Φ_V = 60 lm, V_F = 2.9 V
Ultra-high Brightness, Surface Mount LED

SEP1WD1L21DA

Preliminary **Data Sheet**

Description

The SEP1WD1L21DA is a surface mount white LED. The product includes a protection diode for ESD protection.

Features

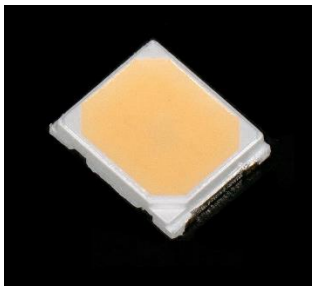
- Color ---------- White
- Luminous Flux, Φ_V ---------- 60 lm (typ.) (I_F = 150 mA)
- Forward Voltage, V_F ---------- 2.9 V (typ.) (I_F = 150 mA)
- Chromaticity (x, y) ---------- (0.3447, 0.3553)
- Viewing Angle, $2\theta_{1/2}$ ---------- 120 deg
- MSL 3
- RoHS Compliant
- Pb-free, Reflow Soldering
- High Reliability

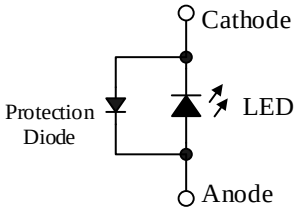
Applications

- In-vehicle lighting

Package

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





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 specifically noted, T_A = 25 °C.

Parameter	Symbol	Conditions	Rating	Unit
Power Dissipation	P_D		864	mW
Forward Current	I_F		240	mA
Forward Current Reduction	ΔI_F	$T_A \geq 72$ °C	−3.6	mA/°C
Pulse Forward Current	I_{FP}	Frequency = 1 kHz Pulse Width ≤ 100 µs	260	mA
Reverse Current	I_R		10	mA
Operating Temperature	T_{OP}		−40 to 100	°C
Storage Temperature	T_{STG}		−40 to 100	°C
Junction Temperature	T_J		150	°C
Thermal Resistance	$\theta_{(J\text{-}A)}$		80	°C/W
	$\theta_{(J\text{-}S)}$		25	°C/W

Electrical / Optical Characteristics

Unless specifically noted, T_A = 25 °C.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	I_F = 150 mA	2.5	2.9	3.6	V
Reverse Voltage	V_R	I_R = 1 mA	—	0.8	—	V
Luminous Flux	Φ_V	I_F = 150 mA	—	60	—	lm
Chromaticity	x	I_F = 150 mA	—	0.3447	—	—
	y		—	0.3553	—	—
Viewing Angle	$2\theta_{1/2}$	I_F = 150 mA	—	120	—	deg

Mechanical Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Unit
Package Weight		—	0.0214	—	g

Chromaticity Bins

Figure 1 is the chromaticity diagram plotting chromaticity bins, with a tolerance of ±0.01.

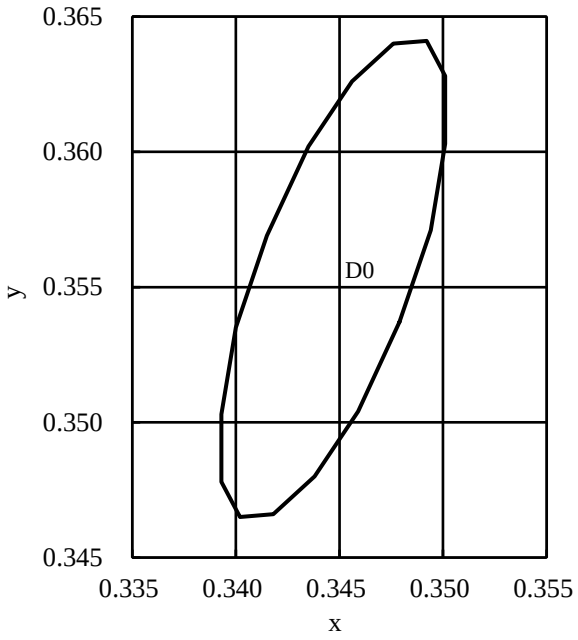


Figure 1. Chromaticity Diagram

Table 1. Chromaticity Diagram: Region and Coordinates

Parameter	MacAdam Ellipse
	5-step
Chromaticity Center Coordinate, x	0.3447
Chromaticity Center Coordinate, y	0.3553
Ellipse Major Axis	0.016399
Ellipse Minor Axis	0.005974
Rotation Angle, θ	62.8080°

