



Laser Diodes for Motion Sensor and TOF Sensor

May. 21, 2020
Optical module Business Unit
Photonics Div.
Product Development Dept. 1

Application with Motion sensing and ranging by LDs



- ✓ It is widely used for grasping the distance and shape of an object in a non-contact manner, taking advantage of the linearity of the laser beam.

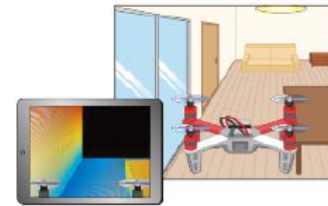


Games and VR&AR equipment



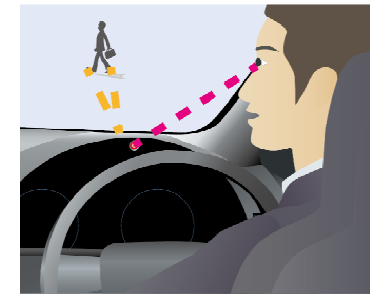
robot vacuum cleaner

Measures the shape of the entire room before operation and calculates the optimal cleaning path.



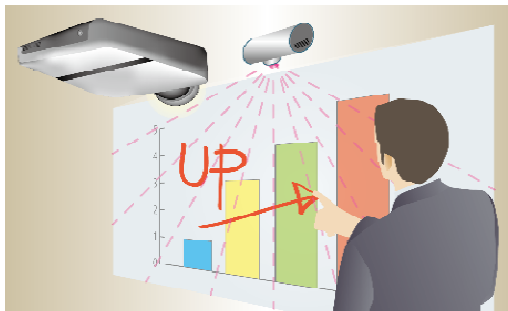
drone

The distance to the ground is measured. It is used for automatic landing and 3D mapping.



driver's monitor

Recognizes the direction of the driver's face and eyelid movements and alerts the driver.

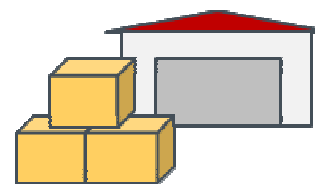


interactive projector



3D Scanner

Obtain the coordinate data of the shape of the object.



Understanding of goods in the logistics warehouse

Contributing to the efficiency of logistics by detecting the shape and condition of objects in a logistics warehouse.



Control of automotive air conditioning and navigation systems

Non-contact control of the equipment. P. 1

Various way for motion sensing

Recently, the 4 types of ranging methods as below have been studied according to cost and functionality.

	Triangulation	TOF(Time of Flight)	Flash-TOF	Structured light
Method				
Feature	•Range : ~10m •Easy to use •Image sensor is higher cost.	•Range : ~50m •Easy to use •More precise than triangulation •Photo diode is lower cost than Image sensor	•Range : ~3m •Easy to get 3D image data •Powerful MCU is needed •TOF sensor and MCU are high cost	•Range : ~3m •Easy to get 3D image data •Powerful MCU is needed •TOF sensor and MCU are high cost
Recommended ROHM PN	RLD78NZM5 RLD78NZM7	RLD78NZM5 RLD78NZM7 RLD84NZJ2 RLD94NZJ7 RLD90QZW5	RLD85SAY7 RLD85SAY8 RLD94SAQ7 RLD94SAQ8 ※ : 4 types of diffusion angle are available.	RLD85SAY7 RLD85SAY8 RLD94SAQ7 RLD94SAQ8 ※ : An additional DOE is needed.

