

# SPECIFICATION

REFOND P/N

RF-A2E31-RGBE-W1

R&D

Mass Production

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# 1. Description

## 1.1 General Description



The Red LED which was fabricated using a red chip  
LED

The Green LED which was fabricated using a green chip  
LED

The Blue LED which was fabricated using a blue chip  
LED

The LED package dimension: 3.0mmX3.0mmX0.65mm  
3.0mmX3.0mmX0.65mm

## 1.2 Features

EMC Package. EMC.

Extremely wide viewing angle.

Suitable for all SMT assembly and solder process. SMT

Available on tape and reel.

Moisture sensitivity level: Level 2. Level2

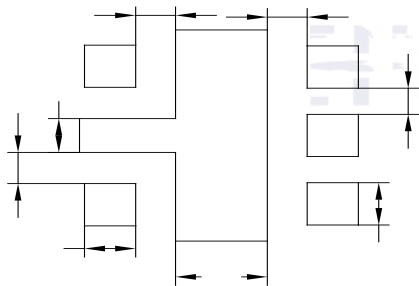
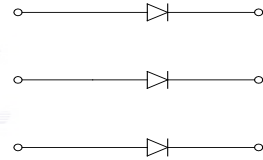
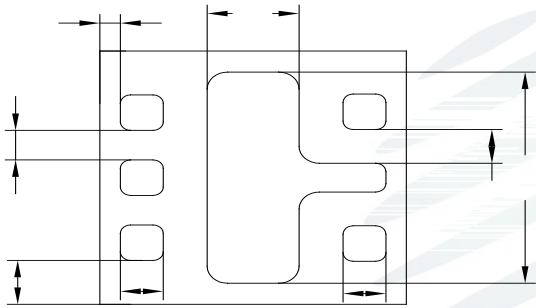
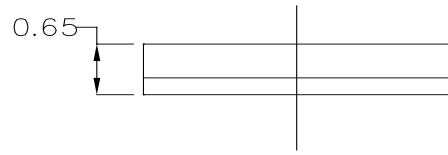
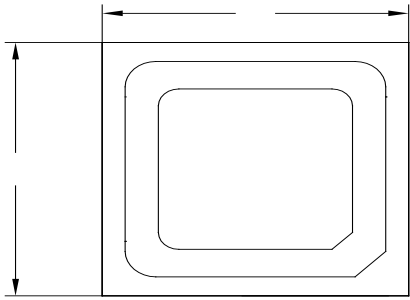
Compliance with RoHS and REACH. RoHS REACH

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 Interior Lighting.

## 1.4 Package Dimension



### Notes

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

$\pm 0.2$



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

Parameter	Symbol	Rating	Units	
Power Dissipation	P <sub>D</sub>	R	468	mW
		G	612	mW
		B	612	mW
Forward Current	I <sub>F</sub>	R/G/B:150	mA	
Peak Forward Current	I <sub>FP</sub>	180	mA	
Reverse Voltage	V <sub>R</sub>	5	V	
Electrostatic Discharge(HBM)	E <sub>SD</sub>	2000	V	
Operating Temperature	T <sub>OPR</sub>	-40 ~ +110		
Storage Temperature	T <sub>STG</sub>	-40 ~ +110		
Junction Temperature	T <sub>J</sub>	125		

