

# SPECIFICATION

REFOND P/N

RF-BNRL30TS-CG-G(WE)

Mass Production





# 1. Description

## 1.1 General Description



The Blue source color devices are made with GaN on Substrate Light Emitting Diode .  
 Product Package:3.50mmX2.80mmX3.50mm.

GaN

3.50mmX2.80mmX3.50mm.

## 1.2 Features

PLCC4 Package. PLCC4

extremely narrow angle.

Suitable for all SMT assembly and solder process.

SMT

Available on tape and reel.

Moisture sensitivity level: Level 2. Level2

RoHS compliant. RoHS

Qualifications: The product qualification test plan is based on the guidelines of AEC-Q102 Stress Test Qualification for Automotive Grade Discrete Semiconductors

AEC-Q102

## 1.3 Application

Automotive Lighting Interior and Exterior.



## 1.4 Package Dimension



### Notes

1. All dimensions units are millimeters.
2. All dimensions tolerances are H0.2, G0.1, H0.05, F7, G6, JS6, F8, G7, JS7, H8, G8, JS8, F9, G8, JS9, H9, G9, JS9, F10, G9, JS10, H10, G9, JS10, F11, G9, JS11, H11, G9, JS11, F12, G9, JS12, H12, G9, JS12, F13, G9, JS13, H13, G9, JS13, F14, G9, JS14, H14, G9, JS14, F15, G9, JS15, H15, G9, JS15, F16, G9, JS16, H16, G9, JS16, F17, G9, JS17, H17, G9, JS17, F18, G9, JS18, H18, G9, JS18, F19, G9, JS19, H19, G9, JS19, F20, G9, JS20, H20, G9, JS20, F21, G9, JS21, H21, G9, JS21, F22, G9, JS22, H22, G9, JS22, F23, G9, JS23, H23, G9, JS23, F24, G9, JS24, H24, G9, JS24, F25, G9, JS25, H25, G9, JS25, F26, G9, JS26, H26, G9, JS26, F27, G9, JS27, H27, G9, JS27, F28, G9, JS28, H28, G9, JS28, F29, G9, JS29, H29, G9, JS29, F30, G9, JS30, H30, G9, JS30, F31, G9, JS31, H31, G9, JS31, F32, G9, JS32, H32, G9, JS32, F33, G9, JS33, H33, G9, JS33, F34, G9, JS34, H34, G9, JS34, F35, G9, JS35, H35, G9, JS35, F36, G9, JS36, H36, G9, JS36, F37, G9, JS37, H37, G9, JS37, F38, G9, JS38, H38, G9, JS38, F39, G9, JS39, H39, G9, JS39, F40, G9, JS40, H40, G9, JS40, F41, G9, JS41, H41, G9, JS41, F42, G9, JS42, H42, G9, JS42, F43, G9, JS43, H43, G9, JS43, F44, G9, JS44, H44, G9, JS44, F45, G9, JS45, H45, G9, JS45, F46, G9, JS46, H46, G9, JS46, F47, G9, JS47, H47, G9, JS47, F48, G9, JS48, H48, G9, JS48, F49, G9, JS49, H49, G9, JS49, F50, G9, JS50, H50, G9, JS50, F51, G9, JS51, H51, G9, JS51, F52, G9, JS52, H52, G9, JS52, F53, G9, JS53, H53, G9, JS53, F54, G9, JS54, H54, G9, JS54, F55, G9, JS55, H55, G9, JS55, F56, G9, JS56, H56, G9, JS56, F57, G9, JS57, H57, G9, JS57, F58, G9, JS58, H58, G9, JS58, F59, G9, JS59, H59, G9, JS59, F60, G9, JS60, H60, G9, JS60, F61, G9, JS61, H61, G9, JS61, F62, G9, JS62, H62, G9, JS62, F63, G9, JS63, H63, G9, JS63, F64, G9, JS64, H64, G9, JS64, F65, G9, JS65, H65, G9, JS65, F66, G9, JS66, H66, G9, JS66, F67, G9, JS67, H67, G9, JS67, F68, G9, JS68, H68, G9, JS68, F69, G9, JS69, H69, G9, JS69, F70, G9, JS70, H70, G9, JS70, F71, G9, JS71, H71, G9, JS71, F72, G9, JS72, H72, G9, JS72, F73, G9, JS73, H73, G9, JS73, F74, G9, JS74, H74, G9, JS74, F75, G9, JS75, H75, G9, JS75, F76, G9, JS76, H76, G9, JS76, F77, G9, JS77, H77, G9, JS77, F78, G9, JS78, H78, G9, JS78, F79, G9, JS79, H79, G9, JS79, F80, G9, JS80, H80, G9, JS80, F81, G9, JS81, H81, G9, JS81, F82, G9, JS82, H82, G9, JS82, F83, G9, JS83, H83, G9, JS83, F84, G9, JS84, H84, G9, JS84, F85, G9, JS85, H85, G9, JS85, F86, G9, JS86, H86, G9, JS86, F87, G9, JS87, H87, G9, JS87, F88, G9, JS88, H88, G9, JS88, F89, G9, JS89, H89, G9, JS89, F90, G9, JS90, H90, G9, JS90, F91, G9, JS91, H91, G9, JS91, F92, G9, JS92, H92, G9, JS92, F93, G9, JS93, H93, G9, JS93, F94, G9, JS94, H94, G9, JS94, F95, G9, JS95, H95, G9, JS95, F96, G9, JS96, H96, G9, JS96, F97, G9, JS97, H97, G9, JS97, F98, G9, JS98, H98, G9, JS98, F99, G9, JS99, H99, G9, JS99, F100, G9, JS100, H100, G9, JS100