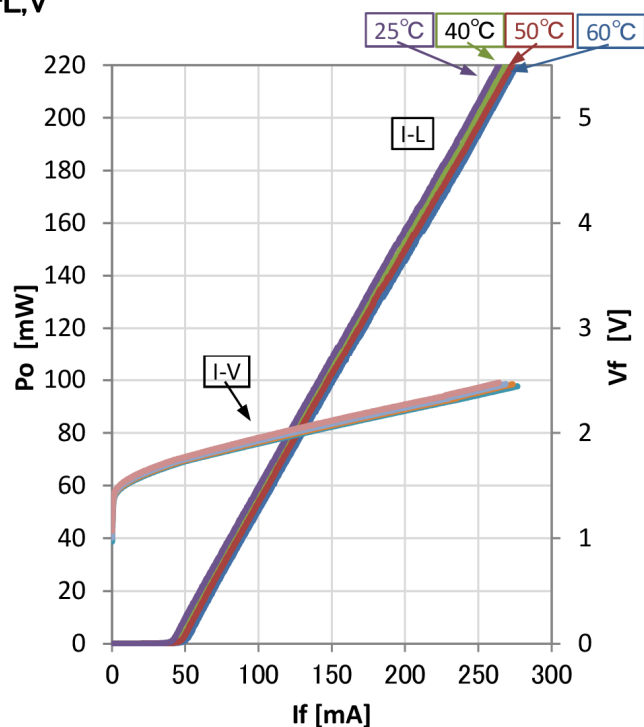
RLD8* N/P ZJ* Characteristics



The following is an example of the RLD82PZJ1 measurement.

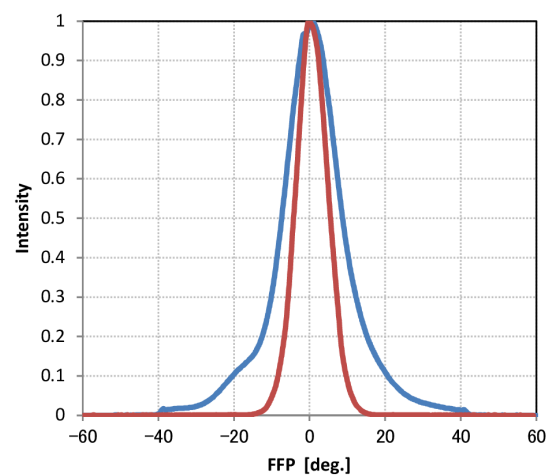
Temp.	I _{th} (mA)	I _{op} (mA)	V _{op} (V)	I _m (mA)	η(W/A)	θ _⊥ (deg)	θ _∥ (deg)	λ (nm)
25	40.2	244.7	2.41	0.35	0.97	16.0	9.7	821.4
40	43.7	249.0	2.40	0.37	0.96	16.2	9.7	825.9
50	46.2	253.2	2.39	0.38	0.95	16.3	9.8	828.6
60	49.3	258.5	2.38	0.39	0.94	16.0	9.9	831.3

I-L,V

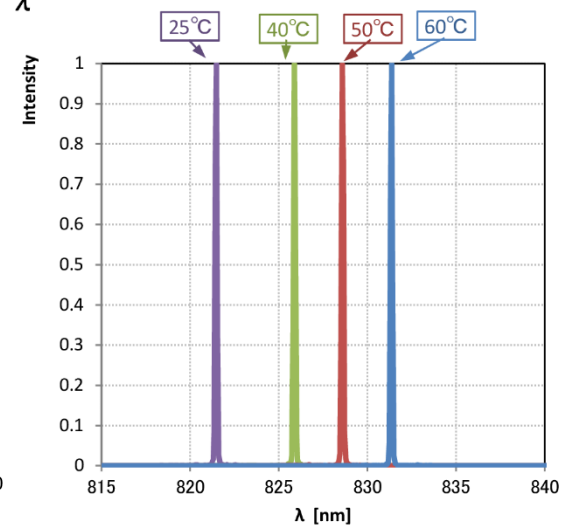


*This data is made from the result of having measured the sample extracted at random.
Therefore, it is not what showed the ability of the whole product.

