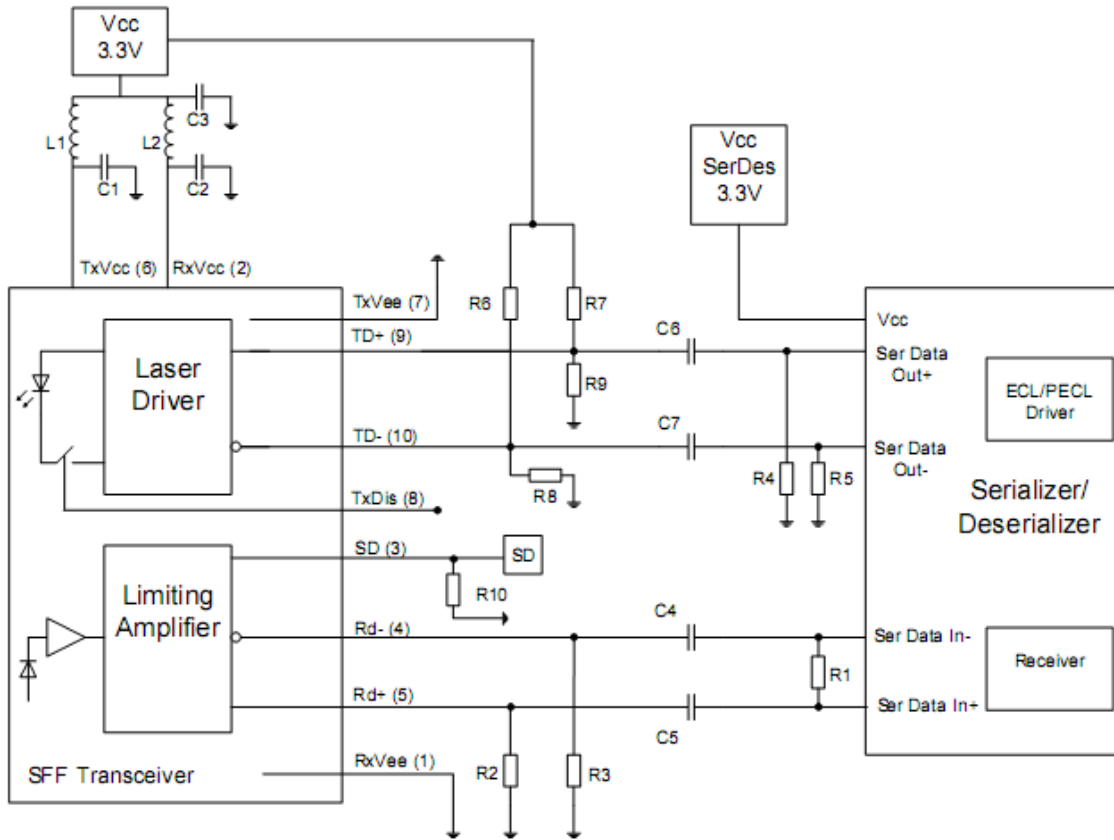
Recommend Circuit Schematic

AC/AC coupling



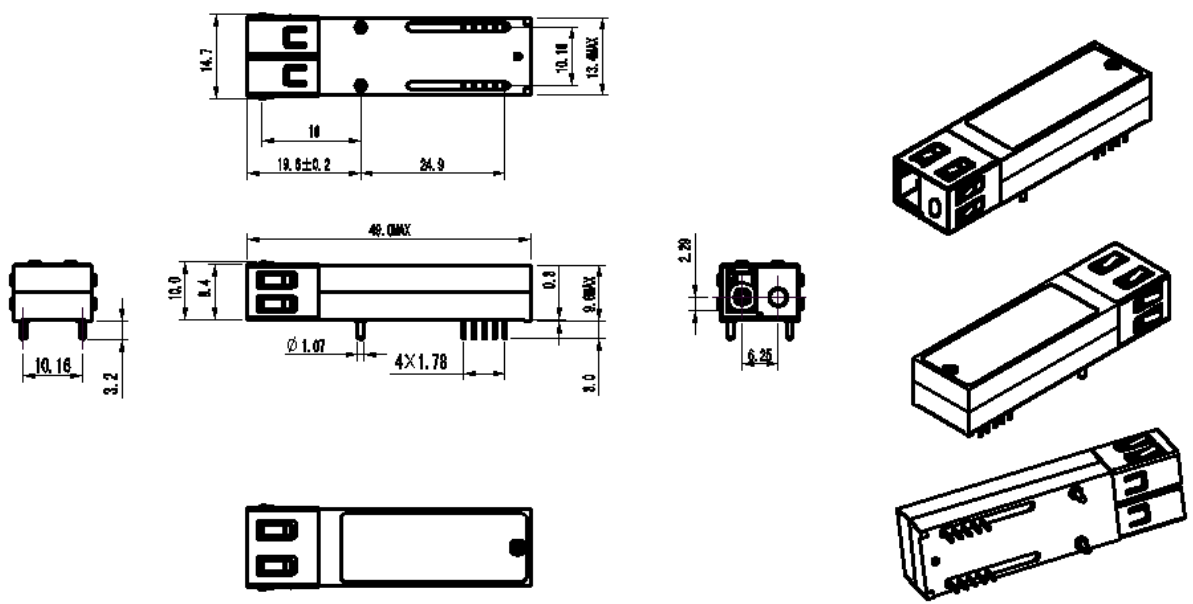
- L1, L2: 1...4.7 μ H
 - C1, C2, C3: 4.7...10 μ F
 - R1, R2: biasing of outputs depending on Serializer
 - R3, R4: 127 Ohms
 - R5, R6: 80 Ohms
 - R7: 510 Ohms for PECL signal detect, open for TTL
- Place R1/2/3/4/5/6 as close to SerDes chip as possible

DC/DC coupling

