Φ_V = 19.6 lm, V_F = 2.81 V
High Color Rendering Index, Surface Mount LED

SEP1AQ1L92SS

Data Sheet

Description

The SEP1AQ1L92SS is a surface mount white LED. Using the product with the SEP1AQ1L92LL in pairs realize high color rendering index.

The product is suitable for LED lighting systems including general-illumination applications and showcases.

Features

- Color ---------- White
- Luminous Flux, Φ_V -------- 19.6 lm (typ.) (I_F = 50 mA)
- Forward Voltage, V_F-------- 2.81 V (typ.) (I_F = 50 mA)
- Chromaticity (x, y)----------(0.3590, 0.3517)
- Viewing Angle, $2\theta_{1/2}$---------- 115 deg
- MSL 3
- RoHS Compliant
- Pb-free, Reflow Soldering
- High Reliability

Applications

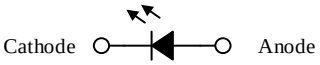
LED lighting for industrial equipment, houses, and facilities such as:

- Lamp for Color Evaluation
- Spotlight
- LED Tube
- Ceiling Light
- Downlight

Package

Dimensions (L × W × H): 2.8 × 3.5 × 0.7 mm

LED



Not to scale

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This technology is protected by worldwide patents, including Japan Patent No. 3931239 owned by NIMS.

Absolute Maximum Ratings

Unless otherwise specified, T_A = 25 °C.

Parameter	Symbol	Conditions	Rating	Unit
Power Dissipation	P_D		300	mW
Forward Current	I_F		100	mA
Reverse Voltage	V_R		3	V
Operating Temperature(1)	T_{OP}	(2)	−40 to 85	°C
Storage Temperature(1)	T_{STG}	(2)	−40 to 100	°C
Junction Temperature	T_J		115	°C

Electrical / Optical Characteristics

Unless otherwise specified, T_A = 25 °C.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	I_F = 50 mA	2.60	2.81	3.00	V
Reverse Current	I_R	V_R = 3 V	—	—	10	μA
Luminous Flux	Φ_V	I_F = 50 mA	14.0	19.6	22.0	lm
Chromaticity	x	I_F = 50 mA	—	0.3590	—	—
	y		—	0.3517	—	—
Viewing Angle	$2\theta_{1/2}$	I_F = 50 mA	—	115	—	deg
Junction-to Solder Point Thermal Resistance	$\theta_{(J\text{-}S)}$	(2)	—	25	—	°C/W

Mechanical Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Unit
Package Weight		—	0.0205	—	g

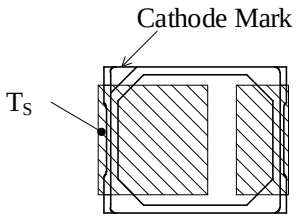


Figure 1. T_S Measurement Point

(1) Determined by the solder point temperature, T_S.
(2) Solder point temperature, T_S, is defined by land pattern of cathode side (see Figure 1).

Luminous Flux Bins

The values have a tolerance of ±10%.

Bin Number	Luminous Flux Range	Unit
1	14 to 16	lm
2	16 to 18	lm
3	18 to 20	lm
4	20 to 22	lm

V_F Bins

The values have a tolerance of ±3%.

Bin Number	V_F Range	Unit
1	2.6 to 2.7	V
2	2.7 to 2.8	V
3	2.8 to 2.9	V
4	2.9 to 3.0	V

Chip Wavelength Bins

Bin Number
S1
S2
S3
S4

Chromaticity Bins

Figure 2 is the chromaticity diagram plotting chromaticity bins, with a tolerance of ±0.01.

