

SPECIFICATION

REFOND P/N

RF-xxHP32DS-EF-I3

☐ R&D

☒ Mass Product



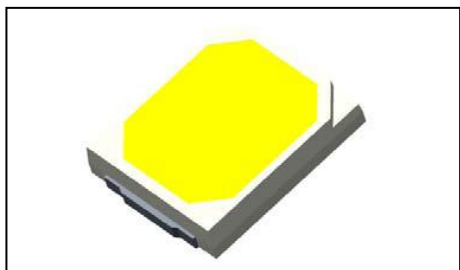
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1. Description

1.1 General Description



The White LED which was fabricated using a blue chip and the phosphor

Product Package: 2.75mmX3.5mmX0.7mm.

1.2 Features

- ▶ PLCC-2 Package.
- ▶ Extremely wide viewing angle.
- ▶ Suitable for all SMT assembly and solder process..
- ▶ Available on tape and reel.
- ▶ Moisture sensitivity level: Level 3.
- ▶ RoHS compliant.

1.3 Application

- ▶ Indoor lighting.
- ▶ Bulb lighting.
- ▶ General indoor applications.



1.4 Product Selection Table

Model NO.	CCT	Center		
		code	x	y
RF-27HP32DS-EF-I3	2700K	G27/G27-1/2/3/4	0.4628	0.4142
RF-30HP32DS-EF-I3	3000K	G30/G30-1/2/3/4	0.4386	0.4104
RF-40HP32DS-EF-I3	4000K	G40/G40-1/2/3/4	0.3868	0.3856
RF-50HP32DS-EF-I3	5000K	G50/G50-1/2/3/4	0.3481	0.3593
RF-65HP32DS-EF-I3	6500K	G65/G65-1/2/3/4	0.317	0.3341

1.5 Package Dimension

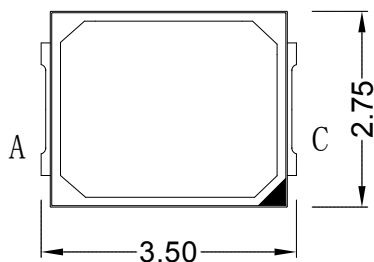


Fig.1-1 Top view

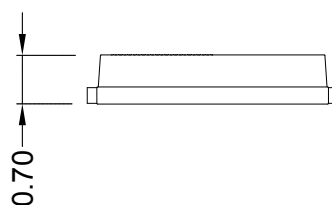


Fig.1-2 Side view

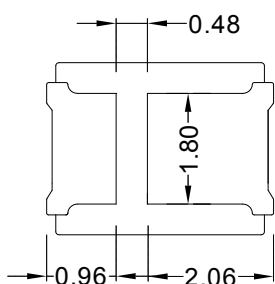


Fig.1-3 Bottom view



Polarity

A: anode

C: cathode

Fig.1-4 Polarity

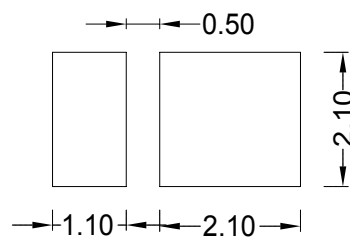


Fig.1-5 Soldering patterns

Notes:

1. All dimensions units are millimeters.
2. All dimensions tolerances are $\pm 0.05\text{mm}$ unless otherwise noted.



1.6 Product Parameters

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

Item	Code	Symbol	Test Condition	Value			unit
				Min.	Typ.	Max.	
Forward Voltage	Rank Y2	V_F	$I_F=100\text{mA}$	8.8	9.1	9.0	V
	Rank Z1			9.0		9.2	V
RF-27HP32DS-EF-I3 4 steps:2615-2765K 6 steps:2565-2810K	Rank WEA	φ	$I_F=100\text{mA}$	120	130	125	lm
	Rank WFA			125		130	lm
	Rank XEA			130		135	lm
RF-30HP32DS-EF-I3 4 steps:2930-3120K 6 steps:2885-3180K	Rank XDD	φ	$I_F=100\text{mA}$	127	137	132	lm
	Rank XED			132		137	lm
	Rank XFD			137		142	lm
RF-40HP32DS-EF-I3 4 steps:3745-4060K 6 steps:3665-4140K	Rank XFA	φ	$I_F=100\text{mA}$	135	143	140	lm
	Rank YGA			140		145	lm
	Rank YHA			145		150	lm
RF-50HP32DS-EF-I3 4 steps:4725-5120K 6 steps:4655-5200K	Rank XFA	φ	$I_F=100\text{mA}$	135	143	140	lm
	Rank YGA			140		145	lm
	Rank YHA			145		150	lm
RF-65HP32DS-EF-I3 4 steps :5960-6575K 6 steps:5835-6720K	Rank XFA	φ	$I_F=100\text{mA}$	135	141	140	lm
	Rank YGA			140		145	lm
	Rank YHA			145		150	lm
Reverse Current		IR	VR=15V	---	10	---	uA
Viewing Angle		2θ 1/2	$I_F=100\text{mA}$	---	120		Deg
Color Rendering Index		Ra(Tj=120°C)		80	---	---	---
Thermal Resistance		Rth (j-s)		---	15	---	°C/W



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

Parameter	Symbol	Rating	Units
Power Dissipation	P _D	1034	mW
Forward Current	I _F	110	mA
Peak Forward Current	I _{FP}	220	mA
Reverse Voltage	V _R	15	V
Electrostatic Discharge(HBM)	ESD	2000	V
Operating Temperature	T _{OPR}	-40 ~ +105	°C
Storage Temperature	T _{STG}	-40 ~ +105	°C
Junction Temperature	T _J	125	°C

Notes:

1. Pulse width≤0.1ms, duty cycle≤1/10.
2. The above forward voltage measurement allowance tolerance is ±0.1V.
3. The above color coordinates measurement allowance tolerance is ±0.005.
4. The above luminous intensity measurement allowance tolerance ±10%.
5. The above Color rendering index measurement allowance tolerance is ±2
6. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
7. All measurements were made under the standardized environment of Refond.
8. 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.
9. ESD yield is over 90% at 2000V ESD (HBM). ESD protection during products handing is needed.



