

CUSTOMER :

No. : - .

EDIT : 0 (1/12)

DATE : 2007/08/07

## SPECIFICATIONS FOR APPROVAL

PRODUCT : 3528 SIZE Warm WHITE WLP LED (TOP VIEW)

MODEL NAME : ADLSM0-3528WAAC-C100-L1

(CUSTOMER P/N : )

| APPROVAL                                                                                                                                     |  |       | REVISION                             |
|----------------------------------------------------------------------------------------------------------------------------------------------|--|-------|--------------------------------------|
| CHKD.                                                                                                                                        |  | APPD. | 0: '07. 08. 07 : a new establishment |
|                                                                                                                                              |  |       |                                      |
|                                                                                                                                              |  |       |                                      |
| REMARK                                                                                                                                       |  |       |                                      |
| ADL = ADIVA LED<br>SM = SMD<br>0 = COLOR (WHITE)<br>3528 = SIZE<br>WAAC = WARM WHITE<br>C100 = 110 DEG VIEWING ANGLE<br>L1 = INTERNAL NUMBER |  |       |                                      |

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|       |       |       |

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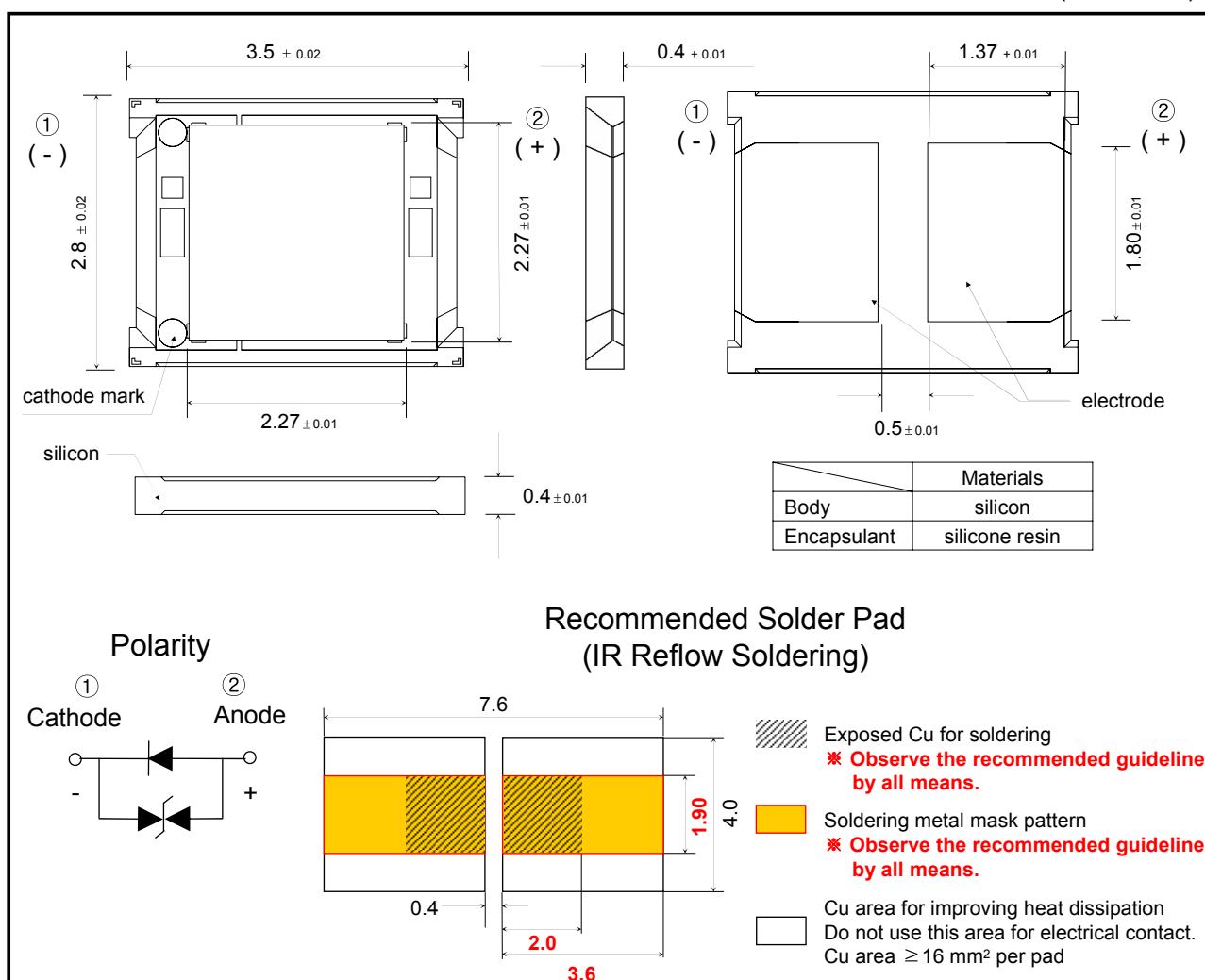
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## 1. Features

