

$\Phi_V = 19.6 \text{ lm}$, $V_F = 2.71 \text{ V}$
High Color Rendering Index, Surface Mount LED
SEP1AQ1L92LL

Description

The SEP1AQ1L92LL is a surface mount white LED. Using the product with the SEP1AQ1L92SS 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.) ($I_F = 50 \text{ mA}$)
- Forward Voltage, V_F ----- 2.71 V (typ.) ($I_F = 50 \text{ mA}$)
- Chromaticity (x, y) ----- (0.3368, 0.3724)
- Viewing Angle, $2\theta_{1/2}$ ----- 115 deg
- MSL 3
- RoHS Compliant
- Pb-free, Reflow Soldering
- High Reliability

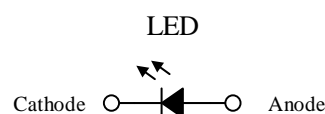
Applications

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



Not to scale

This product uses technology licensed from the National Institute for Materials Science (NIMS).
This technology is protected by worldwide patents, including Japan Patent No. 3931239 owned by NIMS.

Absolute Maximum Ratings

Unless otherwise specified, $T_A = 25\text{ }^\circ\text{C}$.

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	$^\circ\text{C}$
Storage Temperature ⁽¹⁾	T_{STG}	⁽²⁾	-40 to 100	$^\circ\text{C}$
Junction Temperature	T_J		115	$^\circ\text{C}$

Electrical / Optical Characteristics

Unless otherwise specified, $T_A = 25\text{ }^\circ\text{C}$.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	$I_F = 50\text{ mA}$	2.60	2.71	3.00	V
Reverse Current	I_R	$V_R = 3\text{ V}$	—	—	10	μA
Luminous Flux	Φ_V	$I_F = 50\text{ mA}$	14.0	19.6	22.0	lm
Chromaticity	x	$I_F = 50\text{ mA}$	—	0.3368	—	—
	y		—	0.3724	—	—
Viewing Angle	$2\theta_{1/2}$	$I_F = 50\text{ mA}$	—	115	—	deg
Junction-to Solder Point Thermal Resistance	$\theta_{(J-S)}$	⁽²⁾	—	25	—	$^\circ\text{C/W}$

Mechanical Characteristics

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

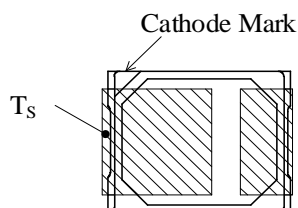


Figure 1. T_S Measurement Point

⁽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).

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Luminous Flux Bins

The values have a tolerance of $\pm 10\%$.

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 $\pm 3\%$.

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
L2
L3
L4
L5

Chromaticity Bins

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

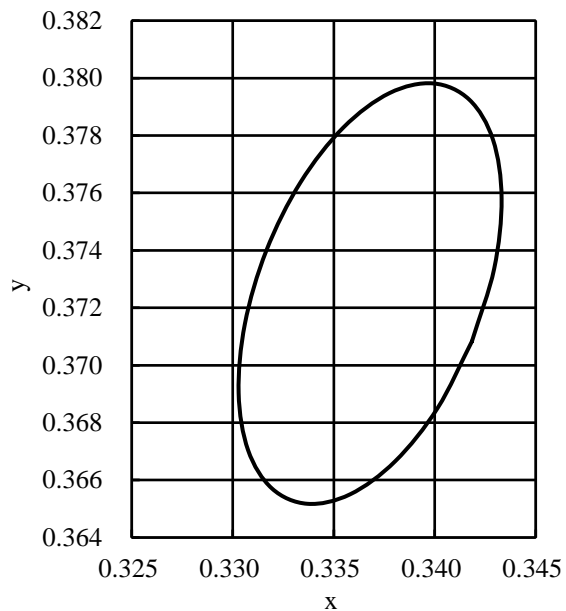


Table 1. Chromaticity Diagram: Region and Coordinates

Parameter	MacAdam Ellipse
	3-step
Chromaticity Center Coordinate, x	0.3368
Chromaticity Center Coordinate, y	0.3724
Ellipse Major Axis	0.00835
Ellipse Minor Axis	0.00515
Rotation Angle, θ	38°