1.7 Bin Range Of Forward Voltage and Luminous Flux (IF=100mA)

Table 1-3

VF (V)	Y2	Z1	
	8.8-9.0	9.0-9.2	
ϕ (lm) RF-27HP32DS-EF-I3	WEA	WFA	XEA
	120-125	125-130	130-135
ϕ (lm) RF-30HP32DS-EF-I3	XDD	XED	XFD
	132-137	132-137	137-142
ϕ (lm) RF-40HP32DS-EF-I3	XFA	YGA	YHA
	135-140	140-145	145-150
ϕ (lm) RF-50HP32DS-EF-I3	XFA	YGA	YHA
	135-140	140-145	145-150
ϕ (lm) RF-65HP32DS-EF-I3	XFA	YGA	YHA
	135-140	140-145	145-150

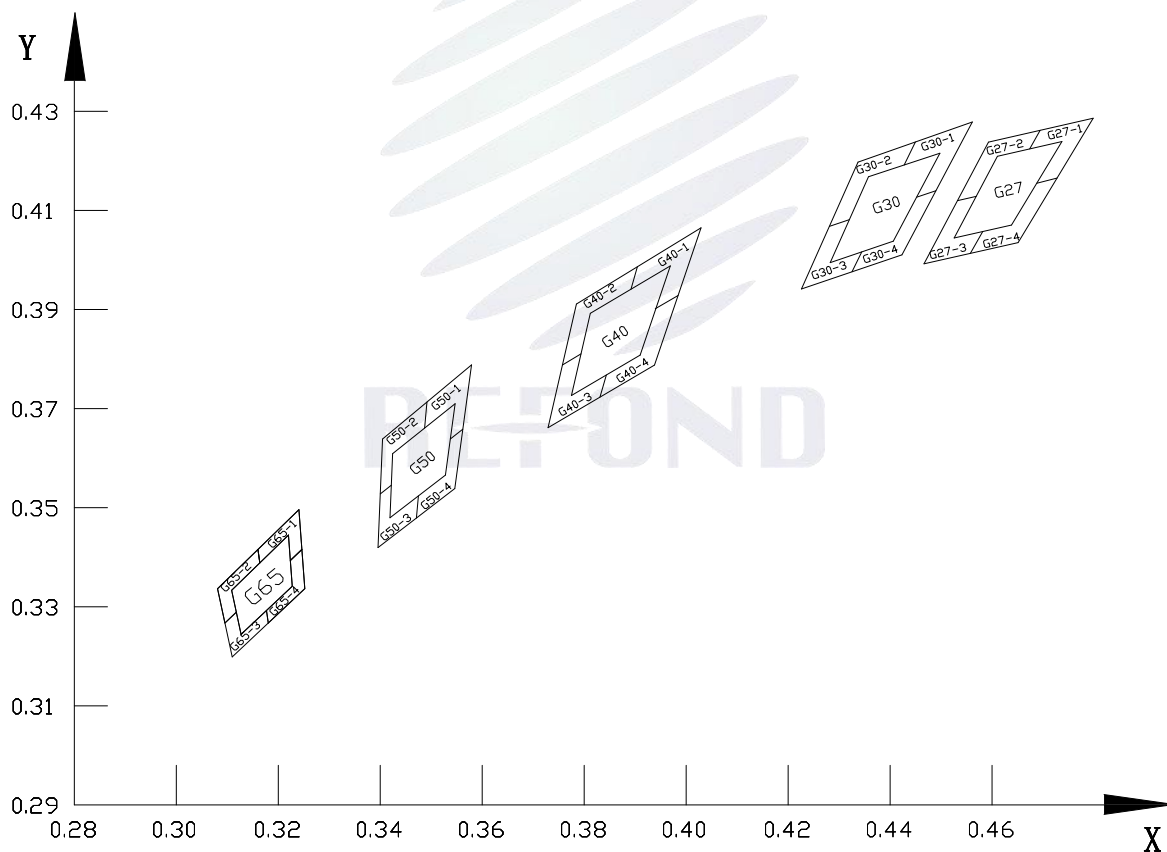


Fig 1-6 The C.I.E Chromaticity Diagram CIE



Table 1-4

ANSI 4-7sdcM									
2700K									
G27		G27-1		G27-2		G27-3		G27-4	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4737	0.4239	0.4674	0.4224	0.4569	0.4128	0.4582	0.4057	0.4688	0.4156
0.4610	0.4209	0.4694	0.4262	0.4532	0.4120	0.4526	0.4044	0.4727	0.4165
0.4526	0.4044	0.4798	0.4286	0.4593	0.4238	0.4569	0.4128	0.4651	0.4035
0.4638	0.4071	0.4727	0.4165	0.4694	0.4262	0.4532	0.4120	0.4557	0.4013
0.4737	0.4239	0.4688	0.4156	0.4674	0.4224	0.4466	0.3992	0.4582	0.4057
Center x y		0.4737	0.4239	0.4610	0.4209	0.4557	0.4013	0.4638	0.4071
0.4628	0.4142	0.4674	0.4224	0.4569	0.4128	0.4582	0.4057	0.4688	0.4156
3000K									
G30		G30-1		G30-2		G30-3		G30-4	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4498	0.4215	0.4428	0.4192	0.4320	0.4081	0.4344	0.4016	0.4452	0.4127
0.4358	0.4168	0.4450	0.4238	0.4282	0.4069	0.4325	0.3976	0.4490	0.4140
0.4282	0.3995	0.4561	0.4278	0.4337	0.4197	0.4226	0.3941	0.4423	0.4010
0.4406	0.4038	0.4490	0.4140	0.4450	0.4238	0.4282	0.4069	0.4325	0.3976
0.4498	0.4215	0.4452	0.4127	0.4428	0.4192	0.4320	0.4081	0.4344	0.4016
Center x y		0.4498	0.4215	0.4358	0.4168	0.4557	0.4013	0.4406	0.4038
0.4386	0.4104	0.4428	0.4192	0.4320	0.4081	0.4582	0.4057	0.4452	0.4127
4000K									
G40		G40-1		G40-2		G40-3		G40-4	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3812	0.3892	0.3940	0.3901	0.3794	0.3810	0.3843	0.3768	0.3940	0.3901
0.3969	0.3988	0.3984	0.3928	0.3757	0.3788	0.3831	0.3723	0.3984	0.3928
0.3910	0.3808	0.4029	0.4065	0.3785	0.3911	0.3729	0.3661	0.3938	0.3788
0.3775	0.3726	0.3904	0.3986	0.3904	0.3986	0.3757	0.3788	0.3831	0.3723
0.3812	0.3892	0.3892	0.3941	0.3892	0.3941	0.3794	0.3810	0.3843	0.3768
Center x y		0.3969	0.3988	0.3812	0.3892	0.3775	0.3726	0.3910	0.3808
0.3868	0.3856	0.3940	0.3901	0.3794	0.3810	0.3843	0.3768	0.3940	0.3901
