

EOLF-BI1603-MQ Series

EOLF-BI1603-QM Series

Single-Mode 100M/155M SDH/SONET
Simplex SFF Transceiver
RoHS6 Compliant



Features

- ◆ Single-Mode Transceiver
- ◆ Operating data rate up to 155Mbps
- ◆ 120km with 9/125μm SMF
- ◆ Single 3.3V Power supply
- ◆ LVPECL Signal Input / Output
- ◆ LVTTTL Transmitter Disable Input
- ◆ LVPECL Signal Detect Output
- ◆ Small Form Factor 2X5 pin Package
- ◆ Class 1 FDA and IEC60825-1 Laser Safety Compliant
- ◆ Operating Case Temperature
 - Standard: 0°C~+70°C
 - Industrial: -40°C~+85°C

Applications

- ◆ Fast Ethernet
- ◆ SONET/SDH Equipment Interconnect
- ◆ Fiber Channel Links
- ◆ Other Optical Link

Ordering information^{*(note1)}

Part No.	Data Rate	λ(nm)	Interface	Distance	Form	Temp.	DDMI
EOLF-BI1603-B-MQ	100M~155Mbps	1510	SC	120km	2x5	Standard	NO
EOLF-BI1603-B-QM	100M~155Mbps	1590	SC	120km	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

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

Code	Parameter	Detailed description
A	F	SFF

B	Blank	BI				
C	λ	13=1310nm	15=1550nm	16=CWDM		
D	Data Rate	03=155M, 06=622M, 10=100M~1000M, 12=1.25G, 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 ^{*note2}

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, isolators, and other components.

Product Description

The EOLF-BI1X03-X series Single-mode transceivers is small form factor, low power, and high performance module for bi-directional optical data communications such as Fast Ethernet and SONET OC-3 / SDH STM-1.

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 InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. A LVPECL logic interface simplifies interface to external circuitry.

Interface information

The Signal Detect (SD, active high), normal optical input of receiver represents to a logic "1" level, which means asserted.

The following versions are available:

1. AC/AC Transceiver

Tx and Rx are AC coupling. Tx has differential 100Ω load.

2. DC/DC Transceiver

Standard PECL inputs and outputs, Tx and Rx are DC coupling.

3. AC/DC Transceiver

Tx is AC coupled, Differential 100Ω load, Rx has standard PECL output and is DC coupling.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _s	-40	+85	°C
Supply Voltage	V _{cc}	-0.5	3.6	V
Operating Relative Humidity		-	95	%

*Exceeding any one of these values may destroy the device immediately.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	
Operating Case Temperature	T _A	EOLF-BI1X03-X	0		+70	°C
		EOLF-BI1X03-XI	-40		+85	
Power Supply Voltage	V _{cc}	3.15	3.3	3.45	V	
Power Supply Current	I _{cc}			300	mA	
Data Rate	OC-3/STM-1		155		Mbps	
	Fast Ethernet		100			

Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
LVPECL Inputs(Differential)	V _{in}	400		2000	mVpp	AC Coupled Inputs ^{*(note3)}
Input Impedance (Differential)	Z _{in}	85	100	115	ohm	R _{in} > 100 kohm @ DC
TX_Dis	Disable	2		V _{cc} +0.3	V	
	Enable	0		0.8		
TX_FAULT	Fault	2		V _{cc} +0.3	V	
	Normal	0		0.5		
Receiver						
LVPECL Outputs (Differential)	V _{out}	400		2000	mVpp	AC Coupled Outputs ^{*(note3)}
Output Impedance (Differential)	Z _{out}	85	100	115	ohm	
RX_SD	Normal	-1.1		-0.74	V	
	SD	-2.0		-1.58	V	

Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
9µm Core Diameter SMF			120		km
Data Rate			155		Mbps

Transmitter					
Centre Wavelength, EOLF-BI1603-B-MQ	λ_c	1490	1510	1530	nm
Centre Wavelength, EOLF-BI1603-B-QM		1570	1590	1610	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Average Output Power ^{*(note4)}	P _{out}	-2		3	dBm
Extinction Ratio ^{*(note5)}	ER	10			dB
Rise/Fall Time(20%~80%)	tr/tf			2	ns
Total Jitter ^{*(note5)}	TJ			1	ns
Output Optical Eye	Telcordia GR-253-CORE and IUT-T G.957 Compliant ^{*(note7)}				
TX_Disable Assert Time	t _{off}			10	us
Receiver					
Center Wavelength, EOLF-BI1603-B-MQ	λ_c	1560	1590	1620	nm
Center Wavelength, EOLF-BI1603-B-QM		1480	1510	1540	
Receiver Sensitivity ^{*(note6)}	P _{min}		-37	-35	dBm
Receiver Overload	P _{max}	-10			dBm
SD De-Assert	SDD			-36	dBm
SD Assert	SDA	-45			dBm
LOS Hysteresis ^{*(note8)}		0.5			dB