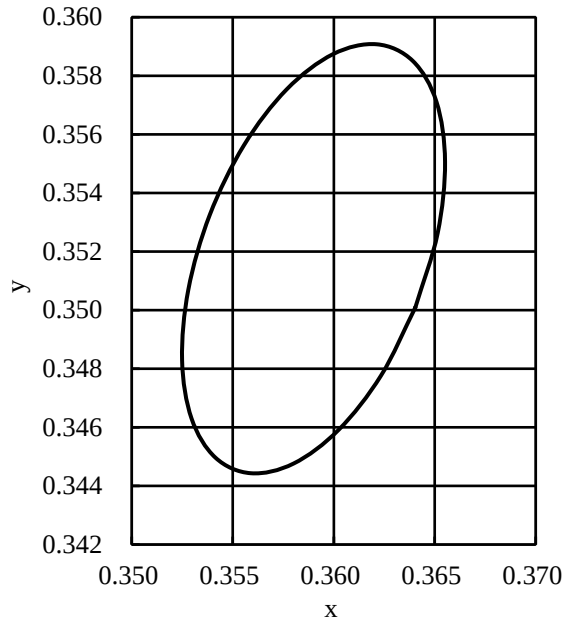


Figure 2. Chromaticity Diagram

Table 1. Chromaticity Diagram: Region and Coordinates

Parameter	MacAdam Ellipse
	3-step
Chromaticity Center Coordinate, x	0.3590
Chromaticity Center Coordinate, y	0.3517
Ellipse Major Axis	0.0084
Ellipse Minor Axis	0.0052
Rotation Angle, θ	38°

Derating Curves

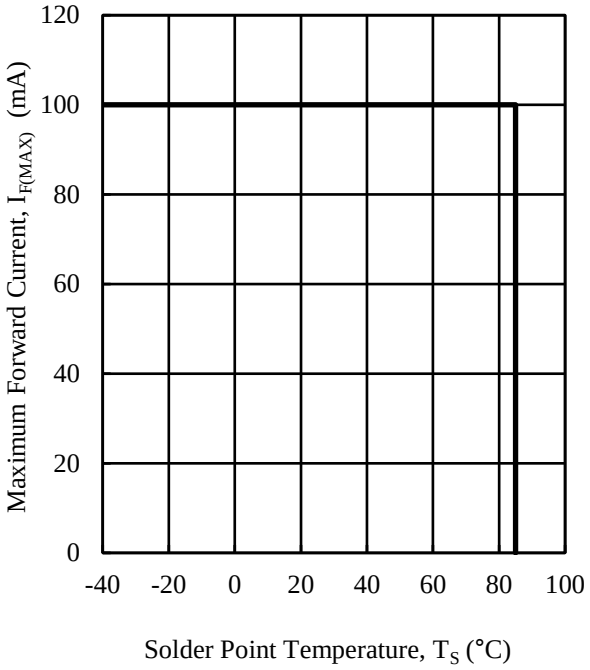


Figure 3. $I_{F(MAX)}$ vs. T_S

Characteristic Curves

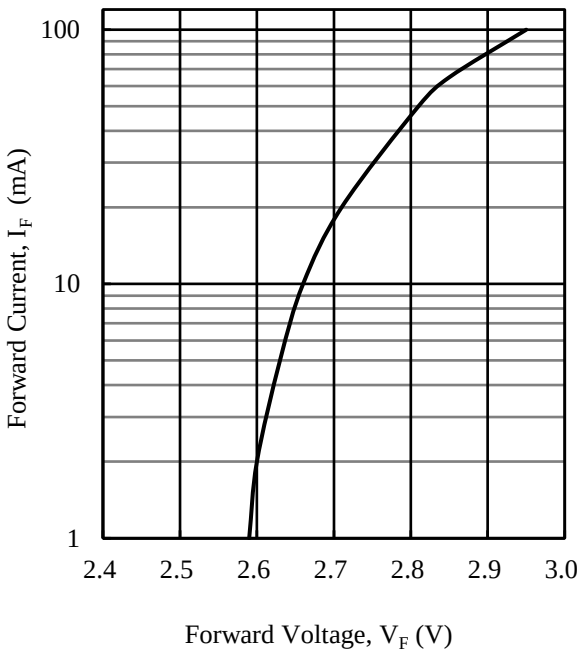


Figure 4. I_F vs. V_F (T_A = 25 °C)

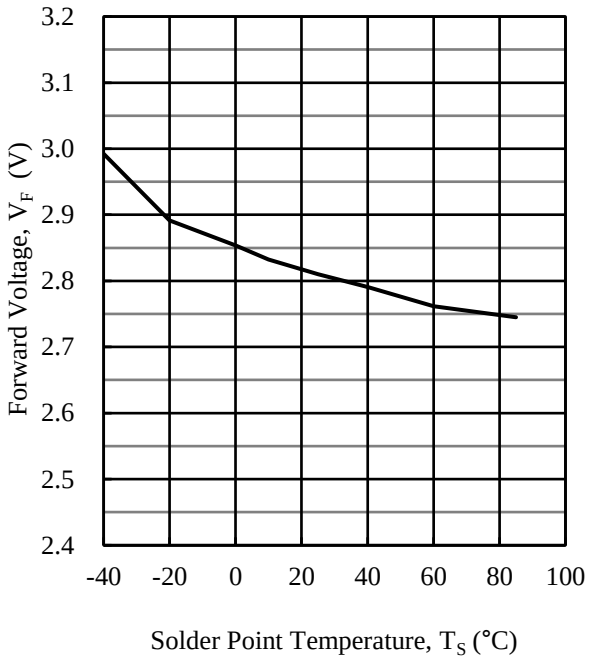


Figure 5. V_F vs. T_S (I_F = 50 mA)