0.2

## 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	$V_F$	$I_F=50\text{mA}$	2.8	3.1	3.4	V
Reverse Current	$I_R$	$V_R=5\text{V}$	---	---	10	$\mu\text{A}$
Luminous Intensity	$I_V$	$I_F=50\text{mA}$	4300	6500	10000	mcd
Dominant wavelength	$\lambda_d$	$I_F=50\text{mA}$	465	468	475	nm
Viewing Angle		$I_F=50\text{mA}$	---	30	---	deg
Thermal Resistance.	$R_{THJ-S}$	$I_F=50\text{mA}$	---	---	220	$^{\circ}\text{C}/\text{W}$

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

Parameter	Symbol	Rating	Units
Power Dissipation	$P_D$	204	mW
Forward Current	$I_F$	60	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  $\pm 0.1V$ .
3. The above color coordinates measurement allowance tolerance is  $\pm 0.005$ .       $\pm 0.005$ .
4. The above luminous intensity measurement allowance tolerance  $\pm 10\%$ .
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
8. ESD yield is over 90% at 2000V ESD (HBM). ESD protection during products handling is needed.

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## 1.6Bin Range Of Forward Voltage and Luminous Intensity and Dominant wavelength (IF=50mA)      BIN      (IF=50mA)

Table 1-3

V <sub>F</sub>	G1	G2	H1	H2	I1	I2
	2.8-2.9	2.9-3.0	3.0-3.1	3.1-3.2	3.2-3.3	3.3-3.4
IV mcd	P1	P2	Q1	Q2		
	4300-5300	5300-6500	6500-8000	8000-10000		
WD(nm)	D1	D2	E1	E2		
	465-467.5	467.5-470	470-472.5	472.5-475		



