

< Specifications (Precautions and Prohibitions) >

● Safety Precautions

1) The products are designed and produced for application in ordinary electronic equipment (AV equipment, OA equipment, telecommunication equipment, home appliances, amusement equipment, etc.).
 If the products are to be used in devices requiring extremely high reliability (medical equipment, transport equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or operational error may endanger human life and sufficient fail-safe measures, please consult with the ROHM sales staff in advance. If product malfunctions may result in serious damage, including that to human life, sufficient fail-safe measures must be taken, including the following:

- [a] Installation of protection circuits or other protective devices to improve system safety
- [b] Installation of redundant circuits in the case of single-circuit failure

2) The products are designed for use in a standard environment and not in any special environments. Application of the products in a special environment can deteriorate product performance. Accordingly, verification and confirmation of product performance, prior to use, is recommended if used under the following conditions:

- [a] Use in various types of liquid, including water, oils, chemicals, and organic solvents
- [b] Use outdoors where the products are exposed to direct sunlight, or in dusty places
- [c] Use in places where the products are exposed to sea winds or corrosive gases, including Cl_2 , H_2S , NH_3 , SO_2 , and NO_2
- [d] Use in places where the products are exposed to static electricity or electromagnetic waves
- [e] Use in proximity to heat-producing components, plastic cords, or other flammable items
- [f] Use involving sealing or coating the products with resin or other coating materials
- [g] Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering
- [h] Use of the products in places subject to dew condensation

3) The products are not radiation resistant.

4) Failure induced under deviant condition from what defined in the product specification can not be guaranteed.

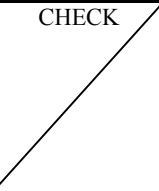
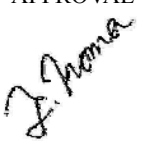
5) When product safety related problems arises, please immediately inform to ROHM, and consider technical counter measure.

● Precautions Regarding Application Examples and External Circuits

- 1) If change is made to the constant of an external circuit, allow a sufficient margin due to variations of the characteristics of the products and external components, including transient characteristics, as well as static characteristics.
- 2) The application examples, their constants, and other types of information contained herein are applicable only when the products are used in accordance with standard methods. Therefore, if mass production is intended, sufficient consideration to external conditions must be made.

● Precaution for Foreign Exchange and Foreign Trade Act

- 1) ROHM has not determined whether or not the products are considered "a controlled product or labor" as specified in Foreign Exchange and Foreign Trade Act.
 Accordingly, if exportation of the products, either separately or integrated in another company's products, is intended, or giving the products to persons who are not residents is planned, additional steps are required, based upon the appropriate regulations.

DESIGN	CHECK	APPROVAL	DATE: Feb.10, 2014	SPECIFICATION No. : 78NZM5 -00A
			REV. : 004E	ROHM Co.,Ltd.

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● Prohibitions Regarding Industrial Property

- 1) These Specifications contain information related to the ROHM industrial property. Any use of them other than pertaining to the usage of appropriate products is not permitted. Duplication of these Specifications and its disclosure to a third party without the Company's permission is prohibited.
- 2) Information and data on products, including application examples, contained in these specifications are simply for reference; the Company does not guarantee any industrial property rights, intellectual property rights, or any other rights of a third party regarding this information or data. Accordingly, the Company does not bear any responsibility for:
 - [a] infringement of the intellectual property rights of a third party
 - [b] any problems incurred by the use of the products listed herein.
- 3) The Company prohibits the purchaser of its products to exercise or use the intellectual property rights, industrial property rights, or any other rights that either belong to or are controlled by the Company, other than the right to use, sell, or dispose of the products.

● Precautions on Use of Products

- 1) The Company is not responsible for any problems resulting from use of the products under conditions not recommended herein.
- 2) The Company should be notified of any product safety issues. Moreover, product safety issues should be periodically monitored by the customer.
- 3) Confirm that operation temperature is within the specified range described in product specification.
- 4) When a highly active halogenous (chlorine, bromine, etc.) flux is used, the remainder of flux may negatively affect product performance and reliability.
- 5) During the mounting process, please ensure not to put strong mechanical stress upon partially.
In case at super-sonic stress, resonation will be occurred. Please do not use it directly or indirectly.

