

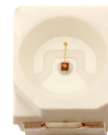


## TECHNOLOGY DATA SHEET & SPECIFICATIONS

MODEL: 3528G3C-KHC-A

### Features

- PLCC-2 package.
- White package.
- Wide viewing angle.
- Computable with automatic placement equipment.
- Pb-free



### Descriptions

• The 3528 series has wide viewing angle and optimized light coupling by inter reflector. This feature makes TOP LED ideal for light pipe application. The low current requirement makes this device ideal for portable equipment or any other application where power is at a premium.

### Usage Notes:

- Surge will damage the LED
- When using LED, it must use a protective resistor in series with DC current about 20mA

### Applications

- Automotive: backlighting in dashboard and switch.
- Telecommunication: indicator and backlighting in telephone and fax.
- Flat backlight for LCD, switch and symbol.
- Light pipe application.
- General use.



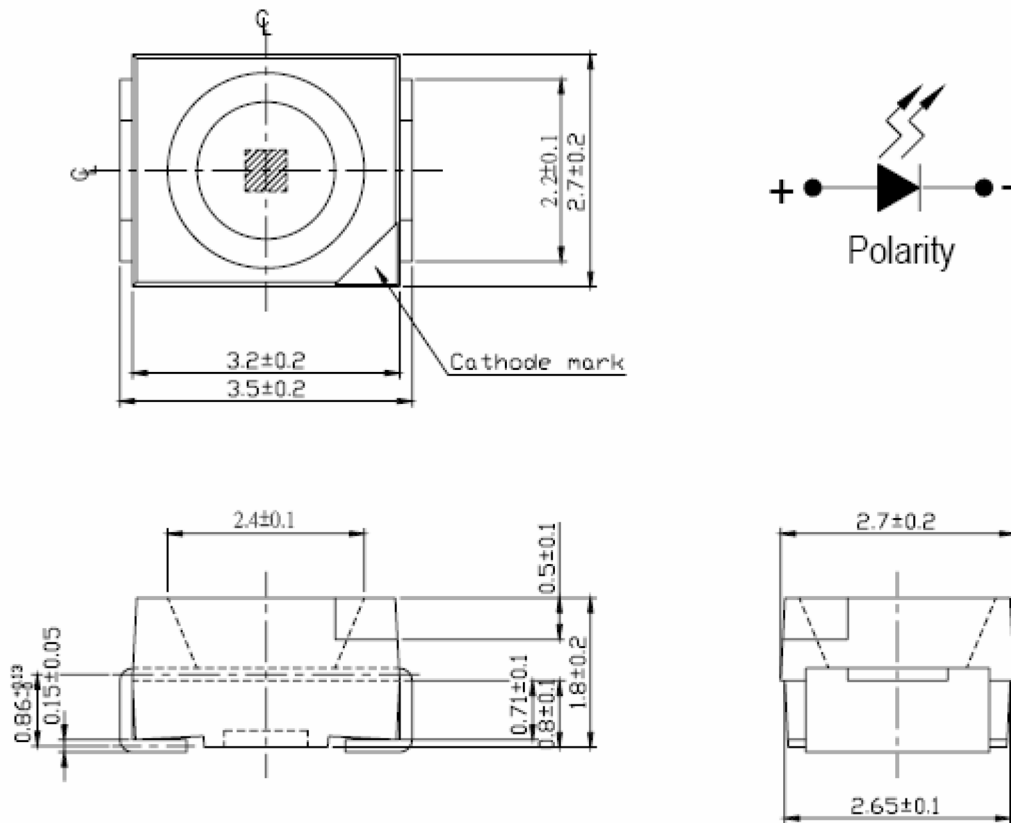
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### Device Selection Guide

| LED Part No.  | Chip     |               | Lens Color  |
|---------------|----------|---------------|-------------|
|               | Material | Emitted Color |             |
| 3528G3C-KHC-A | InGaN    | Green         | Water clear |

### Package Dimensions



### Notes:

- Other dimensions are in millimeters, tolerance is 0.25mm except being specified.
- Protruded resin under flange is 1.5mm Max LED.
- Bare copper alloy is exposed at tie-bar portion after cutting.



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**Absolute Maximum Rating ( $T_a=25^{\circ}\text{C}$ )**

| Parameter                                 | Symbol    | Absolute Maximum Rating                                                                                   | Unit               |
|-------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------|--------------------|
| Peak Forward Current<br>(Duty 1/10 @1KHz) | $I_F$     | 100                                                                                                       | mA                 |
| Forward Current                           | $I_{FM}$  | 25                                                                                                        | mA                 |
| Reverse Voltage                           | $V_R$     | 5                                                                                                         | V                  |
| Power Dissipation                         | $P_D$     | 120                                                                                                       | mW                 |
| Operating Temperature                     | $T_{opr}$ | $-40\sim+80$                                                                                              | $^{\circ}\text{C}$ |
| Storage Temperature                       | $T_{stg}$ | $-40\sim+100$                                                                                             | $^{\circ}\text{C}$ |
| Soldering Temperature                     | $T_{sol}$ | Reflow Soldering : $260^{\circ}\text{C}$ for 10 sec.<br>Hand Soldering : $350^{\circ}\text{C}$ for 3 sec. |                    |



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MODEL: 3528G3C-KHC-A

Electro-Optical Characteristics ( $T_a=25^{\circ}\text{C}$ )

| Parameter                | Symbol          | *Chip Rank | Min. | Typ. | Max. | Unit          | Test Condition     |
|--------------------------|-----------------|------------|------|------|------|---------------|--------------------|
| Luminous Intensity       | $I_v$           | B          | 560  | ---  | 1000 | mcd           | IF=20mA<br>(Note1) |
| Viewing Angle            | $2\theta_{1/2}$ | ---        | ---  | 120  | ---  | Deg           | (Note 2)           |
| Peak Emission Wavelength | $\lambda_p$     | ---        | 520  | ---  | 530  | nm            | IF=20mA            |
| Spectral Line Half-Width | $\Delta\lambda$ | ---        | ---  | 35   | ---  | nm            | IF=20mA            |
| Forward Voltage          | $V_F$           | ---        | 3.0  | ---  | 3.6  | V             | IF=20mA            |
| Reverse Current          | $I_R$           | ---        | ---  | ---  | 10   | $\mu\text{A}$ | VR=5V              |

### Note:

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2.  $\theta_{1/2}$  is the off-axis angle at which the luminous intensity is half the axial luminous intensity.