### 1.7 Typical Optical Characteristics Curves

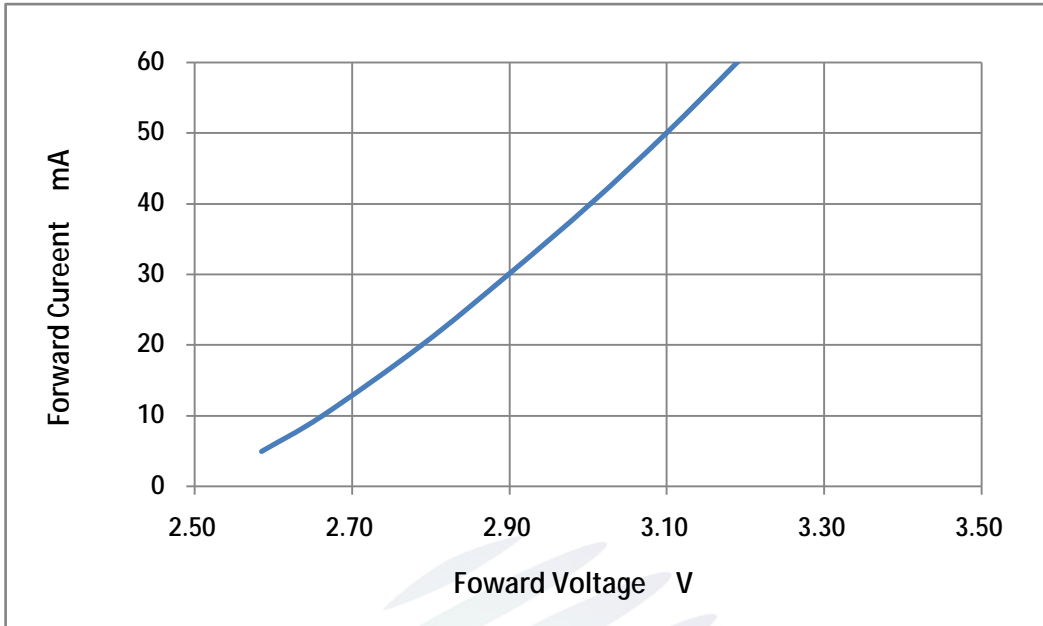


Fig. 1-7 Forward Voltage Vs Forward Current

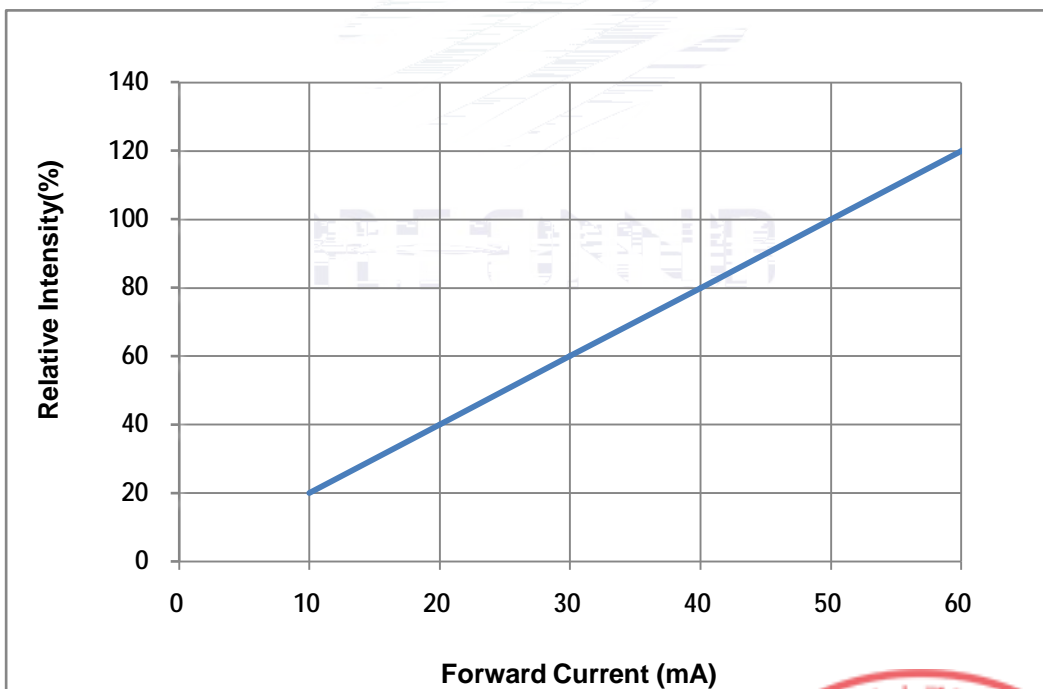


