

# SPECIFICATION

REFOND P/N

RF-A2P08-R315-R0

R&D

Mass Production





# 1. Description

## 1.1 General Description



The Red source color devices are made with AlGaInp on Substrate Light Emitting Diode .  
 Product Package:1.60mmX0.80mmX0.55mm.

LED AlGaInp

1.60mmX0.80mmX0.55mm.

## 1.2 Features

- ▶ PLCC2 Package.PLCC2
- ▶ Extremely wide viewing angle.
- ▶ Suitable for all SMT assembly and solder process. SMT
- ▶ Available on tape and reel.
- ▶ Moisture sensitivity level: Level 2. Level2
- ▶ Compliance with RoHS and REACH. RoHS REACH
- ▶ Qualifications: The product qualification test plan is based on the guidelines of AEC-Q101  
 Stress Test Qualification for Automotive Grade Discrete Semiconductors  
 AEC-Q101

## 1.3 Application

- ▶ Automotive Lighting Interior.
- ▶ Switches.



## 1.4 Package Dimension

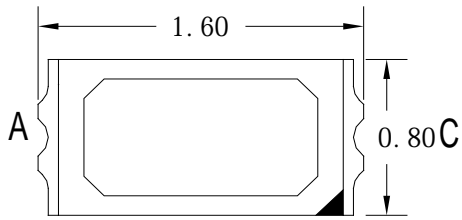


Fig 1-1 Top View

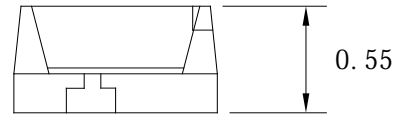


Fig 1-2 Side View

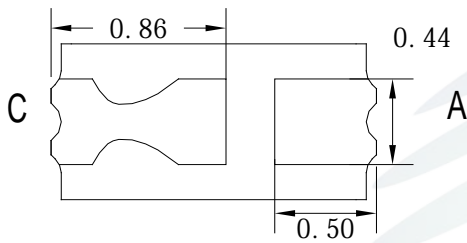


Fig 1-3 Bottom View

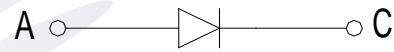


Fig 1-4 Polarity

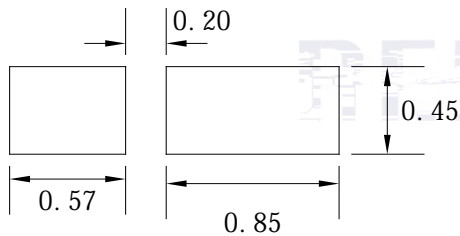


Fig 1-5 Soldering Patterns

### Notes

1. All dimensions units are millimeters.
2. All dimensions tolerances are  $\pm 0.2\text{mm}$  unless otherwise noted.



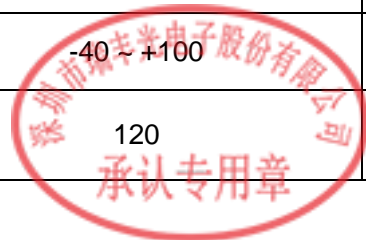
## 1.5 Product Parameters

Table 1-1 Electrical / Optical Characteristics at Ts=25°C

| Item                | Symbol          | Test Condition | Value |      |       | Unit        |
|---------------------|-----------------|----------------|-------|------|-------|-------------|
|                     |                 |                | Min.  | Typ. | Max.  |             |
| Forward Voltage     | $V_F$           | $I_F=20mA$     | 1.8   | 2.1  | 2.4   | V           |
| Reverse Current     | $I_R$           | $V_R=5V$       | ---   | ---  | 10    | $\mu A$     |
| Luminous Intensity  | $I_V$           | $I_F=20mA$     | 80    | 120  | 150   | mcd         |
| Dominant wavelength | $\lambda_d$     | $I_F=20mA$     | 627.5 | 630  | 637.5 | nm          |
| Viewing Angle       | $2\theta_{1/2}$ | $I_F=20mA$     | ---   | 120  | ---   | deg         |
| Thermal Resistance. | $R_{THJ-S}$     | $I_F=20mA$     | ---   | ---  | 300   | $^{\circ}W$ |

Table 1-2 Absolute Maximum Ratings at Ts=25°C

| Parameter                     | Symbol    | Rating     | Units |
|-------------------------------|-----------|------------|-------|
| Power Dissipation             | $P_D$     | 78         | mW    |
| Forward Current               | $I_F$     | 30         | mA    |
| Peak Forward Current          | $I_{FP}$  | 100        | mA    |
| Reverse Voltage               | $V_R$     | 5          | V     |
| Electrostatic Discharge (HBM) | $E_{SD}$  | 2000       | V     |
| Operating Temperature         | $T_{OPR}$ | -40 ~ +100 |       |
| Storage Temperature           | $T_{STG}$ | -40 ~ +100 |       |
| Junction Temperature          | $T_J$     | 120        |       |