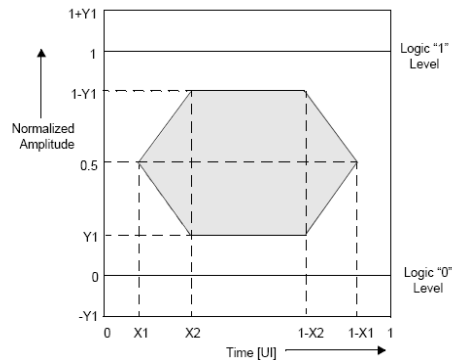
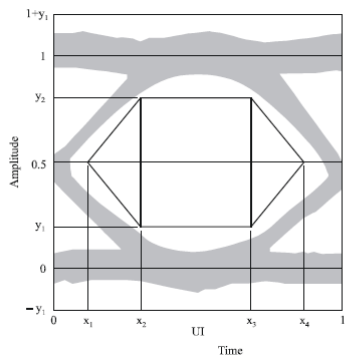
Note3: LVPECL logic, internally AC coupled.

Note4: Output power is measured by coupling into a 9/125 μm Single-mode fiber.

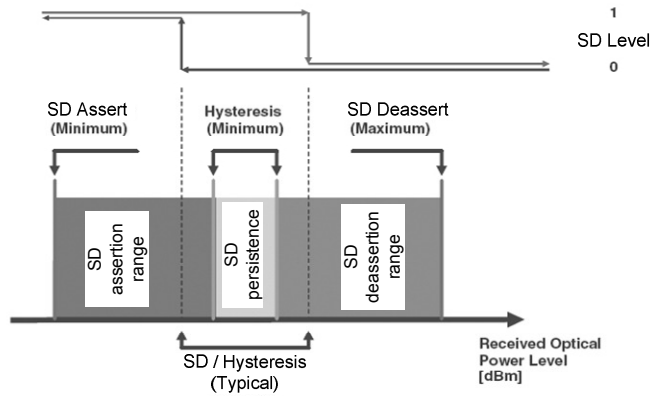
Note5: Filtered, measured with a PRBS 2²³-1 test pattern @155Mbps.

Note6: Minimum average optical power measured at BER less than 1E-10, with a 2²³-1 PRBS and ER=9 dB.

