

< Specifications (Precautions and Prohibitions) >

● **Precaution on using ROHM Products**


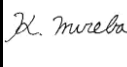
- 1) Our Products are designed and manufactured for application in ordinary electronic equipment (such as AV equipment, OA equipment, telecommunication equipment, home electronics appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (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 : 01/Nov./2022	SPECIFICATION No. : SMLZN4B/E
			Rev. : 001	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

- 1) When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
- 2) In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the ROHM in advance. (For surface mount device.)

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 your 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).

< Specifications (Precautions and Prohibitions) >

● Precaution 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
(Refer to precaution of the individual product.)
 - [c] the Products are exposed to direct sunshine or condensation
 - [d] the Products are exposed to high Electrostatic

- 2) Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded.
It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period. (Refer to precaution of the individual product.)

- 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.

- 4) Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.
(Refer to precaution of the individual product.)

● 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.

● Precaution 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.

< Specifications (Precautions and Prohibitions) >

● **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.
- 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

1. CONSTRUCTION Green Surface Mount Chip LEDs with reflector featuring InGaN packed with transparent colorless resin.

2. USAGE *1 Source of light for display unit.

3. DIMENSIONS See Figure.1

4. ABSOLUTE MAXIMUM RATINGS *2

Power Dissipation	PD (Ta=25°C)	• • • • •	120mW
Forward Current	IF (Ta=25°C)	• • • • •	30mA
Peak Forward Current	IFP (Ta=25°C)	• • • • •	100mA 1)
Reverse Voltage	VR (Ta=25°C)	• • • • •	5V
Operation Temperature	Topr	• • • • •	-40~+100°C
Storage Temperature	Tstg	• • • • •	-40~+100°C

1) Duty 1/10, 1kHz

5. ELECTRO-OPTICAL CHARACTERISTICS (Ta=25°C)

DISCRIPTION	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNITS
Forward Voltage	VF	IF=20mA 2)	2.8	3.4	4.0	V
Reverse Current	IR	VR=5V	-	-	10	μA
Luminous Intensity	IV	IF=20mA 3)	900	1500	2200	mcd
Dominant Wave Length 4)	λD	IF=20mA 3)	519	528	536	nm

2) Lighting time : 1msec 3) Lighting time : 10msec 4) Tolerance : ± 1nm

6. LUMINOUS CLASSIFICATION *3 (Ta=25°C, IF=20mA)

SYMBOL	LUMINOUS CLASSIFICATION RANGE			
"X1"	900	~	1100	mcd
"X2"	1100	~	1400	mcd
"Y1"	1400	~	1800	mcd
"Y2"	1800	~	2200	mcd

Tolerance : ±10%

7. PRODUCT WEIGHT Product weight per piece, approx 0.032 gm.

8. MSL Level 3

*1 : This product cannot be used for Automotive & Industrial (base station, smart meters, signal, etc. and social infrastructure) usage.

If you are not sure about the usage, please contact ROHM.

*2 : Absolute maximum rating is the limit which must not be exceeded even for an instant, once exceeded, LED device destruction might occur. This is not the value that guarantees intensity of light life and other reliabilities.

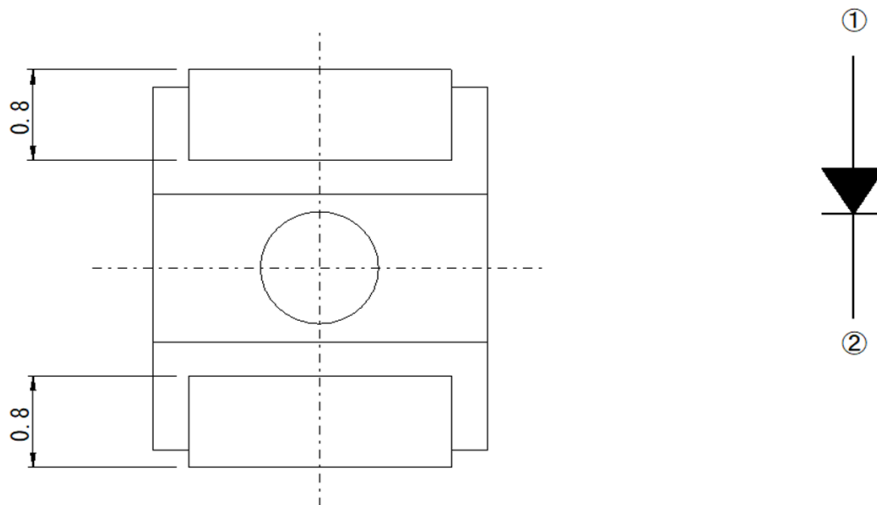
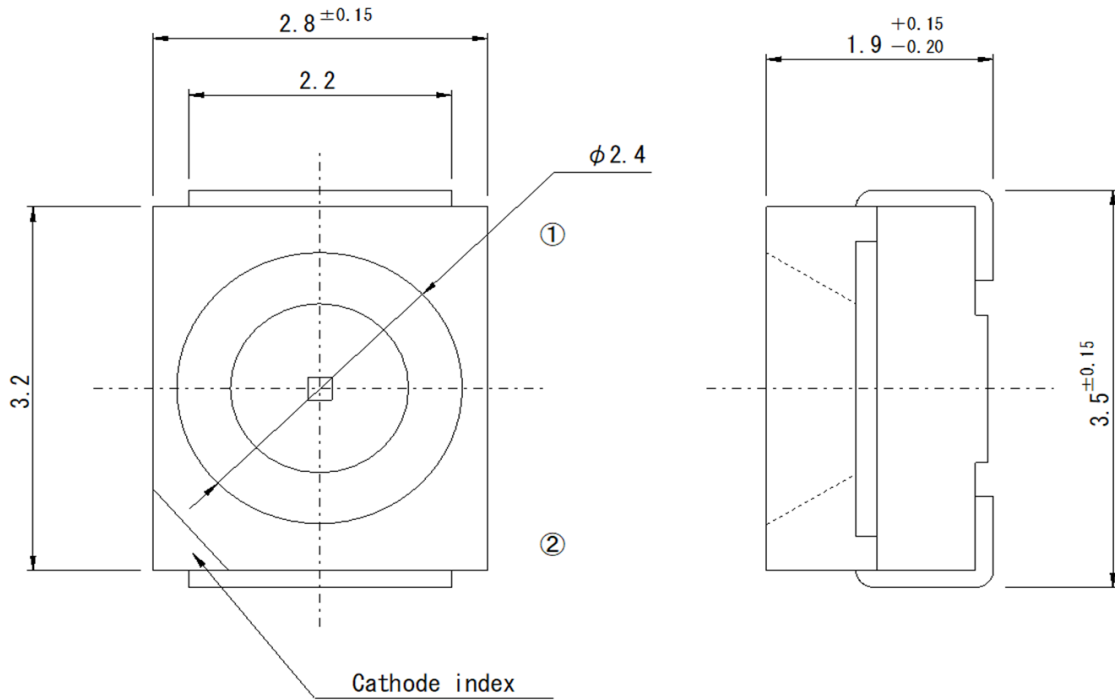
Please refer to the derating data *4 & conducting test data, and make sure to keep the value within absolute maximum rating while using.