Notes

1. 1/10 Duty cycle, 10ms pulse width.      10ms,      1/10.
2. The above forward voltage measurement allowance tolerance is  $\pm 0.1V$ .       $\pm 0.1V$ .
3. The above color coordinates measurement allowance tolerance is  $\pm 0.005$ .       $\pm 0.005$ .
4. The above luminous intensity measurement allowance tolerance  $\pm 10\%$ .  
 $\pm 10\%$ .
5. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
6. All measurements were made under the standardized environment of Refond.
7. When the LEDs are in operation the maximum current should be decided after measuring the package temperature, junction temperature should not exceed the maximum rate. LED
8. ESD yield is over 90% at 2000V ESD (HBM). ESD protection during products handing is needed. 90% LED  
ESD2000V

## 1.6 Bin Range Of Forward Voltage and Luminous Intensity (IF=20mA)

### BIN (IF=20mA)

Table 1-3

|        |           |           |           |           |         |         |
|--------|-----------|-----------|-----------|-----------|---------|---------|
| VF     | B1        | B2        | C1        | C2        | D1      | D2      |
|        | 1.8-1.9   | 1.9-2.0   | 2.0-2.1   | 2.1-2.2   | 2.2-2.3 | 2.3-2.4 |
| IV mcd | F2        | G1        | G2        |           |         |         |
|        | 80-100    | 100-120   | 120-150   |           |         |         |
| WD(nm) | F2        | G1        | G2        | H1        |         |         |
|        | 627.5-630 | 630-632.5 | 632.5-635 | 635-637.5 |         |         |



## 1.7 Typical Optical Characteristics Curves

Fig. 1-7 Forward Voltage Vs Forward Current

|  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|
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Fig. 1-8 Forward Current Vs Relative Intensity