Figure 2. Chromaticity Diagram

Derating Curves

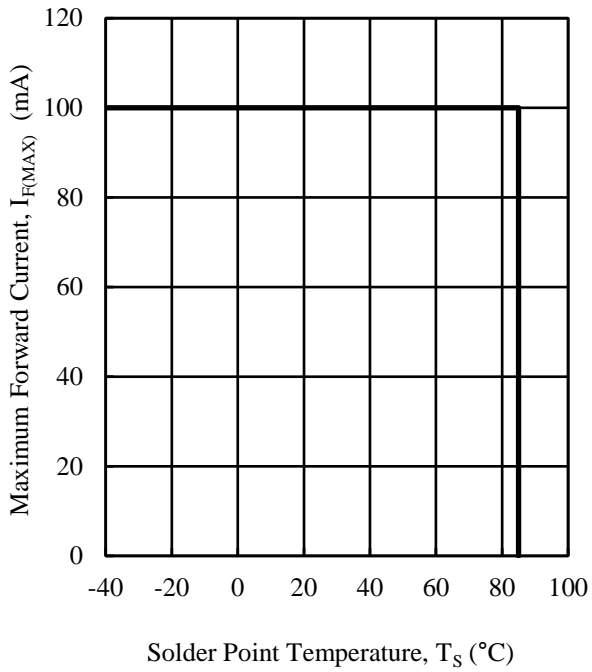


Figure 3. $I_{F(MAX)}$ vs. T_S

Characteristic Curves

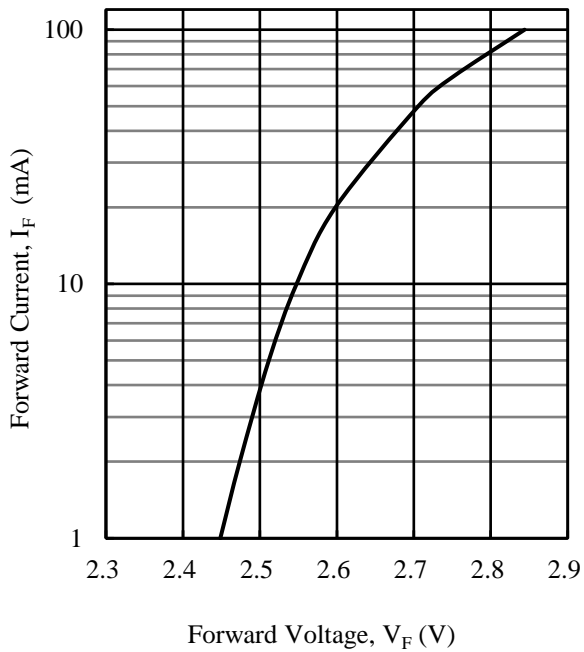


Figure 4. I_F vs. V_F ($T_A = 25\text{ °C}$)

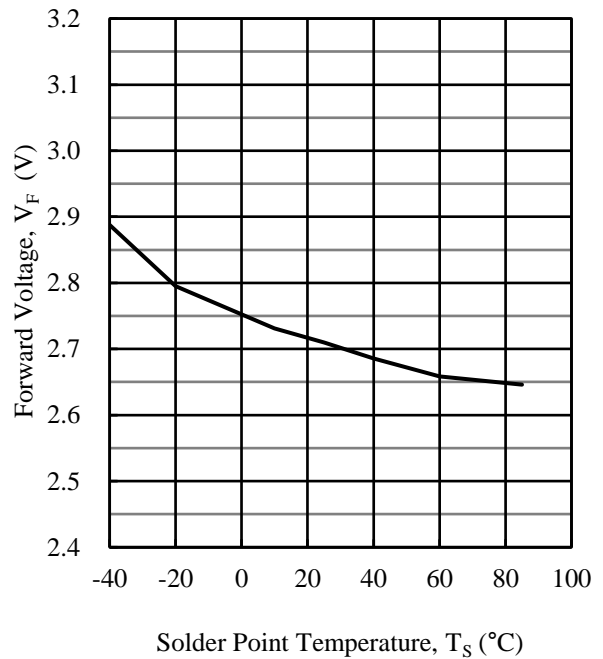


Figure 5. V_F vs. T_S ($I_F = 50\text{ mA}$)