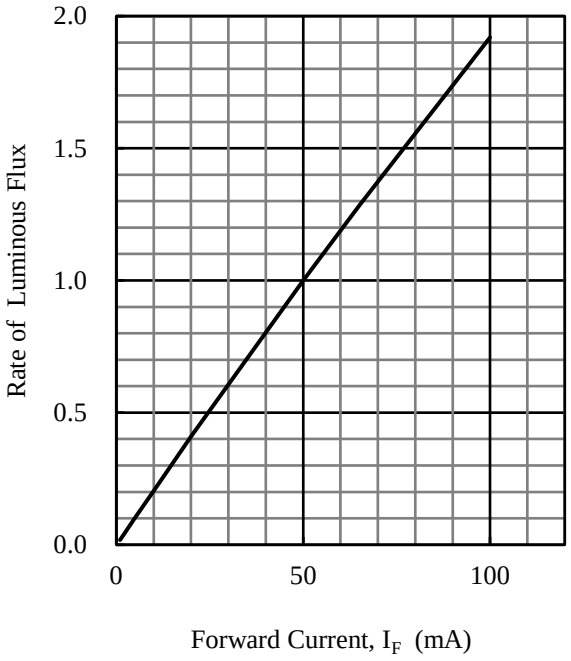


Figure 6. Rate of Luminous Flux – I_F (T_A = 25 °C)

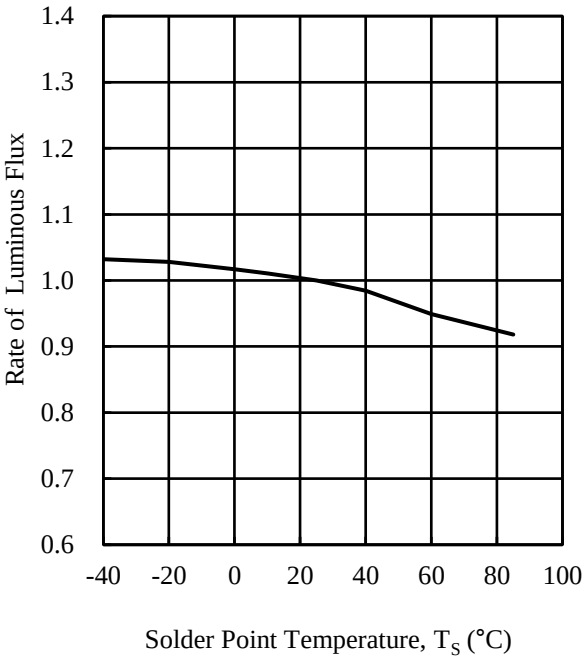


Figure 7. Rate of Luminous Flux vs. T_S (I_F = 50 mA)

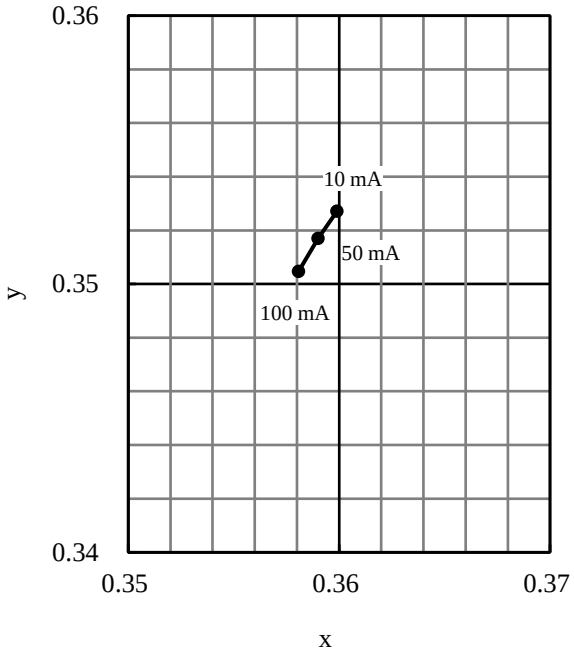


Figure 8. I_F vs. Chromaticity (T_A = 25 °C)