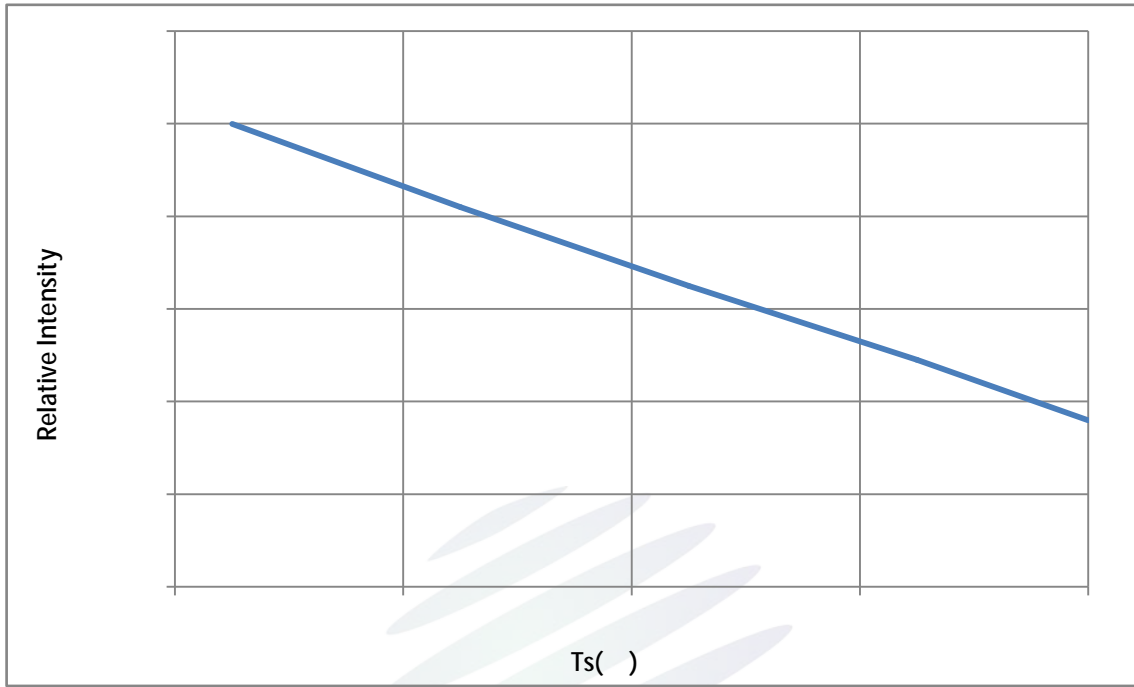


Fig. 1-9 Solder Temperature Vs Relative Intensity

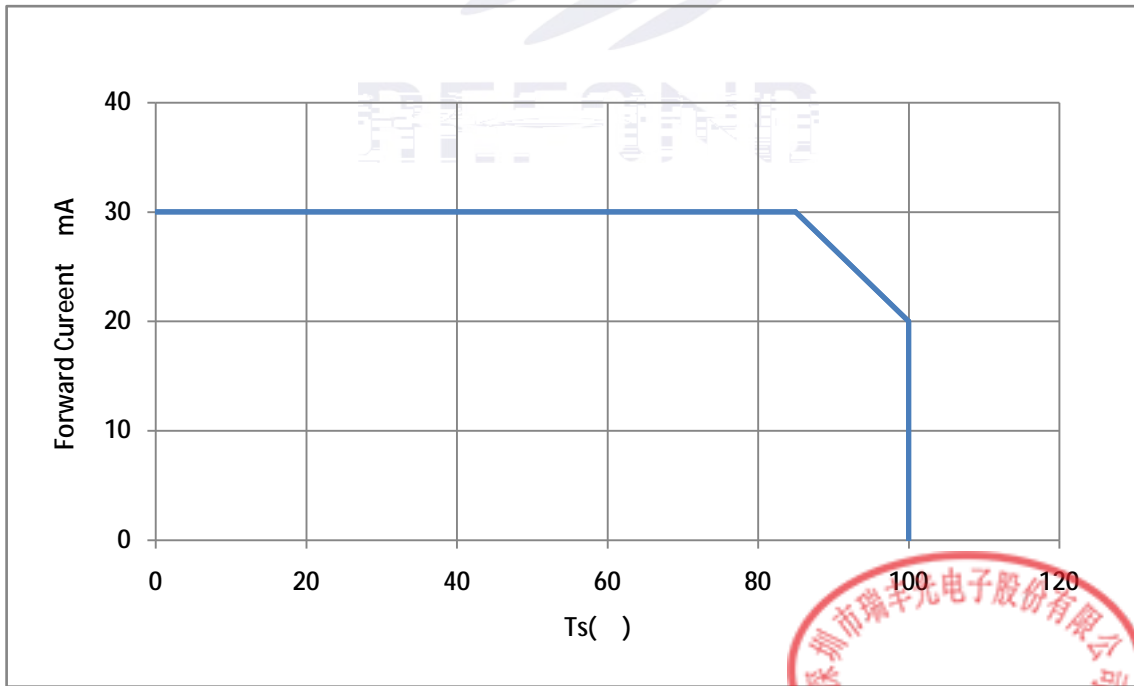
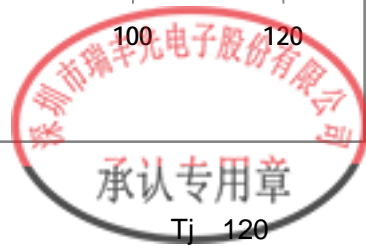