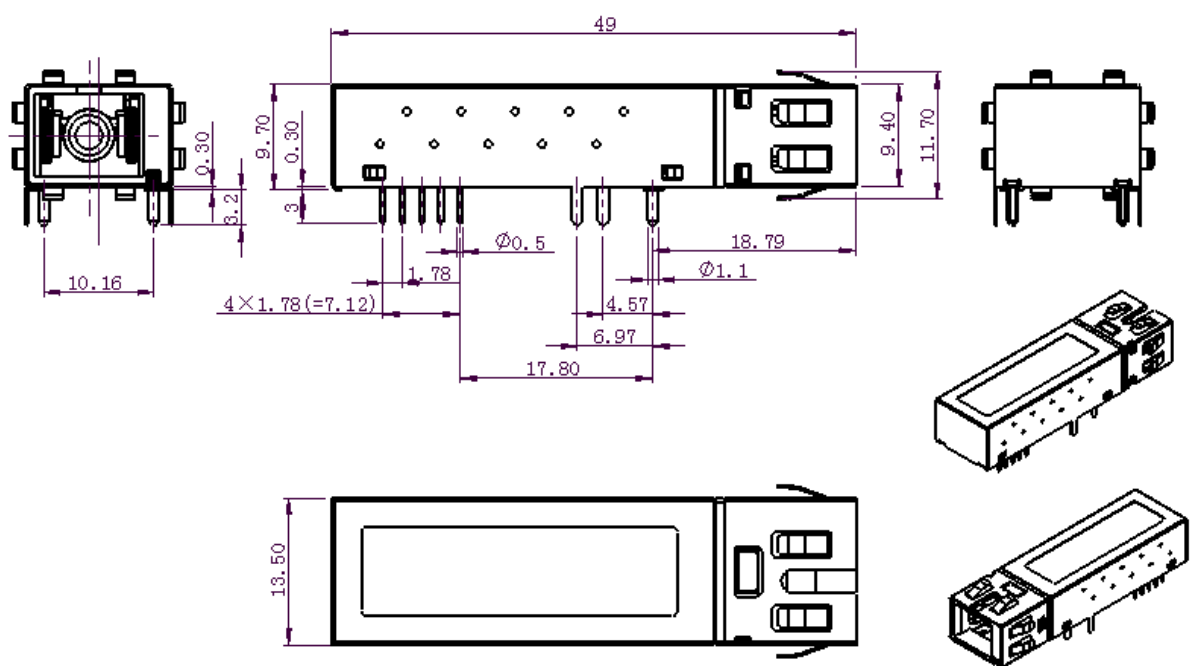


- L1, L2: 1...4.7 μ H
 - C1, C2, C3: 4.7...10 μ F
 - C4, C5, C6, C7: 100 nF
 - R1: 100 Ohms
 - R2, R3: 150 Ohms
 - R4, R5: biasing of outputs depending on Serializer
 - R6, R7: 127 Ohms
 - R8, R9: 80 Ohms
 - R10: 510 Ohms for PECL signal detect, open for TTL
- Place R1/4/5 as close to SerDes as possible
Place R2/3 as close to transceiver as possible