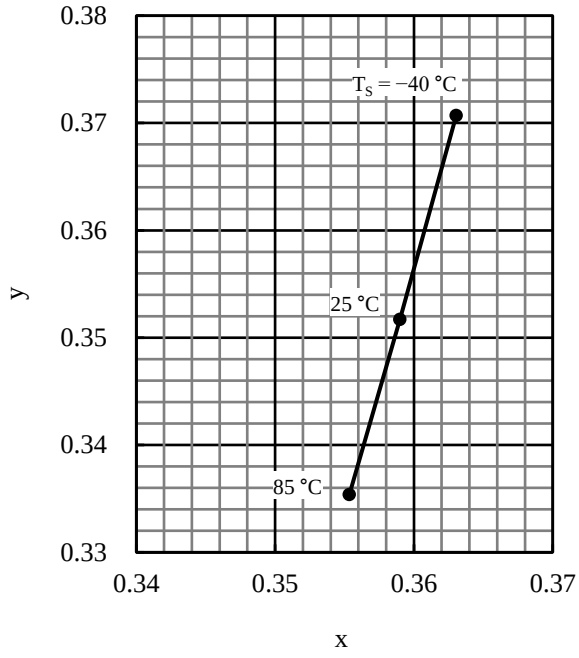


Figure 9. T_S vs. Chromaticity (I_F = 50 mA)

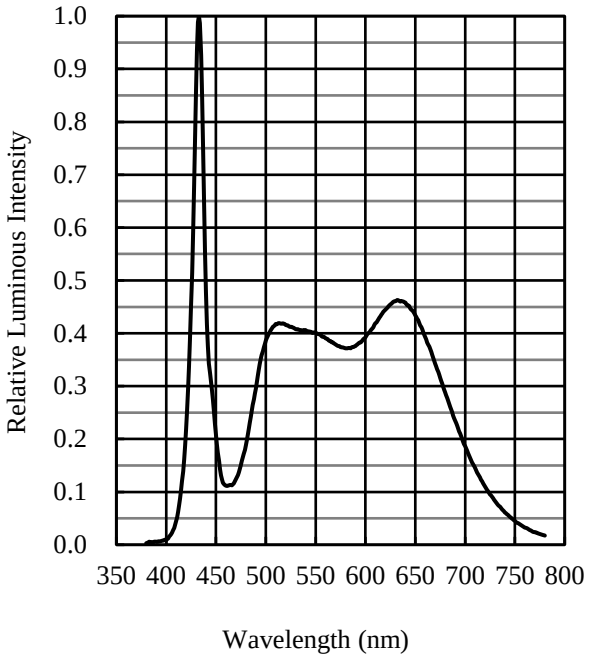


Figure 10. Spectrum (T_A = 25 °C, I_F = 50 mA)