Fig. 1-10 Solder Temperature Vs Forward Current



Tj 120



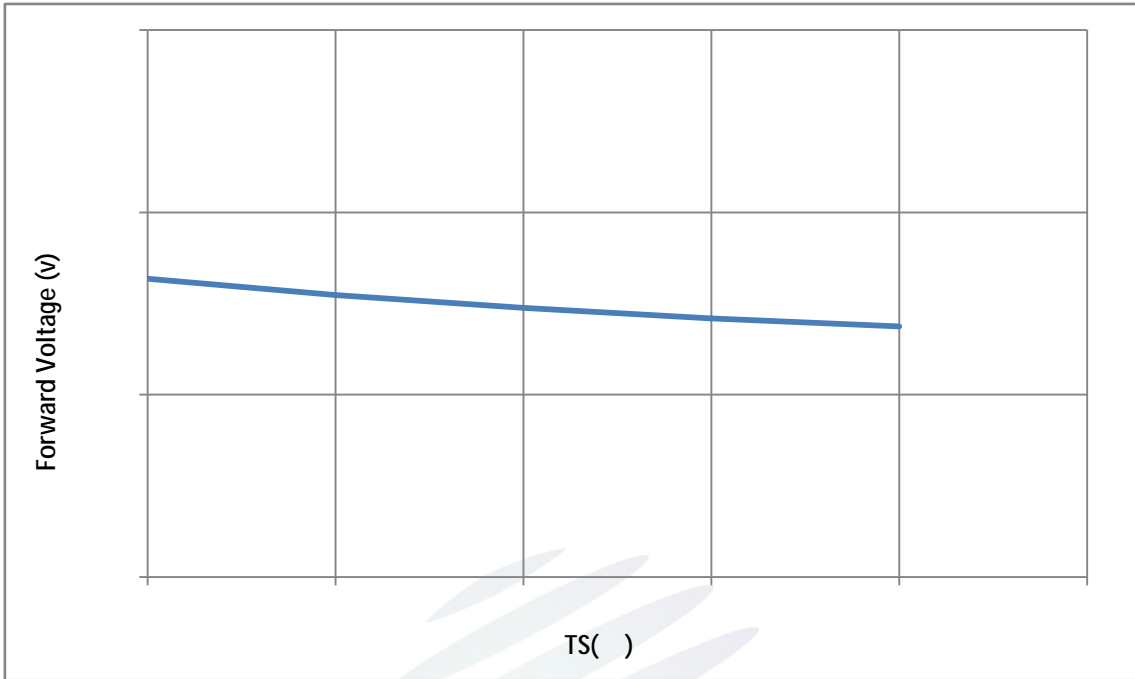


Fig. 1-11 Forward Voltage Vs Solder Temperature

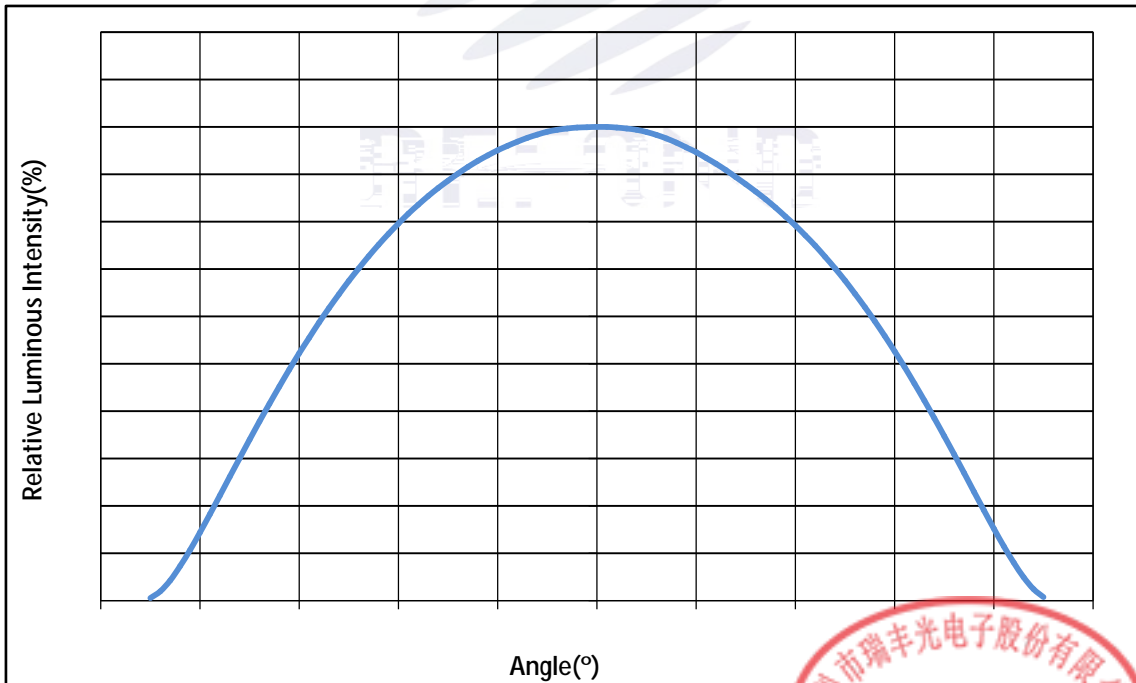


Fig. 1-12 Radiation diagram