Fig. 1-8 Forward Current Vs Relative Intensity



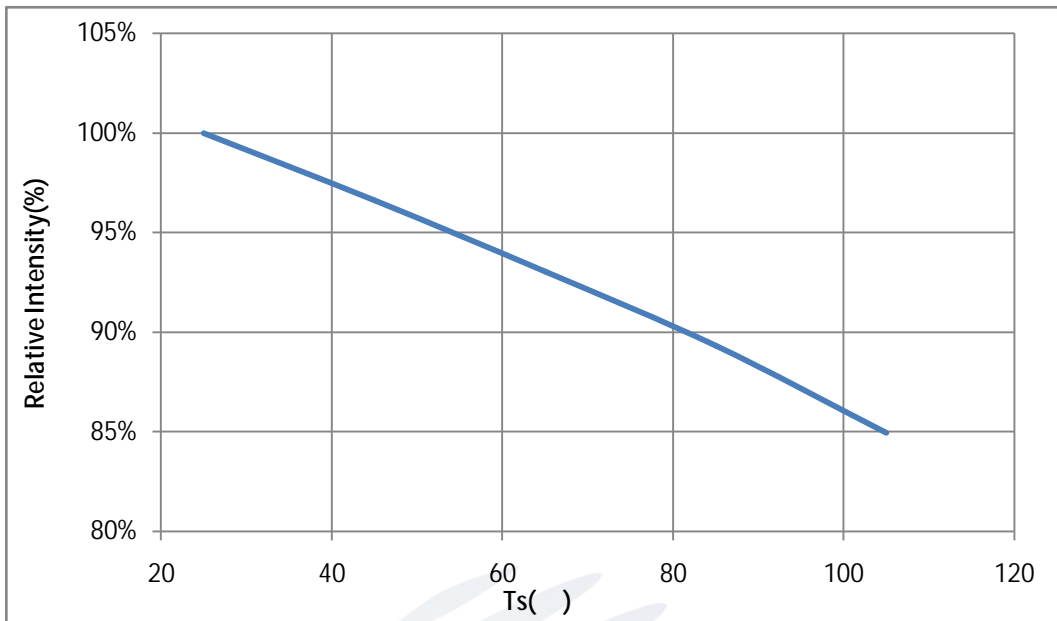


Fig. 1-9 Solder Temperature Vs Relative Intensity