- Equivalent to 3528 Package Outline, 0.4 mm Thickness Slim Type SMD
- Silicon Chip-Carrier (SiCC), Thermal Conductive Silicon Frame PKG
- Wafer Level Package (WLP) type :  $3.5 \times 2.8 \times 0.4$  mm (L×W×H)
- High Luminous Flux ( $\Phi_V$ ) : 40 lm @ 350mA
- Compatible to Pb-free IR reflow soldering
- ESD-withstand voltage : up to 2kV acc. to JESD22-A 114-B

## 2. Outline Dimensions

( Unit : mm )

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### 3. Applications

- Mobile Phone Camera Flash
- Backlighting
- Interior and Exterior Illumination, Automotive Lighting

### 4. Absolute Maximum Ratings

( Ta=25℃ )

| Items                 | Symbols    | Ratings             |                    | Unit  |
|-----------------------|------------|---------------------|--------------------|-------|
| Forward Current       | $I_F$      | 150 <sup>*1)</sup>  | 500 <sup>*2)</sup> | (mA)  |
| Pulse Forward Current | $I_{FP}$   | 1000 <sup>*3)</sup> | 750 <sup>*4)</sup> | (mA)  |
| Power Dissipation     | $P_D$      | 578                 | 1925               | (mW)  |
| Reverse Voltage       | $V_R$      | 5                   | 5                  | ( V ) |
| Operating Temperature | $T_{opr}$  | -40 ~ +100          | -40 ~ +100         | (℃)   |
| Storage Temperature   | $T_{stg}$  | -40 ~ +100          | -40 ~ +100         | (℃)   |
| Thermal Resistance    | $R_{thJA}$ | 180 <sup>*1)</sup>  | 40 <sup>*2)</sup>  | (K/W) |
| Junction Temperature  | $T_j$      | 120                 |                    | (℃)   |

\*1)  $R_{thJA}$  results from mounting on PC board FR 4 (pad size  $\geq 16 \text{ mm}^2$  per pad)\*2)  $R_{thJA}$  results from mounting on Metal Core PC (board size  $\geq 1 \text{ inch}^2$ ) $R_{thJC} \sim 9.8 \text{ K/W}$ \*3) Pulse Width  $\leq 10\mu\text{s}$ , Duty  $\leq 10\%$ \*4) Pulse Width  $\leq 10\text{ms}$ , Duty  $\leq 10\%$ 

### 5. Electro - Optical Characteristics

( Ta=25℃ )

| Items                        | Symbol        | Condition            | Min                               | Typ  | Max    | Unit |
|------------------------------|---------------|----------------------|-----------------------------------|------|--------|------|
| Forward Voltage              | $V_F$         | $I_F=350[\text{mA}]$ | 3.10                              | 3.60 | 3.85   | V    |
| Luminous Flux <sup>*5)</sup> | $\Phi_V$      | $I_F=350[\text{mA}]$ | 30                                | 40   | -<br>- | lm   |
| CIE Value                    | X / Y         | $I_F=350[\text{mA}]$ | Refer to '6. Rank Sorting Method' |      |        | -    |
| Viewing Angle                | $2\Theta 1/2$ | $I_F=150[\text{mA}]$ | -                                 | 110  | -      | deg  |

\*5) color temperature : 3000K

※ These values measured by Optical Spectrum Analyzer of Adiva Technology Inc and tolerances are followings as below

- Luminous Intensity( $I_v$ ) :  $\pm 20\%$ , Forward Voltage( $V_F$ ) :  $\pm 0.1$ , CIE Value :  $\pm 0.01$