FFP



λ

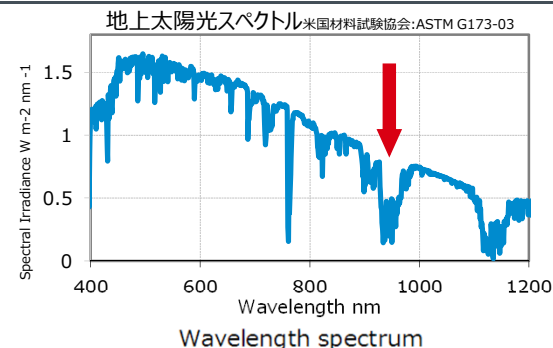


Condition : CW, Po = 200mW
Equipment : ADVANTEST LASER DIODE TEST SYSTEM Q8652
Day : 2017.4.21
Person : Kiyoko Tanaka

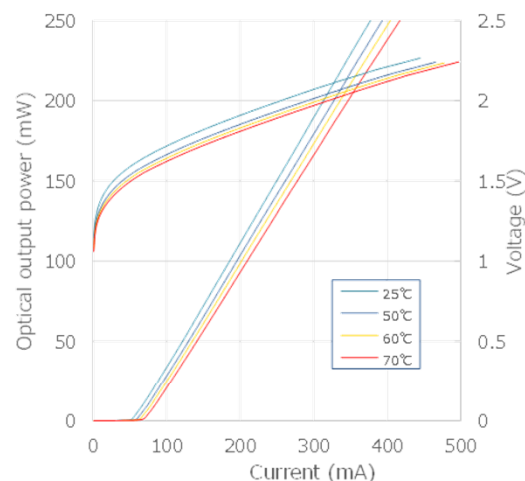
RLD94 N/P ZJ5 Characteristics



The intensity of the solar spectrum drops sharply around 940 nm.
In order to avoid the disturbance of sunlight, a light source in the 940nm band is useful.

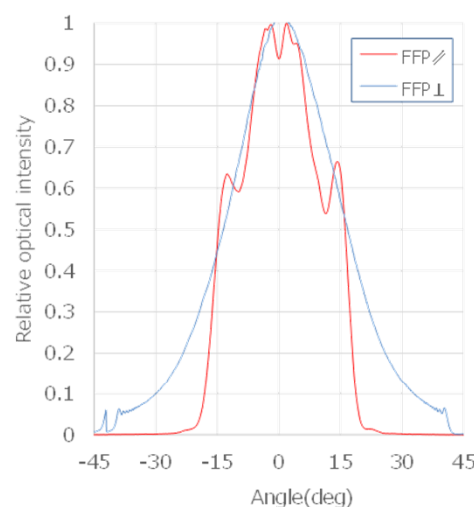


I-L characteristics



温度(°C)	Ith(mA)	Iop(mA)	Vop(V)
25	53	313	2.09
50	59	328	2.11
60	63	336	2.12
70	68	347	2.14

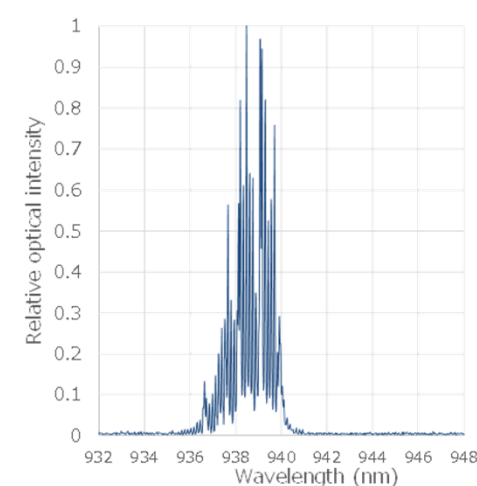
FFP(Far Field Pattern)