5000K									
G50		G50-1		G50-2		G50-3		G50-4	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3547	0.3710	0.3487	0.3661	0.3422	0.3545	0.3475	0.3524	0.3537	0.3639
0.3424	0.3609	0.3492	0.3713	0.3400	0.3528	0.3471	0.3479	0.3562	0.3658
0.3419	0.3480	0.3579	0.3788	0.3405	0.3639	0.3396	0.3419	0.3546	0.3539
0.3528	0.3566	0.3562	0.3658	0.3492	0.3713	0.3400	0.3528	0.3471	0.3479
0.3547	0.3710	0.3537	0.3639	0.3487	0.3661	0.3422	0.3545	0.3475	0.3524
Center x y		0.3547	0.3710	0.3424	0.3609	0.3419	0.3480	0.3528	0.3566

0.3481	0.3593	0.3487	0.3661	0.3422	0.3545	0.3475	0.3524	0.3537	0.3639
6500K									
G65		G65-1		G65-2		G65-3		G65-4	
X	Y	X	Y	X	Y	X	Y	X	Y
0.322	0.3445	0.324	0.3496	0.316	0.3416	0.3095	0.3268	0.318	0.3267
0.3108	0.3333	0.316	0.3416	0.3081	0.3336	0.311	0.3199	0.3252	0.3337
0.3127	0.3244	0.3164	0.3389	0.3095	0.3267	0.318	0.3267	0.3246	0.3416
0.3227	0.3341	0.322	0.3445	0.3118	0.3289	0.3177	0.3292	0.3224	0.3393
0.322	0.3445	0.3224	0.3393	0.3108	0.3333	0.3127	0.3244	0.3227	0.3341
Center x y		0.3187	0.3405	0.3075	0.3293	0.3094	0.3204	0.3194	0.3301
0.3170	0.3341	0.324	0.3496	0.316	0.3416	0.3095	0.3268	0.318	0.3267

Kitting Principles

Table 1-5

CIE Kitting			
CCT	CIE Kit	Reel 1	Reel 2
2700K	Kit 1	G27	G27
	Kit 2	G27-1	G27-3
	Kit 3	G27-2	G27-4
3000K	Kit 1	G30	G30
	Kit 2	G30-1	G30-3
	Kit 3	G30-2	G30-4
4000K	Kit 1	G40	G40
	Kit 2	G40-1	G40-3
	Kit 3	G40-2	G40-4
5000K	Kit 1	G50	G50
	Kit 2	G50-1	G50-3
	Kit 3	G50-2	G50-4
6500K	Kit 1	G65	G65
	Kit 2	G65-1	G65-3
	Kit 3	G65-2	G65-4

Flux Kitting			
CCT	CIE Kit	Reel 1	Reel 2
2700K	Kit 1	120-125	130-135
	Kit 2	125-130	125-130
	Kit 3	130-135	130-135
3000K	Kit 1	127-132	137-142
	Kit 2	132-137	132-137
	Kit 3	137-142	137-142
4000K	Kit 1	135-140	145-150
	Kit 2	140-145	140-145
	Kit 3	145-150	145-150
5000K	Kit 1	135-140	145-150
	Kit 2	140-145	140-145
	Kit 3	145-150	145-150
6500K	Kit 1	135-140	145-150
	Kit 2	140-145	140-145
	Kit 3	145-150	145-150

VF Kitting			
CCT	CIE Kit	Reel 1	Reel 2
2700K	Kit 1	Y2(8.8-9.0)	Y2(8.8-9.0)
	Kit 2	Z1(9.0-9.2)	Z1(9.0-9.2)
3000K	Kit 1	Y2(8.8-9.0)	Y2(8.8-9.0)
	Kit 2	Z1(9.0-9.2)	Z1(9.0-9.2)
4000K	Kit 1	Y2(8.8-9.0)	Y2(8.8-9.0)
	Kit 2	Z1(9.0-9.2)	Z1(9.0-9.2)
5000K	Kit 1	Y2(8.8-9.0)	Y2(8.8-9.0)
	Kit 2	Z1(9.0-9.2)	Z1(9.0-9.2)
6500K	Kit 1	Y2(8.8-9.0)	Y2(8.8-9.0)
	Kit 2	Z1(9.0-9.2)	Z1(9.0-9.2)