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## 6. Rank Sorting Method

### ■ Luminous Flux, CIE Value, Forward Voltage Rank

| Rank                                                  |                                                                                    |                |                   | Bin      |
|-------------------------------------------------------|------------------------------------------------------------------------------------|----------------|-------------------|----------|
| $\Phi$ (lm, @350mA)                                   | CIE Value( @350mA)                                                                 | Typical CCT(K) | $V_F$ (V, @350mA) |          |
| K rank : 30 ~ 40<br>L rank : 40 ~ 50<br>M rank : 50 ~ | P rank<br>( 0.438/ 0.412 ) ( 0.409 / 0.400 )<br>( 0.397/ 0.367 ) ( 0.422 / 0.379 ) | 3250           | 3.10 ~ 3.35       | K/L/M A1 |
|                                                       |                                                                                    |                | 3.35 ~ 3.60       | K/L/M A2 |
|                                                       |                                                                                    |                | 3.60 ~ 3.85       | K/L/M A3 |
|                                                       | Q rank<br>( 0.454/ 0.446 ) ( 0.421 / 0.433 )<br>( 0.409/ 0.400 ) ( 0.438 / 0.412 ) | 3250           | 3.00 ~ 3.25       | K/L/M B1 |
|                                                       |                                                                                    |                | 3.25 ~ 3.50       | K/L/M B2 |
|                                                       |                                                                                    |                | 3.50 ~ 3.75       | K/L/M B3 |
|                                                       | R rank<br>( 0.467/ 0.420 ) ( 0.438 / 0.412 )<br>( 0.422/ 0.379 ) ( 0.449 / 0.388 ) | 2800           | 3.00 ~ 3.25       | K/L/M C1 |
|                                                       |                                                                                    |                | 3.25 ~ 3.50       | K/L/M C2 |
|                                                       |                                                                                    |                | 3.50 ~ 3.75       | K/L/M C3 |
|                                                       | S rank<br>( 0.487/ 0.454 ) ( 0.454 / 0.446 )<br>( 0.438/ 0.412 ) ( 0.467 / 0.420 ) | 2800           | 3.00 ~ 3.25       | K/L/M D1 |
|                                                       |                                                                                    |                | 3.25 ~ 3.50       | K/L/M D2 |
|                                                       |                                                                                    |                | 3.50 ~ 3.75       | K/L/M D3 |

\* Voltages are tested at a current pulse duration of 1 ms and an accuracy of  $\pm 5.0\%$ .

\* This categories are established for classification of products.

\*  $V_F$ ,  $I_V$  values are based on 1-die performance.

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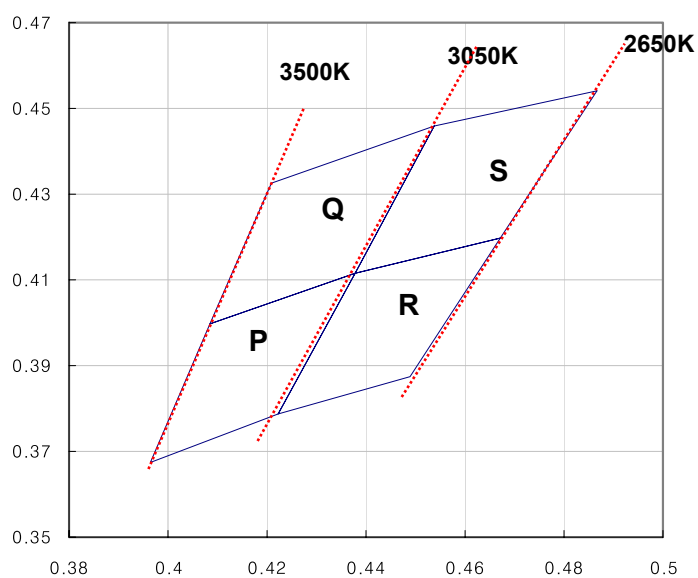
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## Chromaticity Diagram

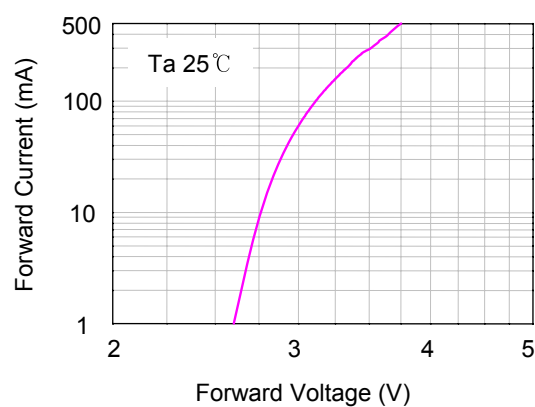


\* Chromaticity coordinate groups are tested at a current pulse duration of 100 ms and a tolerance of  $\pm 0.01$ .

