Optoelectronics Components Data Sheet

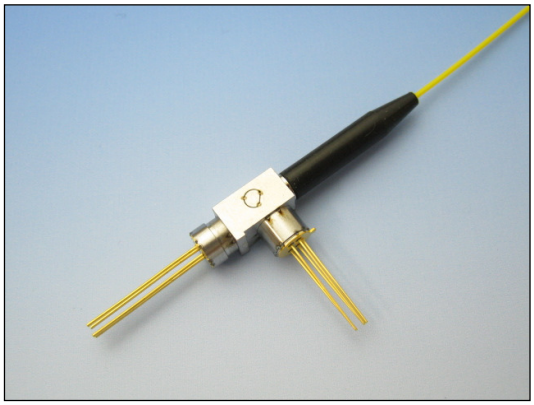
■ BD29D

Preliminary

1.25 Gbps Bi-Directional Optical Module for GE-PON OLT applications

Description

BD29D is a bi-direction optical module integrated with a 1490nm laser diode (LD) to transmit optical downstream data, a photodetector to receive 1310nm optical upstream data and a single mode fiber, which can operate up to 1.25Gbps.The module consists of the multi quantum well distributed feed-back LD (MQW DFB-LD) with a monitor photodiode, a avalanche photo diode (APD) with a burst trans-impedance amplifier (TIA), a wavelength division multiplexing (WDM) filter, a cut filter and the fiber. This module is suitable for building optical line terminal (OLT) of 1.25bps passive optical network (PON) system.



Features

- Integrated WDM filter for Tx/Rx operation at 1490/1310 nm
- High fiber output power (Tx) : 6mW
- Built-in optical isolator
- High sensitivity (Rx) : -34dBm
- Integrated 1490nm &1550nm to 1650nm cut filter
- 1490nm MQW DFB LD suitable for burst transmitter data rate up to 1.25Gbps
- 1310nm APD receiver with integrated 1.25Gbps burst TIA
- Hermetically sealed LD and APD-TIA devices
- YAG laser spot welding for high reliability
- -5 ^{o}C to +70 ^{o}C operating temperature range

Applications

- OLT module for PON System:
  - GE-PON (Gigabit Ethernet Passive Optical Network) system
  - E-PON (Ethernet PON) system

Absolute Maximum Ratings

(Tc=25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit	Conditions
Module				
Storage temperature	Tstg	-40 ~ +85	°C	
Operating temperature	Tc	-5 ~ +70	°C	
Soldering temperature	Ts	260	°C	10sec, >2mm
LD				
Light output power	Pf	10	mW	CW
Reverse voltage	VRmax	2	V	
Forward current	IFmax	150	mA	
Monitor PD				
Reverse voltage	VRmax	20	V	
Forward current	IFmax	2	mA	
APD				
Reverse voltage	VRmax	Vbr	V	Vbr:APD breakdown voltage
Forward current	IFmax	2	mA	
TIA				
Maximum applied voltage	Vcc	4	V	

Electrical and Optical Characteristics

(Tc=-5 to 70°C, , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
LD						
Output power	Pf	CW	6	---	---	mW
Threshold current	Ith	CW, Tc=25°C	5	---	13	mA
		CW, Tc=70°C	12	---	34	mA
Modulation current	Imod	CW, Tc=70°C, Pf=6mW	---	---	77	mA
Peak wavelength	λ	CW, Pf=6mW	1480	1490	1500	nm
Spectrum width	Δλ	CW, Pf=6mW, –20dB	---	---	1	nm
Side-mode suppression ratio	SMSR	CW, Pf=6mW	---	---	35	dB
Rise & Fall time	t_r, t_f	20-80%, Ib=Ith, Pf=6mW	---	---	0.3	ns
Forward voltage	Vf	CW, Pf=6mW	---	---	1.6	V
Tracking Error	TE	CW, Im=constant (@Tc=25°C)	-1	---	1	dB
Monitoring output current	Im	VR=1V, CW, Pf=6mW Tc=25°C	150	500	2800	μA
PD & TIA						
Supply voltage	V_{CC}	---	3	3.3	3.6	V
Supply current	I_{CC}	Vcc=3.3V (no loads)	---	21	35	mA
APD responsivity	S	λ=1310nm, APD M=1 Pin=-30dBm	0.75	---	---	A/W

APD breakdown voltage	Vbr	Id=10 μA		40	---	60	V
Temperature coefficient of Vbr	γ	γ=ΔVbr/ΔTc		---	0.09	0.12	V/°C
Responsivity	R	Pin=-33dBm (Pulse, Ave.) Differential, APD M=optimum λ=1310nm, 100MHz		---	45	---	kV/W
Sensitivity	Prmin	fop=1.25Gbps, NRZ ExR=10dB,BER=10^{-12} PRBS 2^7-1	M= optimum	---	-34	---	dBm
Overload	Prmax		M=3	---	-5	---	
Rise and fall time	tr tf	Pin=-12dBm (Pulse, Ave) fop=1.25Gbps, λ=1490nm 20-80%,		---	0.05	---	ns