Derating Curves

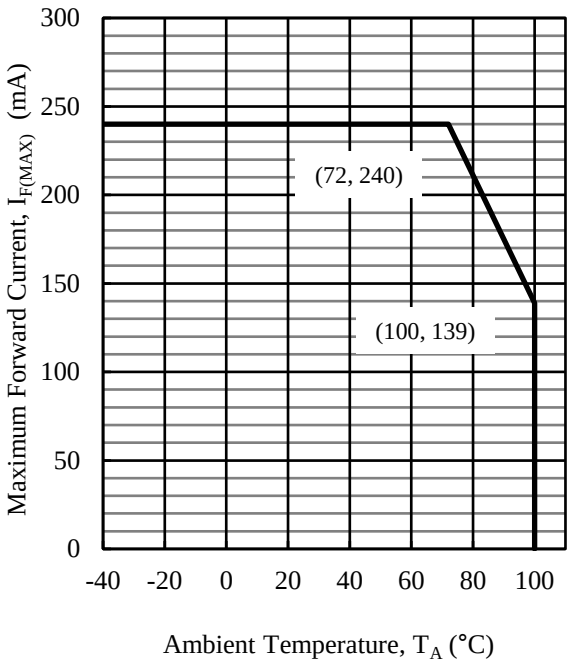


Figure 2. $I_{F(MAX)}$ vs. T_A

Characteristic Curves

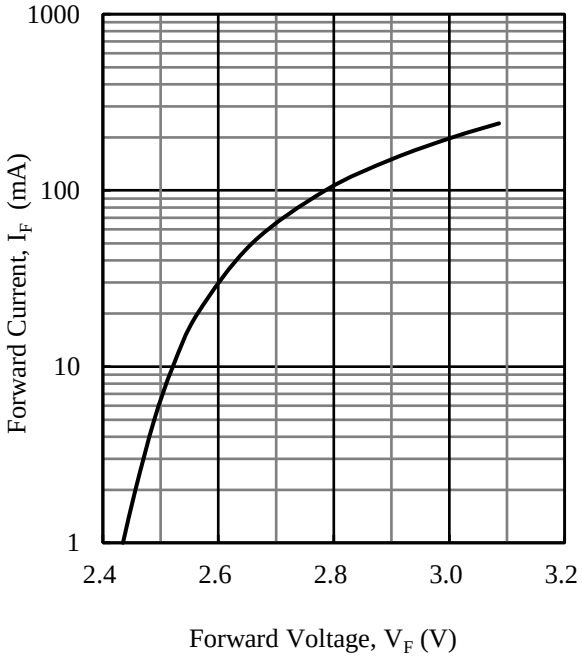


Figure 3. I_F vs. V_F

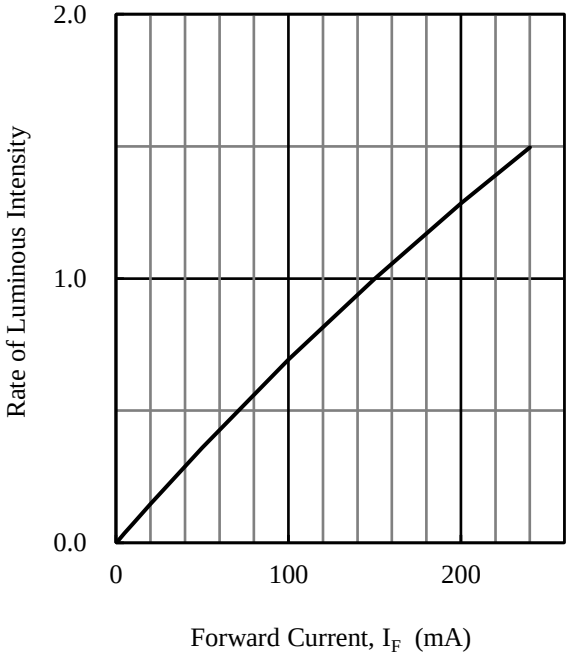


Figure 4. Rate of Luminous Intensity vs. I_F