Multi-Mode

FFP //(deg)	FFP ⊥(deg)
30.9	30.3

Wavelength spectrum



Multi-Mode

発振波長(nm)
939

Equipment : Yamakatsu electronics industry LASER DIODE TEST SYSTEM YLT8601-S

Condition : CW, Po=200mW, Tc=25-70°C

Lot No. : 1650R9614W

Day : Dec 21, 2016

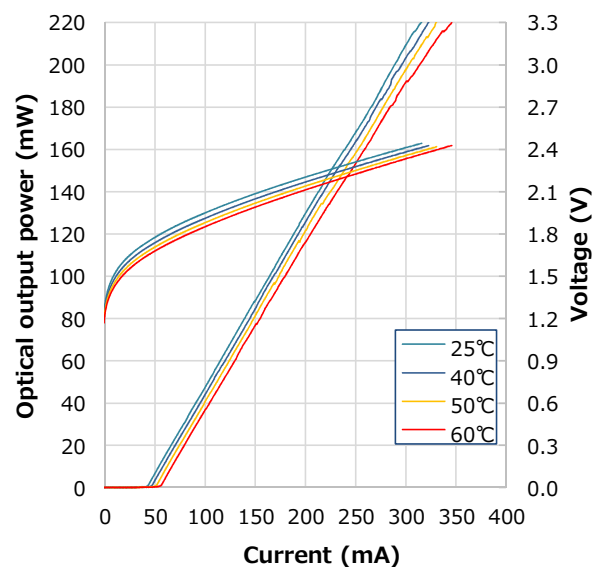
Person : Ryusuke Iimura

RLD94 N/P ZJ7 Characteristics



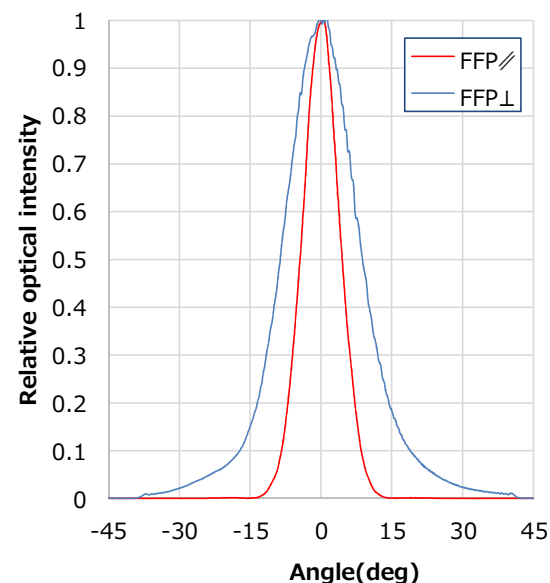
The intensity of the solar spectrum drops sharply around 940 nm.
In order to avoid the disturbance of sunlight, a light source in the 940nm band is useful.

I-L characteristics



温度(°C)	Ith(mA)	Iop(mA)	Vop(V)
25	43	289	2.39
40	47	296	2.37
50	51	303	2.36
60	56	314	2.36

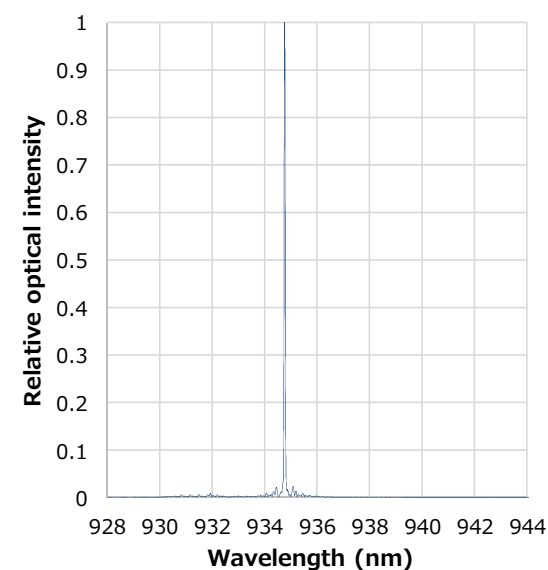
FFP(Far Field Pattern)