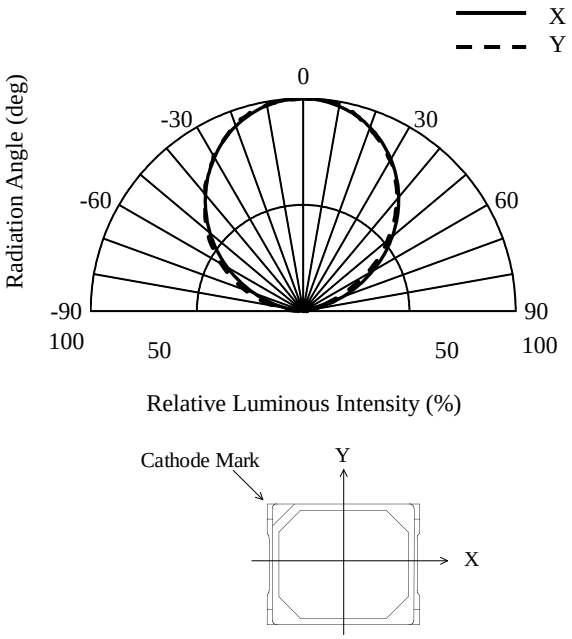
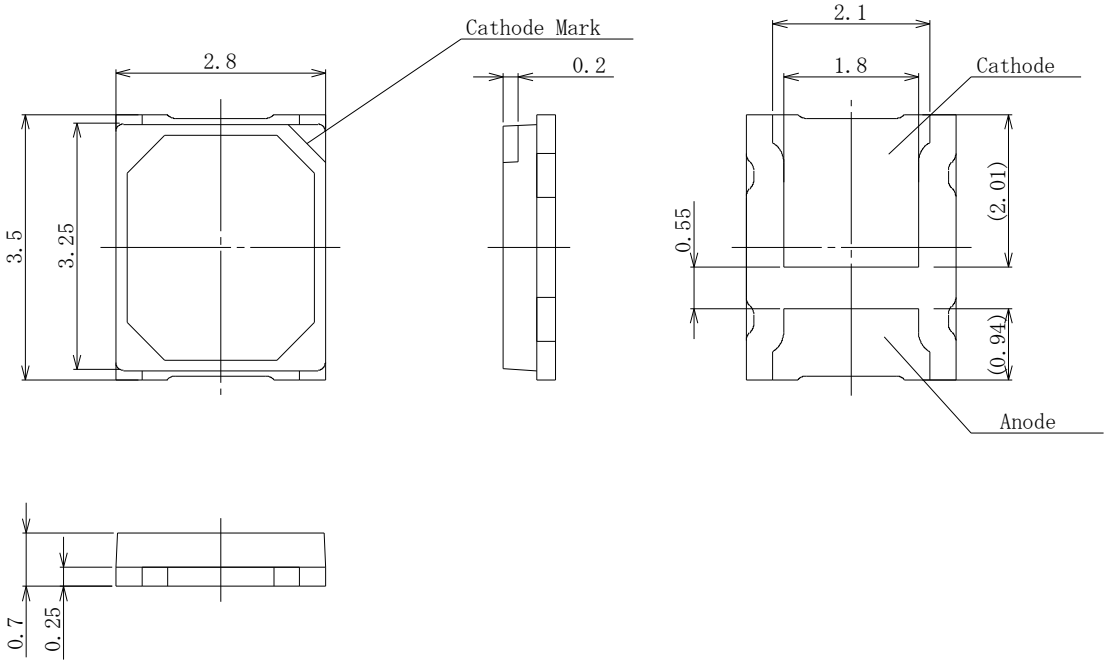


Figure 11. Directivity (T_A = 25 °C, I_F = 50 mA)

Physical Dimensions

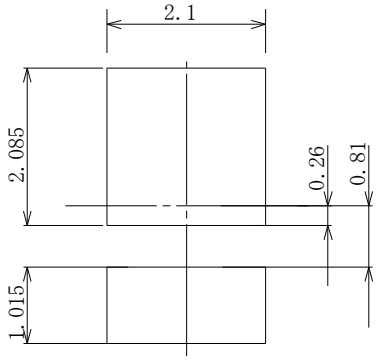
● **Surface Mount (2.8 × 3.5 × 0.7 mm)**



NOTES:

- Dimensions in millimeters
- Tolerance: ±0.2 mm
- All the values in parentheses are reference dimensions.
- Pb-free (RoHS compliant)
- MSL 3 (Moisture Sensitivity Level 3)