Notes

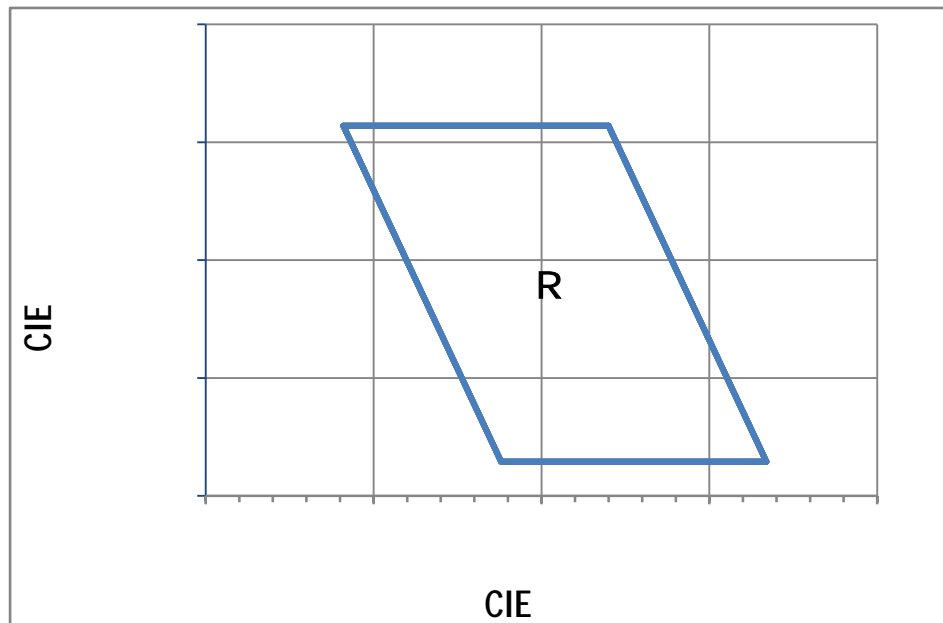
- 1/10 Duty cycle, 10ms pulse width. 10ms, 1/10.
- The above forward voltage measurement allowance tolerance is ±0.1V. ± 0.1V.
- The above color coordinates measurement allowance tolerance is ± 0.005. ± 0.005.
- The above luminous intensity measurement allowance tolerance ±10%. ± 10%.
- Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
- All measurements were made under the standardized environment of Refond.
- 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
- ESD yield is over 90% at 2000V ESD (HBM). ESD protection during products handing is needed. 90% LED ESD2000V