1.8 Typical optical characteristics curves

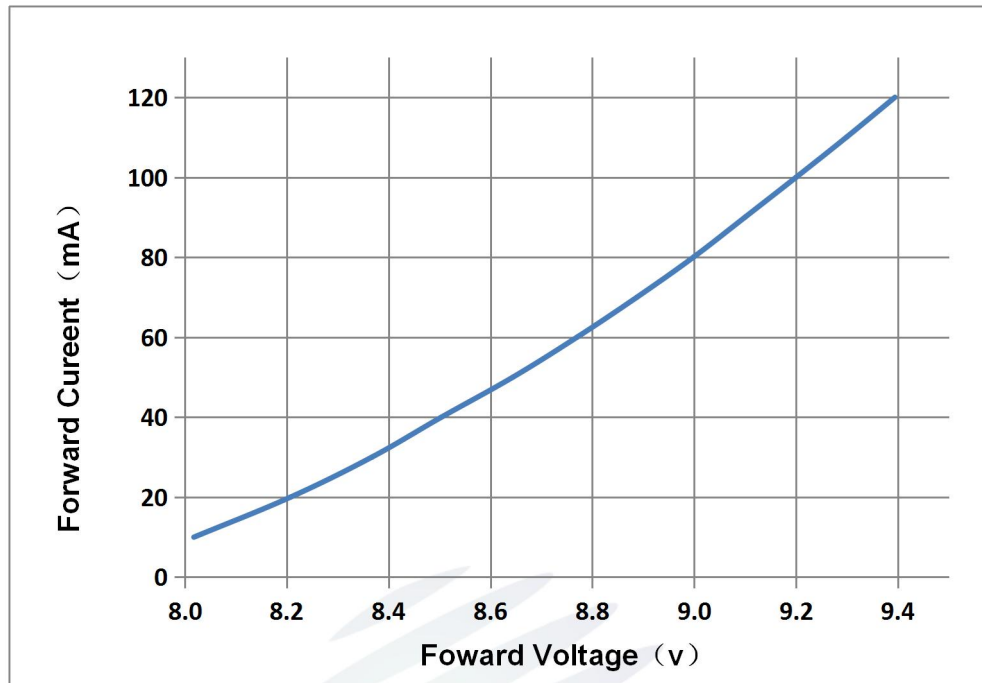


Fig 1-9 Forward Voltage Vs. Forward Current

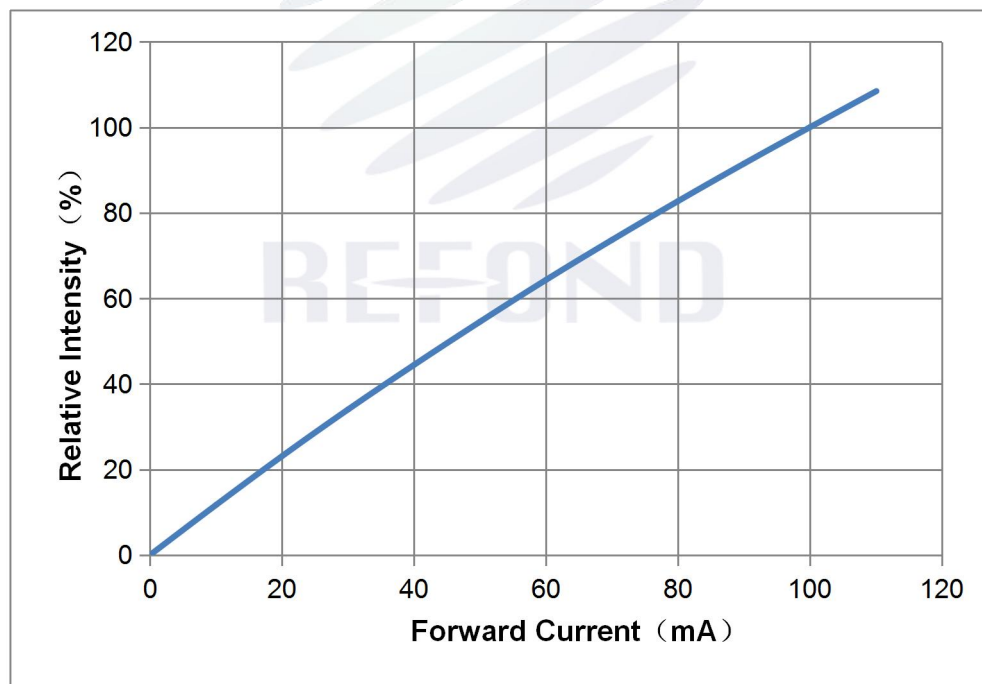


Fig 1-10 Forward Current Vs. Relative Intensity



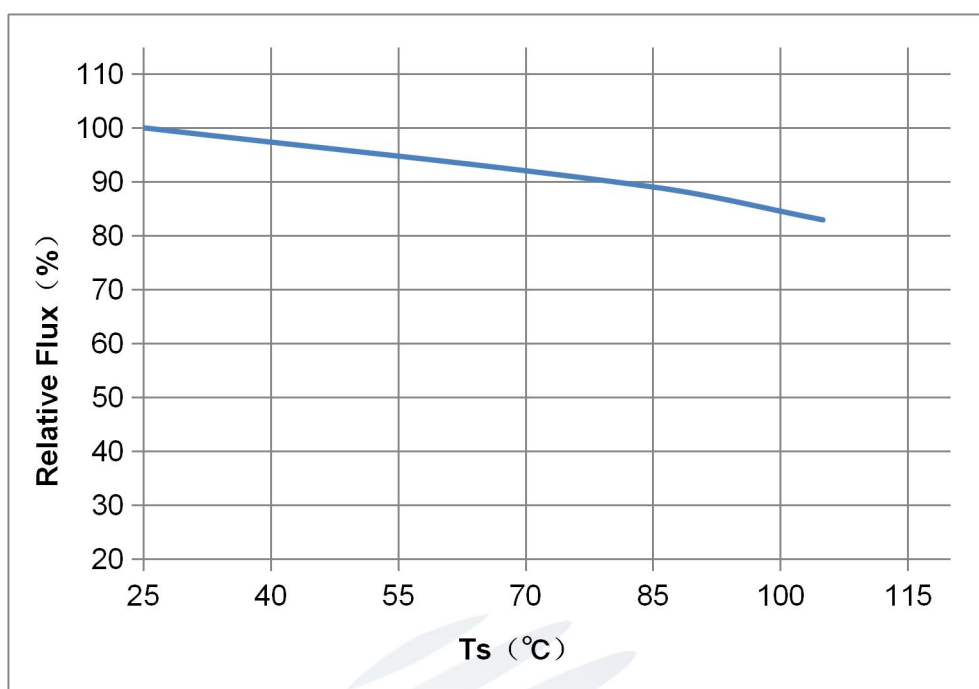