*3 : If rank shift occur, we may ask for re-approval of new rank when necessary.

*4 : Even within derating, the reliability and luminosity life may be affected by deterioration of sealing resin and reflector, etc.

So please check with your application again.

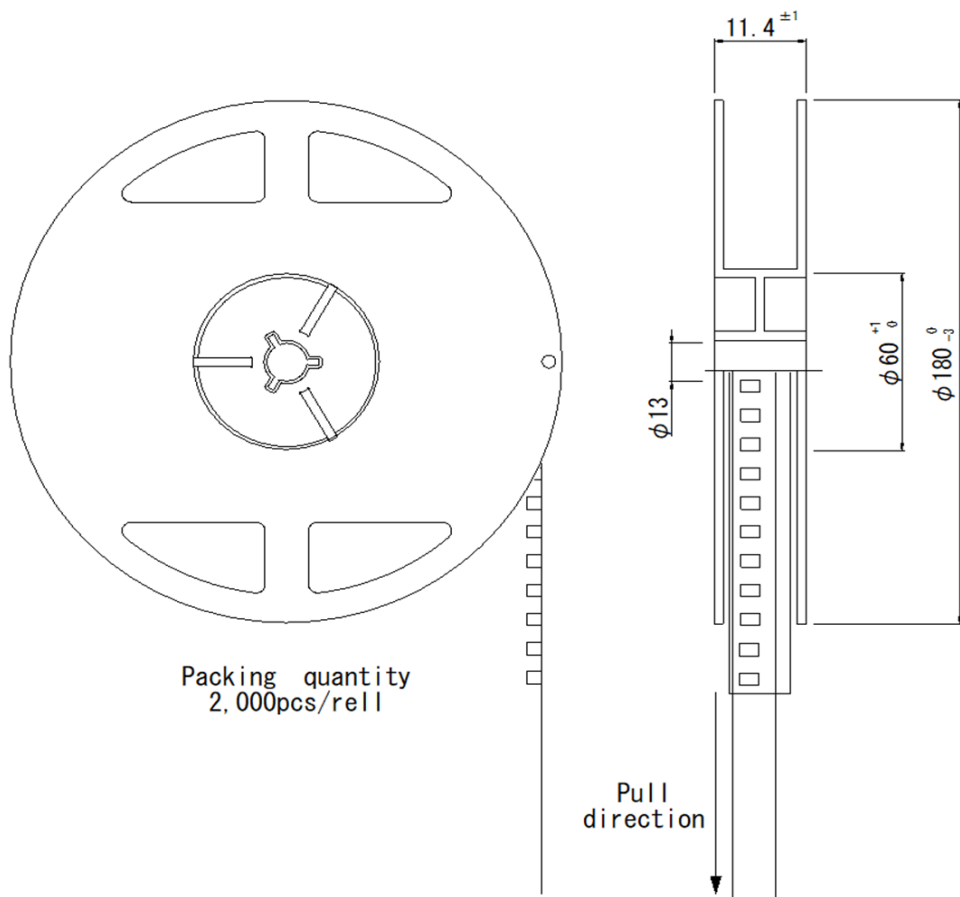
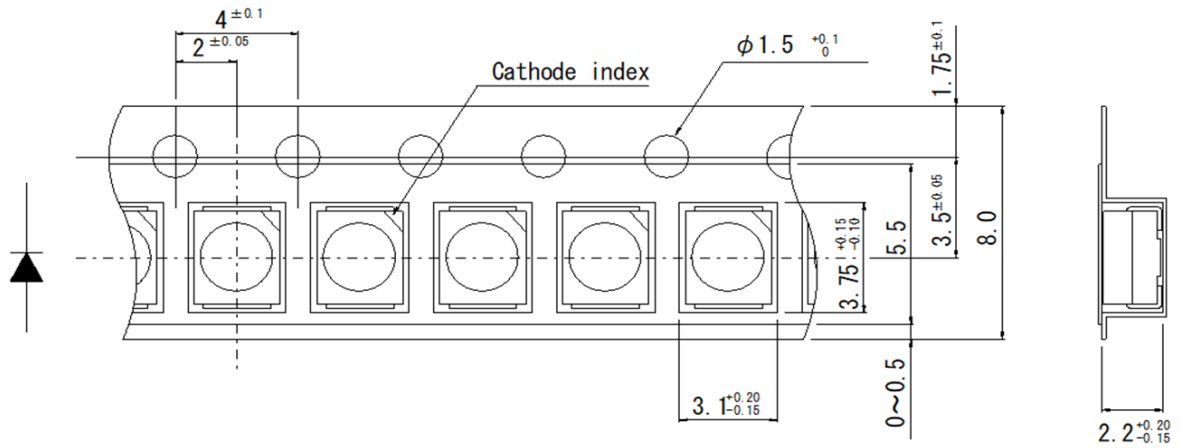
【Figure 1】



(Unit : mm)

(Note) Tolerance is within ± 0.2 mm unless otherwise specified.