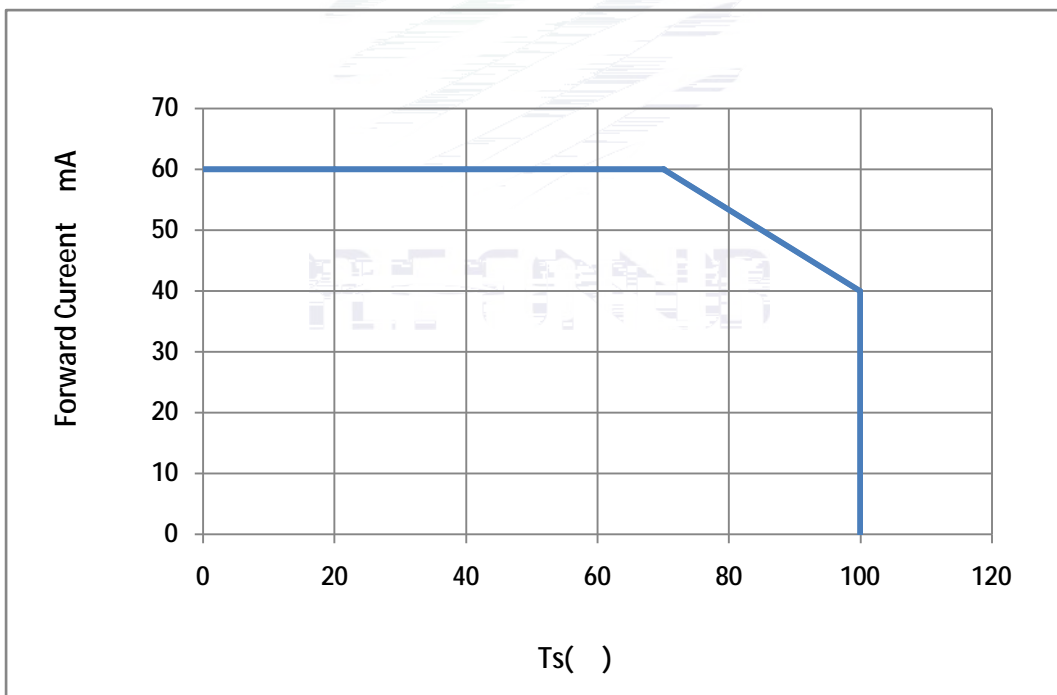


Fig. 1-10 Solder Temperature Vs Forward Current





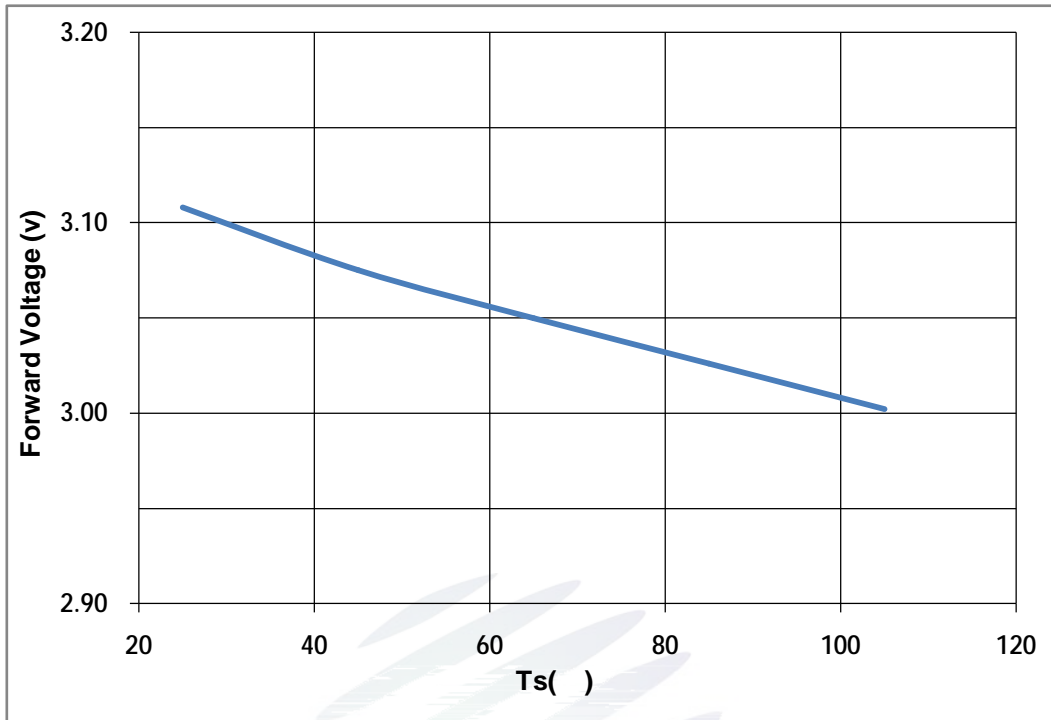


Fig. 1-11 Forward Voltage Vs Solder Temperature