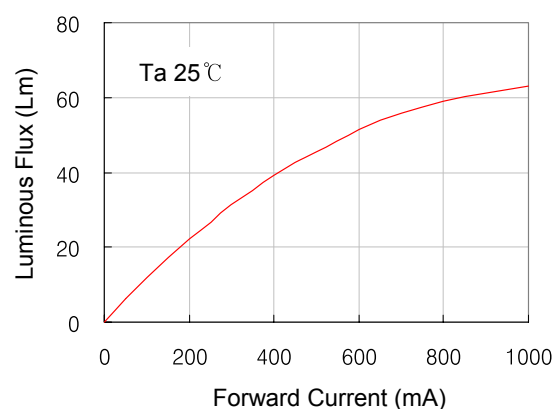
|              |                                      |                       |      |      |                         |
|--------------|--------------------------------------|-----------------------|------|------|-------------------------|
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## 7. Typical Characteristic Curves

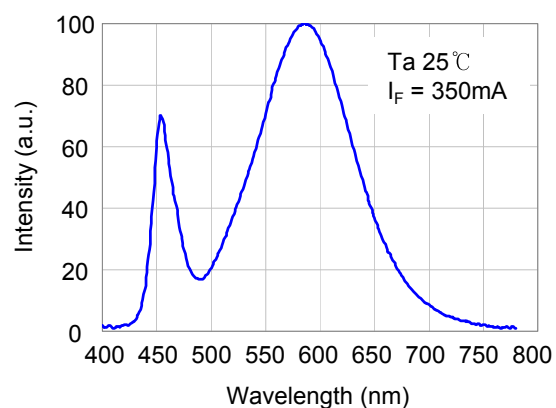
### ■ Forward Voltage vs. Forward Current



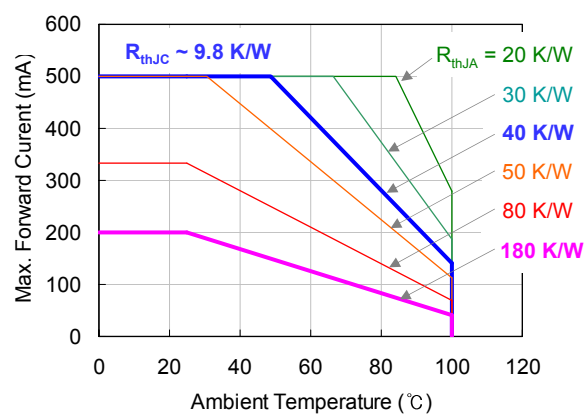
### ■ Forward Current vs. Luminous Flux



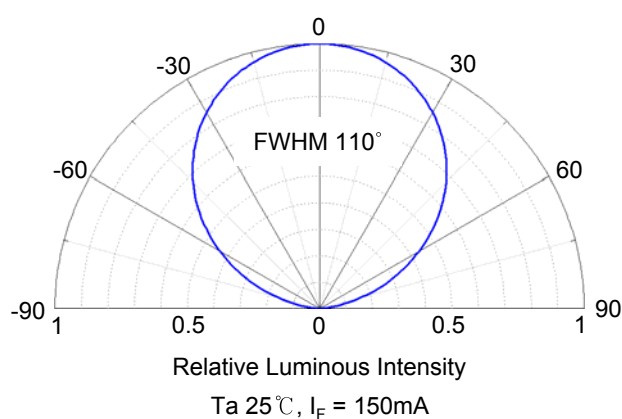
### ■ Spectrum



### ■ Max. Permissible Forward Current



### ■ Radiation Characteristics



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## 8. Reliability Test Items and Conditions