Fig 1-11 Solder Temperature Vs Relative Intensity

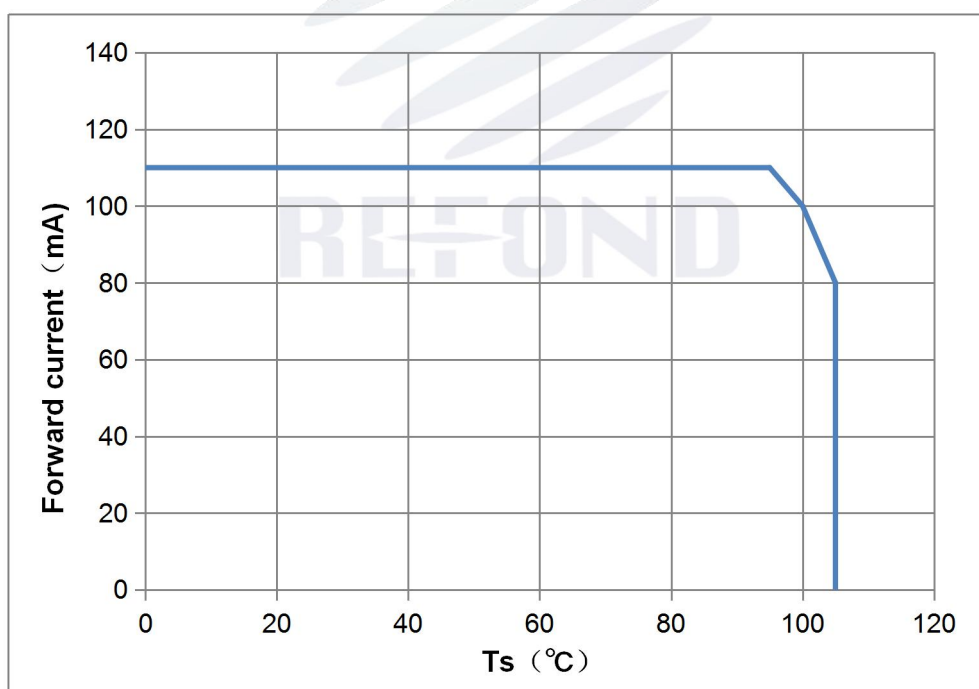


Fig 1-12 Solder Temperature Vs. Forward Current

Tj ≤ 135°C



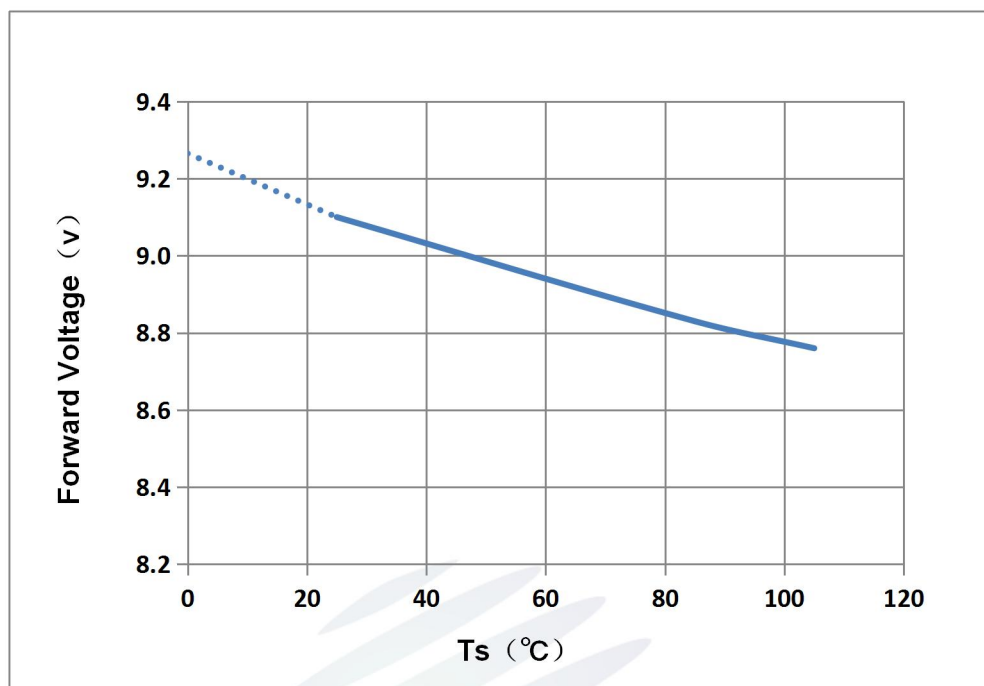


Fig 1-13 Forward Voltage Vs Solder Temperature

