

< Specifications (Precautions and Prohibitions) >

● Precautions on using ROHM Products

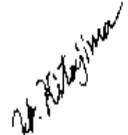
- 1) Our Products are designed and manufactured for application in ordinary electronic equipment (such as AV equipment, OA equipment, telecommunication equipment, home electronics appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment, transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property (“Special Applications”), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM’s Products for Specific Applications.

- 2) ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures.
 - [a] Installation of protection circuits or other protective devices to improve system safety
 - [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure

- 3) Our Products are designed and manufactured for use under standard conditions and not under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM’s Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc, prior to use, must be necessary:
 - [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
 - [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
 - [c] Use of our Products in places where the Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - [f] Sealing or coating our Products with resin or other coating materials
 - [g] Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
 - [h] Use of the Products in places subject to dew condensation

- 4) The Products are not subject to radiation-proof design.

- 5) Please verify and confirm characteristics of the final or mounted products in using the Products.

DESIGN 	CHECK 	APPROVAL 	DATE: Dec.26, 2017	SPECIFICATION No. : 94NZJ7 -00A
			REV. 003E	ROHM Co.,Ltd.

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- 6) In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse) is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- 7) De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.
- 8) Confirm that operation temperature is within the specified range described in the product specification.
- 9) ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

● **Precaution for Mounting / Circuit board design**

When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.

Regarding Precaution for Mounting / Circuit board design, please specially refer to ROHM Mounting specification. (Refer to precaution of the individual product.)

● **Precautions Regarding Application Examples and External Circuits**

- 1) If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
- 2) You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise you own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for damages, expenses or losses incurred by you or third parties arising from the use of such information.

● **Precaution for Electrostatic**

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

● **Precautions for Storage / Transportation**

- 1) Product performance and soldered connections may deteriorate if the Products are stored in the places where:
 - [a] the Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [b] the temperature or humidity exceeds those recommended by ROHM
(Ambient temperature: 5 to 40°C, relative humidity: 30 to 80%)
 - [c] the Products are exposed to direct sunshine or condensation
 - [d] the Products are exposed to high Electrostatic

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- 2) Even under ROHM recommended storage condition, solder-ability of products out of recommended storage time period may be degraded.
It is strongly recommended to confirm the characteristics and solder-ability before using Products of which storage time is exceeding the recommended storage time period (The recommended storage time period is one year after the shipment.)
- 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.

● Precaution for product label

QR code printed on ROHM product label is for ROHM's internal use only, and please do not use at customer site.

● Precaution for disposition

When disposing Products please dispose them properly using an authorized industry waste company.

● Precaution for Foreign exchange and Foreign Trade act

Note: Since concerned goods have not been determined to be fallen under listed items of export control prescribed by Foreign Exchange and Foreign Trade act or not, please consult with ROHM in case of export.

● Precautions Regarding Intellectual Property Rights

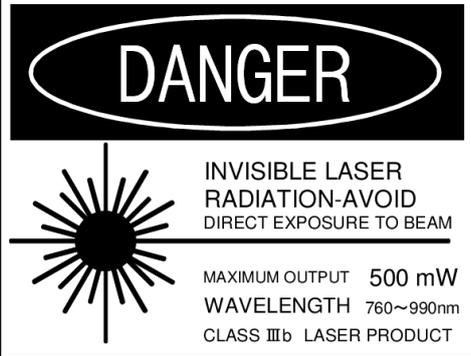
- 1) All information and data including but not limited to application example contained in this document is for reference only. ROHM does not warrant that foregoing information or data will not infringe any intellectual property rights or any other rights of any third party regarding such information or data.
- 2) ROHM shall not have any obligations where the claims, actions or demands arising from the combination of the Products with other articles such as components, circuits, systems or external equipment (including software)
- 3) No license, expressly or implied, is granted hereby under any intellectual property rights or other rights of ROHM or any third parties with respect to the Products or the information contained in this document. Provided, however, that ROHM will not assert its intellectual property rights or other rights against you or your customers to the extent necessary to manufacture or sell products containing the Products, subject to the terms and conditions herein.

● Other Matters

- 1) This document may not be reprinted or reproduced, in whole or in part, without prior written consent of ROHM.
- 2) The Products may not be disassembled, converted, modified, reproduced or otherwise changed without prior written consent of ROHM.
- 3) In no event shall you use in any way whatsoever the Products and the related technical information contained in the Products or this document for any military purposes, including but not limited to, the development of mass-destruction weapons.

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- 4) The proper names of companies or products described in this document are trademarks of registered trademarks of ROHM, its affiliated companies or third parties.
- 5) 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.
- 6) 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.