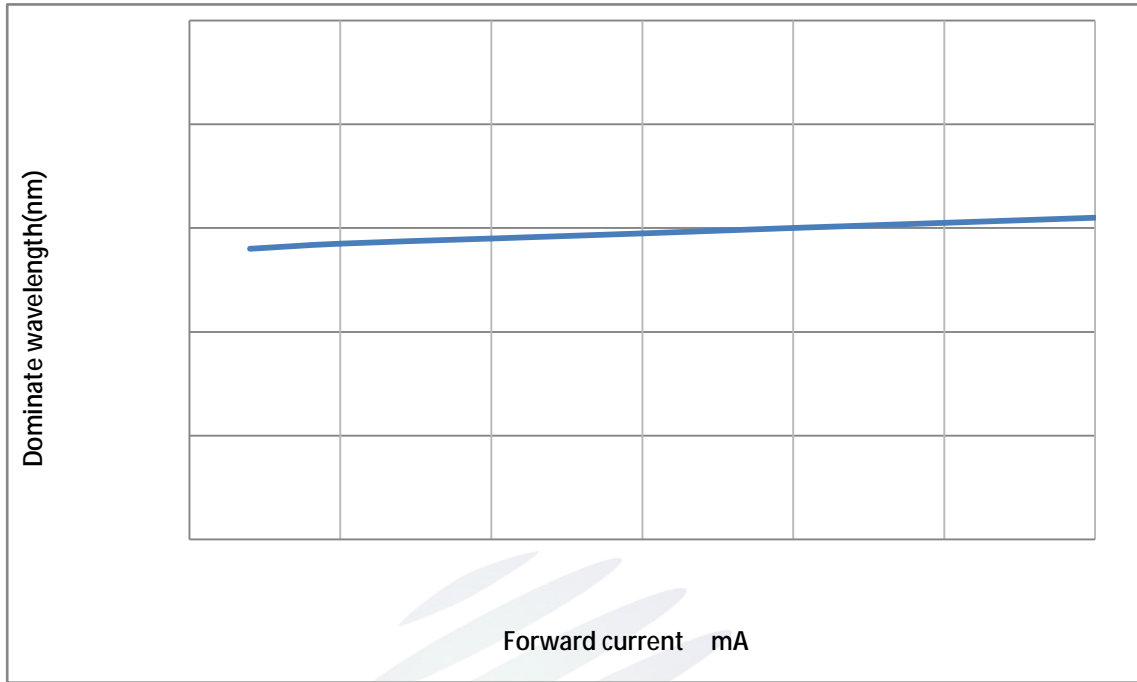


Fig. 1-13

(Ts=25°C)

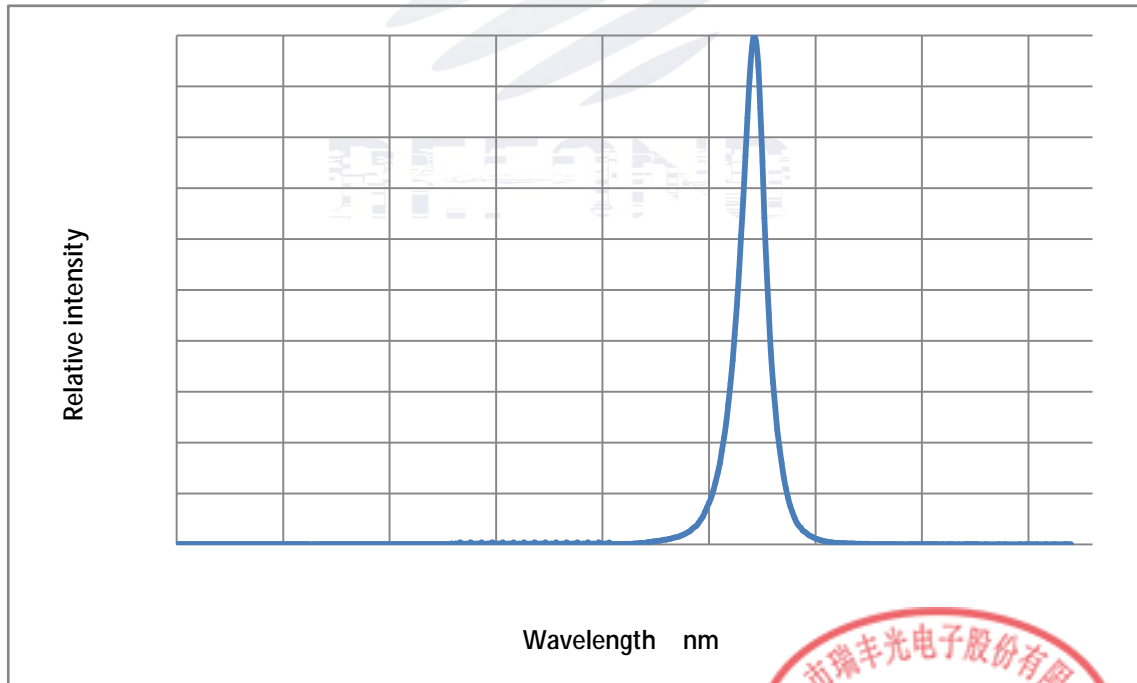


Fig. 1-14 Spectrum Distribution



## 2. Packaging

### 2.1 Packaging Specification

Package:4000pcs/reel.