【Taping : T86】

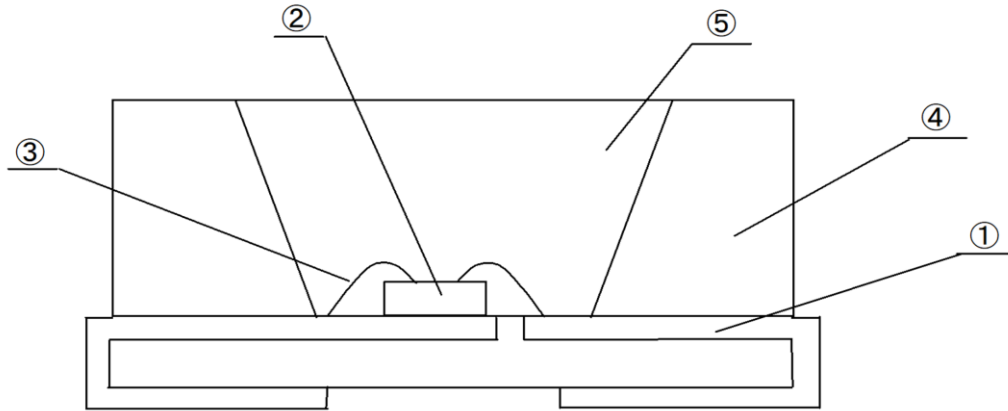


Packing quantity
2,000pcs/reel

(Unit : mm)

(Note) Tolerance is within ± 0.2 mm unless otherwise specified.

【STRUCTURE · MATERIAL】

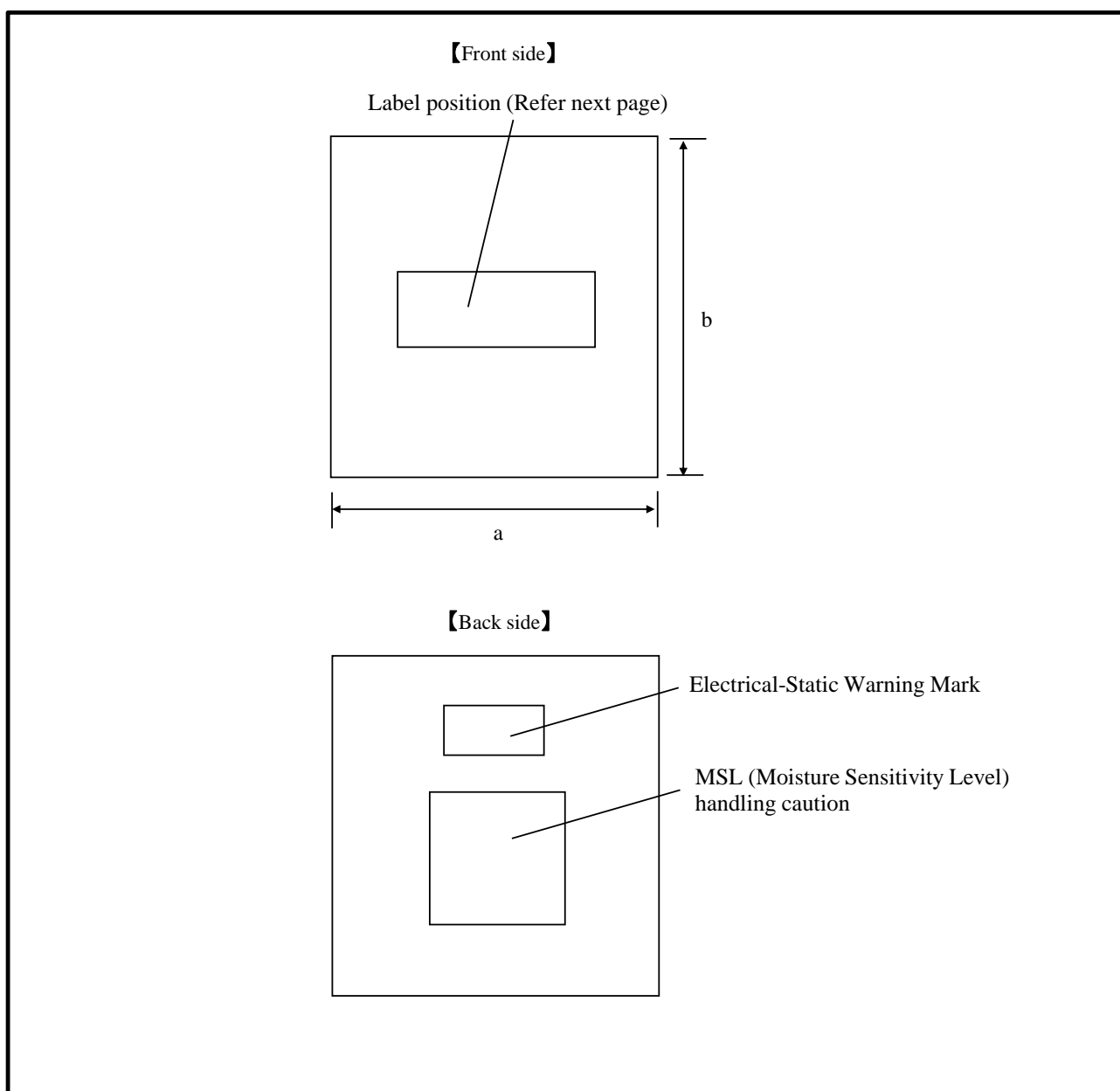


No.	APPELLATION	MATERIAL
①	Lead Frame	Ag plating over Cu frame
②	LED Chip	InGaN
③	Bonding Wire	Gold
④	Reflector	Thermoplastic resin
⑤	Resin	Silicone resin