● Precaution for Storage / Transportation

- 1) Product performance and soldered connections may deteriorate if the products are stored in the following places:
 - [a] Where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [b] Where the temperature or humidity exceeds those recommended by the Company
Temperature: 5°C - 40°C, Humidity 30% - 80% (Put condition for individual product)
 - [c] Storage in direct sunshine or condensation
 - [d] Storage in high Electrostatic
- 2) Even under ROHM recommended storage condition, solderability of products over 1 year old (Put condition for each product) may be degraded.
It is strongly recommended to confirm solderability before using products of which storage time is exceeding recommended storage time period. (Recommended storage condition: Temperature 5°C - 40°C, Humidity 30% - 80%)
- 3) Store / transport cartons in the correct direction, which is indicated on a carton as a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

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● **Precaution for product label**

QR code printed on ROHM product label is only for internal use, and please do not use at customer site.
It might contain a internal part number that is inconsistent with an product part number.

● **Precaution for disposition**

When disposing products please dispose them properly with a industry waste company.

● **Other Matters**

- 1) Please sign these Specifications and return one copy to the Company.
If a copy is not returned within three months after the issued date specified on the front page of these Specifications, the Company will consider the Specifications accepted.
- 2) If any matter related to these Specifications needs to be clarified, discussions shall be held promptly between the two parties concerned to determine the issue.

1. Application Laser printer
2. Device Laser Diode
3. Type RLD78NZM5 -00A
4. Structure AlGaAs Double-hetero Invisible Laser Diode
with a build-in PIN photo diode for laser power monitoring
5. Dimensions Figure-1
6. Pin Figure-2

7. Absolute Maximum Ratings

(Tc=25°C)

No.	Parameter	Symbol	Ratings	Unit
1	Optical output	Po	10	mW
2	Reverse voltage	LD Vr	2	V
		PIN PD Vr(PD)	20	
3	Operating temp.	Top	-10 ~ 60	°C
4	Storage temp.	Tstg	-40 ~ 85	°C

8. Characteristics

(Tc=25°C)

No.	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Control
1	Threshold current	Ith	—	5	10	30	mA	*1
2	Operating current	Iop	Po=6mW	13	20	40	mA	
3	Operating voltage	Vop	Po=6mW	—	1.8	2.3	V	
4	Output efficiency	η	4mW/(I(6mW)-I(2mW))	0.30	0.55	0.80	mW/mA	
5	Monitor current	Im	Po=6mW, Vr(PD)=15V	0.60	1.15	1.80	mA	
6	Beam divergence	$\theta_{//}$	Po=6mW	7	9	13	deg.	
7		$\theta_{\perp}$		23	28	33	deg.	
8	Beam tolerance	$\Delta\theta_{//}$		-2	0	+2	deg.	
9		$\Delta\theta_{\perp}$		-3	0	+3	deg.	
10	Emission point accuracy	ΔXYZ	—	-100	0	+100	μm	
11	Lasing wavelength	λ	Po=6mW	775	793	800	nm	
12	Astigmatic difference	As	NA=0.55, Po=3.5mW	—	1	6	μm	*2

Caution:

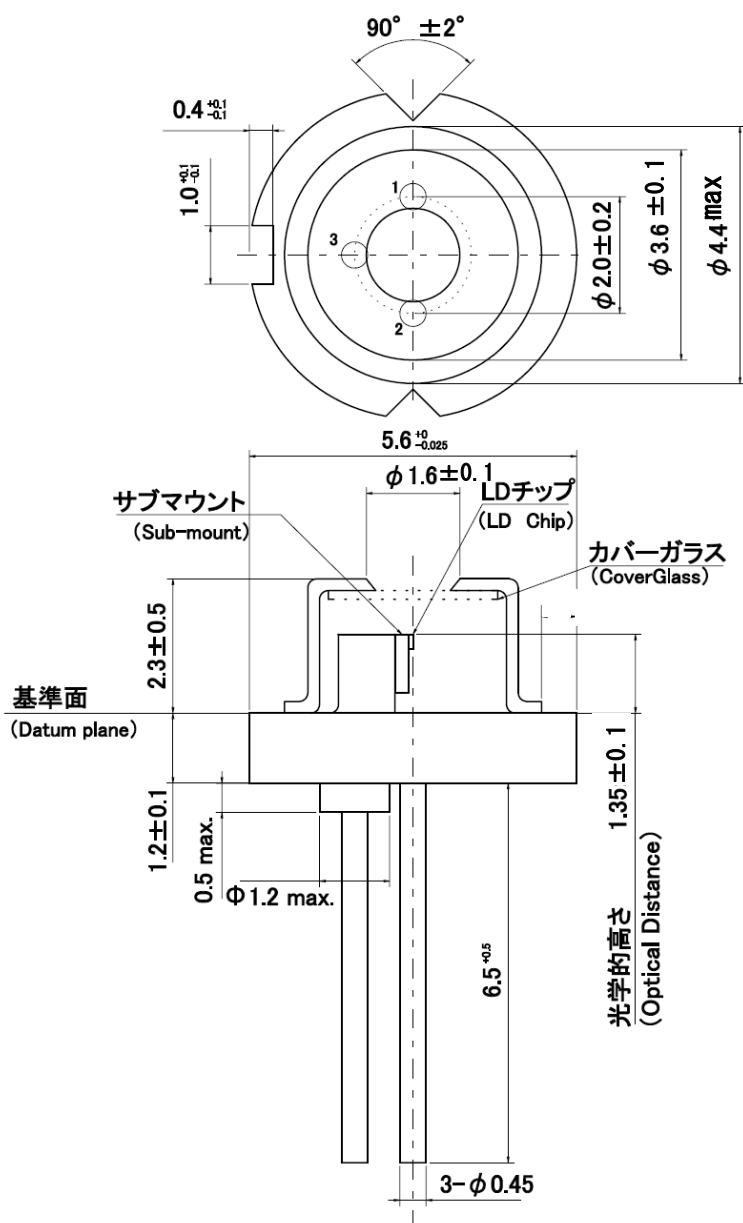
Control : *1 is 100% inspection, *2 is design guarantee.