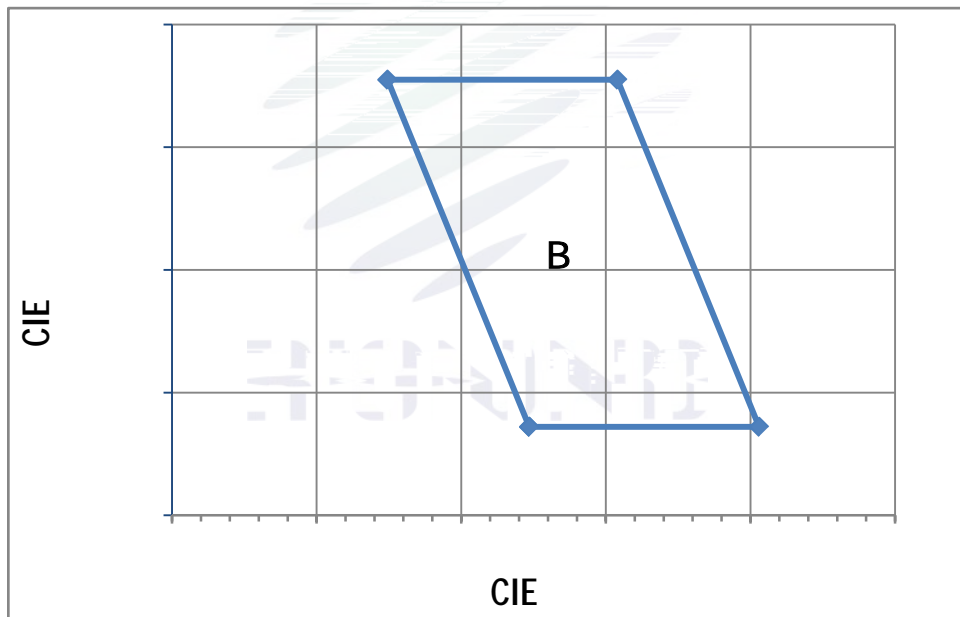
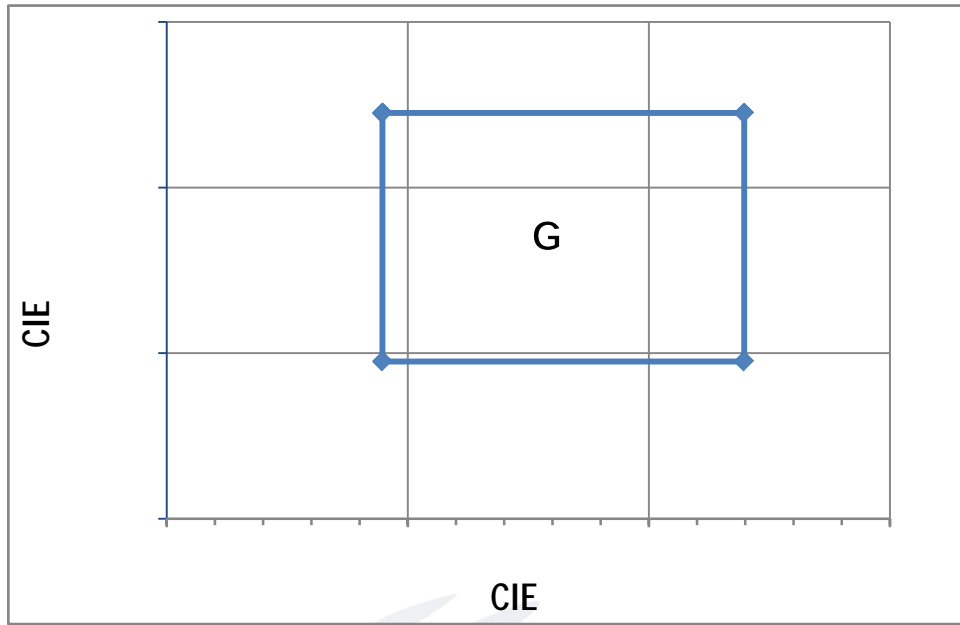
## 1.6Bin Range Of Forward Voltage and Luminous Flux (IF=150mA)

**BIN (IF=150mA)**

Table 1-3

VF(V)	R	Q7
		2.0-2.6
	G	R7
		2.8-3.4
	B	R7
		2.8-3.4
WLD(nm)	R	B1
		19.6-30.0
	G	B3
		37-55.3
	B	B2
		6.9-13.0
WLD(nm)	R	C
		617.5-625
	G	E
		520-530
	B	B
		460-470





BIN CODE	CIE-X1	CIE-Y1	CIE-X2	CIE-Y2	CIE-X3	CIE-Y3	CIE-X4	CIE-Y4
R	0.6876	0.2929	0.7034	0.2929	0.694	0.3214	0.6782	0.3214
G	0.1479	0.7245	0.1779	0.7245	0.1779	0.7095	0.1479	0.7095
B	0.1347	0.0372	0.1506	0.0372	0.1408	0.0655	0.1249	0.0655