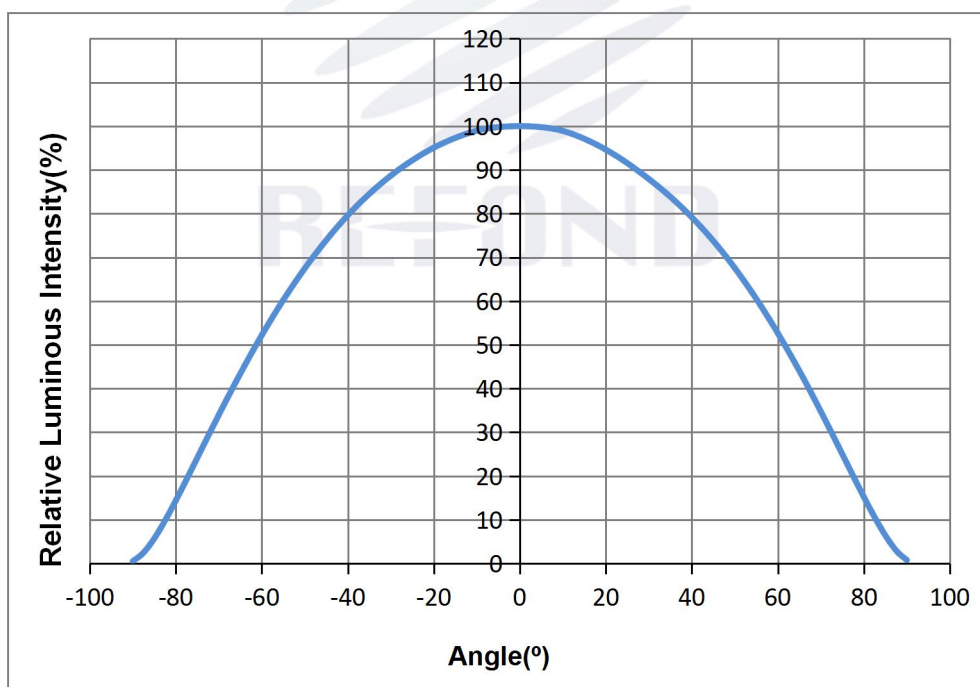


Fig 1-14 Radiation diagram



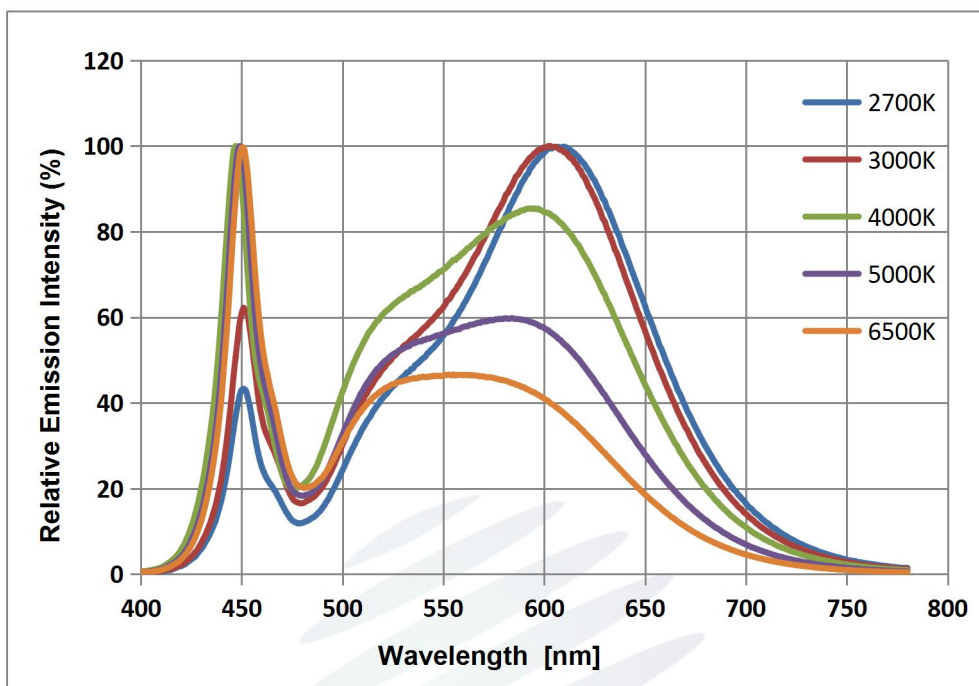


Fig 1-15 Spectrum Distribution

REFOND



2. Packaging

2.1 Packaging Specification

Package:16000pcs/reel or 4000pcs/reel.