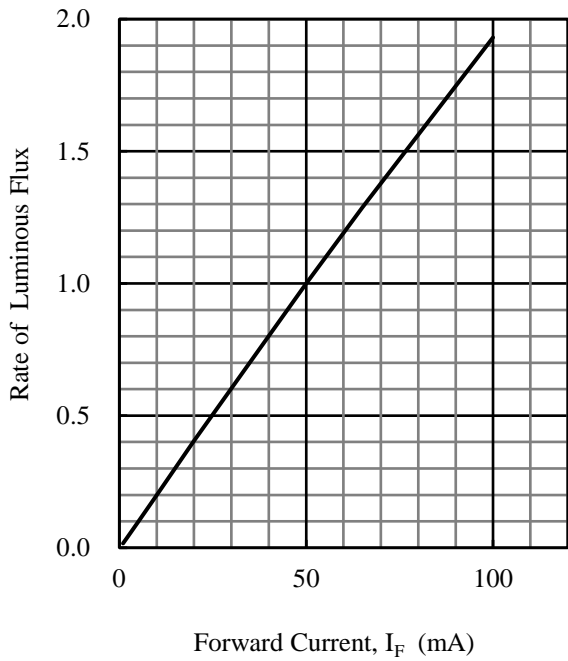


Figure 6. Rate of Luminous Flux – I_F ($T_A = 25\text{ °C}$)

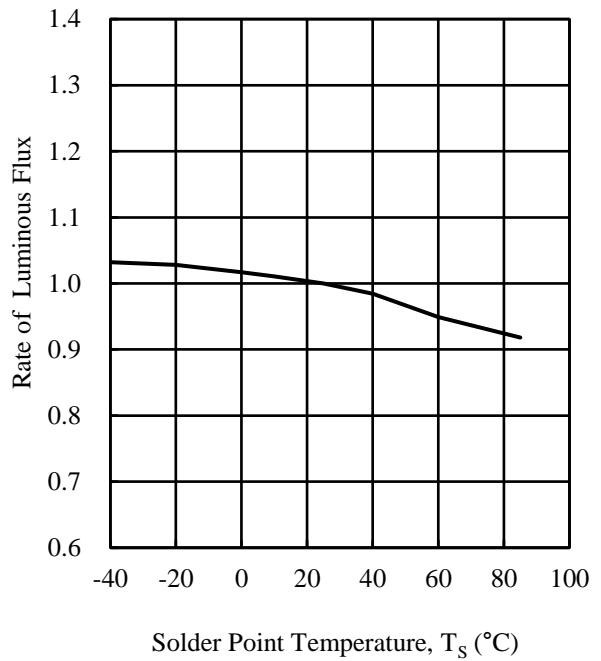


Figure 7. Rate of Luminous Flux vs. T_S ($I_F = 50\text{ mA}$)