## 1.7 Typical Optical Characteristics Curves

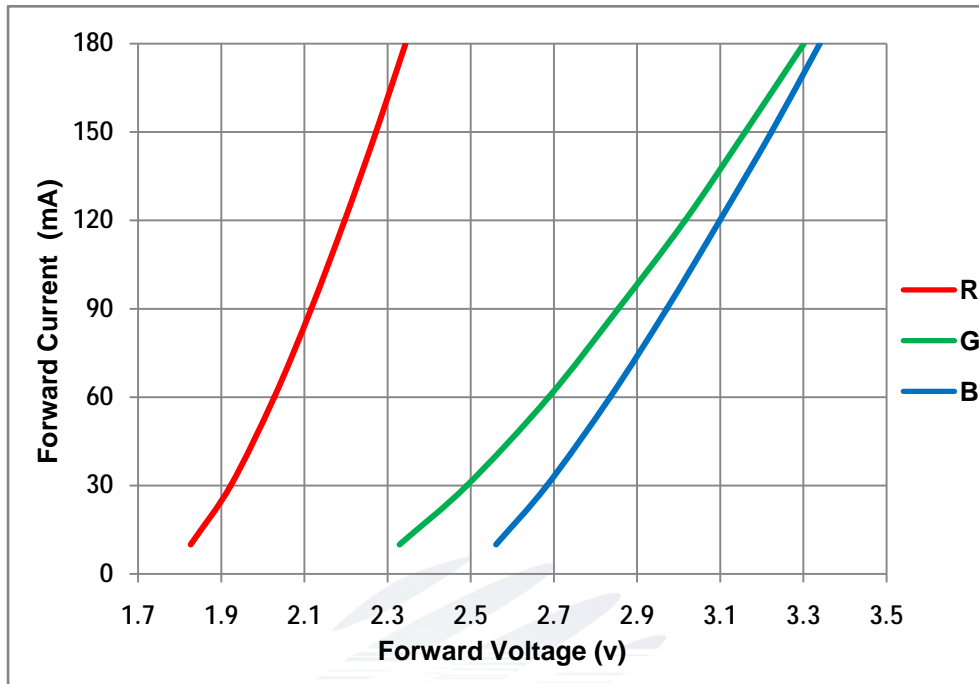


Fig. 1-7 Forward Voltage Vs Forward Current

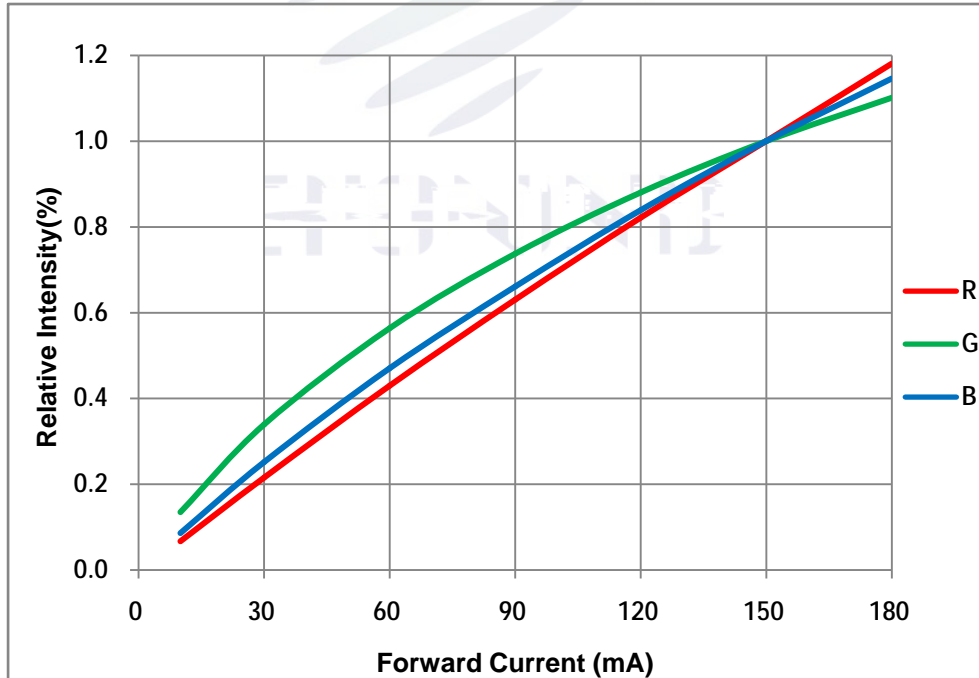


Fig. 1-8 Forward Current Vs Relative Intensity

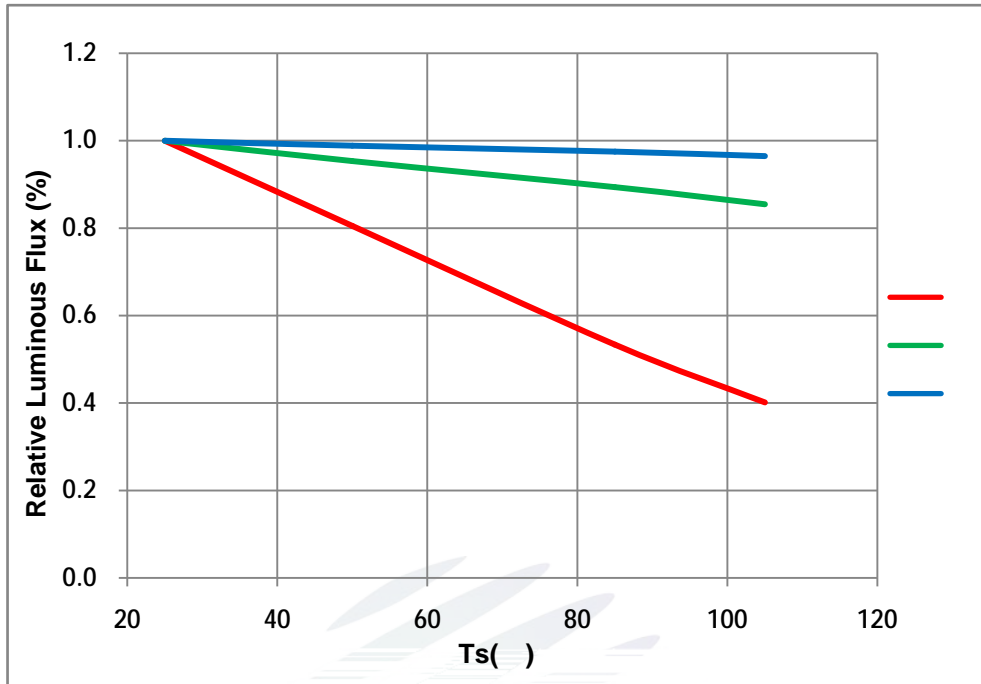


Fig. 1-9 Solder Temperature Vs Relative Intensity

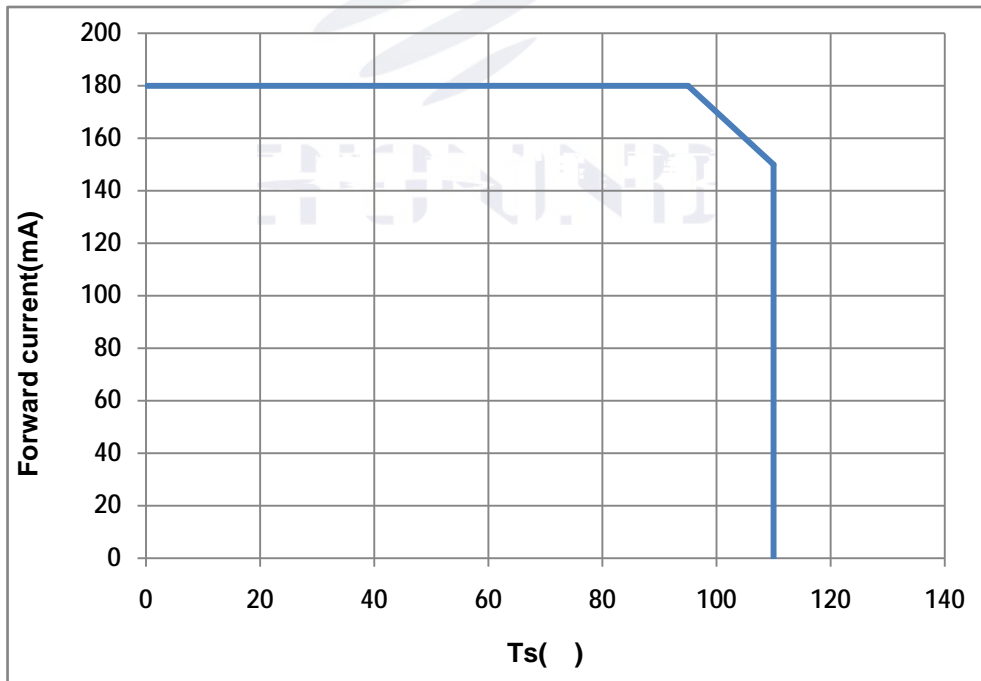


Fig. 1-10 Solder Temperature Vs Forward Current



Fig. 1-11 Forward Voltage Vs Solder Temperature

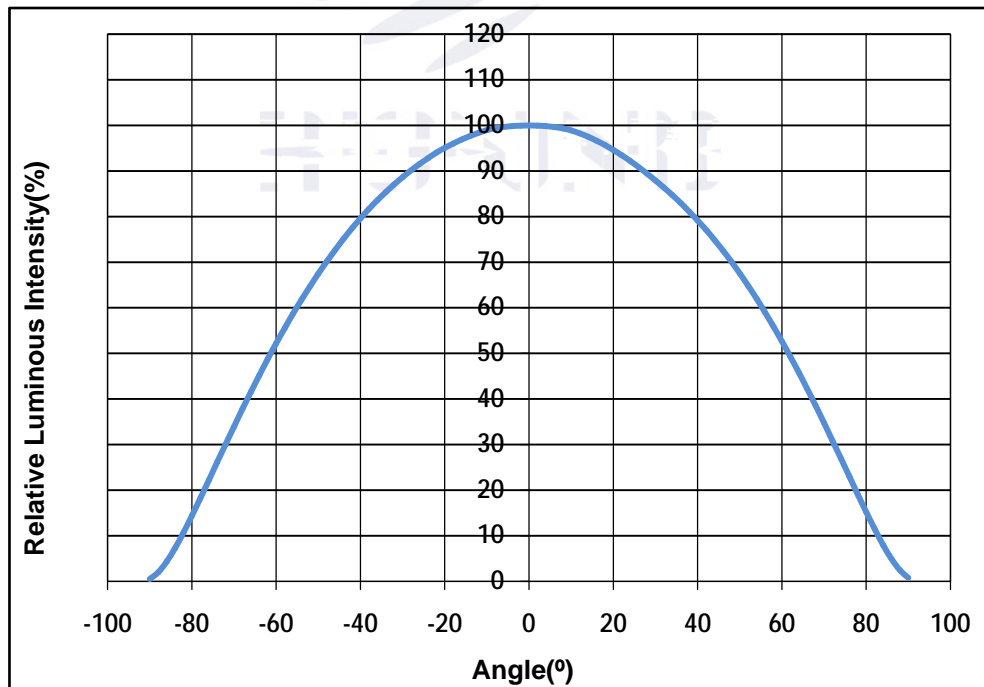


Fig. 1-12 Radiation diagram

Fig. 1-13 Forward current Vs Dominate wavelength

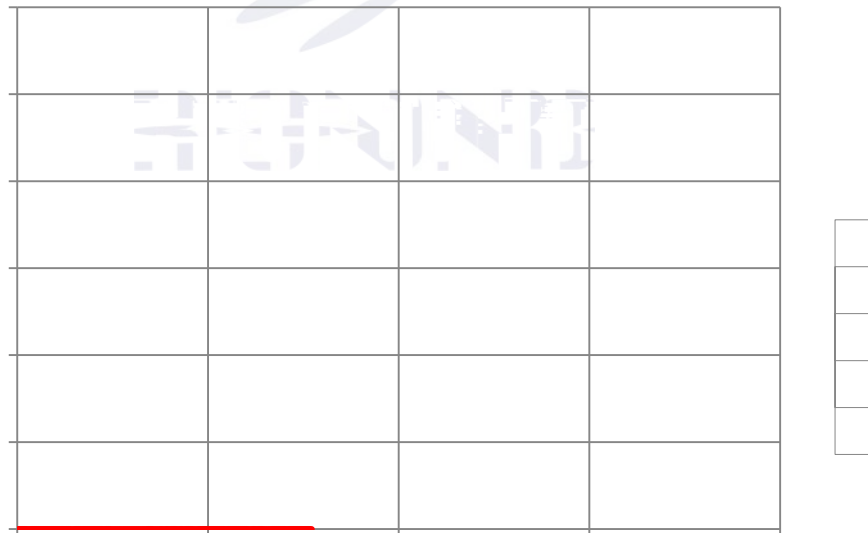


Fig. 1-14 Spectrum Distribution

## 2. Packaging

### 2.1 Packaging Specification

Package:5000pcs/reel.

#### 2.1.1 Carrier Tape Dimension



Fig.2-1 Carrier Tape Dimension

#### 2.1.2 Reel Dimension



Table 2-1 Reel Dimension

A	12.0± 0.1mm A12
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Fig.2-2 Reel Dimension