#### 2.1.1 Carrier Tape Dimension

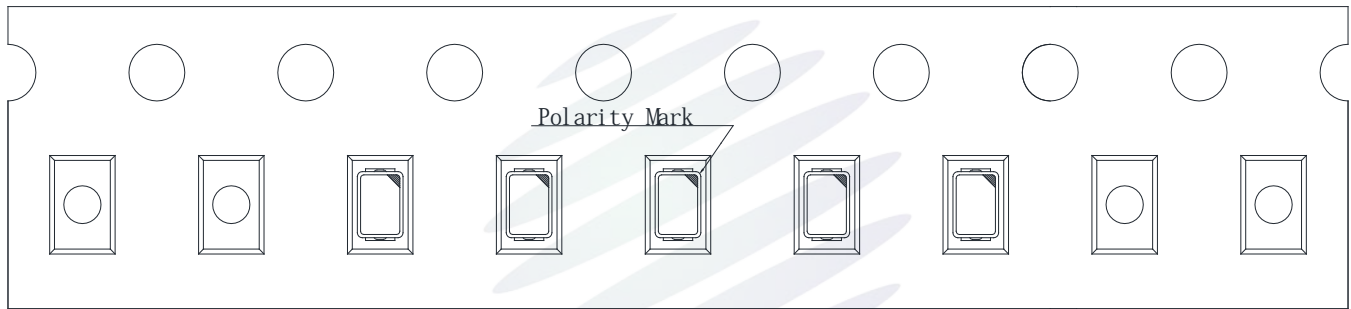
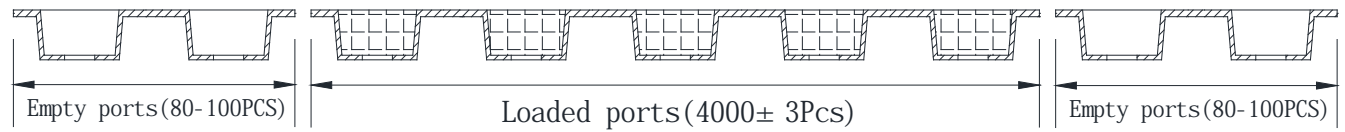


Fig.2-1 Carrier Tape Dimension

#### 2.1.2 Reel Dimension

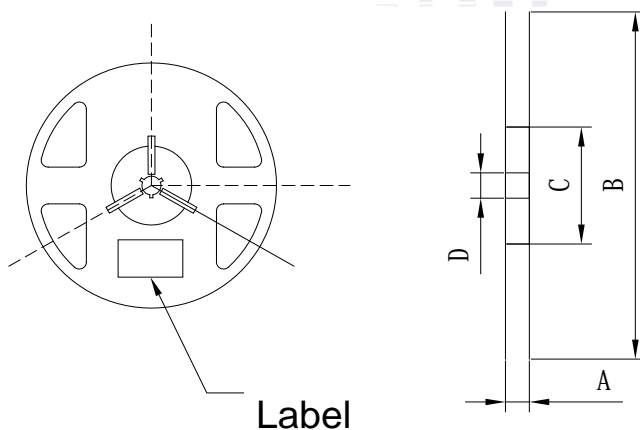


Fig.2-2 Reel Dimension

Table 2-1 Reel Dimension

|   |             |
|---|-------------|
| A | 8.0± 0.1mm  |
| B | 178± 1mm    |
| C | 60± 1mm     |
| D | 13.0± 0.5mm |

#### Notes

The tolerances unless mentioned  $\pm 0.1$ mm. Unit : mm

$\pm 0.1$



### 2.1.3 Label Form Specification

Table 2-2 Specification

|          |                  |
|----------|------------------|
| PART NO. | Part Number      |
| SPEC NO. | Spec Number      |
| LOT NO.  | Lot Number       |
| BIN CODE | Bin Code         |
| $\Phi$   | Luminous flux    |
| XY       | Chromaticity Bin |
| $V_F$    | Forward Voltage  |
| WLD      | Wavelength       |
| QTY      | Packing Quantity |
| DATE     | Made Date        |