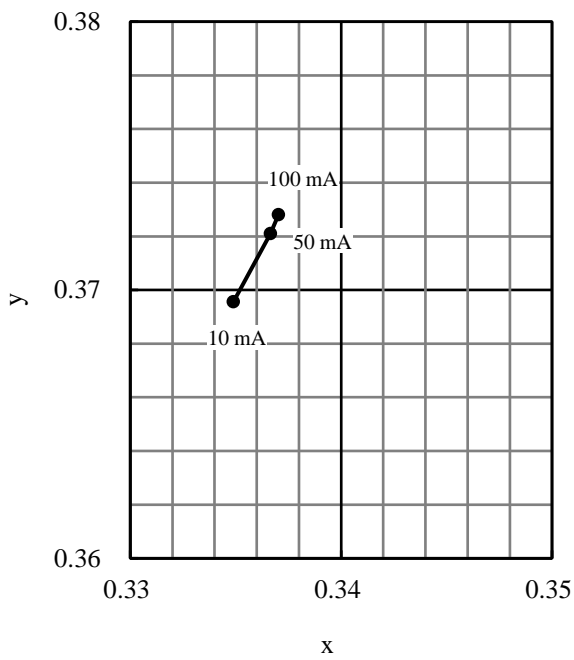


Figure 8. I_F vs. Chromaticity ($T_A = 25\text{ °C}$)

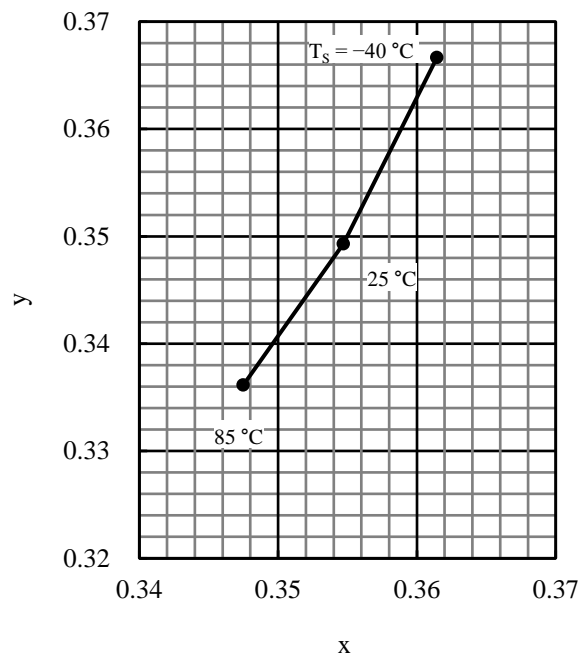


Figure 9. T_S vs. Chromaticity ($I_F = 50\text{ mA}$)

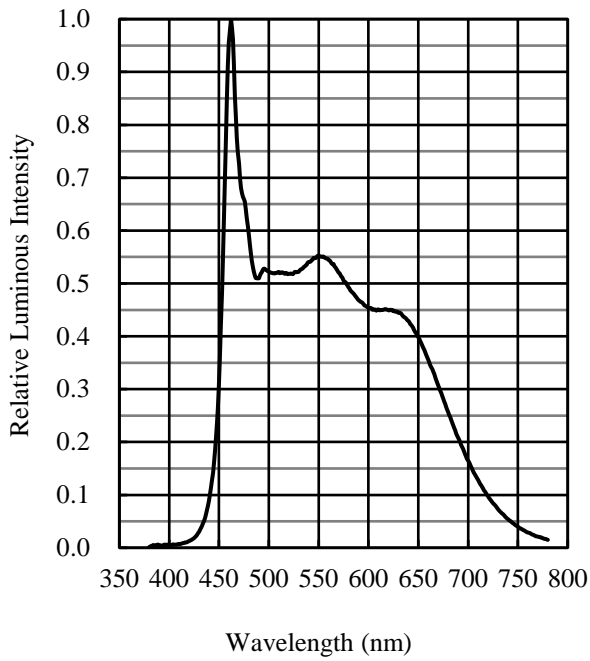


Figure 10. Spectrum ($T_A = 25\text{ }^\circ\text{C}$, $I_F = 50\text{ mA}$)