● **Land Pattern Example**



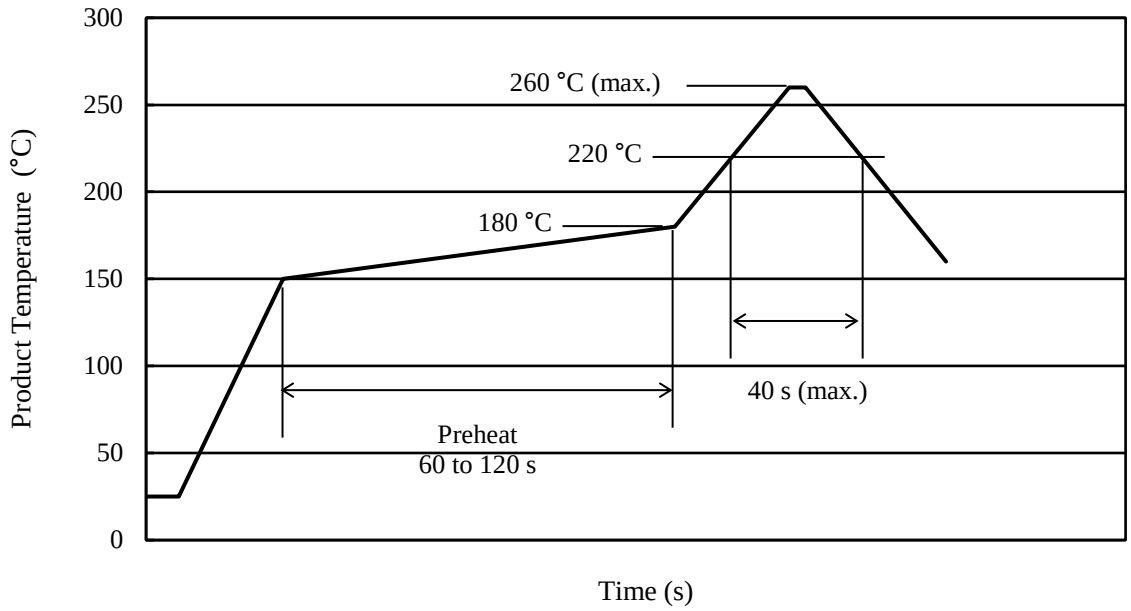
Unit: mm

Soldering Conditions

When soldering the products, it is required to minimize the working time within the following limits:

- Reflow:
  Preheat: 150 to 180 °C / 60 to 120 s
  Solder heating: 220 °C / 40 s (260 °C peak, 2 times)
- Soldering iron: 350 ±10 °C, 3 s, 1 time

● **Reference Reflow Profile**



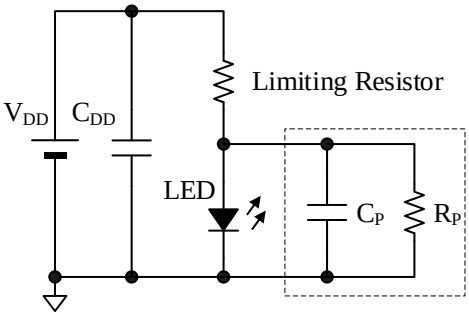
Precautions for Use

● **Measures for Electrostatic Discharge (ESD)**

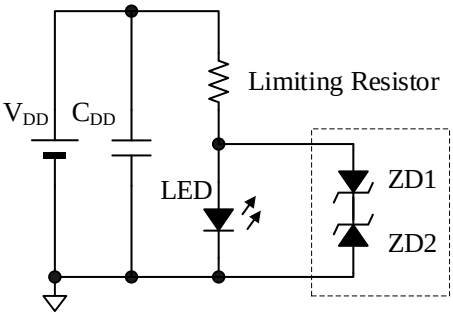
Because this product is sensitive to ESD, it is necessary to take adequate measures against ESD and surge for safe and proper handling. In particular, note that when a voltage that exceeds the absolute maximum rating is applied, the product may be damaged.

● **Reference Protection Circuits for Electrostatic Discharge and Surge**

The following figures show reference protection circuits that prevent the product from any damage due to ESD or surge. Note that these circuits are only examples; therefore, be sure to check the ESD and surge levels in your actual system and to take appropriate measures (e.g., adding a part) as needed.



Example of Adding Filter
(C_P ≥0.01 μF, R_P = 10 kΩ)



Example of Adding Zener Diodes
(ZD1, ZD2: V_Z = 7 V to 8 V)

● **Other**

- After soldering the product, care should be taken not to apply mechanical stress or excessive vibration until it cools to room temperature.
- Do not cool the product rapidly.
- When mounting the product on a board, mounting position and orientation should be taken into account so that any stress due to board warpage is not applied to the product.
- Do not touch the encapsulating resin of the product with sharp objects such as a tweezer or fingernails. Also, do not use the product again after removal.
- Do not touch the product after mounting it on a board.
- The product emits a high-power light. Therefore, care should be taken not to look at the light emission directly for a long time because it may hurt your eyes.
- Use the product at rated current (sorting current) as much as possible. When the product is used at a current lower than the rated current (sorting current), a variation in forward voltage or luminous intensity may increase. Therefore, care should be taken for such variation when you use the product at low current.
- When the product comes into contact with material containing sulfide or is exposed to an atmosphere containing sulfide gas, the following may be caused: discoloration in the silver plating of the metal parts inside and outside the package; change in the brightness and tint of the original luminescent color.
- When using the product, care should be taken not to apply a voltage in the opposite direction of the LED.

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