### 8-1. Items and Results of Reliability Test

| No | Item                                                  | Test Condition                                                                          | Test Hours/<br>Cycles           | Sample<br>No | Ac/Re |
|----|-------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------|--------------|-------|
| 1  | Steady State Operating Life                           | Ta 25℃, I <sub>F</sub> =350 mA<br>(tested with Adiva Tech std. circuit board *1))       | 1000hr                          | 11 pcs       | 0 / 1 |
| 2  | High Temp. Humidity Life                              | Ta 60, 90% RH, I <sub>F</sub> =300mA<br>(tested with Adiva Tech std. circuit board *1)) | 1000hr                          | 11 pcs       | 0 / 1 |
| 3  | Steady State Operating Life<br>of High Temperature    | Ta 85℃, I <sub>F</sub> =120mA<br>(tested with Adiva Tech std. circuit board *1))        | 1000hr                          | 11 pcs       | 0 / 1 |
| 4  | Steady State Operating Life<br>of Low Temperature     | Ta -30℃, I <sub>F</sub> =350 mA<br>(tested with Adiva Tech std. circuit board *1))      | 1000hr                          | 11 pcs       | 0 / 1 |
| 5  | High Temp. Storage                                    | 100℃                                                                                    | 1000hr                          | 11 pcs       | 0 / 1 |
| 6  | Low Temp. Storage                                     | -40℃                                                                                    | 1000hr                          | 11 pcs       | 0 / 1 |
| 7  | Temperature Cycle                                     | -40℃(30min) ~ 25℃(5min)<br>~ 100℃(30min) ~ 25℃(5min)                                    | 100cycle                        | 11 pcs       | 0 / 1 |
| 8  | Thermal Shock                                         | 100℃(15min) ~ -40℃(15min)                                                               | 100cycle                        | 11 pcs       | 0 / 1 |
| 9  | Resistance to<br>Soldering Heat<br>(Reflow Soldering) | T <sub>sld</sub> = 260℃, 10s<br>(pre treat. 30℃, 70%, 168hr)                            | 1 times*2)                      | 11 pcs       | 0 / 1 |
| 10 | Vibration                                             | 200m/s <sup>2</sup> , 100~2000Hz(sweep 4min) 48min,<br>3 directions                     | 4 times                         | 11 pcs       | 0 / 1 |
| 11 | Electrostatic Discharge                               | R=1.5kΩ, C=100pF,<br>Test Voltage 2kV                                                   | 3times<br>Negative/<br>Positive | 11 pcs       | 0 / 1 |

\*1) thermal resistance R<sub>THJA</sub> ~ 50 K/W

\*2) soldering heat test time is restricted to one time

### 8-2. Criteria for Judging the Damage

(U.S.L : Upper Spec. Limit, S : Initial Value)

| Item            | Symbol         | Test Condition         | Limit   |             |
|-----------------|----------------|------------------------|---------|-------------|
|                 |                |                        | Min.    | Max.        |
| Forward Voltage | V <sub>F</sub> | I <sub>F</sub> = 350mA | -       | U.S.L.× 1.2 |
| Luminous Flux   | P <sub>O</sub> | I <sub>F</sub> = 350mA | S × 0.7 | -           |

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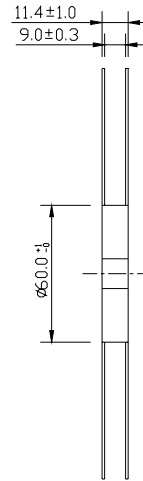
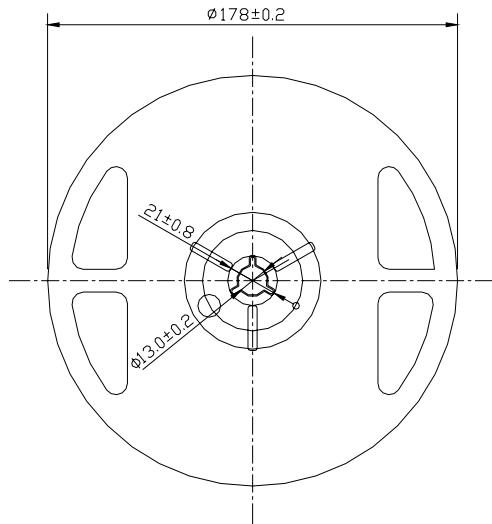
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## 9. Package and Marking of Products