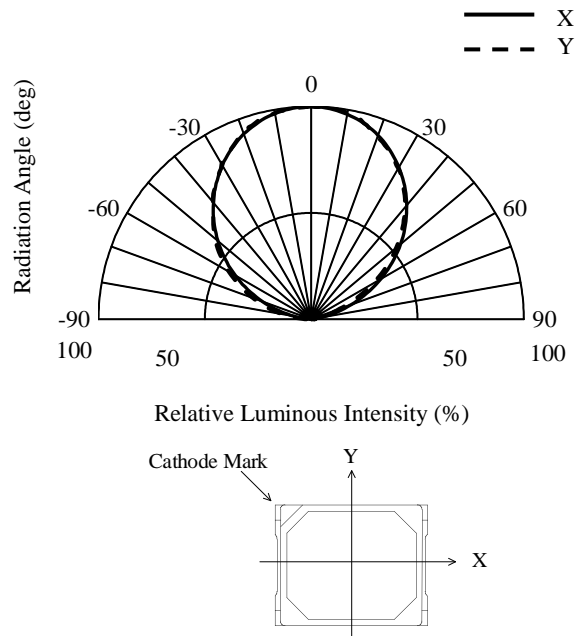
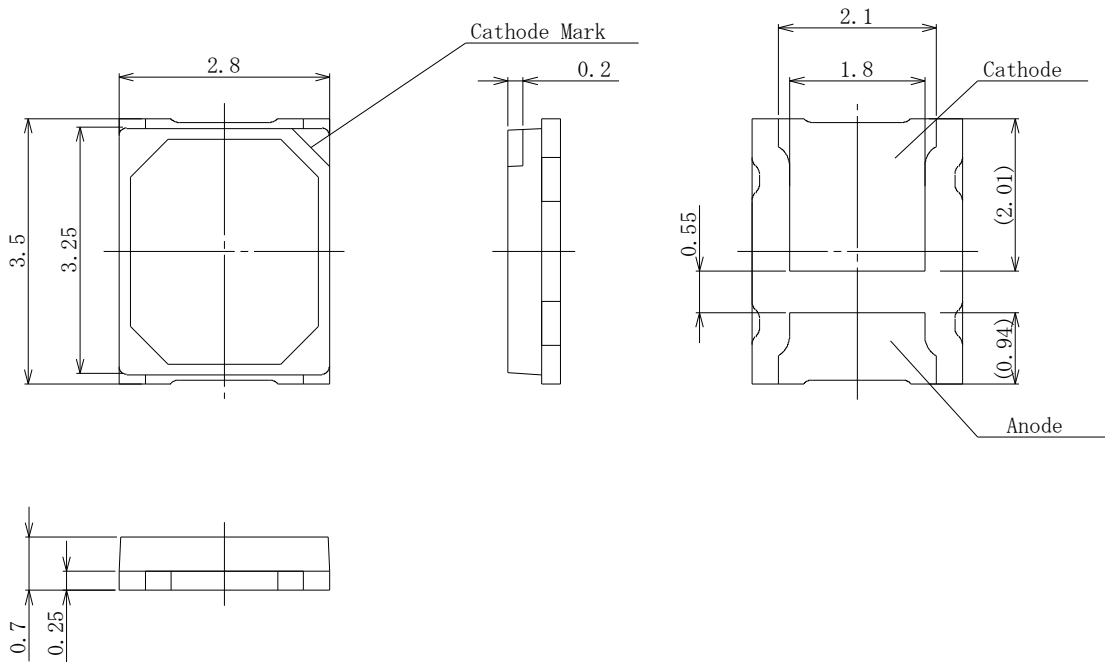


Figure 11. Directivity ($T_A = 25\text{ }^\circ\text{C}$, $I_F = 50\text{ mA}$)

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Physical Dimensions

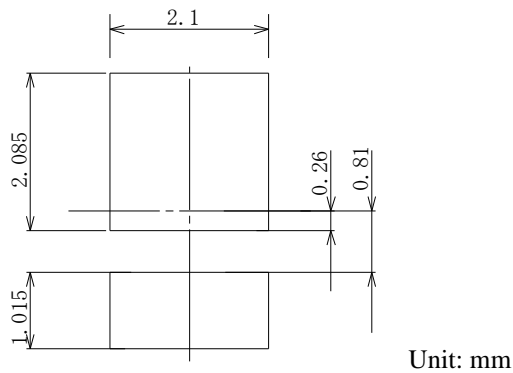
• Surface Mount (2.8 × 3.5 × 0.7 mm)