【PACKAGING REQUIREMENTS】

1. PACKING

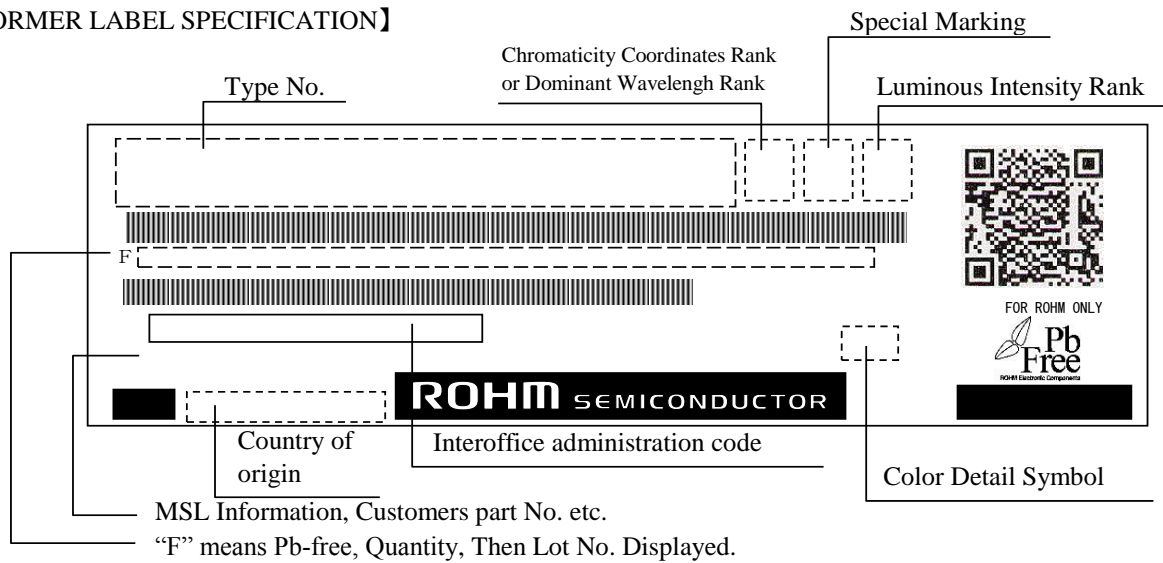
- (1) One reel is packed in aluminum bag.
The size of aluminum bag is 240(a)×250~280(b)mm.
- (2) Aluminum bag is sealed by pressured for all directions.
- (3) Insert the moisture indicator card to the aluminum bag.
- (4) Print the “Electrical-Static Warning mark”label and
“MSL (Moisture Sensitivity Level : JEDEC compatible”label on the back side of aluminum bag.




2. MARKING

The following information shall be described in the label on the aluminum bag.:
ROHM Type number, Packing quantity, Luminous intensity rank, and Lot number etc.

【FORMER LABEL SPECIFICATION】

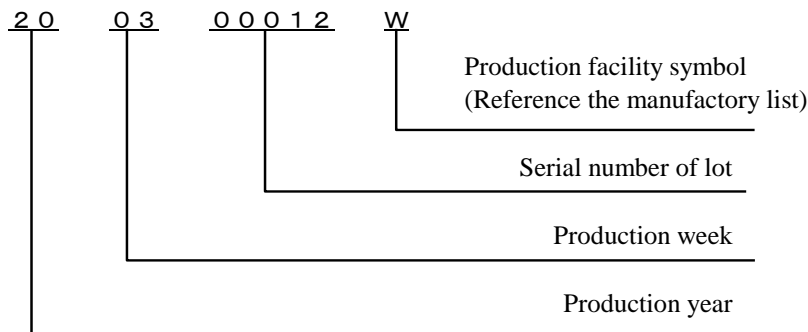


Note)  Indicates bar code expressed by code 39.



Indicates Pb-free Products.

【EXAMPLE OF LOT NO. MARKING】



●Precaution (Surface Mount Device)
1.Storage

If the product is heated during the reflow under the condition of hygroscopic state, it may vaporize and expand which will influence the performance of the product. Therefore, the package is waterproof. Please use the product following the conditions:

• Using Conditions

Classification	Temperature	Humidity	Expiration Date	Remark
①Before using	5~30°C	30~70%RH	Within 1 year from Receiving	Storage with waterproof package
②After opening package	5~30°C	Below 70%RH	Within 168h	Please storing in the airtight container with our desiccant (silica gel)

• Baking

Bake the product in case of below:

- ①The expiration date is passed.
- ②The color of 5% and 10% on humidity indicator card is not green.
(Even if the product is before expiration date.)

• Baking Conditions

Temperature	Time	Humidity
60±3°C	40~48h	Below 20%RH
Remark	<ul style="list-style-type: none"> • Bake products in reel. • Reel and embossed tape are easy to be deformed when baking, so please try not to apply stress on it. • Recommend bake once. 	

2.Application Methods
2-1. Precaution for Drive System and Off Mode

Design the circuit without the electric load exceeding the ABSOLUTE MAXIMUM RATING that applies on the products. If drive by constant voltage, it may cause current deviation of the LED and result in deviation of luminous intensity, so we recommend to drive by constant current. (Deviation of VF value will cause deviation of current in LED.) Furthermore, for off mode, please do not apply voltage neither forward nor reverse. Especially, for the products with the Ag-paste used in the die bonding, there's high possibility to cause electro migration and result in function failure.

2-2. About derating

It is considered that derating characteristics will not result in LED chip's electrical destruction. Even within the derating, the reliability and luminous life can be affected depending on operating conditions and ambient environment. So we would be appreciate it if you can confirm with your application again.

2-3. About product life

Depending on operating conditions and environment(applied current, ambient temperature and humidity, corrosive gas), decreasing of luminosity and change of chromaticity may occur even within the specification conditions.