FFP/(deg)	FFP⊥(deg)
8.9	17.4

Single-Mode

Wavelength spectrum



発振波長(nm)
934.8

Single-Mode

Equipment : Yamakatsu electronics industry LASER DIODE TEST SYSTEM YLT8601-S

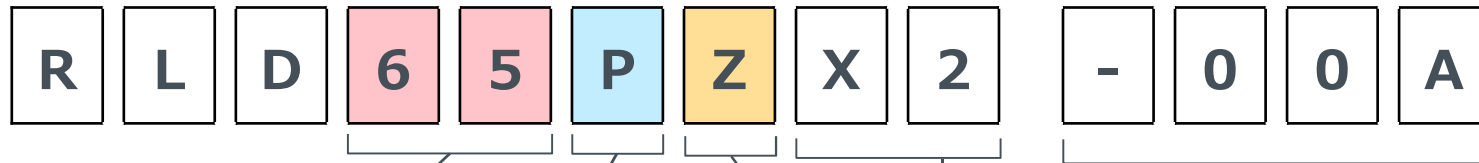
Condition : CW, Po=200mW, Tc=25-60°C

Lot No. : 1713R9621W

Day : Apr 16, 2017

Person : Hisayoshi Kitajima

Part Number Explanation



Wavelength

63	630nm
65	650nm
78	780nm
82	820nm
84	840nm
85	850nm
90	905nm
94	940nm

Polarity

Nark	LD Common	PD Common
M	Cathode	Cathode
N	Anode	Cathode
P	Cathode	Anode
Q	Cathode	PD-less
S	Floating	PD-less

Chip type

Package

Suffix No.

-00A, -01A: General products

-00B, 10C and etc.: Customized products

Mark	Diameter	Pin	Glass Window	feature
Z	5.6φ	3	✓	
P	5.6φ	3	—	
N	5.6φ	4	✓	
R	5.6φ Resin	3	—	
F	Flat Resin	4	—	

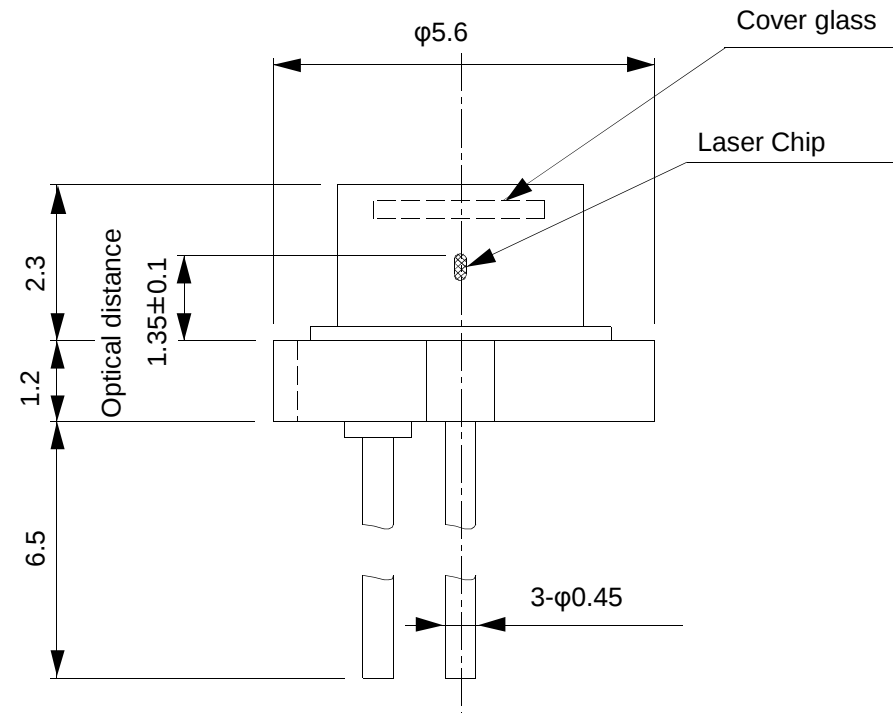
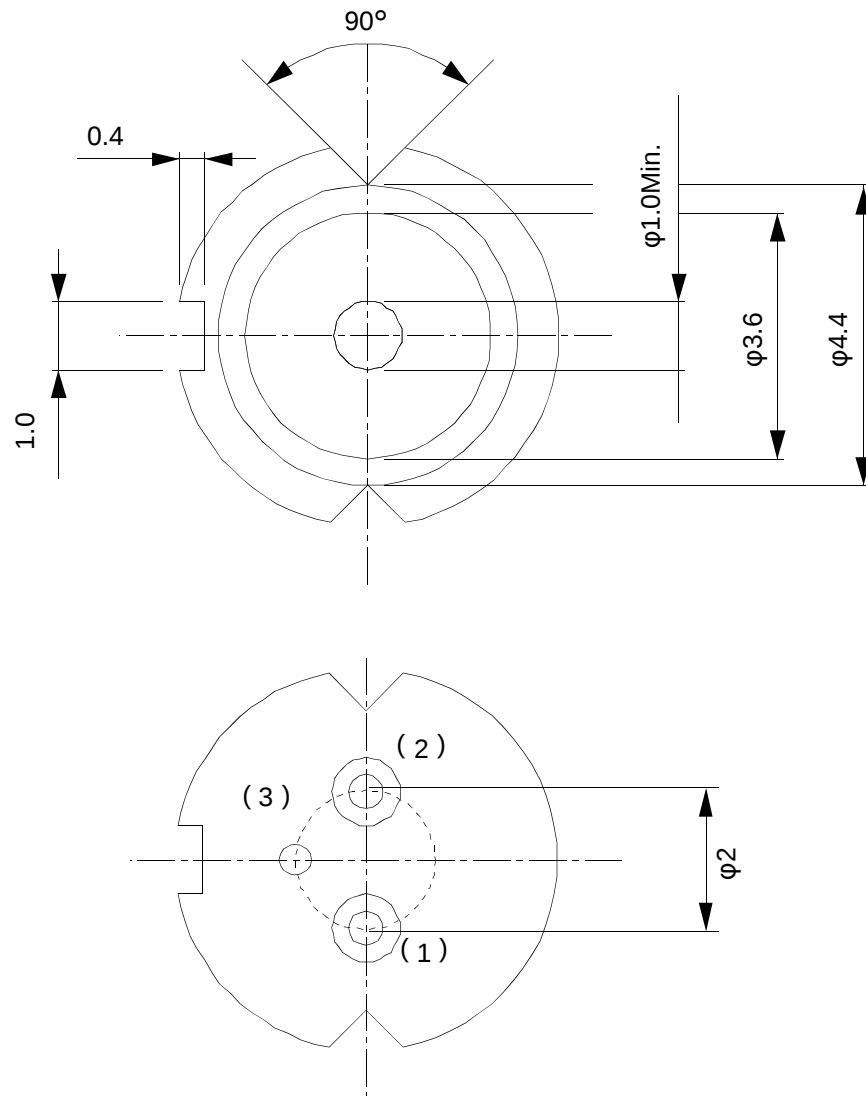
Parts List