### 9-1. Taping Outline Dimension

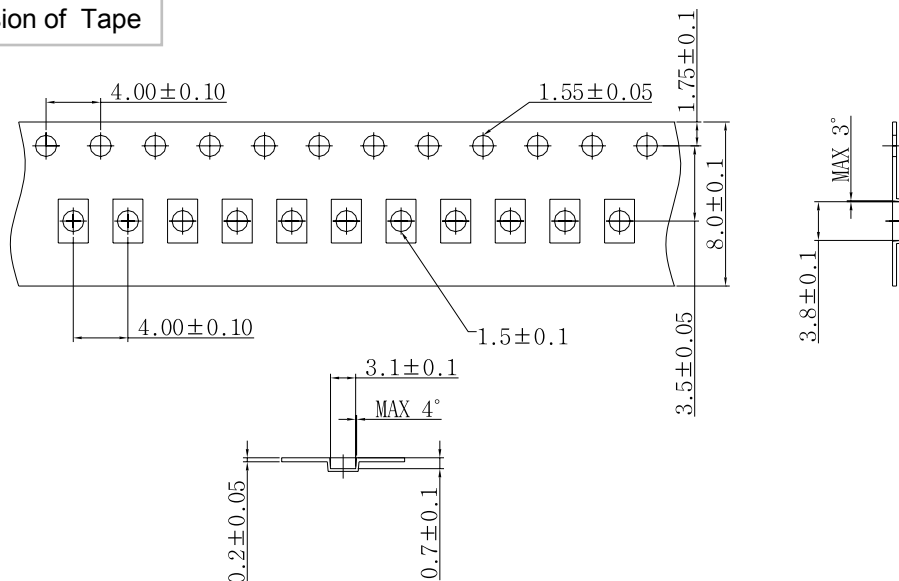
Dimension of Reel

( Unit : mm )

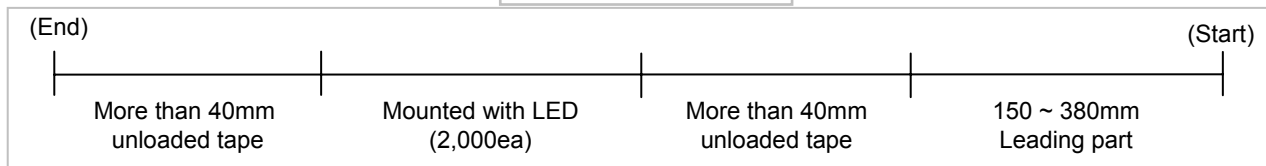


- ◆ Packing Materials :
- Reel : Conductive PS (black)
  - Emboss Tape : Conductive PS (black)
  - Cover Tap : Conductive PET base

Dimension of Tape



Arrangement of Tape

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**10. Cautions on use**

## 10-1. For the Handling

## - Over-current-proof

Customer must apply resistors for protection, others slight voltage shift will cause big current change ( Burn out will happen ).

- **Fragile**

During processing, mechanical stress on the surface should be minimized as much as possible. Our product consists of ductile silicon. During SMT processing, there are basically no restrictions regarding the form of the pick and place nozzles, except that overload mechanical pressure on the package must be prevented.

- **Solvent**

This device should not be used in any type of fluid such as water, oil, organic solvent etc, When washing is required, IPA should be used.

## 10-2. For the Storage

- Proper temperature and RH conditions for storage are : 5 °C ~35 °C , RH 60%.

- Do not open moisture-proof bag before the products are ready to use.

- Store products in a moisture-proof bag with a desiccant(silica gel) after open.

- These products should be used within 168 hours after opening the bag based upon storage condition.

- These products must be baked to remove moisture before using them if the Silica gel loses its blue color. Conditions for baking are  $60 \pm 5^{\circ}\text{C}$ , 20% (RH) and 24 hours maximum. (For reeled status without bag)

- Considering the tape life, we suggest our customers to use our products within a year(from production date)

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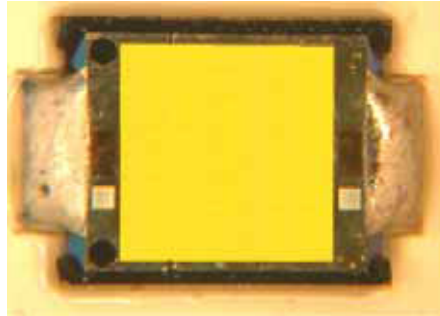
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## 10-3. Soldering Status

- According to recommended solder pad rules, Customer must observe the recommended guidelines by all means, especially soldering metal mask pattern, exposed Cu for soldering, etc.
- Check the below status, if you followed the recommended solder pad rules.