Please contact our sales office if you use it for the following applications.

- ① It requires long luminosity life
- ② It is always lit

2-4. Applied Stress on Product

The top of the LED is very soft, which the silicone resin is used as sealing resin. Therefore, please pay attention to the overstress on it which may influence its reliability.

2-5. Usage

The product is LED. We are not responsible for the usage as the diode such as protection chip, rectifier, switching and so on.

3. Others

3-1. Surrounding Gas

Notice that if it is stored under the condition of acid gas (chlorine gas, sulfured gas) or alkali gas (ammonia), it may result in low soldering ability (caused by the change in quality of the plating surface) or optical characteristics changes (light intensity, chrominance) and change in quality of die bonding (Ag-paste) materials. All of the above will cause function failure of the products.

Therefore, please pay attention to the storage environment for mounted product (concern the generated gas of the surrounding parts of the products and the atmospheric environment).

3-2. Electrostatic Damage

The product is part of semiconductor and electrostatic sensitive, there's high possibility to be damaged by the electrostatic discharge. Please take appropriate measures to avoid the static electricity from human body and earthing of production equipment. Especially, InGaN type LEDs have lower resistance value of electrostatic discharge and it is recommended to introduce the ESD protection circuit. The resistance values of electrostatic discharge (actual values) vary with products, therefore, please call our Sales staffs for inquiries.

3-3. Electromagnetic Wave

Applications with strong electromagnetic wave such as, IH cooker, will influence the reliability of LED, therefore please evaluate before using it.

4. Mounting

4-1. Soldering

- No resin hardening agent such as filler is used in the sealing resin of the product. Therefore, resin expansion and moisture absorption at humidity will cause heat stress during soldering process and finally has bad influence on the product's reliability.
 - The product is not guaranteed for flow soldering.
 - Do not expose the product in the environment of high temperature (over 100°C) or rapid temperature shift (within 3°C/sec. of temperature gradient) during the flow soldering of surrounding parts.
- In case of carrying out flow soldering of surrounding parts without recommended conditions, please contact us for inquiries.
- Please set appropriate reflow temperature based on our product usage conditions and specification.
 - The max for reflowing is 2 times, please finish the second reflow soldering and flow soldering with other parts within the usage limitation after open the moistureproof package.
 - Compare with N2 reflow, during air reflow, because of the heat and surrounding conditions, it may cause the discoloration of the resin.
 - For our product that has no solder resist, because of its solder amount and soldering conditions, one of its specific characteristics is that solder will penetrate into LED. Thus, there's high possibility that will influence its reliability. Therefore, please be informed, concerning it before using it.

4-2. Automatic Mounting

4-2-1. Suction nozzle

Excessive load may cause damage inside the LED product, so select an optimal suction nozzle according to the material and shape of the LED product.

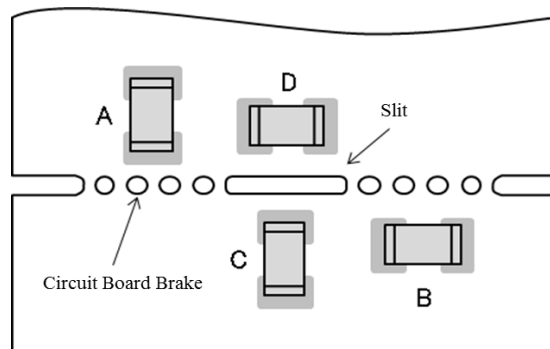
4-2-2. Mini Package (Smaller than 1608 size)

Vibration may result in low mounting rate since it will cause the static electricity of product and adhere to top cover tape. We recommend to

- set magnet on parts feeder cassette of the mounter to control the product stabilization
- set ionizer to prevent electrostatic charge

4-3. Mounting Location

The stress like bending stress of circuit board dividing after mounting, may cause LED package crack or damage of LED internal junction, therefore, please concern the mounting direction and position to avoid bending or screwing with great stress of the circuit board.



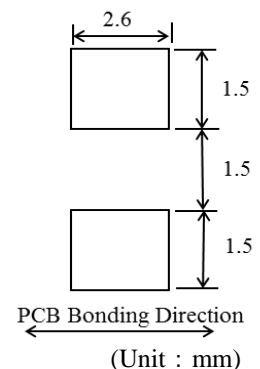
Stress strength according to the mounting position:
A > B > C > D

4-4. Mechanical Stress after Mounting

The mechanical stress may damage the LED after circuit mounting, so please pay attention to the touch on product.

4-5. Soldering Pattern for Recommendation

We recommend the soldering pattern that shows on the right. It will be different according to mounting situation of circuit board, therefore, please concern before designing.

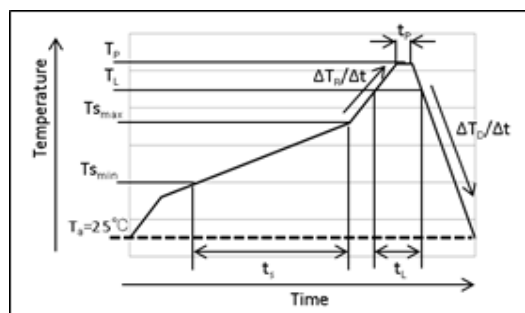


4-6. Reflow Profile

For reflow profile, please refer to the conditions below:(※)

• Meaning of marks, Conditions

Mark	Meanings	Conditions
T _{Smax}	Maximum of pre-heating temperature	180°C
T _{Smin}	Minimum of pre-heating temperature	140°C
T _S	Time from T _{Smin} to T _{Smax}	Over 60 sec.
T _L	Reference temperature	230~250°C
t _L	Retention time for T _L	Within 40 sec.
T _P	Peak temperature	250°C(MAX.)
t _p	Time for peak temperature	Within 10 sec.
ΔT _R /Δt	Temperature rising rate	Under 3°C/sec.
ΔT _D /Δt	Temperature decreasing rate	Within -3°C/sec.