Under development

Part No.	Wavelength λ_p (nm)	Absolute Maximum Ratings (Tc=25°C)		Electrical and Optical Characteristics (Tc=25°C)							
		Po (mW)	Top Max. (°C)	Po (mW)	I _{th} (mA)	I _{op} (mA)	η (W/A)	V _{op} (V)	I _m (mA)	θ_L (deg)	$\theta_{//}$ (deg)
RLD82NZJ1	822	220	60	200	50	255	0.95	2.4	0.30	17.0	9.5
RLD82PZJ1	822	220	60	200	50	255	0.95	2.4	0.30	17.0	9.5
RLD84NZJ2	842	220	60	200	40	250	0.95	2.4	0.40	19.0	9.5
RLD84PZJ2	842	220	60	200	40	250	0.95	2.4	0.40	19.0	9.5
RLD85NZJ4	852	220	60	200	40	250	0.95	2.4	0.40	18.0	9.5
RLD85PZJ4	852	220	60	200	40	250	0.95	2.4	0.40	18.0	9.5
RLD94NZJ5	942	285	65	200	55	325	0.75	2.2	0.90	30.0	35.0
RLD94NZJ7	942	220	60	200	40	260	0.9	2.4	1.00	17.0	9.5
RLD94PZJ5	942	285	65	200	55	325	0.75	2.2	0.90	30.0	35.0
RLD94PZJ7	942	220	60	200	40	260	0.9	2.4	1.00	17.0	9.5

Package: 5.6φ 3pin CAN



(unit : mm)