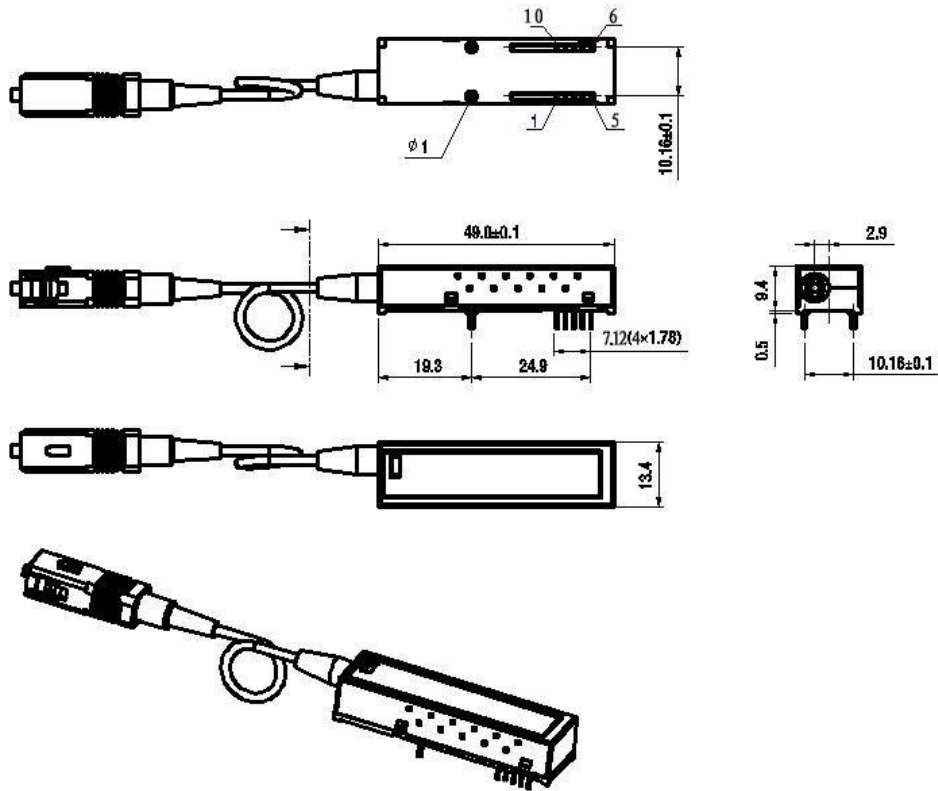
Mechanical Specifications*



LC



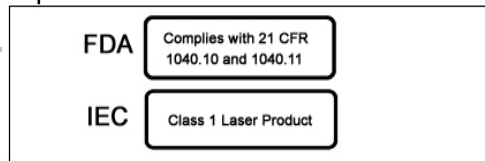
SC



Pigtail

*The pins on the three graphs are only for demonstrate, the dimension for pins is compliant to SFF MSA.

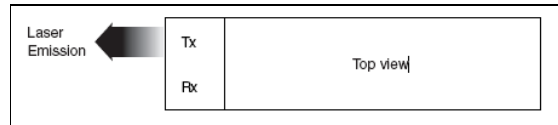
Class 1 Labels



Laser Emission Data

| | |
|---|----------|
| Wavelength | > 1460nm |
| Total output power (as defined by FDA: 7mm aperture at 20cm distance) | <0.79mW |
| Total output power (as defined by IEC: 7mm aperture at 10cm distance) | <10mW |
| Beam divergence | 12.5° |

Laser Emission



Obtaining Document

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Or contact Eoptolink Technology Inc., Ltd. listed at the end of the documentation to get the latest document.

Revision History

| Revision | Initiated | Reviewed | Approved | DCN | Release Date |
|----------|-----------|-----------|----------|-----------|--------------|
| V3.a | Cathy | Kelly.Cao | | Released. | Mar 26, 2008 |

Notice:

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