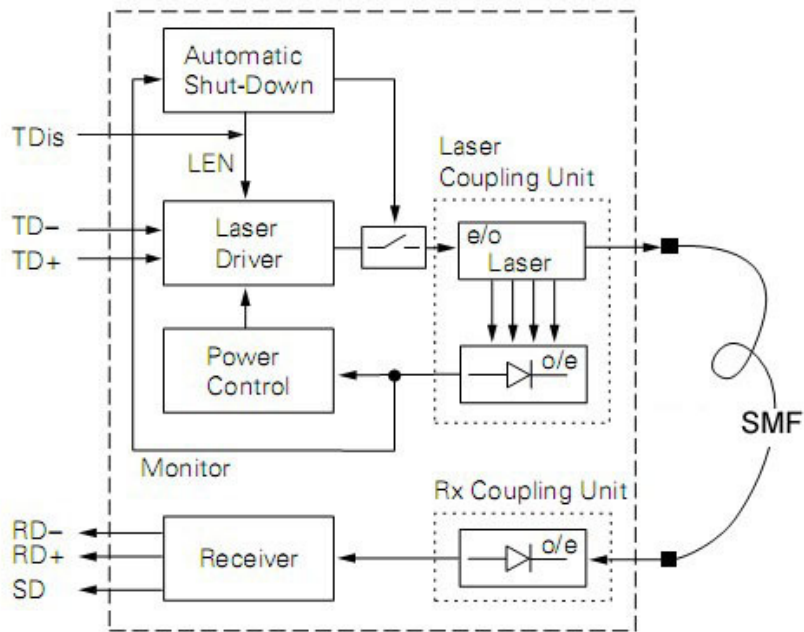
Note7: Eye Pattern Mask



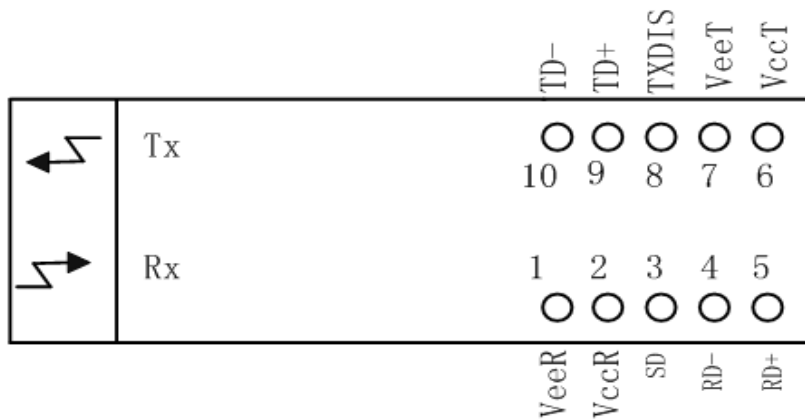
Note8: SD Hysteresis



Functional Description of Transceiver



SFF Transceiver Electrical Pad Layout

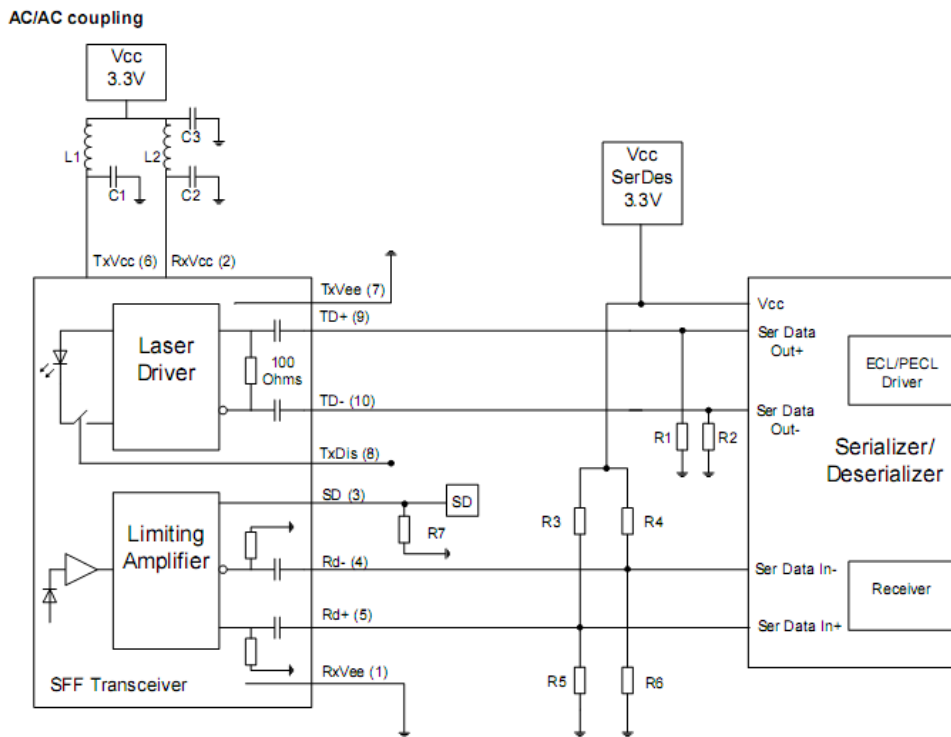


Case isolated from circuit ground.