 <p>DANGER</p> <p>INVISIBLE LASER RADIATION-AVOID DIRECT EXPOSURE TO BEAM</p> <p>MAXIMUM OUTPUT 500 mW WAVELENGTH 760~990nm CLASS IIIb LASER PRODUCT</p>	<p>INVISIBLE SEMICONDUCTOR LASER</p>  <p>AVOID EXPOSURE-invisible Laser radiation is emitted from this aperture</p>
	<p>ROHM SEMICONDUCTOR</p> <p>Laser Diode This product complies with 21 CFR Part 1040.10 and 1040.11</p> <p>ROHM Co.,LTD. 21.Saiin Mizosaki-cho,Ukyo-ku Kyoto 615,8585, Japan</p>

1. Application Sensor
2. Device Laser Diode
3. Type RLD94NZJ7 -00A
4. Structure Double-hetero Structure Invisible Single mode Laser Diode With a Built-in P.D.
5. Dimensions Figure-1
6. Pin Figure-2

7. Absolute Maximum Ratings

(Tc=25°C)

No.	Parameter	Symbol	Ratings	Unit	
1	Optical output	Po	220	mW	
2	Reverse voltage	LD	Vr	2	V
		PIN PD	Vr (PD)	20	V
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	—	—	50	70	mA	*1
2	Operating current	Iop	Po=200mW	—	270	400	mA	
3	Operating voltage	Vop	Po=200mW	—	2.4	2.8	V	
4	Output efficiency	η	50mW/(I(200mW)-I(150mW))	0.65	0.9	1.4	W/A	
5	Monitor current	Im	Po=200mW, Vr(PD)=5V	0.3	1.0	1.5	mA	
6	Beam divergence	θ//	Po=200mW	7.0	9.5	12.0	deg.	
7		θ⊥		13	17	21	deg.	
8	Beam tolerance	∠θ//		-3	0	+3	deg.	
9		∠θ⊥		-4	0	+4	deg.	
10	Emission point accuracy	∠XYZ	—	-100	0	+100	μm	
11	Lasing wavelength	λ	Po=200mW	932	942	952	nm	

Caution:

Control: *1 is 100% inspection.

θ⊥ and θ// are defined as full width at half maximum.

Operating temperature shown on this specifications is regulated by case temperature; Tc.

Figure-1

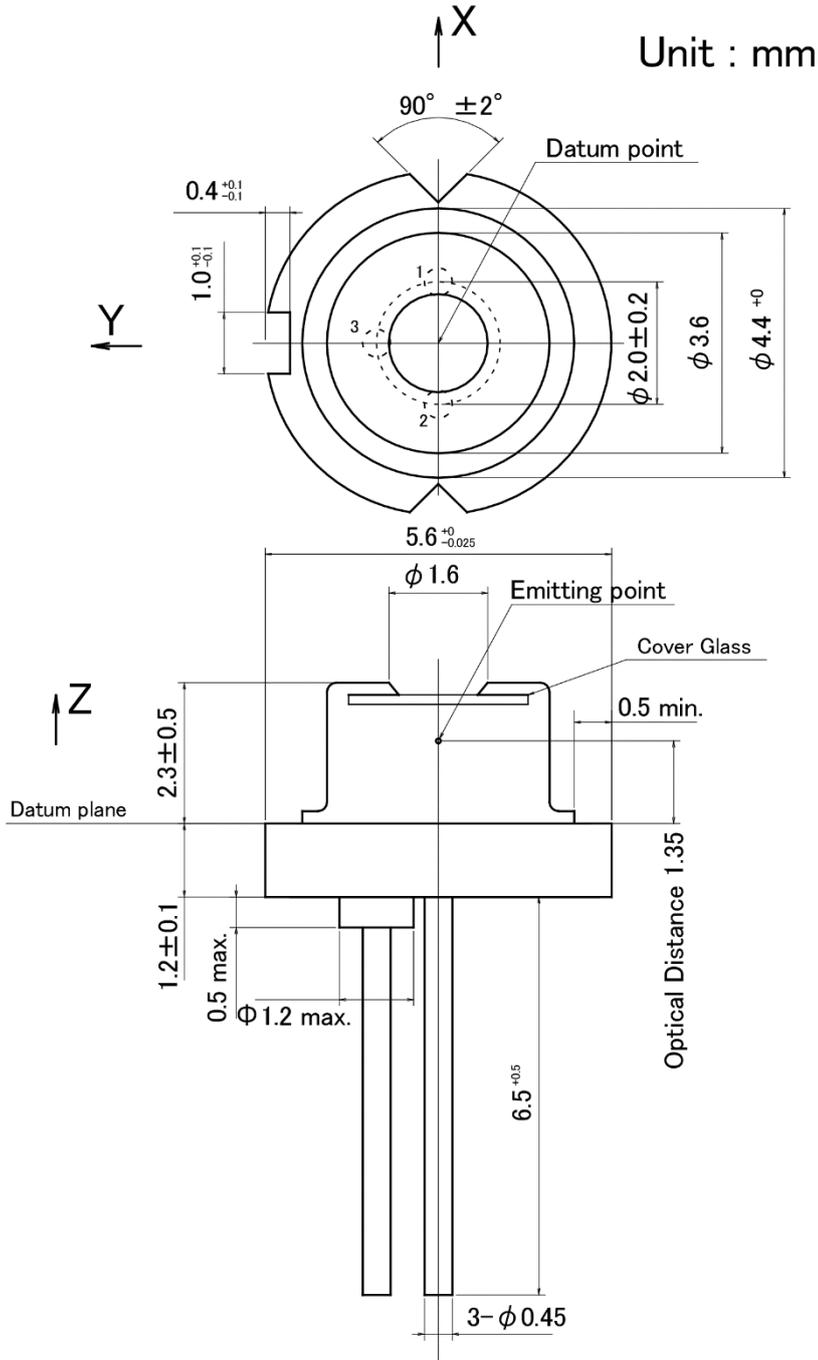
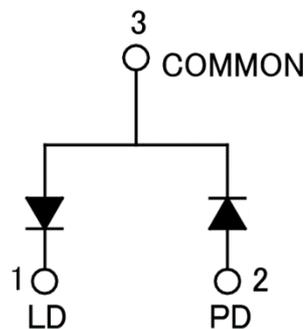