Fig. 2-3 Label Form Specification

### 2.2 Moisture Resistant Packing

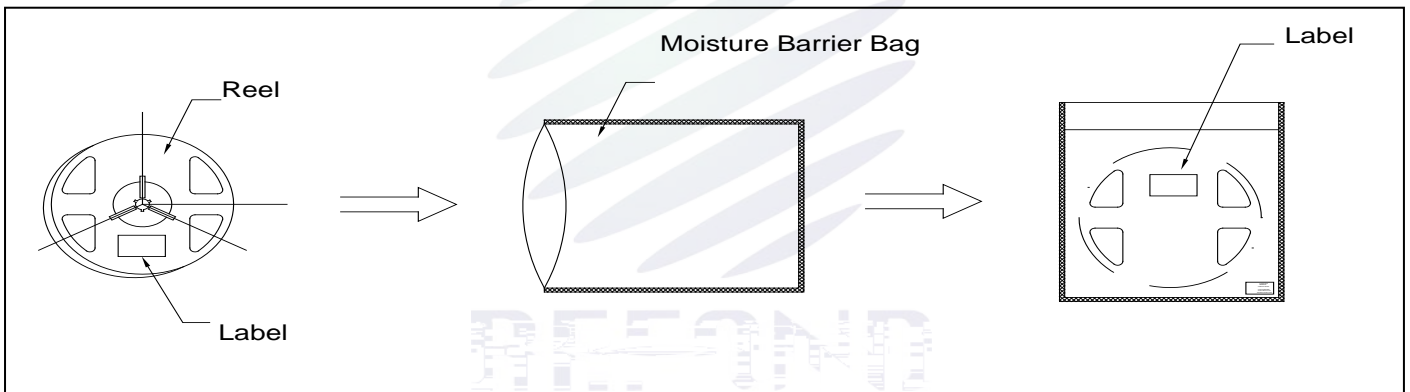


Fig.2-4 Moisture Resistant Packing

### 2.3 Cardboard Box

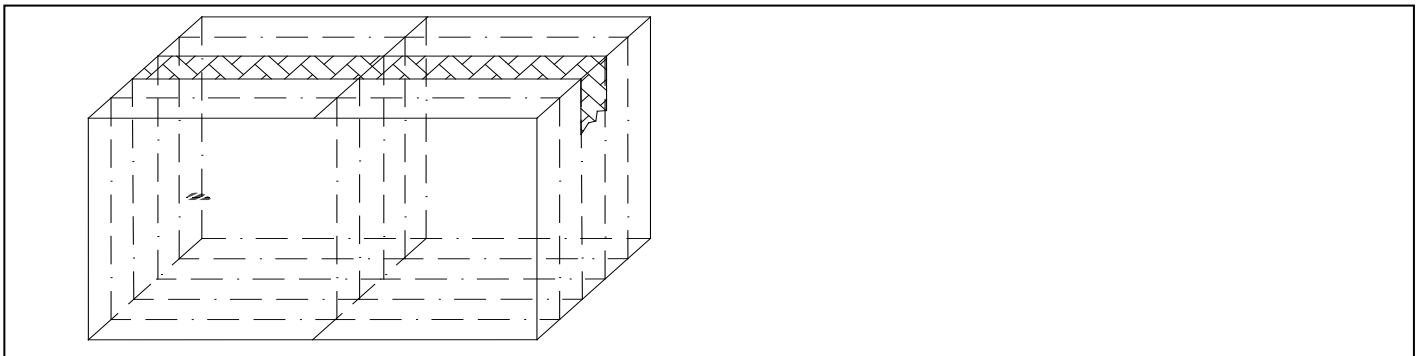


Fig.2-5 Cardboard Box

## 2.4 Reliability Test Items And Conditions

Table 2-3 Reliability Test Items And Conditions

| Test Items                                  | Ref. Standard          | Test Condition                  | Time       | Quantity | Ac/Re / |
|---|------------------------|---------------------------------|------------|----------|---------|
| Reflow                                      | JESD22-B106            | Temp:260 max<br>T=10 sec        | 2times     | 20pcs.   | 0/1     |
| MSL2<br>2                                   | JESD22-A113            | 85 / 60%RH                      | 168 hrs.   | 20pcs.   | 0/1     |
| Thermal Shock                               | JEITAED-4701<br>300307 | -40 15min<br>↑↓10s<br>125 15min | 1000 cycle | 20pcs.   | 0/1     |
| Life Test                                   | JESD22-A108            | Ta=85<br>If=20mA                | 1000hrs.   | 20pcs.   | 0/1     |
| High Temperature<br>High Humidity Life Test | JESD22-A101            | 85 / 85%RH<br>If=20mA           | 1000hrs.   | 20pcs.   | 0/1     |



## 2.5 Criteria For Judging Damage

Table 2-4 Criteria For Judging Damage

| Test Items      | Symbol | Test Condition | Criteria For Judgement |             |
|-----------------|--------|----------------|------------------------|-------------|
|                 |        |                | Min.                   | Max.        |
| Forward Voltage | $V_F$  | $I_F=20mA$     | -                      | U.S.L*)x1.1 |



### 3. SMT Reflow Soldering Instructions SMT

#### 3.1 SMT Reflow Soldering Instructions SMT

Fig.3-1 SMT Reflow Soldering Instructions SMT

Table 3-1 Reflow parameters

|  |                       |                      |
|--|-----------------------|----------------------|
| Average temperature rise speed                             | $T_{smax}$ $T_P$      | 3 °C/    Max 3 °C/ s |
| Preheating: minimum temperature                            | ( $T_{smin}$ )        | 150 °C               |
| Preheating: Max temperature                                | ( $T_{smax}$ )        | 200 °C               |
| Preheating: Time   | $T_{smin}$ $T_{smax}$ | 60 - 120    60s-120s |
| Time limited to maintain high temperature: the temperature | ( $T_L$ )             | 217 °C               |
| Time limited to maintain high temperature: The Time        | ( $t_L$ )             | 60    Max 60s        |
| Peak /Classification of temperature:                       | /    ( $T_P$ )        | 260 °C               |

Time limit classification of peak temperature time  $t_p$





## 4. Handling Precautions

### 4.1 Handling Precautions

(1) LED operating environment and sulfur element composition cannot be over 100PPM in the LED mating usage material. This is provided for informational purposes only and is not a warranty or endorsement.