Pin Function Definitions

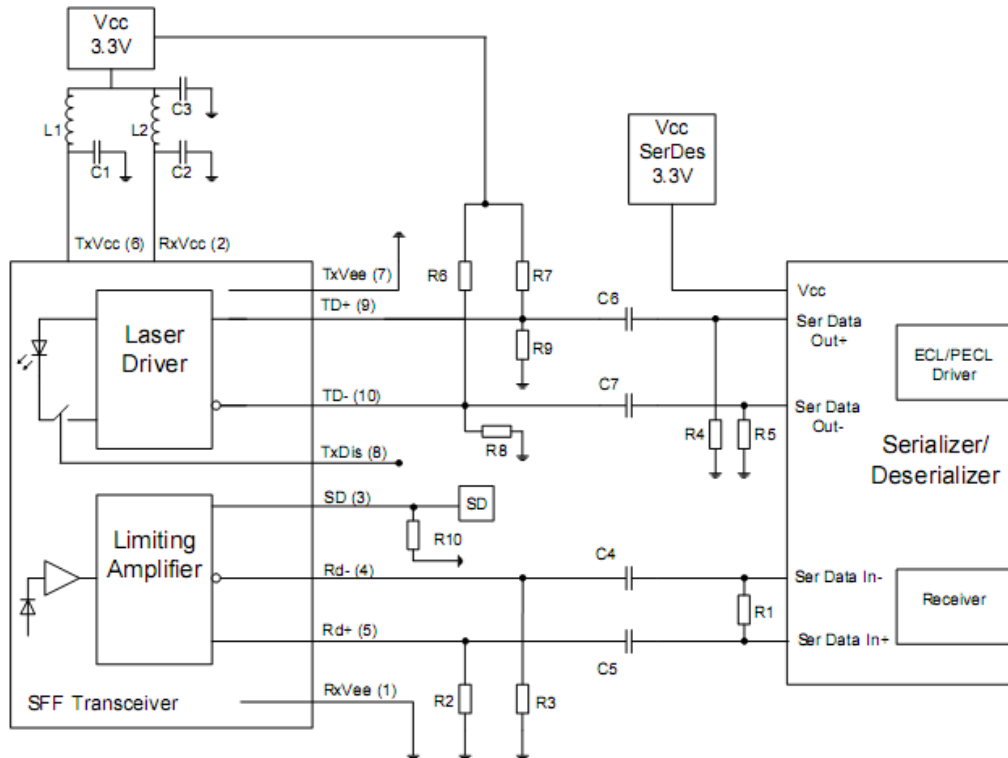
Pin No.	Name	Function
	MS	Mounting Studs, Case isolated from circuit ground
1	VeeR	Receiver Signal Ground
2	VccR	3.3V DC power for receiver section
3	SD	Signal Detect Output (LVPECL) “1” - “Signal valid”, “0” – “Lose of signal”
4	RD-	Received Data Out Bar (LVPECL), without termination inside
5	RD+	Received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

Recommend Circuit Schematic



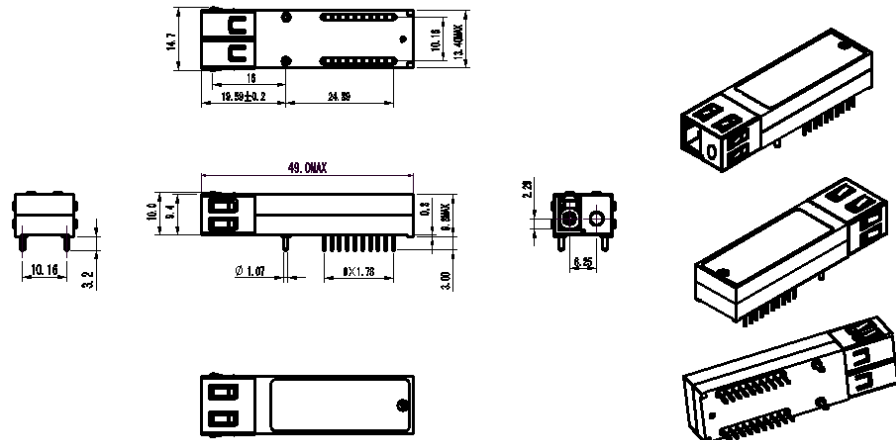
- L1, L2: 1...4.7 μ H
 - C1, C2, C3: 4.7...10 μ F
 - R1, R2: biasing of outputs depending on Serializer
 - R3, R4: 127 Ohms
 - R5, R6: 80 Ohms
 - R7: 510 Ohms for PECL signal detect, open for TTL
- Place R1/2/3/4/5/6 as close to SerDes chip as possible