Figure-2



● Operation notes on use

This device is classified as a class IIIb laser product , emitting invisible 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. Please be careful to below points.
 - ① The adhesiveness of the die-bonding paste dramatically declines in high temperature, thus the package temperature must be observed with extreme care at all times. Please avoid heating the whole package such as reflow soldering.
 - ②It is recommended to heat only one lead frame at a time. (Please avoid heating multiple leads simultaneously.)
 - ③Heating the lead frame will cause the whole package temperature to rise thus it is recommended to release the package heat by heat sink during soldering.
 - ④It is recommended to solder the GND lead first to restrain the heat conduction from the lead frame.
- (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.

【Conditions for supply of products for automotive use】

- 1) This part does not comply with AEC-Q102. This product is designed for general consumer applications.
- 2) Do not use this part for devices or equipment which require extremely high reliability or whose malfunction or operational error may endanger human life/ body and may concern any other serious damage or loss.
- 3) Documents and data which are provided at the time of part number acquisition and certification shall be in ROHM standard format.
- 4) ROHM will not correspond to joint design reviews on occasions such as part certification.
- 5) ROHM will only exchange the defective/non-conformed parts to good ones if the defect/non-conformity is clearly caused by the defect of this part. However, removal or installation of the part will not be supported.
- 6) ROHM will clarify the failure symptom of the parts by analyzing the failed parts, if the failure during the usage of the device/ equipment is caused by this part.
However, if the cause is not identified, ROHM will not conduct any additional tests.
- 7) Except for cases where three or more defective/non-conformed parts are found in the same assembly lot (hereinafter referred to as “frequent failure”), sorting/exchanging of non-defective parts will not be supported.
Also, ROHM will not implement any countermeasures to suppress the occurrence/outflow of defective products for subsequent parts.
- 8) Emergency actions will be taken by ROHM only if “frequent failures” are occurring in the field and parts are being used within the spec range. The contents of the emergency actions will be decided upon consultation with our customer.
- 9) For visual failures which do not affect the characteristics, functions or reliability of the part, ROHM will not support any countermeasure actions.
- 10) Reliability tests are done in the form of sampling inspections in order to estimate the product life time. However, this test does not guarantee the product’s ability.
- 11) Even if tests and analysis are done at the customers’ side, ROHM will only support failures which affect the initial performance and functions of the part.
- 12) ROHM will not support quality improvement activities on customer's initiative, like achieving zero defect.
- 13) In case of any changes to 5M, ROHM will verify that the change has no influence on the product’s characteristics, functions and reliabilities. After that, only a notification will be sent to the customer 3 months prior to the implementation of the change.
- 14) ROHM will notify the discontinuation of production 6 months in advance. If the customer will make a last time buy order 3 months before the discontinuation, ROHM will supply them. However, the upper limit of the last time buy quantity will be restricted to ROHM’s production capacity and the availability of the materials.