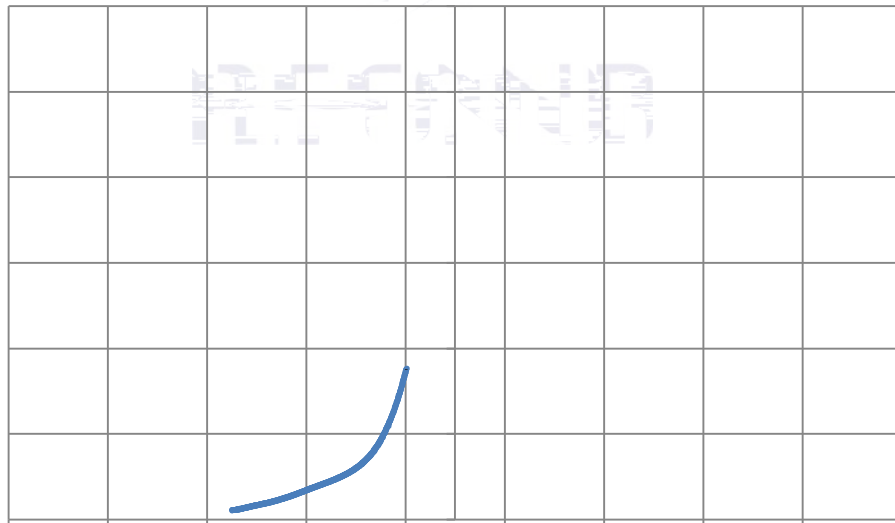


Fig. 1-12 Radiation diagram

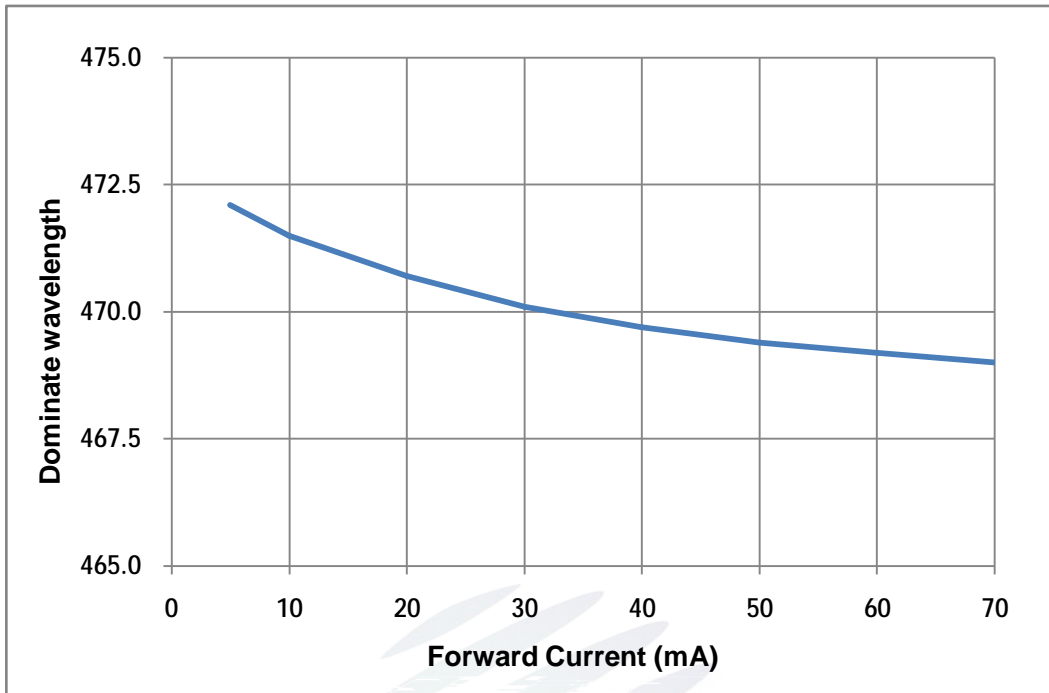


Fig. 1-13 Forward current vs. Dominate wavelength (Ts=25°C)