10-4. *Adiva Tech* will not be held responsible for any damage to the user that may result from accidents or any other reasons during operation of the user's unit if use to exceed the absolute maximum ratings, or not keep the matters that demand special attention.

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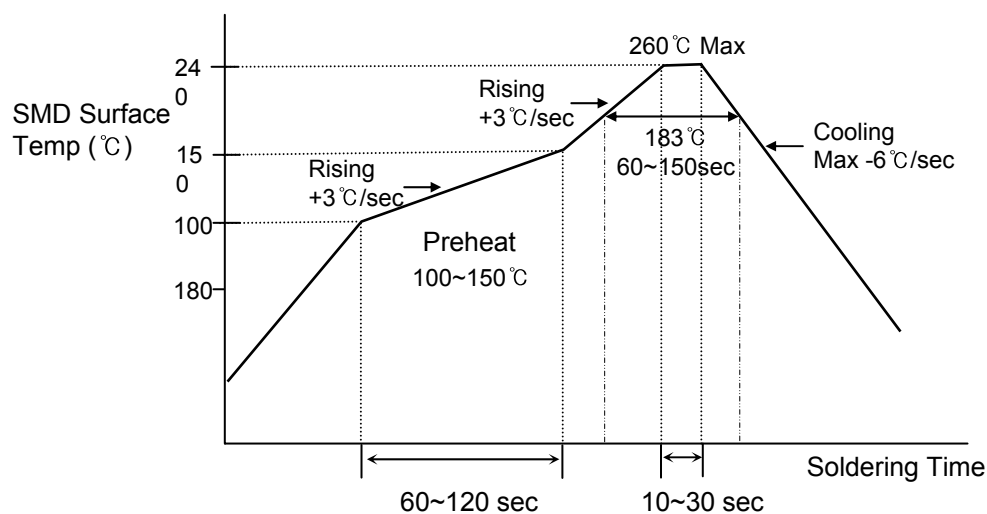
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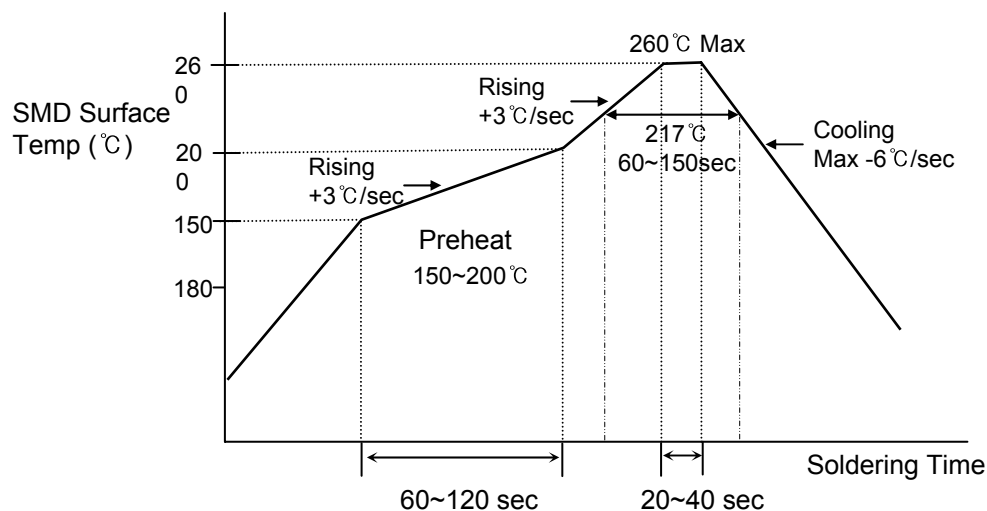
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## 11. Others

### 11-1. Pb Solder



### 11-2. Pb Free Solder



### 11-3. Soldering Iron

Basic spec is  $\leq 3\text{sec}$  when  $350^\circ\text{C}$ . If temperature is higher, time shorter ( $+10^\circ\text{C} \rightarrow -1\text{sec}$ ). Power dissipation of Iron should be smaller than 15W, and temperature should be controllable. Surface temperature of the device should be under  $230^\circ\text{C}$ .

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