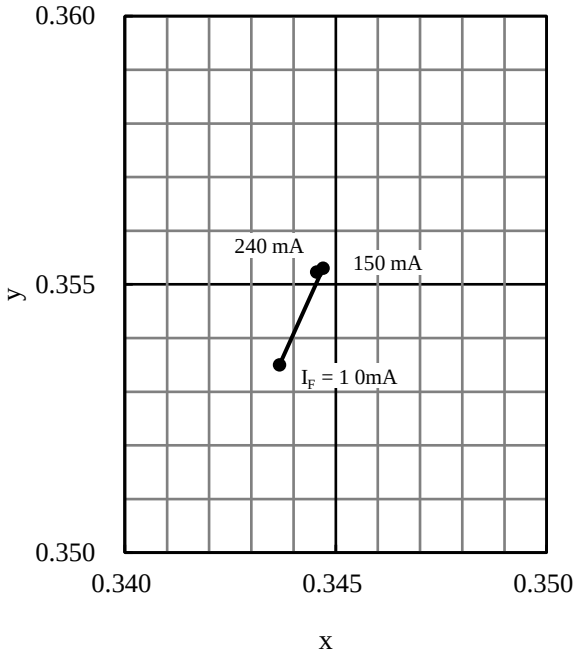


Figure 5. I_F vs. Chromaticity

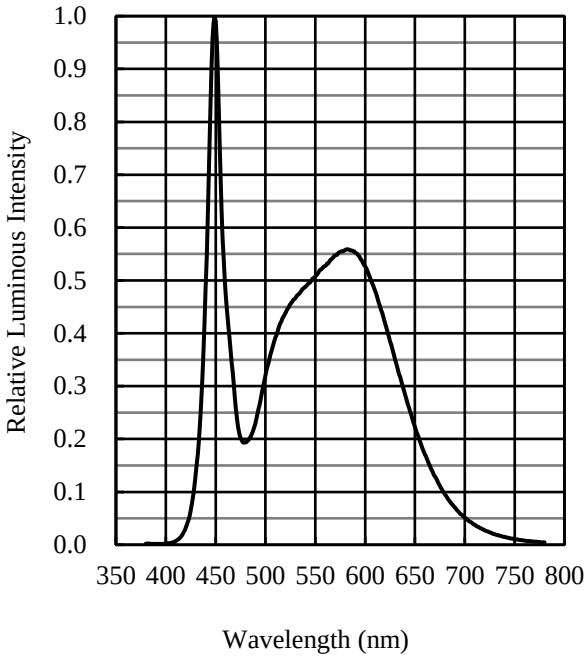
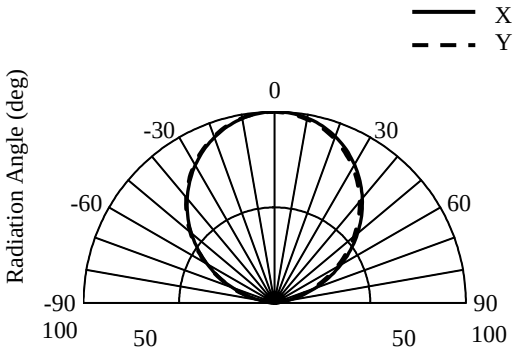


Figure 6. Spectrum



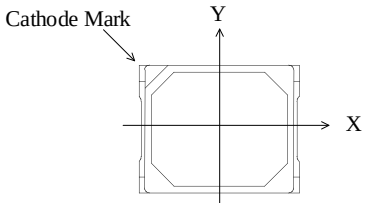
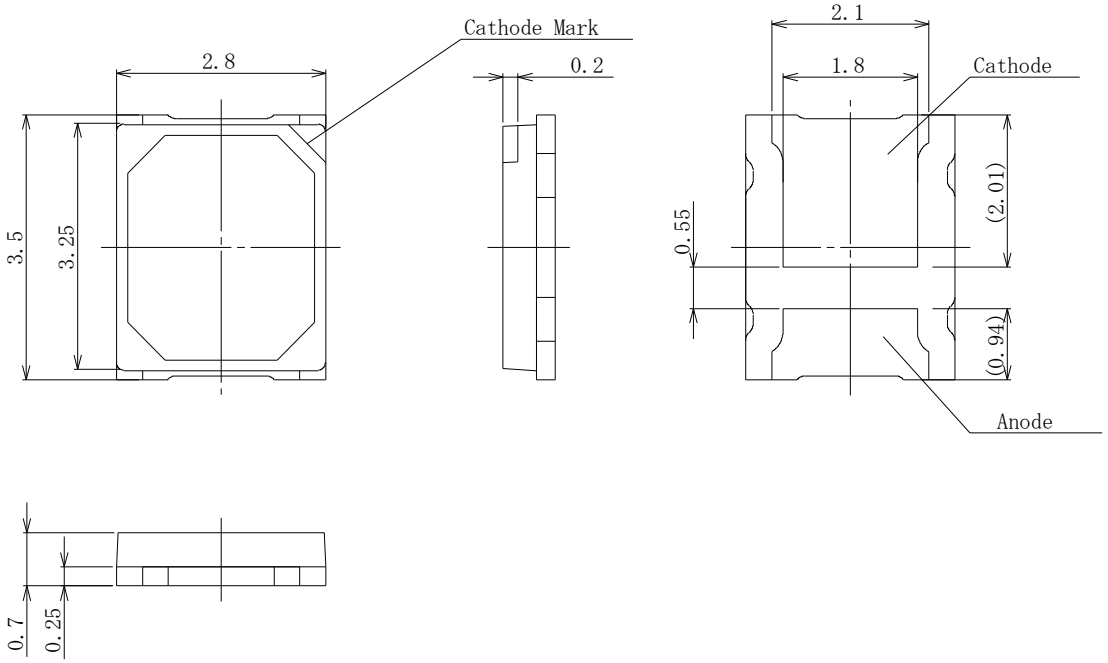