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### Reliability Test Items And Conditions

| No | Item                                                       | Test Condition                                                                                                                                                                    | Sample Number | Criteria for Judging                                                        | Ac/Re |
|----|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------|-------|
| 1  | Solder ability                                             | $T=235 \pm 5^{\circ}\text{C}$ $T=5\text{sec.}$                                                                                                                                    | 15            | Good wetting                                                                | 0/1   |
| 2  | Soldering heat                                             | $T=260 \pm 5^{\circ}\text{C}$ $T=10\text{sec.}$                                                                                                                                   | 15            | $IV \geq \text{LSL}^*$<br>$VF \leq \text{USL}^*$<br>$IR \leq \text{USL}$    | 0/1   |
| 3  | Rapid change of temperature followed by: damp heat, cyclic | L: $-40^{\circ}\text{C}$ 10min<br>(2~3) min<br>H: $+100^{\circ}\text{C}$ 10min<br>5cycle<br>$T = (25 \sim 55)^{\circ}\text{C}$<br>RH: (90~95) %<br>2cycle 48h<br>recovery time 2h | 11            | $IV \geq \text{LSL}$<br>$VF \leq \text{USL}$<br>$IR \leq \text{USL}$        | 0/1   |
| 4  | Damp heat, cyclic                                          | $T = (25 \sim 55)^{\circ}\text{C}$<br>RH: (90~95) %<br>6 cycle 144h<br>recovery time 2h                                                                                           | 11            | $IV \geq 0.7\text{LSL}$<br>$VF \leq 1.1\text{USL}$<br>$IR \leq 2\text{USL}$ | 0/1   |
| 5  | Electrical endurance                                       | $I_F = 30\text{mA}$<br>$T = 1000\text{h}$                                                                                                                                         | 22            | $IV \geq 0.7\text{LSL}$<br>$VF \leq 1.1\text{USL}$<br>$IR \leq 2\text{USL}$ | 0/1   |
| 6  | Storage at high temperature                                | $T_{\text{stg}} = 100 \pm 2^{\circ}\text{C}$<br>$t = 1000\text{h}$                                                                                                                | 15            | $IV \geq \text{LSL}$<br>$VF \leq \text{USL}$<br>$IR \leq \text{USL}$        | 0/1   |
| 7  | Terminal strength                                          | Tensile: $W = 5\text{N}$ $t = 30\text{s}$<br><b>Bending: <math>W = 2.5\text{N}</math> 2times</b>                                                                                  | 15            | No damage                                                                   | 0/1   |

\*U.S.L.: Upper Standard Level

\* L.S.L.: Lower Standard Level



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### APPLICATION NOTES:

#### 1)Soldering:

##### ① Manual soldering by soldering iron:

The use of a soldering iron of less than 25W is recommended and the temperature of the iron must be kept at no higher than 300°C.

##### ② Reflow soldering:

a. The temperature profile as shown in Fig.3 is recommended for soldering SMD LED by the reflow furnace.

b. Care must be taken that the products be handled after their temperature has dropped down to the normal room temperature after soldering.

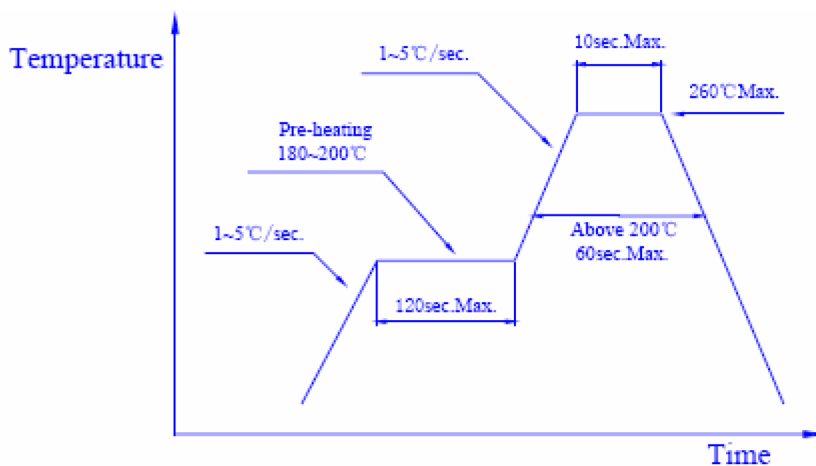


Fig.3

#### 2)Post solder cleaning:

When cleaning after soldering is needed, the following conditions must be adhered to.



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- ① Cleaning solvents: Freon TF or equivalent or alcohol.
- ② Temperature: 50°C Max. for 30 seconds or 30°C Max. for 3 minutes
- ③ Ultrasonic: 300W Max.
- 3) OTHERS:
  - a. Care must be taken not to cause stress to the epoxy resin portion of SMD LED while it is exposed to the high temperature.
  - b. Care must be taken not to rub the epoxy resin portion of SMD LED with a hard or sharp edged article such as the sand blast and the metal hook as the epoxy resin is rather soft and liable to be damaged.