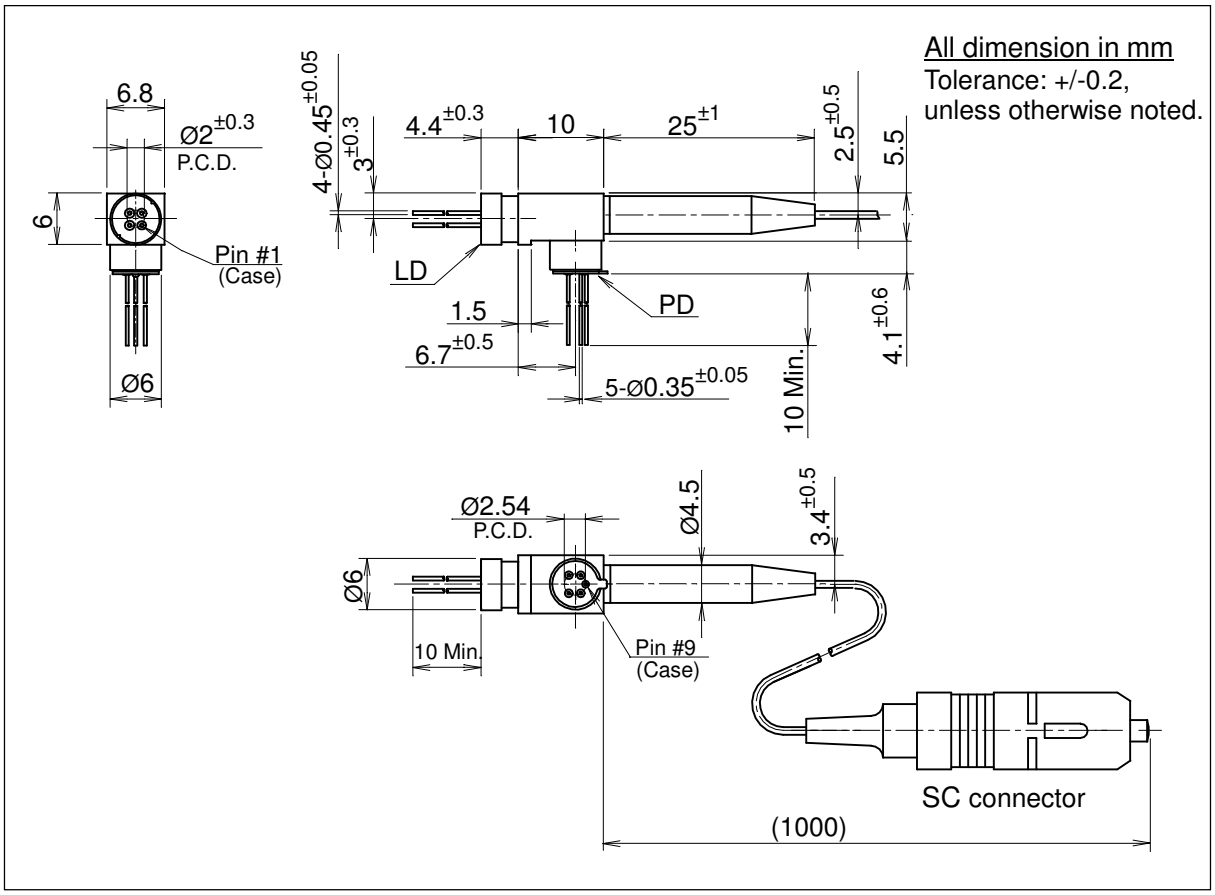
Module						
Operating bit rate	fop	---	---	---	1.25	Gbps
Optical crosstalk	CRT	Note 1	---	---	-47	dB
Optical return loss	ORL	λ=1310nm range	20	---	---	dB
		λ=1490nm range	20	---	---	dB

Note1: Optical crosstalk(CRT) is defined as CRT=10*log($I_{Det,0}$/$I_{Det,1}$) [dB] with:
$I_{Det,0}$: the photocurrent with Pf=1mW, without optical input, CW laser operation, VR = 2V and
$I_{Det,1}$: the photocurrent without Pf=0mW, but Pin=1mW optical input power , λ=1310nm.

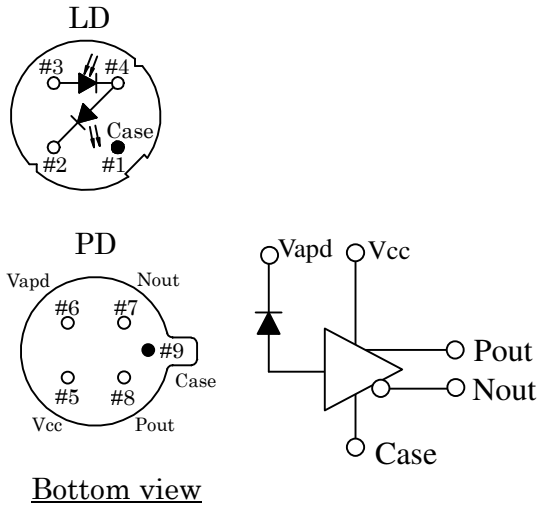
Optical Fiber Characteristics

Parameter	Min	Typ	Max	Unit
Fiber type	Single mode			---
Mode field diameter	8	9	10	μm
Clad diameter	123	125	127	μm
Concentricity error	---	---	1	μm
Cladding non-circularity	---	---	2	%
Mode field non-circularity	---	---	6	%
Cut off wavelength	1270	---	---	nm
Jacket diameter	0.8	0.9	1	mm
Bending Radius	20	---	---	mm
Tensile strength fiber case	5	---	---	N
Length	---	(1000)	---	mm
Connector	SC type / SPC			

Outline Drawings



Pin configuration



Pin No.	Function
LD	
1	Case
2	LD cathode
3	Monitor PD anode
4	LD anode, Monitor PD cathode
PD	
5	Vcc : TIA supply voltage
6	Vapd : APD cathode
7	Nout : Inverting TIA Output
8	Pout : Non-inverting TIA Output
9	Case : Ground

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