※Above conditions are for reference. Therefore, evaluate by customer's own circuit boards and reflow furnaces before using, because stress from circuit boards and temperature variations of reflow furnaces vary by customer's own conditions.

4-7. Attention Points in Soldering Operation

This product was developed as a surface mount LED especially suitable for reflow soldering.

So reflow soldering is recommended. In case of implementing manual soldering, please take care of following points.

① SOLDER USED

Sn-Cu, Sn-Ag-Cu, Sn-Ag-Bi-Cu

② HAND SOLDERING CONDITION

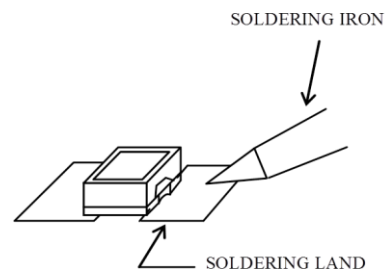
LED products do not contain reinforcement material such as a glass fillers.

So thermal stress by soldering greatly influence its reliability.

Please keep following points for manual soldering.

	ITEM	RECOMMENDED CONDITION
a)	Heating method	Condition) Temp. of iron top less than 325 °C within 3 sec. Heating on PCB pattern, not direct to the LED. (Fig-1)
b)	Handling after soldering	Please handle after the part temp. Goes down to room temp.

Figure-1



4-8. Cleaning after Soldering

Please follow the conditions below if the cleaning is necessary after soldering.

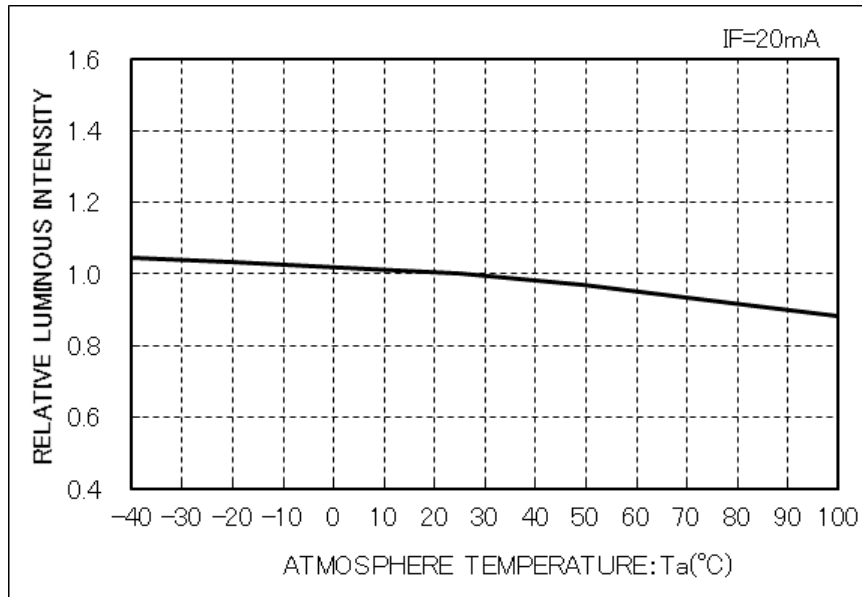
Solvent	We recommend to use alcohols solvent such as, isopropyl alcohols
Temperature	Under 30°C within 3 minutes
Ultrasonic Cleaning	15W / Below 1 liter (capacity of tank)
Drying	Under 100°C within 3 minutes

【MANUFACTORY】

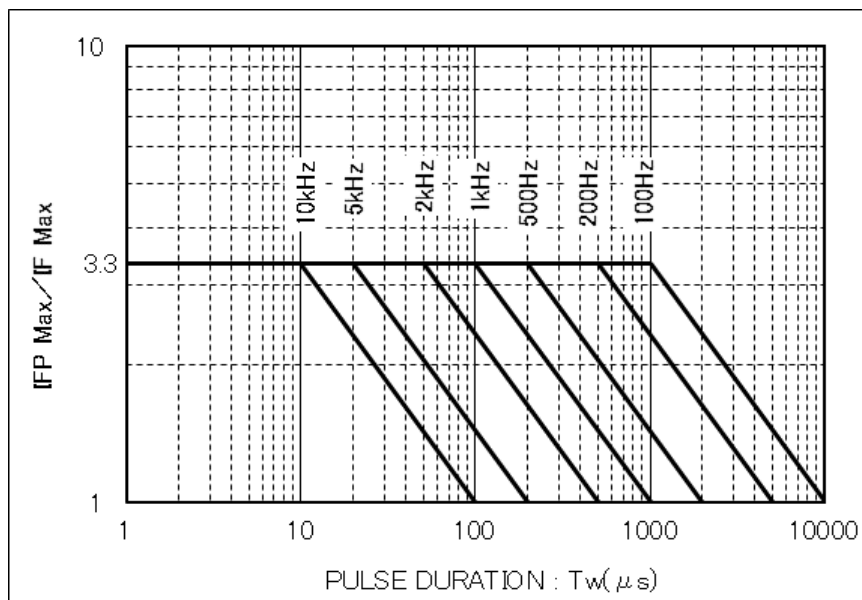
FACTORY	SYMBOL
ROHM Wako Co.,Ltd. 100 Tomioka, Kasaoka, Okayama 714-8585 Japan	W
ROHM-Wako Electronics (Malaysia) Sdn. Bhd. Lot 1320 Kawasan Perindustrian, Pengkalan ChepaII, Padang Tembak 16100 Kota Bharu, Kelantan, Malaysia	D
ROHM Semiconductor (China) Co.,Ltd. No.7, Weisan Rd, Micro-electronics Ind, Jingang Highway Xiqing Dist, Tianjin 300385	N
HARVATEK CORPORATION (Taiwan OEM) No.18, Lane522, Sec.5, JhonghuaRd, Hsinchu City 300, Taiwan 30094	1

* This sheet is mentioned all factory locations of LED products.
Please contact us if you need detail information about each package.