Figure 7. Directivity

Physical Dimensions

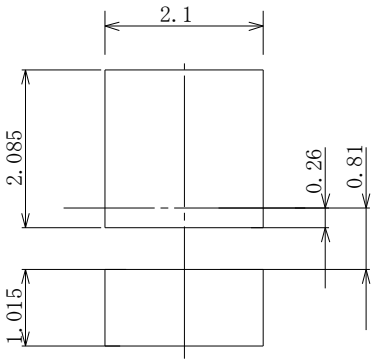
● **Surface Mount (2.8 × 3.5 × 0.7 mm)**



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**



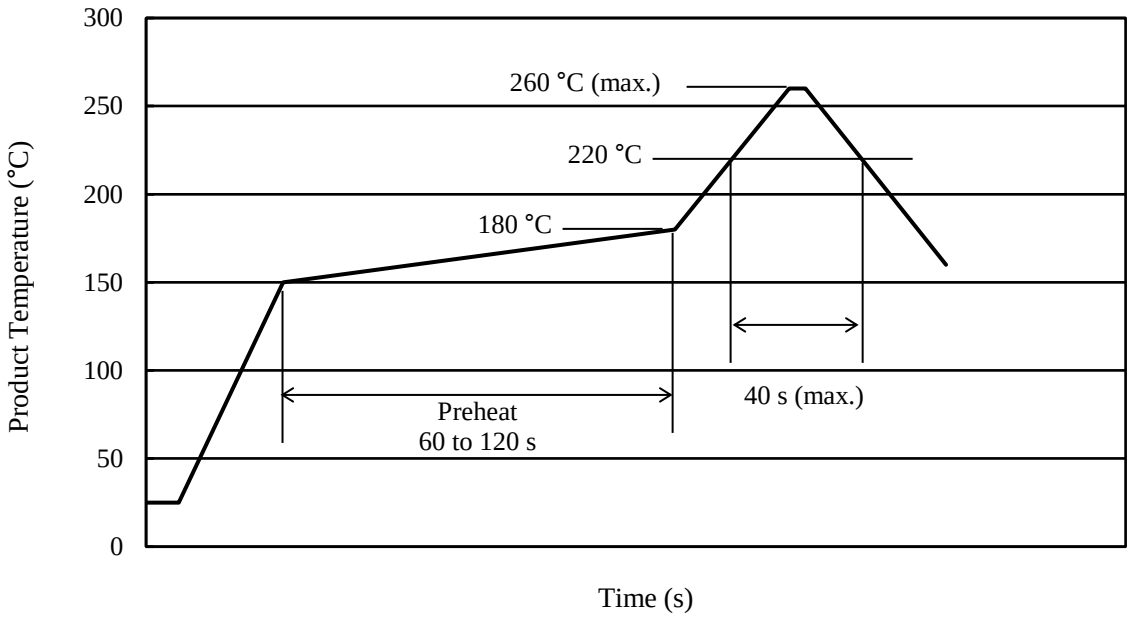
Unit: mm

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**

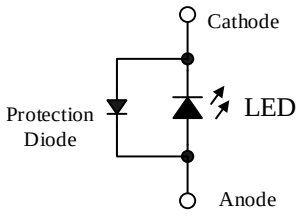


Precautions for Use

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

In general, InGaN-based elements such as blue LEDs are very sensitive to ESD. For enhanced ESD withstand capability, this product is designed to include a surge protection diode as shown in the figure below. Therefore, the following ESD withstand capabilities are ensured: ≥200 V on machine model (C = 200 pF, R = 0 Ω), and ≥2000 V on human body model (C = 100 pF, R = 1.5 kΩ). Note that, however, all the values mentioned above are not guaranteed.

When using the product, care should be taken not to apply a voltage in the opposite direction of the LED. If a voltage is applied in the opposite direction of the LED, the surge protection diode becomes conductive, and then an unintended current may flow through the set.



● **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.

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