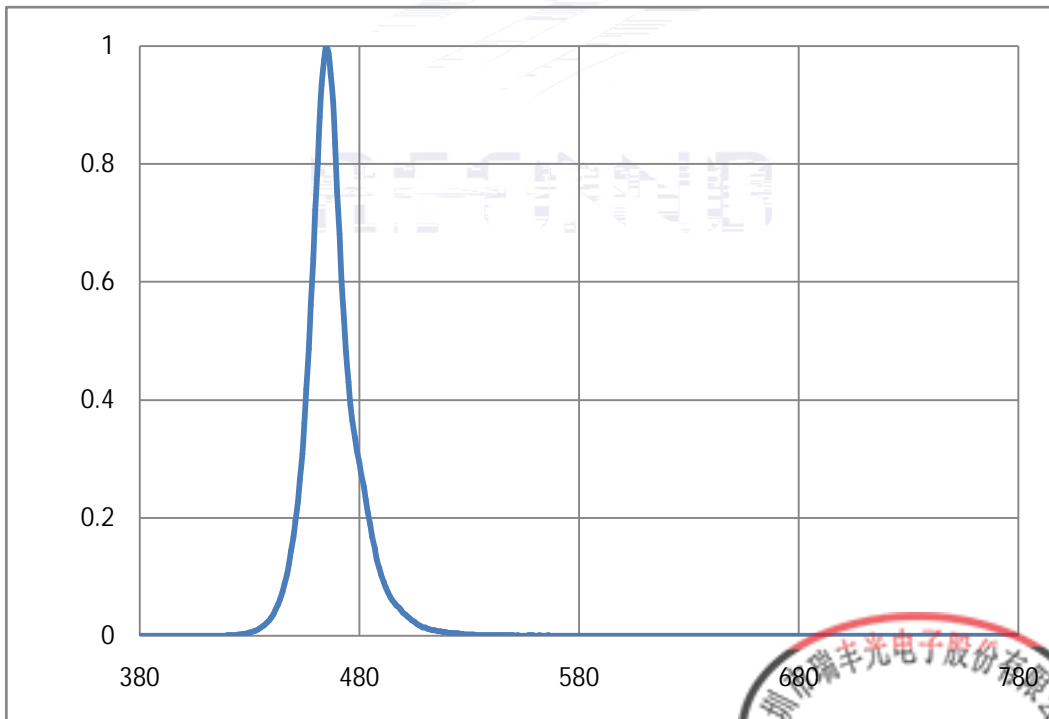
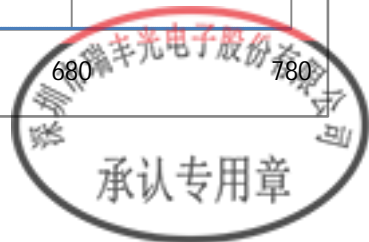


Fig. 1-14 Spectrum Distribution



## 2. Packaging

### 2.1 Packaging Specification

Package:2000pcs/reel.                      2000pcs

#### 2.1.1Carrier Tape Dimension



### 2.1.3 Label Form Specification

#### 2- Specification

PART NO.	Part Number
SPEC NO.	Spec Number
LOT NO.	Lot Number
BIN CODE	Bin Code
	Luminous flux
XY	Chromaticity Bin
V <sub>F</sub>	Forward Voltage
WLD	Wavelength
QTY	Packing Quantity
DATE	Made Date