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

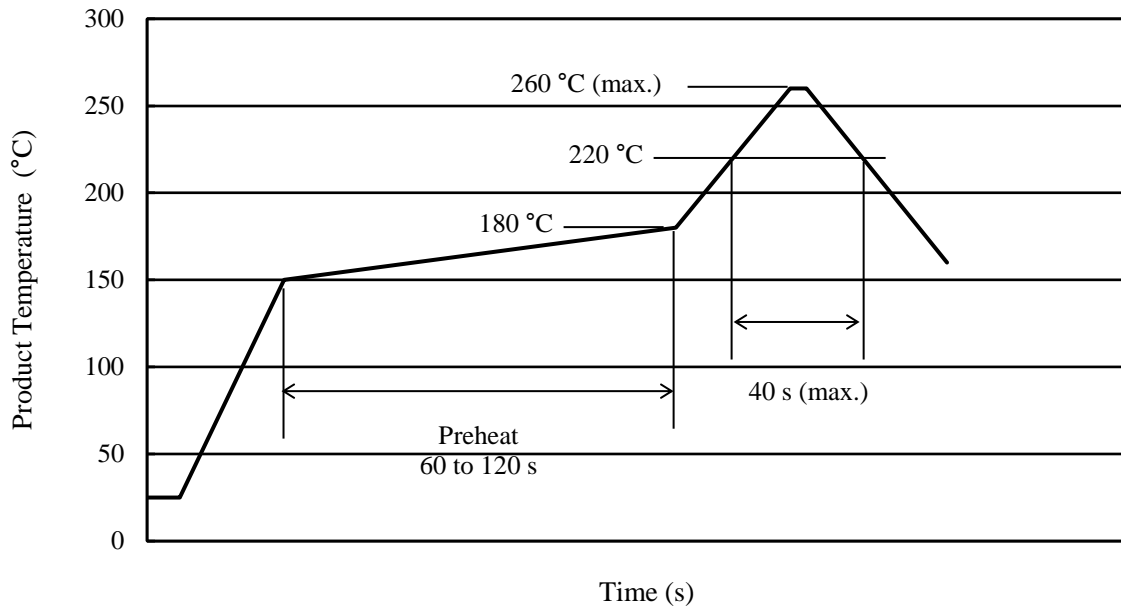


Soldering Conditions

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



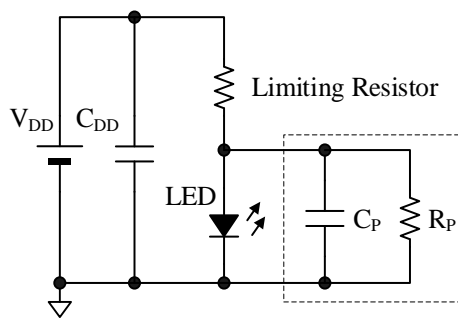
Precautions for Use

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

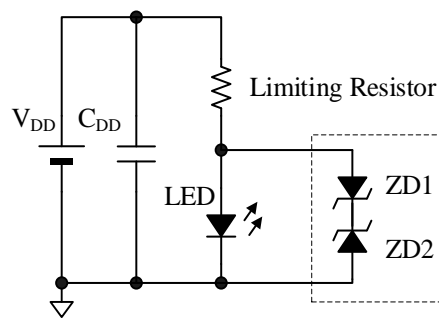
Because this product is sensitive to ESD, it is necessary to take adequate measures against ESD and surge for safe and proper handling. In particular, note that when a voltage that exceeds the absolute maximum rating is applied, the product may be damaged.

• **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
($C_P \geq 0.01 \mu\text{F}$, $R_P = 10 \text{ k}\Omega$)



Example of Adding Zener Diodes
($ZD1, ZD2: V_Z = 7 \text{ V to } 8 \text{ V}$)

• **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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