RELATIVE LUMINOUS INTENSITY - ATMOSPHERE TEMPERATURE



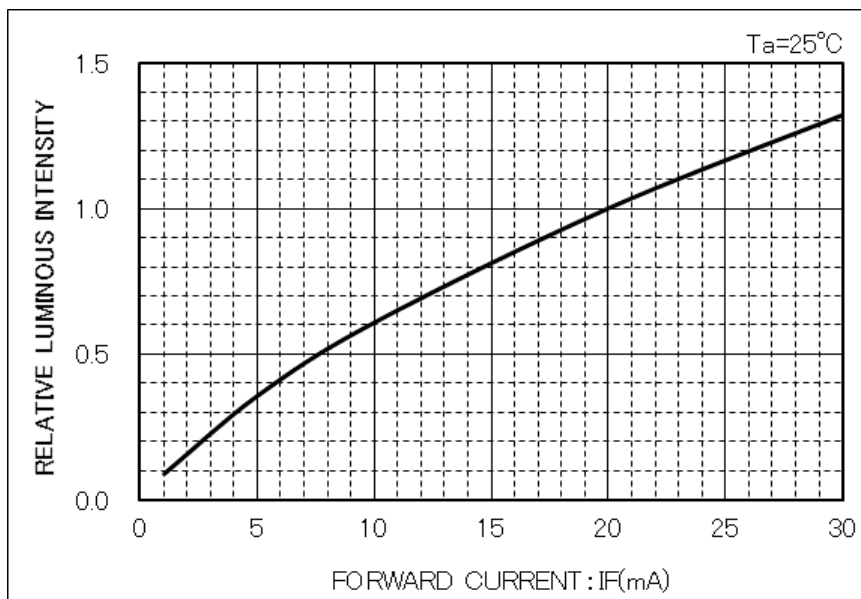
RATIO OF MAXIMUM TOLERABLE PEAK CURRENT - PULSE DURATION



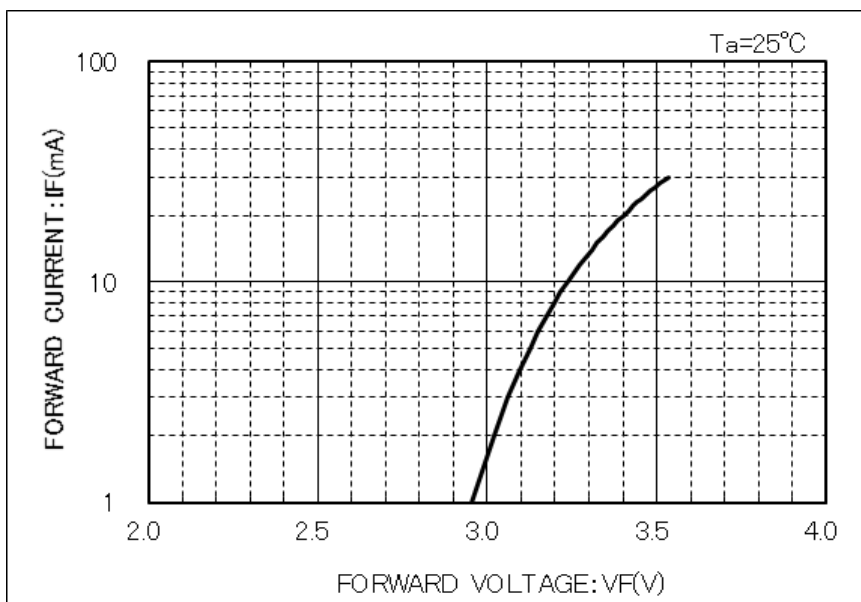
※This data is actual value from specific lot and is not guaranteed.

Reference

RELATIVE LUMINOUS INTENSITY - FORWARD CURRENT



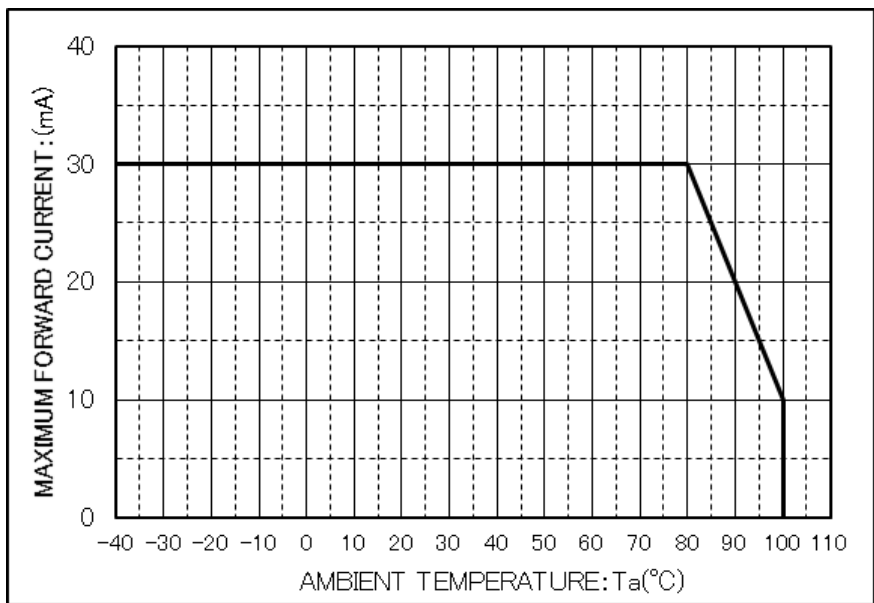
FORWARD CURRENT - FORWARD VOLTAGE



※This data is actual value from specific lot and is not guaranteed.