LED 100PPM.

(2) In order to prevent external material from getting into the inside of LED, which may cause the malfunction of LED, the single content of Bromine element is required to be less than 900PPM, the single content of Chlorine element is required to be less than 900PPM, the total content of Bromine element and Chlorine element in the external materials of the application products is required to be less than 1500PPM. This is provided for informational purposes only and is not a warranty or endorsement.

|         |        |        |
|---------|--------|--------|
|         | LED    | LED    |
|         | 900PPM | 900PPM |
| 1500PPM |        |        |

(3) VOCs (Volatile organic compounds) emitted from materials used in the construction of fixtures can penetrate silicone encapsulants of LEDs and discolor when exposed to heat and photonic energy. The result can be a significant loss of light output from the fixture. Knowledge of the properties of the materials selected to be used in the construction of fixtures can help prevent these issues. Refond advises against the use of any chemicals or materials that have been found or are suspected to have an adverse effect on device performance or reliability. To verify compatibility, Refond recommends that all chemicals and materials be tested in the specific application and environment for which they are intended to be used. Attaching LEDs, do not use adhesives that outgas organic vapor.

|     |     |     |
|-----|-----|-----|
| LED | LED | LED |
|-----|-----|-----|

LED

(4) Handle the component along the side surface by using forceps or appropriate tools; Do not directly touch or handle the silicone lens surface, it may damage the internal circuitry.

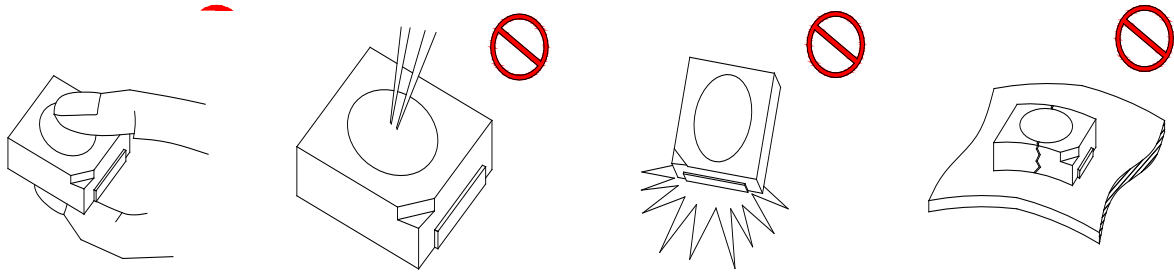


Fig 4-1 Handling Precautions

(5) In designing a circuit, the current through each LED can not exceed the absolute maximum rating specified for each LED. In the meanwhile, resistors for protection should be applied, otherwise slight voltage shift will cause big current change, burn out may happen. The driving circuit must be designed to allow forward voltage only when it is ON or OFF. If the reverse voltage is applied to LED, migration can be generated resulting in LED damage.

LED

LED

(6) Thermal Design is paramount importance because heat generation may result in the Characteristics decline, such as brightness decreased, Color change and so on. Please consider the heat generation of the LEDs when making the system design.

LED

(7) Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust, requiring special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components. Refond suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin. Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

LED

Table 4-1 Storage

| Conditions |                             | Temperature | Humidity | Time  |
|------------|-----------------------------|-------------|----------|---|
| Storage    | Before Opening Aluminum Bag | 30          | 75%      | Within 1 Year From Date                       |
|            | After Opening Aluminum Bag  | 30          | 60%      | Recommended for use<br>within 24 hours<br>24H |
| Baking     |                             | 60± 5       | -        | 24hours<br>24                                 |

(8) If the moisture absorbent material silica gel has faded away or the LEDs have exceeded the storage time, baking treatment should be performed after unpacking and based on the following condition 60± 5 for above 24 hours.

60± 5          24

If the package is flatulence or damaged, please notify the sales staff to assist.

(9) Similar to most Solid state devices; LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).  
LED

(10) Other points for attention, please refer to our relevant information.







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REFOND

Declare

This specification is written both in English and in Chinese and the latter is formal.