#### Notes

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

$\pm 0.1$

### 2.1.3 Label Form Specification

Table 2-2 Specification

Fig. 2-3 Label Form Specification

### 2.2 Moisture Resistant Packing



Fig.2-4 Moisture Resistant Packing

### 2.3 Cardboard Box

Fig.2- 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 T=10 sec	2times	20pcs.	0/1
MSL2 2	JESD22-A113	85 / 60%RH	168 hrs.	20pcs.	0/1
Thermal Shock	JEITAED-4701 300307	-40 15min  125 15min	1000 cycle	20pcs.	0/1
Life Test	JESD22-A108	Ta=105 If=150mA	1000hrs.	20pcs.	0/1
High Temperature High Humidity Life Test	JESD22-A101	85 / 85%RH If=150mA	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	$V_F$	$I_F=150\text{mA}$	-	U.S.L*)x1.1
Reverse Current	$I_R$	$V_R = 5\text{V}$	-	U.S.L*)x2.0
Luminous Flux		$I_F=150\text{mA}$	L.S.L*)x0.7	-

### Notes

- 1.U.S.L: Upper standard level      L.S.L: Lower standard level
- 2.The above reliability tests is based on the





### 3. SMT Reflow Soldering Instructions SMT



Notes

(1)Reflow soldering should not be done more than twice. If more than 24 hours between the two solderings , LED will be damaged. 24 LED

(2)When soldering , do not put stress on the LEDs during heating.

3.1.1 Repairing

Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable,a double-head soldering iron should be used (as below figure). It should be confirmed in advance whether the characteristics of LEDs will or not be damaged by repairing.

LED

LED

3.1.2 Cautions

The encapsulated material of the LEDs is silicone. Therefore the LEDs have a soft surface on the top of package. The pressure to the top surface will be impacted on the reliability of the LEDs. Precautions should be taken to avoid the strong pressure on the encapsulated part. So when use the picking up nozzle, the pressure on the silicone resin should be proper. LED LED

(2) Components should not be mounted on warped (non coplanar) portion of PCB. After soldering, do not warp the circuit board.LED PCB

(3) Do not apply mechanical force or excess vibration during the cooling process to normal temperature after soldering. Do not rapidly cool device after soldering.

## 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. The single content of Sulfur element in the wafer and the solder must be less than 100PPM.

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



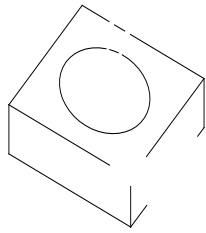


Fig 4-1 Handling Precautions

(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

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 within 24 hours
Baking		60± 5	-	24hours 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.

Date	Reviser)]	
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Declare

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