Reference

DERATING ※1、※2



THERMAL RESISTANCE (JUNCTION/SOLDER POINT) ※1

$R_{\theta j-s}$. . . 100°C/W

THERMAL RESISTANCE (JUNCTION/AMBIENT) ※1

$R_{\theta j-a}$. . . 240°C/W

JUNCTION TEMPERATURE

T_{jMax} . . . 120°C

※1: [Evaluation board]

Glass epoxy (FR4) : 30x10mm, t=1.6mm

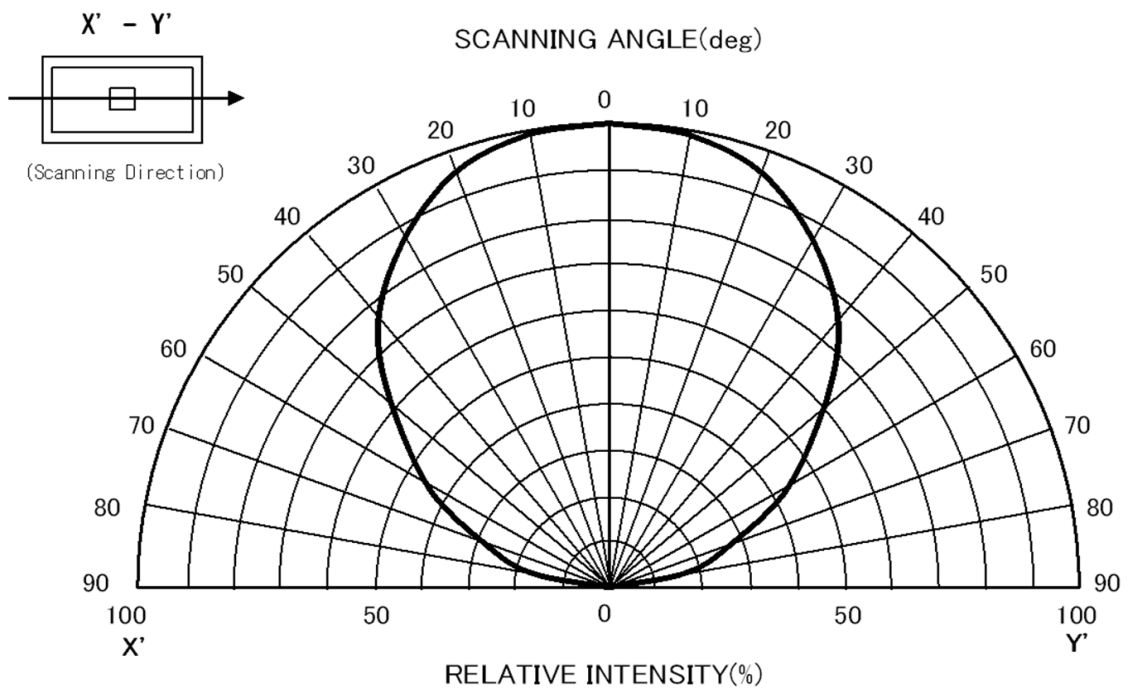
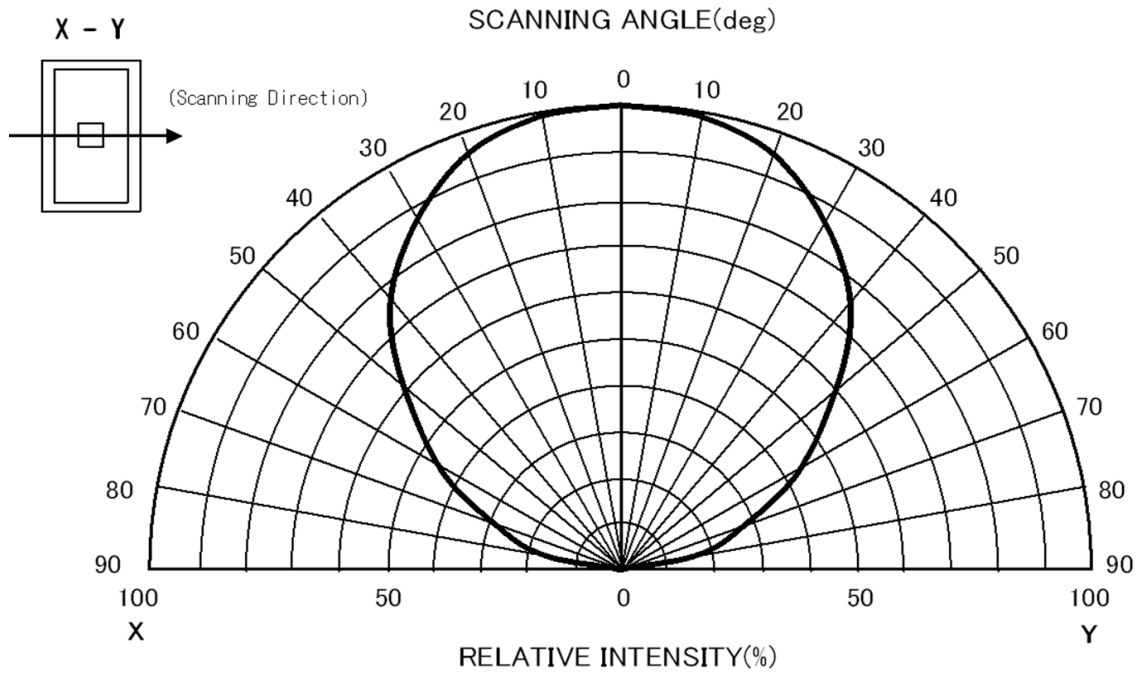
Pad Size (Cu) : 5.0x5.0mm (Cathode), t=0.07mm

※2: Even within derating, the reliability and luminosity life may be affected by deterioration of sealing resin and reflector, etc. So please check with your application again.

※This data is actual value from specific lot and is not guaranteed.

Reference

RELATIVE LUMINOUS INTENSITY - VIEWING ANGLE



※This data is actual value from specific lot and is not guaranteed.

Reference