2.1.1Carrier Tape Dimension

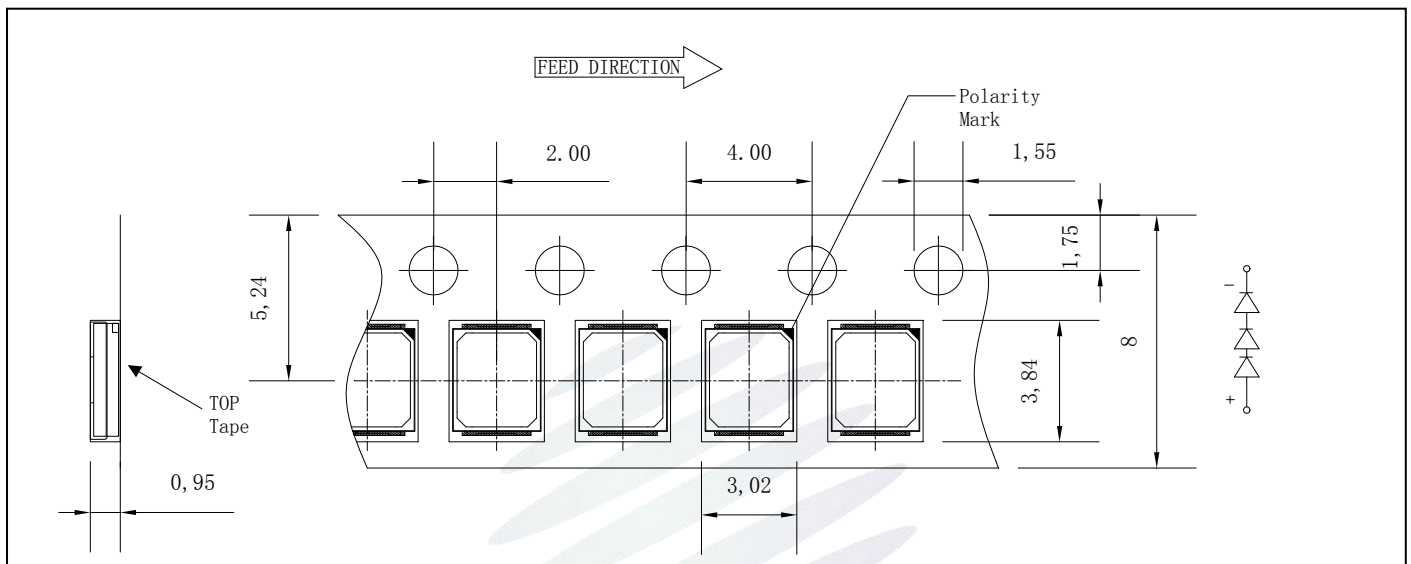


Fig.2-1 Carrier Tape Dimension

2.1.2 Reel Dimension

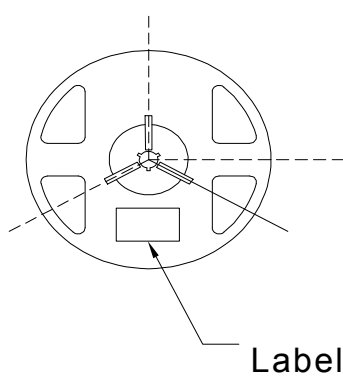


Fig.2-2Title

Table 2-1 Title

	16000pcs	4000pcs
A	12.7±0.3mm	11.75±0.3mm
B	330.2±2mm	177.8±0.2mm
C	79.5±0.2mm	58.5±0.2mm
D	14.3±0.2mm	13.5±0.2mm

Notes:

The tolerances unless mentioned ±0.1mm. Unit : mm



2.1.3 Label Form Specification

PART NO:		
SPEC NO:		
LOT NO		
BIN CODE:		
Φ :	XY:	
VF:	WLD:	
		
QTY:		
DATE:		

Fig 2-3 Title

Table 2-2 Title

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

2.2 Moisture Resistant Packing

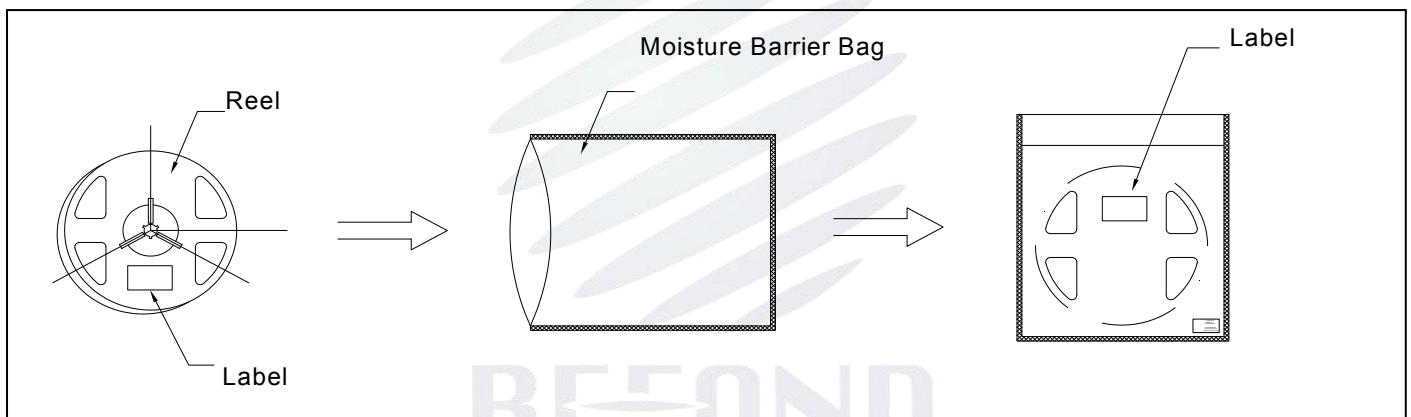


Fig.2-4Title

2.3 Cardboard Box

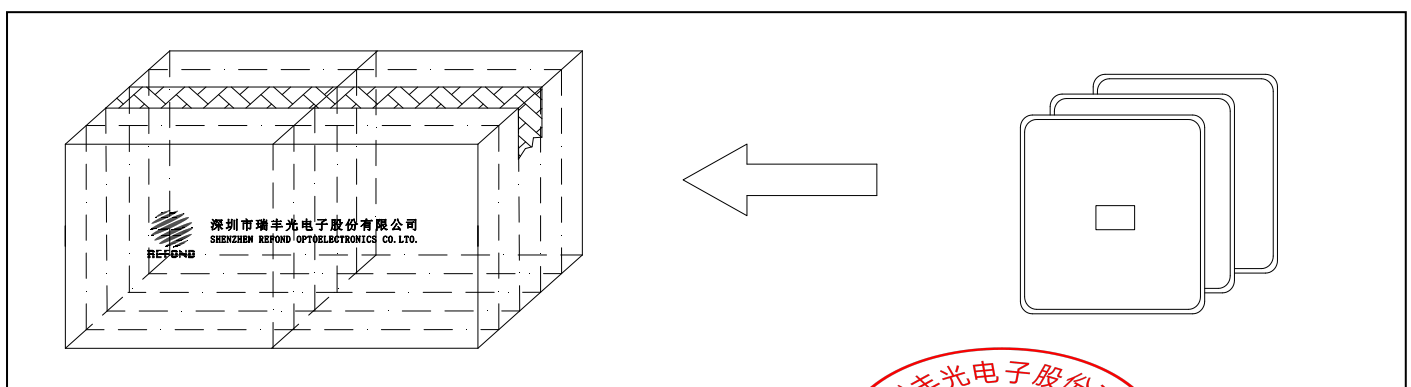


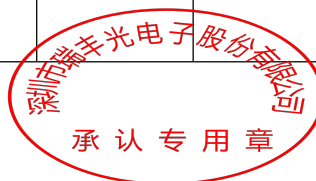
Fig.2-5Title



2.4 Reliability Test Items And Conditions

Table 2-3 Title

Test Items	Ref. Standard	Test Condition	Time	Quantity	Ac/Re
Reflow	JESD22-B106	Temp:260°Cmax T=10 sec	2times	10pcs	0/1
Thermal Shock	JEITAED-4701 300307	-40°C 15min ↑↓10s 100°C 15min	200cycles	10pcs	0/1
High Temperature Storage	JEITAED-4701 200 201	Temp:100°C	1000hrs	10pcs	0/1
Low Temperature Storage	JEITA ED-4701 200 202	Temp:-40°C	1000hrs	10pcs	0/1
Life Test	JESD22-A108	Ta=25°C If=100mA	1000hrs	10pcs	0/1
High Temperature High Humidity Life Test	JESD22-A101	60°C/ 90%RH If=100mA	1000hrs	10pcs	0/1
Temperature Humidity Storage	JEITA ED-4701 100 103	TA=85°C RH=85%	1000hrs	10pcs	0/1
Sulfur test	/	80°C, 4H, 0.6Cosan	4hrs	10pcs	0/1