Fig. 2-3 Label

### 2.2 Moisture Resistant Packing

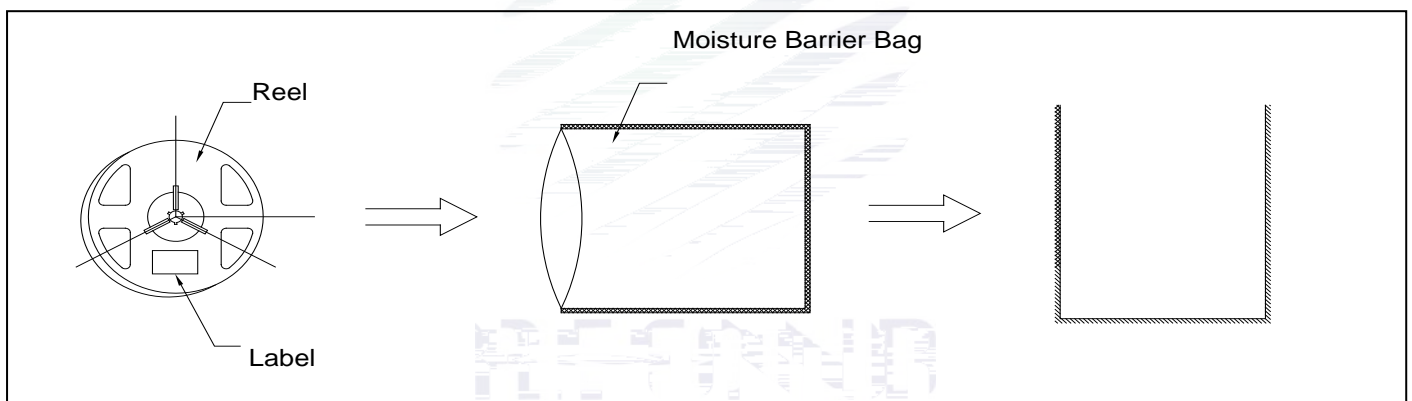


Fig.2-4 Moisture Resistant Packing

### 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 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 10s 125 15min	1000 cycle	20pcs.	0/1
Life Test	JESD22-A108	Ta=100 If=50mA	1000hrs.	20pcs.	0/1
High Temperature High Humidity Life Test	JESD22-A101	85 / 85%RH If=50mA	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	$V_F$	$I_F=50mA$	-	U.S.L*)x1.1
Reverse Current	$I_R$	$V_R = 5V$	-	U.S.L*)x2.0
Luminous Flux		$I_F=50mA$	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 verification of a single/strip LED of Refond's existing experimental platform,the reliability experiment was taken under good heat dissipation conditions. when customers applies the LED to the series and parallel circuit, should take consideration of all the factors such as the current, voltage distribution, heat dissipation and others. /
- 3.The technical information shown in the data sheets is limited to the typical characteristics and circuit examples of the referenced products. It does not constitute the warranting of industrial property nor the granting of any license.



### 3. SMT Reflow Soldering Instructions SMT

#### 3.1 SMT Reflow Soldering Instructions SMT

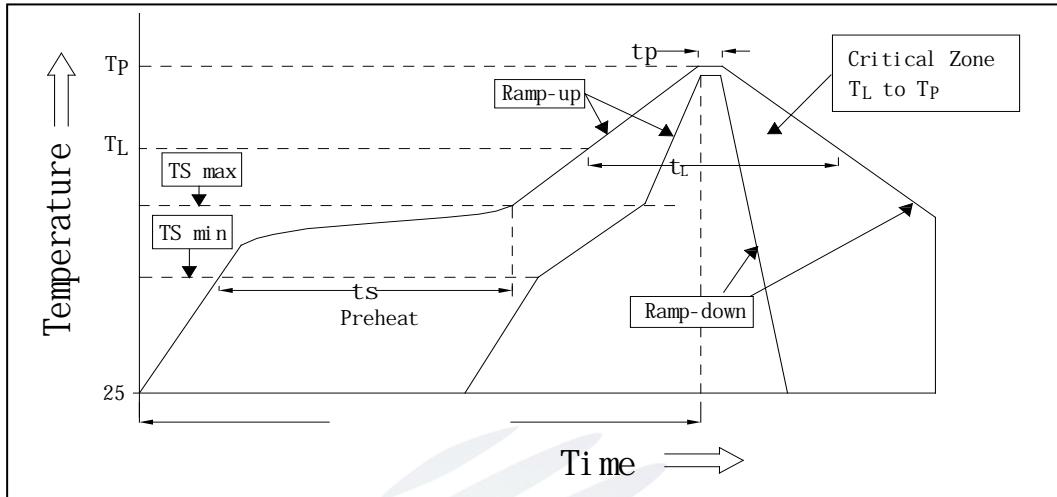
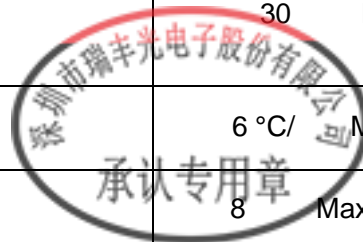


Fig.3-1SMT Reflow Soldering Instructions SMT

Table 3-1Reflow parameters

Average temperature rise speed	$T_{smax} - T_P$	3 °C/ s    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	$t_p$	10    Max 10s
( $T_P$ ) 5 °C Hold time within 5 °C with the actual peak temperature (TP)		30    Max 30s
Cooling speed		6 °C/ s    Max 6 °C/ s
25 °C Needed time from 25 °C to $T_P$		8    Max 8 minutes



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

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

3.1.1 Soldering Iron

(1) When do soldering by hand, keep the temperature of iron below less 300 less than 3 seconds.









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 24
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.







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Declare

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