DC/DC coupling

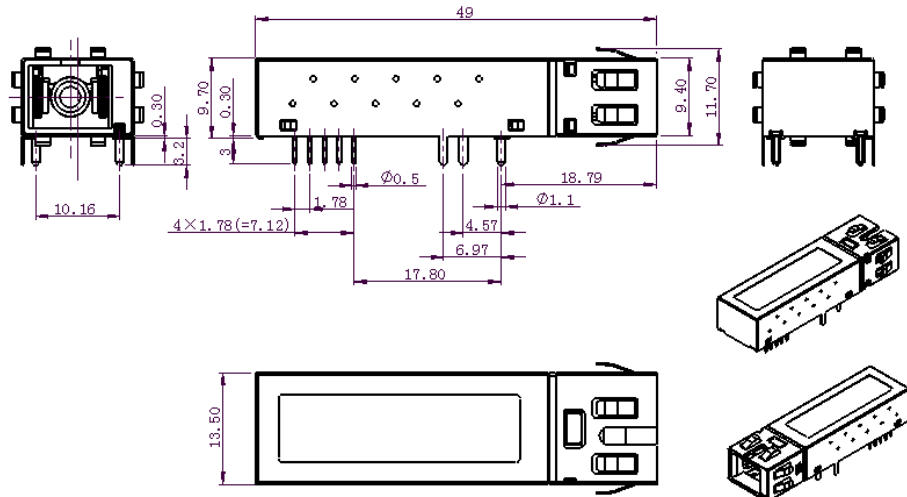


- L1, L2: 1...4.7 μ H
 - C1, C2, C3: 4.7...10 μ F
 - C4, C5, C6, C7: 100 nF
 - R1: 100 Ohms
 - R2, R3: 150 Ohms
 - R4, R5: biasing of outputs depending on Serializer
 - R6, R7: 127 Ohms
 - R8, R9: 80 Ohms
 - R10: 510 Ohms for PECL signal detect, open for TTL
- Place R1/4/5 as close to SerDes as possible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

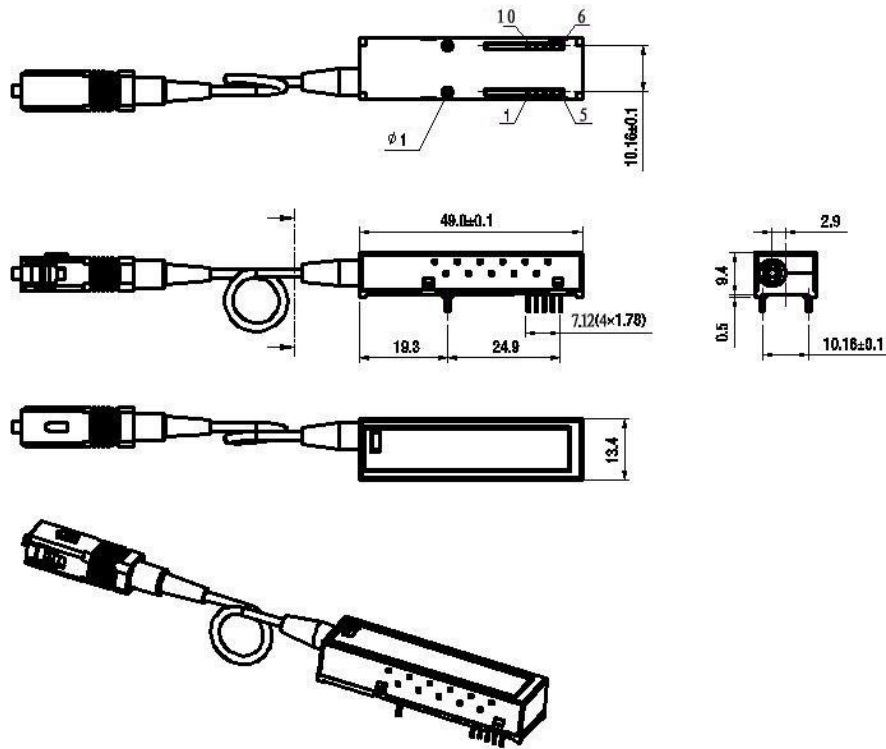
Mechanical Specifications*



LC



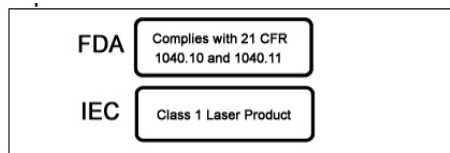
SC



Pigtail

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

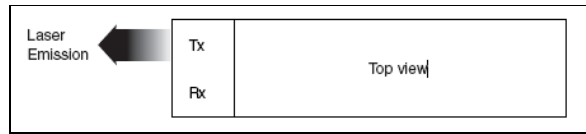
Class 1 Labels



Laser Emission Data

Wavelength	1510nm&1590nm
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

You can visit our website:

<http://www.eoptolink.com>

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		Released.	Mar 25, 2008

Notice:

Eoptolink reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance. Applications that are described herein for any of the optical link products are for illustrative purposes only. Eoptolink makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Contact:

Add: Floor 5, Building 2, No. 21 Gaopeng Avenue, High-Tech District, CHENGDU, SICHUAN
610041 P.R. CHINA

Tel: (+86) 028-85122709 ext 816 & 809

Fax: (+86) 028-85121912

Postal: 610041

E-mail: sales@eoptolink.com

<http://www.eoptolink.com>