 $\theta_{\perp}$, $\theta_{//}$ are defined as full width at half maximum.

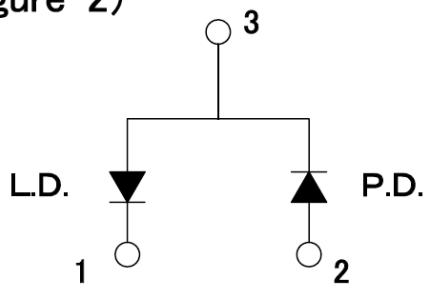
Operation temperature shown on this specifications is regulated by case temperature; Tc

図－1 (Figure-1)

Unit : mm



図－2 (Figure-2)



● Operation notes on use

This device is classified as a class III b laser product , emitting (in)visible laser radiation. Direct exposure should be avoid and never look at the emitting surface.

- (1) (Absolute maximum ratings) If an excessively flows in a laser diode, a large optical output will occur and the emitting facet may sustain damage. This optical damage can occur even with momentary over-current. For this reason, absolute maximum ratings which must not be exceeded even momentarily have been established. Exercise particular caution with respect to the drive voltage supply and static electricity. We guarantee use within the absolute maximum ratings. These ratings are established for a case temperature of 25°C . As the temperature of laser diode increases, its maximum output will decrease and the operating range will shrink. Even when operated within the absolute maximum ratings, operation at high temperature will result in a shorter life than operation at low temperature. For this reason, the design should include sufficient margin for heat radiation and light output.
- (2) (Heat radiation conditions) Like other semiconductors, prolonged operation of a laser diode will cause heat to build up at junctions and increased case temperature. For this reason, attach aluminum (or other) heat sinks (at least 30x30x3mm) to the stem of the laser.
- (3) (Protection against damage due to electrostatic discharge and other current surges) Electrostatic discharge and other current surges can cause deterioration and damage in laser diode, resulting in reduced reliability. We advise talking the following protective measures.
 - ①Ground the device and circuits . Install surge filters, surge reduction transformers, or other electrostatic discharge protectors in the power supply inputs.
 - ②When working with laser diodes wear anti-static clothing , including footwear and caps . Grounded wrist straps should always be worn while working with laser diodes, and the trap should be grounded through a 1Mohm resistance.
 - ③Use anti-static containers for transport and storage .
 - ④Laser deterioration and damage can occur due to excessive current spikes when the power is turned on or off . Design circuits to avoid the generation of excessive current spikes.
 - ⑤Inductive surge near equipment that emits high-frequency EMI can damage or destroy lasers . Avoid using lasers near fluorescent lamps or other of EMI emissions.
- (4) (Soldering) Use a grounded soldering iron to solder laser leads . Solder at a temperature of no more than 350°C for a maximum of 3 seconds , at a point at least 2mm from the root of the leads . In addition, please do not solder with the leads tip. This is because plating here may consist thinly.
- (5) (In the use of the glue) There is the possibility that the volatilization component of the glue exerts the influence on the characteristic of laser diode. Please use it after it confirm sufficiently.
- (6) (Handling packages) Packages must not be dropped or subjected to excessive pressure. In the forming processing, be careful not to add stress to the inner leads and cut wires. Never touch the glass parts of the laser. A damaged or dirtied glass parts will impair the performance of the laser.
- (7) (Safety) It is extremely dangerous to look, either directly or through a lens, at the laser beam emitted from a laser diode. Use a TV camera or other similar device to adjust the optical axis.