2.5 Criteria For Judging Damage

Table 2-4 Title

Test Items	Symbol	Test Condition	Criteria For Judgement	
			Min.	Max.
Forward Voltage	V_F	$I_F=100\text{mA}$	-	$(\text{U.S.L.}) \times 1.1$
Reverse Current	I_R	$V_R = 15\text{V}$	-	$(\text{U.S.L.}) \times 2.0$
Luminous Flux	Φ	$I_F=100\text{mA}$	$(\text{L.S.L.}) \times 0.7$	-

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 are 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

3.1 SMT Reflow Soldering Instructions

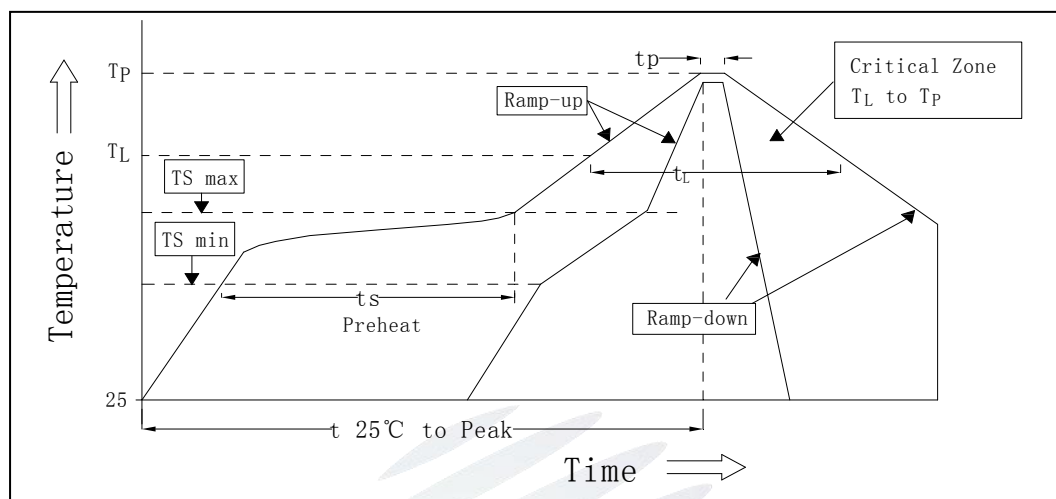


Fig.3-1Title

Table 3-1Title

Average temperature rise speed (Ts max 至Tp)	Max 3 °C/ s
Preheating: minimum temperature: (Ts min)	150 °C
Preheating: Max temperature: (Ts max)	200 °C
Preheating: Time: (Ts min 至Ts max)	60s-120s
Time limited to maintain high temperature: the temperature: (TL)	217 °C
Time limited to maintain high temperature: The Time : (tL)	Max 60s
Peak /Classification of temperature:(Tp)	260 °C
Time limit classification of peak temperature time (tp)	Max 10s
Hold time within 5 °C with the actual peak temperature (TP)	Max 30s
Cooling speed	Max 6 °C/ s
Needed time from 25 °C to Tp	Max 8 minutes



Note:

(1) Reflow soldering should not be done more than two times. In the case of more than 24 hours passed soldering after first, LEDs will be damaged.

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

3.1.1 Soldering Iron

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

(2) The hand solder should be done only one time.

3.1.2 Repairing

Repair 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 will not be damaged by repairing.

3.1.3 Cautions

(1) 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 influence to 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.

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

(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. This is provided for informational purposes only and is not a warranty or endorsement.



(2) In order to prevent ex-ternal 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 elementis 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.

(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 affect 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.

(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.

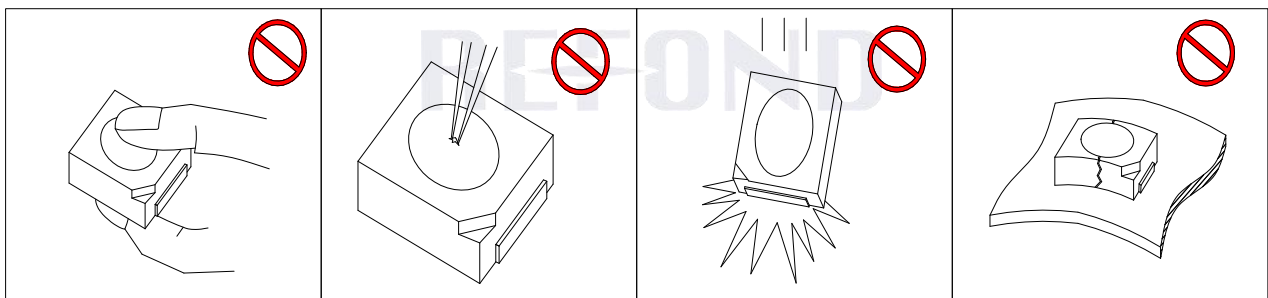


Fig 4-1 Title

(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.

(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.

(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.

Table 4-1Storage

Conditions		Temperature	Humidity	Time
Storage	Before Opening Aluminum Bag	$\leq 30^{\circ}\text{C}$	$\leq 75\%$	Within 1 Year From Date
	After Opening Aluminum Bag	$\leq 30^{\circ}\text{C}$	$\leq 60\%$	24hours
Baking		$60 \pm 5^{\circ}\text{C}$	-	$\geq 24\text{hours}$

(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) $^{\circ}\text{C}$ for above 24 hours.

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).

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



Version History

Date	Revisor	Version	Verifier	Remarks
2022-01-19	Zhifanzhao	E/0	Zhiweiliao	Issued





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